Two Rural Worlds: Differences of Rural High School Students' Motivational Profiles in Indiana and Colorado

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This research examined how rural high school students' self-perceptions and environmental perceptions influence their engagement, expectations, and achievement, and how those relationships differ by geographic rural location. Participants were 224 students in four rural, public high schools in two U.S. states, Colorado and Indiana. Path models followed by multivariate regression analyses, and MANOVAs were utilized to examine relationships among variables and test for group differences. Overall, a single, generic motivational model did not fit well for the two-state rural sample. At the state level, the two subsamples demonstrated unique significant paths, some shared and others divergent. School differences (within states) were largely non-significant, supporting the case for unique profiles attributable to state-level influences on rural contexts. Both demonstrated theoretically-consistent relationships, but with different strengths in the paths. Colorado's motivational profile is more complex, while Indiana's is more straightforward, with fewer significant paths and mediating relationships. By subject area, math was motivationally higher than other subjects. These findings present potentially important implications for rural schools in resource management, administration and teaching practice.

An historic balance point in the study of rural places is how the uniqueness of context influences what are often considered universal human characteristics and relationships demonstrated by research. Debates among rural researchers alternately call for greater empirical rigor, to improve generalizability and consequent broader utility of research findings (Arnold, Newman, Gaddy, & Dean, 2005), and greater sensitivity to the uniqueness and individuality of rural communities, to bolster research authenticity (Barley & Beesley, 2007; Howley, Theobald, & Howley, 2005). In the present study, we used a data-driven, comparative approach to examine motivational differences between rural high school students with similar individual characteristics in two U.S. state systems. Our intent was to reconcile some of the assertions underlying discussions of the universality of human motivation, on one hand, and the uniqueness of rural contexts on the other.

Issues in Rural Schools

Compared to urban settings and to K-12 schools without regard to context, little systematic research is done that focuses on and occurs in rural schools (Gándara, Gutièrrez, & O'Hara, 2001). One researcher estimated as little as 6% of the published research in K-12 school settings as rural (Hardré, 2008). Even less has been done on motivation in rural contexts (Hardré & Sullivan, 2008), particularly with attention to rural students' personal motivating characteristics and perceptions of their academic contexts (Freeman & Anderman, 2005).

Rural schools nationally share sets of descriptive characteristics that signal risk of low achievement, low motivation, and lack of school success (D'Amico, Matthes, Sankar, Merchant, & Zurita, 1996; Lichter, Roscigno, & Condron, 2003; National Research Council, 1993). Rural schools tend to serve large minority populations and be located in areas of high poverty and low parental education (Flora, Flora, & Fey, 2003; Khattri, Riley, & Kane, 1997; National Center for Educational Statistics, 2009b; Stern, 1994). Many rural schools are faced with financial constraints so they cannot offer the same support, resources, and extracurricular programs as non-rural schools, even in the same states (Ballou & Podgursky, 1995; National Center for Educational Statistics, 2009a). Rural teachers may be required to teach in multiple subject areas, grades, and ability levels, often at lower compensation than in nearby non-rural schools (Colangelo, Assouline, & New, 1999; Fowler & Walberg, 1991; Lemke, 1994). Rural students

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are more likely to drop out or discontinue their educations prematurely than similar non-rural peers (Gándara et al., 2001; Kao & Tienda, 1998; National Center for Educational Statistics, 2008). Together, these data paint a dismal picture of rural education nationally.

However, among themselves, rural communities are also different (Colangelo et al., 1999; McTavish & Salamon, 2003), and some of that difference presents promise for success and advantage that is largely unacknowledged (Hardré, 2007; Howley, 2009; Kannapel & DeYoung, 1999; Woodrum, 2009). Local values and opportunities exert influences on the attitudes of students and their families about education and careers that can be leveraged in positive ways (Barley & Beesley, 2007; Bush, 2005; Flora et al., 2003). The individual attention and close role modeling possible in small schools and classes can support self-perceptions and aspirations to carry students beyond local limits (Ballou & Podgursky, 1995). Innovative programs that adapt to local cultures and utilize local resources demonstrate great promise for growing talented youth (Faircloth, 2009; Woodrum, 2009).

Though researchers, grounded in rural sociology, assert that "rural" is not only about geographic boundaries, population density, or remoteness (Halfacree, 2003; Howley, 2009), these characteristics are the descriptors on which federal, state, foundation funding and program qualifications are based. As the government's functional definition of rural, these characteristics are a key part of reference points that rural researchers must use to assert findings about rural schools and the students they serve.

Given these contrasts, rural research must address the influence of local differences (Howley et al., 2005), but also offer strategies that meaningfully support improvement and success across rural contexts (Arnold et al., 2005). Rural researchers and practitioners must balance attention to individuals with consideration of communities and cultures to avoid oversimplifying the contributions of diverse rural educational contexts (DeYoung, Howley, & Theobald, 1995).

One explanation of local, rural differences in academic motivation and achievement is that local values, priorities, and social norms shape the identities of youth (Greenwood, 2009), and create unique identities that often endure (Hektner, 1995). Community values and goals may be very different from school-based values aligned with national norms and priorities (Bush, 2005; Corbett, 2009). Such contrasting value messages may result in emotional and personal conflict for rural youth (DeYoung et al., 1995; Faircloth, 2009), leading them to resist the tenets of school and close doors to real benefits that they might gain from formal education (Corbett, 2009; Hektner, 1995). Although some values and characteristics have been found to be shared among rural areas and demonstrated as more prevalent in rural than non-rural contexts, it is important to balance sameness and uniqueness (Coladarci, 2007; Hardré, 2007).

Some rural studies have set out to identify parsimony (coherence and relative homogeneity) in the motivational profile of rural youth specifically (e.g., Hardré & Sullivan, 2008; Hardré, Sullivan, & Crowson, 2009), and either found them largely consistent with that of non-rural youth (e.g., Yang & Fetsch, 2007), or found patterns of difference (e.g., Hardré, Crowson, DeBacker, & White, 2007). Given these issues and the demonstrably powerful role of motivation in education, it is critical to take important educational questions and test them in the specialized setting of the rural school (Hardré & Sullivan, 2009; Holloway, 2002). Further, it is important not to assume that rural contexts are generic or homogeneous (Howley, 2003; McTavish, & Salamon, 2003), but to examine rural groups explicitly for differences that may inform a richer understanding in research, and a more appropriate set of strategies for practice (Hardré & Sullivan, 2009).

Integrated View of Motivation and Environment

We conceptualize motivation as complex, integrative, and dynamic in human life and education. Motivation is an internal process (involving beliefs, values, perceptions and interpretations) that is embedded within external environmental conditions (teachers, class, social experiences, successes, and failures) and helps shape the choices and actions of individuals (Dai & Sternberg, 2004; Eccles & Roeser, 2009). The consequences of actions iteratively affect environmental conditions and experiences, which in turn influence related internal, motivational processes (Guay, Marsh & Boivin, 2003; Linnebrink & Pintrich, 2004). This process is not explained by a single-theory model, but by the interactions of multiple constructs from different theoretical frameworks. This investigation, therefore, uses a set of variables demonstrated as influential in adolescents' motivation, related to one another across multiple studies (Eccles & Roeser, 2009; Patrick, Ryan & Kaplan, 2007), summarized in the following sections.

Students' Self-Perceptions, Goal Orientations and Environmental Perceptions

Students bring personal characteristics to the classroom, such as self-perceptions, goals, expectations, and different types and degrees of motivation (Maehr, 1989; Miller, Behrens, Greene, & Newman, 1993). School motivation is influenced by achievement, teacher feedback and communication, and other elements of classroom learning environments (Linnenbrink & Pintrich, 2002a; Maehr & Midgley, 1996). Motivations that students develop in school influence their goals, achievement, expectations,

and intentions (Maehr & Midgley, 1996; Pintrich, 2003). Some motivations generalize to school overall while others develop specific to subject areas and classes (Linnenbrink & Pintrich, 2002b).

Social elements of motivation. In addition, some elements of students' motivation are individually developed through perceptions of their unique experiences, while others derive from shared experiences and perceptions of the social environments of classroom, school, and community (Maehr & Midgley, 1996; Neighbors & Knee, 2003; Ryan & Deci, 2000). Some studies indicate that rural schools may provide more adaptive motivational environments for students than other (e.g., urban) schools (Kannapel & DeYoung, 1999). Benefits of rural schools may include less competitiveness and more teacher attention (Freeman & Anderman, 2005).

Self-perceptions. The present study examines student self-perceptions including perceived ability, competence, value, instrumentality, and self-efficacy. Perceived ability and competence refer to how capable an individual feels of accomplishing the tasks given in a particular domain. Ability focuses more on general capacity to do well, and competence on task-based performance. The subjective judgment of personal competence powerfully impacts the academic choices that students make, and the effort and investment they give to learning and achievement (Eccles & Wigfield, 1995; Meece, Wigfield, & Eccles, 1990; Wigfield & Eccles, 2000). Competence is linked to past experiences and to present and future opportunities (Meece et al., 1990), which often vary across community contexts (Bleeker & Jacobs, 2004; Regional Educational Laboratory at AEL, 2003; Stern, 1994).

Self-efficacy, related to and extending beyond competence, is the learner's belief that he or she can successfully organize and perform behaviors that will produce a specific desired outcome, even in the face of challenges and setbacks (Bandura, 1997; Liem, Lau & Nie, 2008). Self-efficacy is demonstrably a predictor of grades and task performance (e.g., Pajares & Miller, 1995; Pietsch, Walker, & Chapman, 2003; Schunk, 1996). The greater the self-efficacy, the more energy and effort a person will invest toward initiating and persisting in the face of challenges (Hardré & Sullivan, 2008).

Students' perceptions of the task and content also influence motivation (Greene, Miller, Crowson, Duke, & Akey, 2004; Schunk, Pintrich & Meece, 2007; Sansone & Morgan, 1992). Important perceptions relating to content include perceived value, instrumentality or utility, and success expectations (Miller, Greene, Montalvo, Ravindran, & Nicholls, 1996). Task value includes personal interest, and the perceived importance and value of the work at hand (Eccles, O'Neill & Wigfield, 2005; Eccles & Wigfield, 1995). Instrumentality refers to whether the learner sees benefits linked to the knowledge and skills, which influences engagement and investment, not so much for the work itself, but for the related gains it can enable (Eccles & Wigfield, 1995; Sansone & Smith, 2000).

Achievement goals. Students come to school with existing achievement goals, and also develop these within the class and school contexts (Church, Elliot, & Gable, 2001; Hardré, 2008). Achievement goal orientations are normally divided into three types: learning (or mastery), performance approach, and performance avoidance (Elliot & Church, 1997; Maehr & Midgley, 1996). Learning goals describe a learner engaging out of a personal desire to know and understand the content and master the skills (Ames, 1992; Kaplan & Maehr, 2007). Performance approach goals describe a learner trying to outperform others, to look good in the face of external, social pressure and comparisons (Church et al., 2001; Greene & Miller, 1996). Performance avoidance goals describe a learner evading work or public performance to avoid embarrassment or looking incompetent to others (Elliot & Harackiewicz, 1996). Learning goals are a productive, positive orientation promoting effort for all students, while performance goals have demonstrated mixed outcomes (Elliot et al., 2000; Midgley, Kaplan, & Middleton, 2001; Pintrich, 2003).

Learning environment. The nature of the classroom learning environment influences student motivation (Greene, et al., 2004; Hardré & Sullivan, 2008; Skinner & Belmont, 1993). Important environmental features include teacher and peer support (Greene et al., 2004), and the teacher's interpersonal interaction and communication style (Black & Deci, 2000; Deci & Ryan, 2002). Perceptions of classroom learning environments strongly predict high school students' perceptions of domain competence and content instrumentality, along with goals (Hardré, Crowson, DeBacker et al., 2007; Hardré & Sullivan, 2008). These positive motivational characteristics can even compensate for negative social and ability comparisons, whether these originate with the student or come from others (Neighbors & Knee, 2003). Classroom environments, including the degree of autonomy support from teachers, influence students' motivational profiles (Hardré & Sullivan, 2008; Ryan & Deci, 2000), which predict rural high school students' intentions to complete school or drop out, even beyond the effects of achievement (Hardré & Reeve, 2003).

Environmental messages from teachers and peers influence students' content perceptions (Black & Deci, 2000; Good & Brophy, 1986), perceived ability (Hardré & Sullivan, 2008; Miller et al., 1996; Schunk, 1996), and goals (Urdan, Midgley, & Anderman, 1998). Goals and self-perceptions influence students' task choice, attitude, learning strategies, motivation, and achievement (Church et al., 2001; Deci & Ryan, 2002; Elliot et al., 2000).

Motivational outcomes. Motivation influences many outcomes from current achievement through future

expectations and identity (Maehr, 1989; Vallerand, Fortier, & Guay, 1997). Engagement and effort are often used as indicators of motivation in learning and achievement contexts (e.g., Reeve, Jang, Hardré, & Omura, 2002; Pintrich, 2003; Greene et al., 2004). Engagement is the student's focus on content and tasks (Hardré, Crowson, DeBacker et al., 2007; Hardré & Sullivan, 2008). Effort is the degree of purposeful energy that a student gives in pursuit of learning and skill development (Wigfield & Eccles, 2000; Reeve et al., 2002). Students with higher perceived competence, self-efficacy, learning goals and success expectations in a course or discipline are more likely to choose related courses, college majors and careers (Bleeker & Jacobs, 2004; Deci & Ryan, 2002; Hidi & Harackiewicz, 2000).

Motivation derived from individual and social experience predicts future outcomes, such as finishing high school, postsecondary plans, and career choice (Hidi & Harackiewicz, 2000; Miller et al., 1993). Self-perceptions mediate social messages (Bleeker & Jacobs, 2004; Nicholls, Patashnick, & Nolen, 1985), and *perceived* ability and competence are more closely linked to future outcomes than *assessed* ability (Eccles & Wigfield, 1995).

Reasons and causes of motivation. If students are lacking one or more of these critical motivational characteristics, they are in danger of being less than optimally motivated and engaged in school (Pintrich, 2003; Schunk, Pintrich & Meece, 2007). Because motivation is an internal process without consistent, dependable behavioral indicators, it can be difficult to assess and address (Hardré, 2007). If teachers can identify their students' motivational needs and address them, they can teach more effectively, and students can learn more effectively (Hidi & Harackiewicz, 2000).

Subject area differences. A range of significant differences in motivation have been found, most notably for math compared to other subjects (Hardré & Sullivan, 2008), but competence and self-efficacy are differentiated by subject area (e.g., students may feel more confident and efficacious in English than in science, or have higher success expectancies in arts than in foreign languages) (Bandura, 1997; Wigfield & Eccles, 2000). Subject area has demonstrated significant differences in motivation for learning and achievement in some studies but not in others (e.g., Anderman & Wolters, 2006; Hardré et al., 2009), so it remains important to consider.

Need for this Research

Among a vast number of studies demonstrating the importance of motivation in students' school success, only a few have included rural samples explicitly, and analyzed (to one degree or another) for local differences. Fewer have focused on rural places in particular, and none we could locate have examined differences between students' motivational profiles across rural areas at state and local levels.

Research Questions

Based on the theoretical and empirical literature, we investigated the following questions:

1. Which factors among the set of student motivational characteristics demonstrate independent influences or mediating effects on rural high school students' motivational and achievement outcomes (i.e., effort & engagement, success expectations, current grade)?

2. Which factors among the set of student perceptions of classroom environment (teacher control, student control, constraints, teacher interpersonal style) demonstrate independent influences on rural high school students' motivational profile for a particular class (goals, competence & efficacy, reasons for motivation, causes not motivated, and task value)?

3. Are there significant state-level or local-level differences in rural high school students' motivational profiles and relationships among the motivational factors assessed here?

Method

Participants

Participants were 224 students in four public high schools in two U.S. states, Indiana and Colorado. Table 1 shows the profile of students in the two state samples on demographics that have, in past research, been linked to school motivation, achievement and educational aspirations. Though it was a volunteer sample, the two state samples are similar across these characteristics. The students' age range was 13-20 (mean age 15) and the students reported a study-wide average GPA of 3.20. The average of the grades in the classes about which the participants were reporting was 86.41%.

Rural Schools and Communities

Rural communities are diverse (Adams, 2003) and a broad range of factors enter into the various definitions of rurality (Brown & Swanson, 2003; Yang & Fetsch, 2007). Therefore, it is necessary to specify sources of definitions used (Howley et al., 2005) and to detail the characteristics of places in rural research (Coladarci, 2007; McTavish & Salamon, 2003). All communities, in which the schools were located, met the criteria for rural places as identified by the U.S. Office of Management and Budget (Office of Management and Budget, 2000), were recognized as rural

Table 1

Profile of the Sample Participants' Characteristics (N = 224)

	Groupings					
	Frequencies & Percent in Whole Sample*		Frequencies & Percent in Indiana Sample		Frequencies & Percent in Colorado Sample	
Characteristics	F	%	F	%	F	%
Gender						
Male	94	42.0	45	40.9	49	43.0
Female	128	57.1	63	57.3	65	57.0
Race						
White	191	85.3	101	91.8	90	78.9
Black	1	0.4	0	0.0	1	9.0
Latino	17	7.6	3	2.7	14	12.3
American Indian	2	0.9	1	0.9	1	0.9
Bi-racial	2	0.9	1	0.9	1	0.9
Other	9	4.0	2	1.8	7	6.1
Grade in School						
Grade 9	92	41.1	47	42.7	45	39.5
Grade 10	43	19.2	24	21.8	19	16.7
Grade 11	45	26.1	20	18.2	25	21.9
Grade 12	44	19.6	19	17.3	25	21.9
Father's Education						
Less than high school	24	10.7	10	9.1	14	12.3
High school only	81	36.2	47	42.7	34	29.8
Some vocational, but no college	23	10.3	15	13.6	8	7.0
Some college, but no degree	35	15.6	14	12.7	21	18.4
Two-year college degree	15	6.7	3	2.7	12	10.5
Four-year college degree	19	8.5	11	10.0	8	7.0
Four-year degree plus graduate work	11	4.9	4	3.6	7	6.1
Graduate degree	14	6.3	5	4.5	9	7.9
Mother's Education						
Less than high school	18	8.0	8	7.3	10	8.8
High school only	54	24.1	36	32.7	18	15.8
Some vocational, but no college	10	4.5	6	5.5	4	3.5
Some college, but no degree	44	19.6	19	17.3	25	21.9
Two-year college degree	36	16.1	15	13.6	21	18.4
Four-year college degree	32	14.3	8	7.3	24	21.1
Four-year degree plus graduate work	12	5.4	8	7.3	4	3.5
Graduate degree	16	7.1	9	8.2	7	6.1

Table 1 (Cont.)

Profile of the Sample Participants' Characteristics (N = 224)

Characteristics	Groupings					
	Frequencies & Percent in Whole Sample*		Frequencies & Percent in Indiana Sample		Frequencies & Percent in Colorado Sample	
	F	%	F	%	F	%
Grade Point Average						
1.9 & below	8	3.7	8	7.3	0	0.0
2.0-2.9	54	24.7	37	34.0	17	15.6
3.0-3.9	124	56.9	50	45.9	73	67.9
4.0+	32	14.7	14	12.7	18	15.8
Subject Area (of class reported)						
Math	82	36.6	54	49.1	28	24.6
English	39	17.4	19	17.3	20	17.5
Science	46	20.5	28	25.5	18	15.8
Other	57	25.4	9	8.2	48	42.1
Estimated Grade in Class						
69 & below	11	5.0	6	5.5	5	4.5
70-79	34	15.5	19	17.2	15	13.7
90 & above	104	47.3	40	36.4	64	58.2

Note. F indicates the frequency of the category in the sample. % indicates the percentage of the category in the sample. Data from participants not responding to a particular demographic question are not included in this table. Students reporting about "Other" subjects responded about the following courses: Web Design, cadet teaching, agricultural science, speech, computer Applications, English as a second language, relationships, choir, Spanish, government/economics, agricultural welding, world civilization, agricultural mechanics, yearbook, weights, shop class, business leadership, global Studies, social studies, art, American History, and Sociology.

schools by their state Departments of Education, and were located in small and relatively isolated communities. By NCES urban-centric locale codes, all were classified as rural distant (locale code 42) or rural remote (locale code 43).[1] Profiles of the states and schools in the study follow, drawn from the Common Core of Data (CCD; National Center for Educational Statistics, 2009a).

Indiana. The state of Indiana has 190 rural school districts, serving 256,288 students. Twenty-five percent (25%) of elementary and secondary students in the state attend rural schools. The average household size is 2.6 persons, and NAEP scores are just at the national average: Math, 282 (national avg. 278); Reading, 261 (national avg. 260). The Indiana sample for this study was comprised of 110 students in two schools (here referred to as #1 and #2). School #1 is classified rural distant (42), and serves 719 students in grades 9-12. The student-teacher ratio is 16.3:1, and only 9 (1%) of students identify as members of ethnic minorities (American Indian, Asian and Hispanic), but 179 (25%) of students are free/reduced lunch eligible. School #2 is also rural distant (42), and serves 199 students in grades 9-12. Its student-teacher ratio is 13.3:1, and only 8 (4%) are ethnic minorities (Hispanic), but 87 (44%) are free/reduced lunch eligible.

Colorado. The state of Colorado has 145 rural districts serving 72,181 rural students in the state. Ten percent (10%) of Colorado's children attend rural schools. The average household size is 2.5, and NAEP scores are also just above the national average (Math, 281; Reading, 265). The Colorado sample for this study was comprised of 114 students from two schools, (here called #3 and #4). School #3 is classified rural remote (43), and serves 262 students in grades 7-12, 172 of them in grades 9-12. The student-teacher ratio is 11.3:1; 55 students (32%) identify as ethnic minorities (Black and Hispanic); and 65 (38%) are free/reduced lunch eligible. School #4 is also rural remote (43), and serves 28 students in grades 7-12, 16 of those in grades 9-12. Its student-teacher ratio is 11.8:1; four (25%) are ethnic minority (Hispanic); and 11 (57%) are free/reduced lunch eligible.

[1]In 2005-6, NCES supported work by the Census Bureau to redesign the 1980 original locale codes to align with changes in the U.S. population and geographic shifts. The new locale codes are based on proximity to an urbanized area (a densely settled core with densely settled surrounding areas), rather than to metropolitan areas. Locale code 42 (rural distant) is Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, or more than 2.5 miles but less than or equal to 10 miles from an urban cluster. Locale code 43 (rural remote) is rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Procedures

With the goal of obtaining a sample of students from representative rural schools from within these states, the researchers created a profile of rural schools within each state, on the factors discussed above (i.e., SES, remoteness, school size, community population and education, and geographic location within the state). From this list, eight candidate schools were randomly selected and invited to participate. The four schools (50%) that agreed to participate were representative of key profile characteristics for the population of interest reflected in the federal and state school profile data. We obtained administrative consent and then teachers and administrators recruited individual student and parent consent for their students. Parental consent was obtained *for* all minor students, along with direct assent *from* students. From the larger student pool in Indiana, we extracted a sample similar in size to that from Colorado, to facilitate comparison.

Questionnaires were administered via a secure online administration system, SurveyMonkey®. Using this method, designated school staff could facilitate the data collection over several days around the school's regular schedule. Facilitators used a standard protocol provided by the researchers. The data were transmitted directly to researchers through the online system, without being handled by the teachers. This method enabled the researchers to ensure confidentiality for student data about classes and teachers. Students were asked to consider a specific academic class and teacher while responding to the questionnaires and to respond to all instruments for that one class and teacher. Courses chosen were distributed across subject areas (e.g., math, English, sciences, social studies, history, and foreign languages). To enable comparison of groups by subject area, classes were categorized into four groups: math, English, science, and other. Students were instructed that if they did not know or did not want to answer a particular question they should leave the item blank.

Instruments

The self-report questionnaires included descriptive characteristics and assessed motivation-related constructs, classroom characteristics, school-related effort, achievement and future intentions. Constructs included the following: perceptions of the teacher and classroom learning environment (teacher motivating effectiveness, teacher motivating strategies, teacher control, student control, constraints, and teacher interpersonal style); self-perceptions in the domain of study (reasons for motivation, causes of lacking motivation, perceived ability, perceived value, and perceived competence); goals (i.e., learning, performance approach, and performance avoidance goals);

and motivation and achievement outcomes (success expectations, effort-engagement, and current grade). All of these instruments have been used previously in rural samples (e.g., Hardré & Reeve, 2003; Hardré, Crowson, DeBacker et al., 2007; Hardré & Sullivan, 2008; Hardré et al., 2009).

Classroom learning environment. Students' perceptions of their learning environments were measured using the In My Classroom (IMC) questionnaire from Greene and Miller (1996) (originally 38 items). Items are arranged on a 1-7 Likert-type scale anchored from "Strongly disagree" to "Strongly agree." Theoretically, the IMC measures support factors and perceived challenge; however, in this sample, the scales did not reconcile in their theoretical configuration, so we conducted an exploratory factor analysis (EFA) and utilized the subscales as they factored in the data (Hennessey & Hardré, 2009). The three subscales that derived (using 20 items) we termed: teacher control (8 items), student control (8 items), and constraints (4 items). Teacher control is the set of motivationally positive factors that are within the teacher's direct control (Cronbach's *alpha* =.93). Student control is the set of motivationally positive factors that are within the students' collective control (Cronbach's *alpha* =.93). Constraints are the motivationally negative factors of the learning environment, both teacher and peer-controlled (Cronbach's *alpha* =.84). These were not just negatively-directional items, but items that loaded onto a factor unique from the other two subsets. Sample items: "When we learn new things, the teacher helps us to see how it relates to our lives outside of school" (teacher control); "In this class students treat each other with respect" (student control); "In this class students get picked on and teased" (constraints).

Teacher's interpersonal style. Students' perceptions of the degree of their teachers' supportive interpersonal style, based on their individual interactions with the teacher, were assessed with the Interpersonal Style Questionnaire (ISQ) (8 items) (Hardré & Reeve, 2003; Hardré & Sullivan, 2008) (reliability alpha = .92). Items are arranged on 1-7 Likert-type numeric scales (anchored from 1 = "Not at all true" to 7 = "Extremely true"). Sample items: "My teacher encourages me to ask questions," and "I feel understood by my teacher."

Students' goals. Students' course-specific achievement goals (i.e., learning, performance approach, and performance avoidance) were assessed using the Approaches to Learning (ATL) Questionnaire (Greene & Miller, 1996). Participants respond on a five-point Likert-type scale (1 = "Strongly disagree" to 5 = "Strongly agree"). Sample items: "I do my work in this class because I want to understand the ideas" (learning goals); "I do my work in this class because I can show other people that I am smart" (performance approach goals); "I don't do my work in this class so I can avoid looking stupid to others" (performance avoidance goals) (typical Cronbach's *alphas* = 75-.90).

Perceived value. Students' perceived value for learning in that class was assessed with the four-item value subscale from Hardré and Reeve (2003) (Likert-type scale: 1 = "Not at all true" to 7 = "Extremely true"). Sample items: "Most of what I learn in this class is valuable" and "I value class-related activity and work" (typical Cronbach's *alphas* =.84-.89) (Hardré & Sullivan, 2008; Hardré et al., 2009).

Perceived competence and self-efficacy. Two critical and theoretically-related motivational characteristics are competence and self-efficacy, both of which are contextualized to tasks and content domains. Students' perceived competence in class was assessed using a 4-item subscale from the Activity-Feelings States scale (AFS; Reeve & Sickenius, 1994). It begins with the stem, "When I am in the classroom, I feel..." with four descriptors: "Competent," "Capable," "Achieving," and "Frustrated" (Likert-type scale, 1 = "Not at all true" to 7 = "Very true;" Cronbach's *alpha* = .81) (e.g., Hardré & Reeve, 2003; Hardré & Sullivan, 2008). Students' self-efficacy for the class was assessed using a contexualized version of the Academic Self-Efficacy scale (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998) used in Hardré & Sullivan (2008, 2009). Eight items are presented with responses on a 1-7 Likert-type scale (1 = "Strongly disagree" to 7 = "Strongly agree"). Sample items: "I believe that I can manage most classroom challenges," and "I often just don't know how to be successful in this class."

Success expectations. Students' future expectations of success in the class were assessed using the success expectancies scale from Hardré and Reeve (2003), (Likert-type scale, 1 = "Not at all true" to 7 = "Very true"). Sample items: "In terms of academic performance, I expect to do well" and "My expectancies for career success are very high" (*alpha* = .79).

Effort-engagement. Students' school-based effort and engagement were assessed with a class-level version of the School Engagement and Effort Scale (SEES) (used in Hardré, Crowson, Ly, & Xie 2007; contextualized from Vallerand et al., 1997) (12 items; 1-7 Likert-type scales). Sample items: "I don't work very hard in this class," and "I really pay attention in this class" (*alpha* = .80) (Hardré, Crowson, et al., 2007; Hardré et al., 2009).

School achievement. The indicator of school achiev-achievement was grade in the class (100-point percentage scale, self-reported).

Analysis

Following reliability analyses, path analyses were run (Jöreskog & Sörbom, 2007) to investigate the relations between Teacher Motivating Characteristics, Student Motivational Characteristics, and Student Motivational Outcomes. Attempts at a test of parsimony for all students

were used to confirm or refute differences indicating unique motivational profiles. Multivariate regressions were used to investigate the nature of those differences in relations between variables in the two state samples (Indiana and Colorado). Then, to rule out competing explanations of the results, the data were tested on the extent to which they varied on the school level and by subject area.

Results

Reliability Analysis

Reliability analyses were conducted on the subscales of all instruments used for this study. Reliability ranged from .73 to .94 for the subscales, all within the acceptable range.

Path Analyses

We set out to determine how Student Motivational Out-Outcomes were influenced by the combination of Student Motivational Characteristics and their perceptions of Teacher Motivating Characteristics. We chose to include only motivational outcomes in our first analyses because including achievement (current grade) in the same model was disallowed by our sample size. It was appropriate to combine the two states at this stage, because their demographics were similar. First, we tested a model including paths only from Student Motivational Characteristics (i.e., reasons for motivation, causes of lacking motivation, learning goals, performance approach goals, performance avoidance goals, perceived ability, perceived value, and perceived competence), to Student Motivational Outcomes (i.e., success expectations and effort-engagement). Second, we added the variables assessing student perceptions of Teacher Motivating Characteristics and Learning Environment (i.e., teacher motivating effectiveness, teacher motivating strategies, teacher control, student control, constraints, and teacher interpersonal style).

In the first phase model test, we used all Student Motivational Characteristics as exogenous variables predicting the two Student Motivational Outcomes. We used LISREL 8.80 (Jöreskog & Sörbom, 2007) to determine the extent to which the model fit the data we collected using Hu and Bentler's (1998) criteria for assessing model-data fit. After removing non-significant paths in the model, we found that the model exhibited exceptional fit (χ^2 = 3.60, df = 25, p =1.000, CFI = 1.00, GFI = 1.00, AGFI = .99, NFI = 1.00, SRMR = .009, RMSEA = .000).

In the second phase, we included all Teacher Motivating Characteristics as predictors of the Student Motivational Characteristics variables. Specifically, all Teacher Motivating Characteristics were allowed to predict each of the Student Motivational Characteristics. Fit of this model was not acceptable (χ^2 = 509.24, df = 52, p < .0001, CFI = .90, GFI = .74, AGFI = .48, NFI = .89, SRMR = .11, RMSEA = .208). We removed all non-significant paths from the model, and looked at modification indices to determine whether any modifications could be made to the model that also made theoretical sense. We added a path from success expectations to perceived value, because it was theoretically sound to assert that individuals who expected success in an area, would value school work in that area. We also added a path from learning goals to reasons for motivation, because these two factors were closely related and statistically coherent. After modifying the path model in these ways, model-data fit was still not at an acceptable level (χ^2 = 283.41, df = 70, p < .0001, CFI = .94, GFI = .84, AGFI = .76, NFI = .93, SRMR = .088, RMSEA = .122). Figure 1 shows the two-phase model with values for all significant parameters.

Summary of whole-sample analysis. From this initial model test, we concluded two things. First, the overall sample of rural high school students did not share a motivational framework that fit a coherent and consistent model of predictive relationships. This finding was consistent with claims from previous research that rural students were not academically or motivationally homogeneous. Second, this analysis demonstrated that the important difference was in the second phase of our hypothesized model. The whole group *was* parsimonious on the first-phase factors, the relationships of paths from student motivational (individual difference) characteristics to motivational outcomes. However, the whole group *was not* parsimonious on the second phase, the relationships of Teacher Motivating Characteristics and Learning Environment on Student Motivational Outcomes. At some level, these rural students were exhibiting unique motivational profiles that defined different dynamics, interacting among teacher practices, characteristics of the learning environments, and student perceptions, with effects on their motivation.

State-Level Differences

Having tested the fit of the whole-sample, rural student data, and being unable to achieve good fit, we moved to a more fine-grained analysis. We set out to determine at what level of localization parsimony might occur. We investigated first state-level and then school-level differences in the motivational relationships.

Multivariate analysis of variance was first conducted to determine whether there were differences at the state level on the Student Motivational Outcomes of success, expectations, and effort-engagement variables. Results of this test showed no multivariate differences in Student MotivationalOutcomes (Hotelling's Trace = .008, $F_{(2, 199)}$ = .810, p = .446). We also conducted a MANOVA to

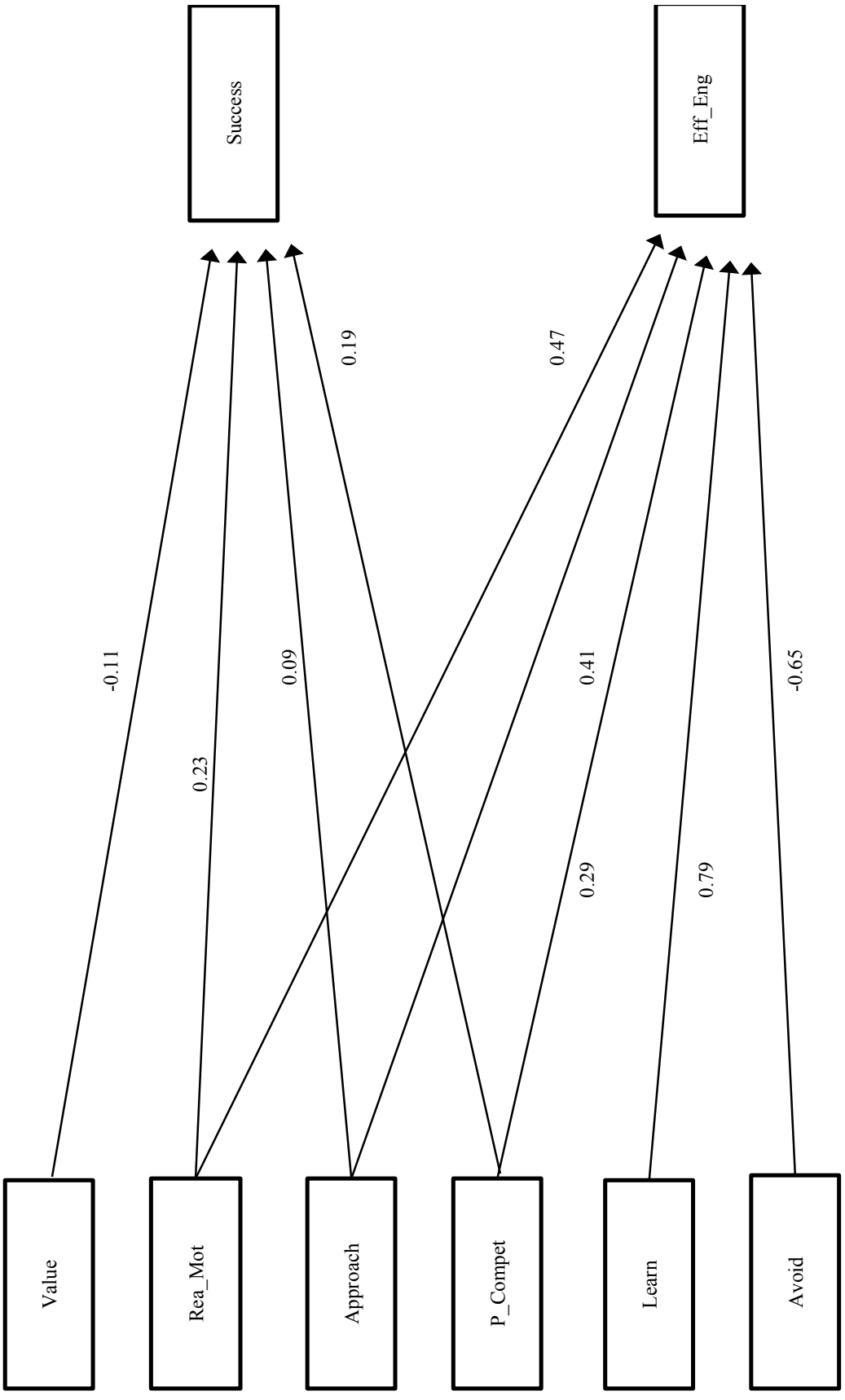

Figure 1 . Path analysis for student motivational characteristics as predictors of student motivational outcomes.

determine whether there were state level differences in the Student Motivational Characteristics variables, finding no significant differences (Hotelling's Trace = .099, $F_{(8, 158)}$ = 1.947, p = .057).

We then tested the extent to which there were significant multivariate differences in students' perceptions of their teachers (i.e., teacher motivational effectiveness, teacher motivational strategies, teacher control, student control, constraints, and teacher interpersonal style) based upon their state of residence. Unlike the previous two tests, we found significant multivariate effects (Hotelling's Trace = .193, $F_{(6, 168)}$ = 5.395, p < .0001, partial η^2 = .162). Follow-up univariate tests showed that students rated their perceptions of their teachers differently on all variables (ps < .01) except for teacher motivational strategies (p = .113). We concluded that we had been unable to fit a path model to our data based on the vast differences in how students from the two states responded to their teachers and classroom learning environments.

Multivariate Regression Analyses by State

Because the state level differences were vast enough that we could not fit two state-level models to the data while respecting our small sample size, we used multivariate regression analyses. To do this, we first ran a multivariate regression analysis from Student Motivational Characteristics variables to Student Motivational Outcomes by state. We used current grade as a class-level achievement outcome variable in this analysis. We then ran regression models from: 1) Student Motivational Characteristics to Student Motivational Outcomes, 2) Teacher Motivating Characteristics to Student Motivational Characteristics, 3) Teacher Motivating Characteristics to Student Motivational Outcomes and, 4) effort-engagement to success expectations and current grade.

Indiana analysis. We were first interested in determining the set of Student Motivational Characteristics variables that predicted our student outcome variables (i.e., success expectations, effort-engagement, and current grade). The multivariate regression model was significant (Wilks' Lambda = .141, $F_{(24, 203.62)}$ = 8.20, p < .0001), suggesting that a further look at the univariate regression model was warranted. We found that success expectations were significantly predicted by reasons for motivation, performance approach goals, and a student's level of perceived competence ($F_{(8, 72)}$ = 23.90, p < .0001, adj. R^2 = .70, obs. power = 1.000). Effort-engagement was significantly predicted by reasons for motivation ($F_{(8,72)}$ = 18.95, p < .0001, adj R^2 = .64, obs. power = 1.000). Current grade was significantly predicted only by perceived competence ($F_{(8, 72)}$ = 6.69, p < .0001, adj. R^2 = .36, obs. power = 1.000). Table 2 gives the univariate results for the three dependent variables.

Our next step was to include the variables that were significant predictors of Student Motivational Outcomes as dependent variables in a second-phase with student perceptions of teachers and their classrooms as the independent variables. We included reasons for motivation, performance approach goals, and perceived competence as dependent variables and the six Teacher Motivating Characteristics as independent variables. Multivariate differences were found in this regression analysis (Wilks' Lambda = .306, $F_{(18, 192.81)}$ = 5.57, p < .0001; see Table 2). Specifically, reasons for motivation was significantly predicted by teacher control and student control ($F_{(6, 70)}$ = 13.11, p < .0001, adj. R^2 = .49, obs. power = 1.000). There were no significant predictors of performance approach goals or perceived competence.

We then tested the multivariate regression model from these significant teacher variables to the Student Motivational Outcomes to see if there were direct relations between these two sets of variables. We found a significant multivariate effect (Wilks' Lambda = .314, $F_{(18, 198.48)}$ = 5.58, p < .0001). Univariate follow-up tests showed that there were no significant predictors of current grade ($F_{(6, 72)}$ = 1.85, p =.1007, adj. R^2= .06, obs. power = .857), but positive student control and teacher interpersonal style were significant predictors of effort-engagement ($F_{(6, 72)}$ = 15.19, p < .0001, adj. R^2= .52, obs. power = 1.000). There was a significant result on success expectations ($F_{(6, 72)}$ = 4.69, p =.0004, adj. R^2= .22, obs. power = 1.000), but there were no significant predictors of this variable. We also investigated multivariate regressions from effort-engagement to success expectations and current grade. The multivariate test was significant (Wilks' Lambda = .576, $F_{(2, 99)}$ = 36.40, p < .0001). Univariate follow-up tests revealed that effort-engagement was a significant predictor of both success expectations ($F_{(1, 100)}$ = 69.53, p < .0001, adj. R^2 = .40, obs. power = 1.000) and current grade ($F_{(1,100)}$ = 12.51, p = .0006, adj. R^2 = .10, obs. power = .958). Results of these univariate follow-up tests are located in Table 2. Figure 2 shows a diagram of all significant relations between Teacher Motivating Characteristics, Student Motivational Characteristics, and Student Motivational Outcomes for students from Indiana.

Colorado analysis. We conducted the same analyses for data collected from rural students living in Colorado as we had for Indiana. Regression analyses run to investigate Student Motivational Characteristics that predict Student Motivational Outcomes showed significant multivariate effects (Wilks' Lambda = .152, $F_{(24, 180.42)}$ = 6.88, p < .0001). Univariate follow-ups confirmed that success expectations were significantly predicted by performance avoidance goals and perceived competence ($F_{(8, 64)}$ = 12.35, p < .0001, adj. R^2 = .56, obs. power = 1.000). Learning and performance avoidance goals were both significant predictors of effort-engagement ($F_{(8, 64)}$ = 23.67, p < .0001, adj. R^2 = .72, obs.

Table 2

Univariate Results for Indiana for the Multivariate Regression Analyses

	Dependent Variables								
	Success expectations			Effort-engagement			Expected grade		
Independent Variables	*b*	*t*	*p*	*b*	*t*	*p*	*b*	*t*	*p*
Reasons for motivation	**0.20**	**3.36**	**0.001**	**1.08**	**4.00**	**<.001**	-0.16	-0.84	0.405
Causes for lacking motivation	0.03	1.22	0.23	0.06	0.53	0.595	0.02	0.26	0.798
Learning goals	0.02	0.28	0.78	0.30	1.12	0.268	0.23	1.19	0.237
Performance approach goals	**0.12**	**3.28**	**0.002**	0.33	1.96	0.054	0.14	1.22	0.225
Performance avoidance goals	-0.02	-0.27	0.79	-0.09	-0.29	0.774	0.05	0.25	0.807
Perceived ability	0.11	1.75	0.09	-0.02	-0.08	0.937	0.32	1.60	0.113
Perceived value	-0.03	-0.39	0.696	0.48	1.46	0.147	-0.18	-0.78	0.439
Perceived competence	**0.11**	**2.52**	**0.014**	-0.12	0.62	0.536	**0.30**	**2.19**	**0.032**
Teacher motivating effectiveness	0.12	1.26	0.210	-0.26	-0.81	0.419	0.32	1.46	0.150
Teacher motivating strategies	-0.05	-0.85	0.397	0.04	0.23	0.816	-0.21	-1.64	0.105
Positive teacher control	0.11	1.64	0.106	0.32	1.36	0.179	0.25	1.54	0.127
Positive student control	0.05	0.46	0.646	**1.13**	**3.11**	**0.003**	0.04	0.17	0.868
Constraints	-0.05	-0.86	0.393	0.15	0.69	0.494	0.13	0.89	0.379
Teacher interpersonal style	0.06	0.98	0.333	**0.90**	**3.90**	**<.001**	-0.26	-1.62	0.109
Effort-engagement	**0.14**	**8.34**	**<0.001**	**----**	----	----	**0.17**	**3.54**	**0.001**
	Reasons for motivation			Performance approach goals			Perceived competence		
Teacher motivating effectiveness	0.09	0.65	0.516	0.21	0.94	0.353	0.41	1.88	0.065
Teacher motivating strategies	-0.06	-0.67	0.504	-0.05	-0.39	0.694	0.01	0.06	0.952
Positive teacher control	**0.26**	**2.64**	**0.010**	-0.12	-0.76	0.453	0.17	1.03	0.305
Positive student control	**0.55**	**3.49**	**0.001**	0.38	1.49	0.141	0.04	0.16	0.872
Constraints	-0.01	-0.13	0.900	-0.16	-0.94	0.350	0.27	1.63	0.106
Teacher interpersonal style	0.05	0.52	0.604	0.23	1.42	0.161	0.32	1.98	0.051

Note. Values in bold indicate statistical significance at the ά =.05 level.

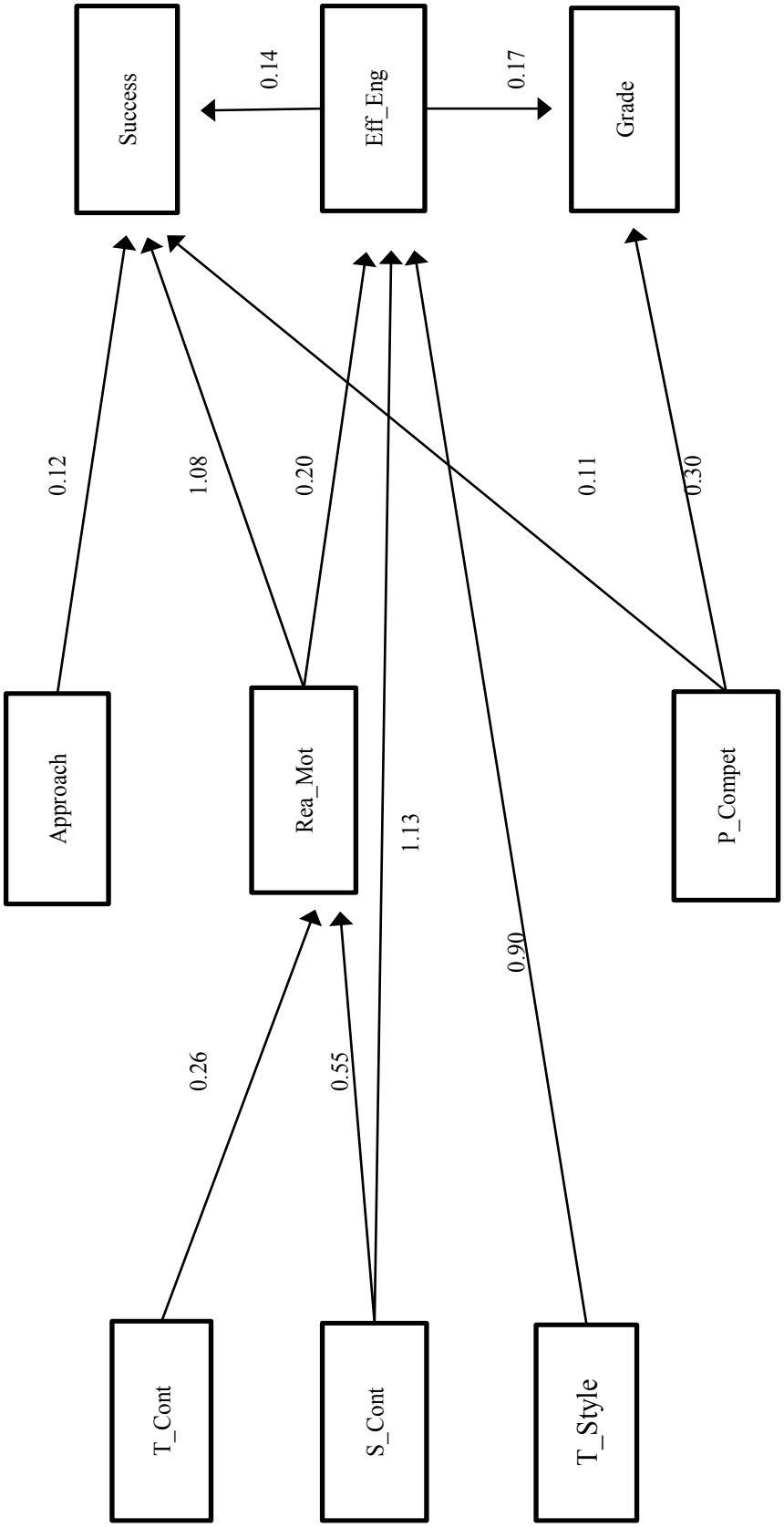

Figure 2. Indiana multivariate regression analysis.

power = 1.000). Interestingly, there were no Student Motivational Characteristics that significantly predicted students' current grade in Colorado ($F_{(8, 64)} = 1.40$, $p = .21$, adj. $R^2 = .04$, obs. power = .893). The results of this analysis are found in Table 3.

We then used those student variables that were significant predictors of our outcome variables (i.e., learning and performance avoidance goals, and perceived competence) as the dependent variables in a second multivariate regression analysis where Teacher Motivating Characteristics were the independent variables. The multivariate regression was significant (Wilks' Lambda = .319, $F_{(18, 215.45)} = 5.95$, $p < .0001$). In univariate effects, teacher interpersonal style was found to be a significant predictor of learning goals ($F_{(6, 78)} = 12.51$, $p < .0001$, adj. $R^2 = .45$, obs. power = 1.000). Performance avoidance goals were predicted by students' perceptions of constraints ($F_{(6, 78)} = 2.54$, $p = .03$, adj. $R^2 = .10$, obs. power = .946). Only student control was a significant predictor of students' perceived competence ($F_{(6, 78)} = 9.06$, $p < .0001$, adj. $R^2 = .37$, obs. power = 1.000). Univariate results are found in Table 3. Interestingly, student control in the classroom was negatively related to students' perceptions of competence. In other words, the more students felt they controlled activities in the classroom, the less competent they felt in the subject area.

We were also interested in whether students' perceptions of Teacher Motivating Characteristics directly predicted any of the Student Motivational Outcomes we measured. The multivariate regression analysis was significant (Wilks' Lambda = .412, $F_{(18, 198.48)} = 4.00$, $p < .0001$). Univariate tests showed that, similar to the results found for Indiana, there were no significant predictors of success expectations ($F_{(6, 72)} = 1.09$, p = .38, adj. $R^2 = .01$, obs. power = .615) or current grade ($F_{(6, 72)} = 1.19$, p = .32, adj. $R^2 = .01$, obs. power = .681). Effort-engagement was significantly predicted by both constraints and teacher interpersonal style ($F_{(6, 73)} = 10.10$, $p < .0001$, adj. $R^2 = .41$, obs. power = 1.000). We also investigated the multivariate effects of effort-engagement on both success expectations and current grade. The results of this test were significant (Wilks' Lambda = .573, $F_{(2, 94)} = 35.09$, $p < .0001$). Univariate tests revealed results similar to those in Indiana. Specifically, effort-engagement was found to be a significant predictor of both success expectations ($F_{(1, 95)} = 70.64$, $p < .0001$, adj. $R_2 = .42$, obs. power = 1.000) and current grade ($F_{(1, 95)} = 6.27$, $p < .0001$, adj. $R^2 = .05$, obs. power = .773) for students in Colorado.

Summary of State-Level Analysis

The state-level analysis confirmed very different motivational profiles for rural high school students in Indiana and Colorado, focusing around their perceptions of their teachers' practice and learning environments. As indicated in the whole-sample path model test, data from the two states were similar in relationships of individual differences predicting motivation and achievement, and in the relationship between effort-engagement and achievement. However, they were less similar in the extent to which perceptions of teaching and environmental factors predicted students' motivational characteristics, along with their direct effects on motivational outcomes and achievement. With the influential dynamic of teacher factors entered into the equation, those perceptions changed how the regression models depict students' motivational profiles leading to engagement, effort, and achievement.

The most notable similarity among rural high school students in both states was that effort-engagement predicted both current achievement and future success expectations. Important differences in Indiana were: 1) student control predicted reasons for having motivation and effort-engagement, 2) performance approach goals were important, directly predicting success expectations, and 3) perceived competence directly predicted achievement and future success expectations. Important differences in Colorado were: 1) the role of classroom constraints predicted avoidance goals and effort-engagement, 2) student control directly affected perceived competence, and 3) learning and avoidance goals were central, predicting effort-engagement.

School-Level Analysis

Having identified state-level differences, we needed to determine whether these results might be an artifact of more local differences in our sample. We conducted MANOVAs on the three sets of variables (i.e., Student Motivational Outcomes, Student Motivational Characteristics, and Teacher Motivating Characteristics) separately, comparing responses for schools within each state. School level differences were non-significant for Student Motivational Outcomes in Colorado (Hotelling's Trace = .017, $F_{(3, 93)} = .527$, $p = .665$, obs. power = .154), but significant in Indiana (Hotelling's Trace = .114, $F_{(3, 98)} = 3.724$, $p = .014$, obs. power = .793). Univariate follow-up tests revealed that the two schools differed in students' achievement (grades in class) (F(1,100) = 9.168, $p = .003$, partial $\eta^2 = .084$), with grades 6.25 percentage points ($p = .003$) higher in School #1 than in School #2 (see Table 4).

School-level differences on Student Motivational Characteristics variables were significant for both Indiana (Hotelling's Trace = .457, F(8, 42) = 2.399, $p = .031$, obs. power = .832) and Colorado (Hotelling's Trace = 1.483, $F_{(8, 18)} = 3.336$, $p = .016$, obs. power = .877). For data collected from Indiana, univariate follow-up tests showed that there were significant differences (Table 4) between schools on learning goals (F(1, 49) = 9.095, p = .004, partial $\eta^2 = .157$) and perceived value ($F_{(1, 49)} = 6.495$, p = .014, partial $\eta^2 = .117$.

Table 3

Univariate Results for Colorado for the Multivariate Regression Analyses

	Dependent Variables								
	Success expectations			Effort-engagement			Expected grade		
Independent Variables	*b*	*t*	*p*	*b*	*t*	*p*	*b*	*t*	*p*
Reasons for motivation	0.09	1.15	0.256	0.04	0.15	0.879	-1.70	-0.56	0.576
Causes for lacking motivation	0.04	1.13	0.263	-0.25	-1.98	0.053	0.15	1.11	0.269
Learning goals	0.13	1.43	0.157	**0.92**	**2.83**	**0.006**	0.21	0.60	0.543
Performance approach goals	0.01	0.19	0.850	0.26	1.06	0.292	-0.10	-0.40	0.691
Performance avoidance goals	**-0.31**	**-3.26**	**0.002**	**-0.66**	**-2.04**	**0.046**	-0.11	-0.31	0.758
Perceived ability	-0.02	-0.22	0.826	-0.09	-0.34	0.734	0.19	0.67	0.504
Perceived value	-0.09	-0.85	0.401	0.55	1.52	0.133	-0.13	-0.36	0.721
Perceived competence	**0.16**	**3.08**	**0.003**	0.21	1.16	0.250	0.21	1.10	0.274
Teacher motivating effectiveness	-0.17	-1.14	0.259	-0.67	-1.50	0.137	0.08	0.22	0.825
Teacher motivating strategies	0.08	1.10	0.276	0.37	1.72	0.090	0.27	1.63	0.108
Positive teacher control	0.11	1.11	0.269	0.25	0.80	0.427	-0.21	-0.91	0.366
Positive student control	0.06	0.39	0.698	0.47	1.10	0.275	-0.24	-0.73	0.467
Constraints	-0.02	-0.20	0.842	**0.77**	**3.11**	**0.003**	0.19	0.98	0.333
Teacher interpersonal style	0.02	0.33	0.745	**0.67**	**3.45**	**0.001**	0.12	0.83	0.412
Effort-engagement	**0.16**	**8.40**	**<.001**	**----**	**----**	**----**	**0.14**	**2.50**	**0.014**
	Learning goals			Performance approach goals			Perceived competence		
Teacher motivating effectiveness	-0.22	-1.10	0.273	0.18	1.32	0.189	0.12	0.36	0.717
Teacher motivating strategies	0.18	1.77	0.081	-0.02	-0.35	0.725	0.28	1.66	0.102
Positive teacher control	0.25	1.79	0.077	0.09	0.92	0.362	0.45	1.91	0.060
Positive student control	0.27	1.43	0.158	-0.13	-0.98	0.332	**-0.79**	**-2.43**	**0.018**
Constraints	0.10	0.83	0.410	**-0.29**	**-3.59**	**0.001**	0.20	0.96	0.338
Teacher interpersonal style	**0.22**	**2.57**	**0.011**	-0.07	-1.26	0.212	0.12	0.83	0.441

Note. Values in bold indicate statistical significance at the $\alpha = .05$ level.

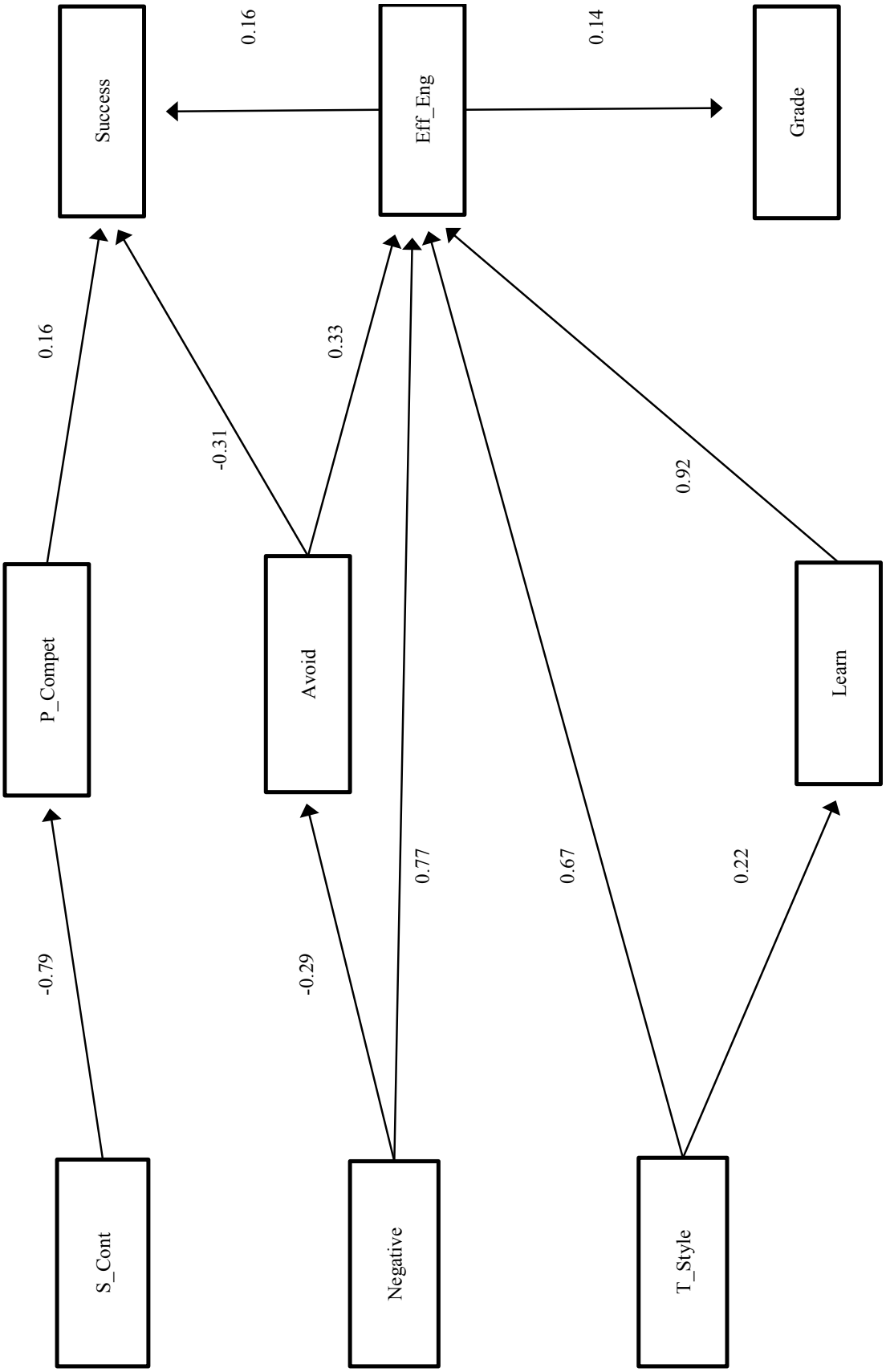

Figure 3. Colorado multivariate regression analysis.

with current grade, students from School #1 rated both learning goals (p = .004) and perceived value (p = .014) higher than those from School #2. For data collected from Colorado, univariate follow-up tests showed that only ratings of performance approach goals were significantly different between the two schools ($F_{(1, 25)}$ = 4.589, p = .042, partial η^2 = .155), with students from School #3 rating the extent of their performance approach goals higher than those from School #4.

Multivariate analyses revealed no significant differences in Teacher Motivating Characteristics between the schools in either Indiana (Hotelling's Trace = .133, $F_{(6, 77)}$ = 1.708, p = .130, obs. power = .615) or Colorado (Hotelling's Trace = .069, $F_{(6, 84)}$ = .960, p = .458, obs. power = .360). Students seemed to perceive teachers' motivating characteristics and their classroom learning environments similarly across schools within these two states. From these results, we concluded that the differences in motivation in these rural schools were due primarily to student characteristics rather than to differences in teachers' practice in the schools. Thus, given the small number of schools included in the sample for each state and the lack of significant differences among the schools within each state, it makes sense to analyze results on a state level as opposed to on a school level for this data.

Summary of School-Level Analyses

Overall, the differences in student data between schools (within states) were not as widespread, consistent, or significant as the differences *between* states. Although there were some differences in the data collected from individuals enrolled in the two schools within each state, those differences were not found in variables related to the school environment. In other words, students enrolled in the two schools in each state rated their teachers' motivational characteristics and the characteristics of the learning environments similarly. Differences, then, were found primarily among student variables. Students from School #1 in Indiana rated the extent of their learning goals and the perceived value of the class they were taking as higher than those in School #2, which corresponds to a significantly higher achievement outcome for those students. Students in the two schools from Colorado rated only the extent of their performance approach goal orientations as significantly different.

Differences that were indicated in students' perceptions and achievement outcomes were *more different* between the two schools in Indiana than between the two Colorado schools. This is particularly surprising because the students in Colorado are more culturally diverse and the schools have more contrast in size and local community characteristics.

Subject Area Analysis

Since prior research in rural high schools has found significant differences in motivation by class subject area, we analyzed for subject area differences. We recombined the data from the two states and analyzed students' responses comparing four clusters of general subjects (math, English, science, and other). Due to missing data on this descriptor, data was used from 198 individuals (i.e., math = 73, English = 37, science = 43, and other = 45). MANOVAs on Student Motivational Outcome variables, showed multivariate differences (Wilks' Lambda = .909, $F_{(9, 469,862)}$ = 2.080, p = .030, obs. power = .774). Univariate follow-up and post-hoc tests revealed relatively small (though significant) differences on effort-engagement ($F_{(3, 195)}$ = 2.671, p = .049, partial η^2 = .039), reported in English in contrast to math (p = .016), Science (p = .041), and other subjects (p = .010) (see Table 5).

We also found evidence that students' responses were significantly different by subject area on Student Motivational Characteristics (Wilks' Lambda = .774, $F_{(24, 453.049)}$ = 1.747, p = .016, obs. power = .981) and Teacher Motivating Characteristics (Wilks' Lambda = .823, $F_{(18, 470.004)}$ = 1.861, p = .017, obs. power = .957). Univariate follow-up tests revealed differences on reasons for motivation ($F_{(3, 163)}$ = 3.096, p = .028, partial η^2 = .067), causes of lacking motivation (F(3, 163) = 3.096, p = .028, partial η^2 = .054), teacher motivating effectiveness ($F_{(3, 171)}$ = 2.737, p = .045, partial η^2 = .046), teacher control ($F_{(3, 171)}$ = 3.337, p = .020, partial η^2 = .056), and student control ($F_{(3, 171)}$ = 3.145, p = .027, partial η^2 = .052).

Post hoc tests (Table 6) revealed that students in math had higher scores regarding their reasons for having motivation than those in English (p = .026), science (p = .018), and other subjects (p = .003). These mathematics students also report significantly lower scores on their individual causes for lacking motivation than those reporting about other subjects (p = .005). With regard to Teacher Motivating Characteristics, those students in math report that teacher motivating effectiveness is significantly higher than those reporting about English (p = .028) or other subjects (p = .018, Table 7). Interestingly, the only difference in student control is between math and other subjects (p = .003), with those responding about math reporting higher instances of student control.

Because our results revealed subject area differences, we investigated the extent to which these results held at the state-level. Dividing the sample by state and conducting separate subject-area tests of significance showed no significant differences on Student Motivational Outcome variables for students in either Indiana (Wilks' Lambda = .868, $F_{(9, 233.789)}$ = 1.556, p = .129, obs. power =.610) or

Table 4

School Differences in Dependent Variables for Data from Indiana and Colorado

	Indiana		Colorado	
Dependent Variables	Mean difference	*P*	Mean difference	*P*
Student Motivational Outcomes				
Success expectations	1.250	0.194	-0.563	0.707
Effort-engagement	5.547	0.180	3.477	0.561
Current Grade	**6.253**	**0.003**	-1.875	0.581
Student Motivational Characteristics				
Reasons for motivation	3.053	0.198	-1.110	0.788
Causes for lacking motivation	6.280	0.178	-2.767	0.715
Learning goals	**7.368**	**0.004**	-1.350	0.681
Performance approach goals	2.311	0.435	**5.550**	**0.042**
Performance avoidance goals	1.090	0.552	4.500	0.092
Perceived ability	1.005	0.703	0.683	0.826
Perceived value	**4.750**	**0.014**	3.633	0.134
Perceived competence	4.570	0.240	-1.217	0.784
Teacher Motivation Characteristics				
Teacher motivating effectiveness	1.406	0.557	5.936	0.036
Teacher motivating strategies	-0.536	0.868	6.128	0.150
Teacher control	1.306	0.596	7.000	0.080
Student control	3.304	0.012	2.359	0.143
Constraints	0.806	0.670	0.987	0.695
Teacher interpersonal style	-0.184	0.935	8.128	0.051

Note. Values in bold indicate statistical significance at the ά = .05 level. Mean differences for Indiana indicate subtraction of group means in the following way: School #1 minus School #2. Mean differences for Colorado indicate subtraction of group means in the following way: School #3 minus School #4. Apparent significant differences for student control in Indiana and teacher motivating effectiveness in Colorado are not in bold because the overall MANOVA did not indicate significant differences.

Table 5

Comparison of Student Motivational Outcomes for the Entire Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Success expectations	math	English	1.892	0.058
		science	1.043	0.271
		other	0.840	0.368
	English	science	-0.849	0.443
		other	-1.052	0.337
	science	other	-0.203	0.847
Effort-engagement	math	English	**9.919**	**0.016**
		science	0.563	0.885
		other	-1.757	0.648
	English	science	**-9.356**	**0.041**
		other	**-11.676**	**0.010**
	science	other	-2.320	0.593
Current grade	math	English	0.865	0.704
		science	-0.230	0.915
		other	-4.160	0.052
	English	science	-1.095	0.665
		other	-5.025	0.046
	science	other	-3.930	0.104

Note. Values in bold indicate statistical significance at the ά = .05 level. Mean differences are calculated by subtracting the mean score of Group 2 from score Group 1. The apparent significant difference for current grade between English and other courses is not in bold because the univariate test was non-significant.

Colorado (Wilks' Lambda = .862, $F_{(9, 221.621)}$ = 1.547, p = .133, obs. power = .605). There were also no significant differences in Student Motivational Characteristics between subject areas for either state (Indiana: Wilks' Lambda = .672, $F_{(24, 212.323)}$ = 1.299, p = .167, obs. power = .896; Colorado: Wilks' Lambda = .683, $F_{(24, 209.423)}$ = 1.224, p = .224, obs. power = .872). Teacher Motivating Characteristics showed no significant differences by subject area in Colorado (Wilks' Lambda = .806, $F_{(18, 232.416)}$ = 1.022, p = .436, obs. power = .683), but there were significant differences between subjects in Indiana (Wilks' Lambda = .675, $F_{(18, 212.617)}$ = 1.760, p = .032, obs. power = .934). Univariate follow-up tests revealed differences on teacher motivational effectiveness ($F_{(3, 80)}$ = 3.214, p = .027, partial η^2 = .108), positive teacher control ($F_{(3, 80)}$ = 3.583, p = .017, partial η^2 = .118), and teacher interpersonal style ($F_{(3, 80)}$ = 3.064, p = .033, partial η^2 = .103). Post hoc tests (Table 8) revealed that students responding about math reported higher ratings of teacher motivational effectiveness (p = .003), teacher control (p = .002), and teacher interpersonal style (p = .018) than did those responding about English. Those responding about science classes also reported higher teacher control (p = .010) and more positive teacher interpersonal style (p = .004) than those responding about English classes.

Summary of Subject Area Analysis

The whole-sample finding that students reporting on math classes reported overall more positive motivational characteristics than those reporting on other classes is consistent and surprising, because it contrasts with most of the research on motivation in rural schools analyzed by subject. Recent work in rural high schools in Oklahoma found *lower* overall motivation in math than other subjects (Hardré et al., 2009). The relative lack of subject-area differences by state leads us to conclude that the state-level differences in motivation are not an artifact of subject area differences, just as they do not result from school-level differences in perceptions and motivation.

Discussion

Three types of important differences emerged in this study. The first is relevant to the needs versus environment controversy in educational psychology. The second informs the question of rural generalizability and local uniqueness. The third raises questions about subject-level differences in motivation for rural students.

General Human Needs and Environmental Influences

Some theories in motivation assume homogeneity of relationships among variables based on the theoretical universality of human needs (e.g., Black & Deci, 2000). Other theories argue for the role of differential responses to environmental and contextual differences to produce varying motivational responses with different outcomes (e.g., Midgley, et al., 2001). Our model test included both frameworks in two phases, to see how theoretically similar needs might interact with contextual and environmental factors to influence engagement and achievement. The model fit best in phase one, the relationships of individual differences to personal motivational outcomes, but less well for perceptions of teachers and learning environments with their relationships to student outcomes.

Further, the distinction between effects from the first and second set of variables introduced underscores an interesting contrast. The individual differences from both states were consistent, and produced a more coherent and parsimonious model, but when the teacher factors and environmental perceptions were introduced, the model lost its parsimony. This difference seems to indicate an important difference between the homogeneity of effects from self-factors and more heterogeneity among effects from environmental perceptions. These findings contrast with previous studies, both rural (e.g., Hardré et al., 2009) and non-rural (e.g., Greene et al., 2004) that have found more parsimony across groups, within different states.

This contrast helps to underscore the validity of both theoretical perspectives and the interaction of the two. It also demonstrates where in the larger dynamic of school motivation the two frameworks converge and diverge. We see in this dynamic that while students perceive their teachers' practice to be similar, the individual ways that students interpret those similar environmental factors influence their motivational responses and consequent engagement (Schunk et al., 2007), which influences school achievement.

Though theoretically sound, this finding is counterintuitive. Much of the literature on learning environments has asserted that it is the characteristics of environments that are different, creating divergence in student responses. This analysis suggests that even when students perceive their learning environments as similar, their individual differences (and consequent interpretations) create differential responses.

Rural—Finding the Divergence

Much of psychological literature and theory argues for generalizability of human motivation across contexts (Ryan & Deci, 2000; Schunk et al., 2007). Some scholars, grounded in rural sociology tend to assume heterogeneity, and much of past rural research has argued for an entirely local perspective, based on the uniqueness of rural places and the potential influence of social, cultural, and geographic

Table 6

Comparison of Student Motivational Characteristics for the Entire Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Reasons for motivation	math	English	**4.562**	**0.026**
		science	**4.316**	**0.018**
		other	**5.215**	**0.003**
	English	science	-0.245	0.912
		other	0.652	0.761
	science	other	0.879	0.643
Causes for lacking motivation	math	English	-7.338	0.051
		science	-5.773	0.084
		other	**-8.936**	**0.005**
	English	science	1.565	0.700
		other	-1.598	0.684
	science	other	-3.163	0.373
Learning goals	math	English	0.576	0.796
		science	-0.184	0.926
		other	-0.526	0.780
	English	science	-0.760	0.754
		other	-1.101	0.638
	science	other	-0.342	0.873
Performance approach goals	math	English	-2.227	0.306
		science	-0.109	0.955
		other	0.305	0.868
	English	science	2.117	0.372
		other	2.531	0.269
	science	other	0.414	0.841

Table 6 (Cont.)

Comparison of Student Motivational Characteristics for the Entire Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Performance avoidance goals	math	English	-1.908	0.160
		science	-0.478	0.692
		other	-0.623	0.587
	English	science	1.429	0.334
		other	1.285	0.369
	science	other	-0.114	0.911
Perceived ability	math	English	1.822	0.403
		science	-0.730	0.706
		other	-0.762	0.679
	English	science	-2.522	0.283
		other	-2.580	0.260
	science	other	-0.032	0.988
Perceived value	math	English	0.855	0.598
		science	-0.521	0.718
		other	0.362	0.792
	English	science	-1.378	0.437
		other	-0.439	0.773
	science	other	0.883	0.567
Perceived competence	math	English	2.169	0.530
		science	-0.235	0.939
		other	-0.645	0.825
	English	science	-2.404	0.523
		other	-2.815	0.439
	science	other	-0.410	0.900

Note. Values in bold indicate statistical significance at the ά = .05 level. Mean differences are calculated by subtracting the mean score of Group 2 from the mean score of Group 1.

Table 7

Comparison of Teacher Motivating Characteristics for the Entire Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Teacher motivational effectiveness	math	English	**4.835**	**0.028**
		science	1.279	0.540
		other	**4.660**	**0.018**
	English	science	-3.557	0.142
		other	-0.175	0.939
	science	other	3.381	0.127
Teacher motivational strategies	math	English	4.213	0.169
		science	-1.276	0.662
		other	0.617	0.821
	English	science	-5.488	0.105
		other	-3.595	0.264
	science	other	1.893	0.539
Teacher control	math	English	3.346	0.193
		science	-1.936	0.456
		other	**5.831**	**0.017**
	English	science	-5.481	0.069
		other	2.285	0.424
	science	other	**7.767**	**0.005**
Student control	math	English	2.167	0.073
		science	1.606	0.164
		other	**3.221**	**0.003**
	English	science	-0.561	0.673
		other	1.054	0.406
	science	other	1.615	0.185

Table 7 (Cont.)

Comparison of Teacher Motivating Characteristics for the Entire Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Constraints	math	English	3.281	0.072
		science	0.081	0.963
		other	3.717	0.023
	English	science	-3.200	0.111
		other	0.436	0.819
	science	other	3.636	0.048
Teacher interpersonal style	math	English	3.002	0.278
		science	-3.082	0.243
		other	2.718	0.272
	English	science	-6.084	0.047
		other	-0.284	0.922
	science	other	5.800	0.038

Note: Values in bold indicate statistical significance at the ά = .05 level. Mean differences are calculated by subtracting the mean score of Group 2 from the mean score of Group 1. Four apparent significant differences are not in bold due to non-significant differences for the univariate tests.

Table 8

Comparison of Teacher Motivating Characteristics for Indiana Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Teacher motivational effectiveness	math	English	**8.938**	**0.003**
		science	3.993	0.126
		other	3.663	0.333
	English	science	-4.945	0.131
		other	-5.274	0.217
	science	other	-0.330	0.935
Teacher motivational strategies	math	English	7.385	0.074
		science	-0.009	0.998
		other	-0.782	0.881
	English	science	-7.394	0.104
		other	-8.167	0.169
	science	other	-0.773	0.890
Teacher control	math	English	**9.426**	**0.002**
		science	0.647	0.807
		other	4.192	0.279
	English	science	**-8.779**	**0.010**
		other	-5.233	0.231
	science	other	3.545	0.389
Student control	math	English	2.318	0.180
		science	1.642	0.278
		other	2.051	0.351
	English	science	-0.676	0.721
		other	-0.267	0.914
	science	other	0.409	0.861

Table 8 (Cont.)

Comparison of Teacher Motivating Characteristics for Indiana Dataset Based on Subject about which Participants are Reporting

Dependent Variables	Group 1	Group 2	Mean difference	*P*
Constraints	math	English	3.544	0.136
		science	1.819	0.381
		other	7.410	0.016
	English	science	-1.724	0.508
		other	3.867	0.258
	science	other	5.591	0.085
Teacher interpersonal style	math	English	**6.744**	**0.018**
		science	-2.332	0.343
		other	-0.048	0.989
	English	science	**-9.076**	**0.004**
		other	-6.792	0.095
	science	other	2.284	0.548

Note. Values in bold indicate statistical significance at the ά = .05 level. Mean differences are calculated by subtracting the mean score of Group 2 from the mean score of Group 1. One apparent significant difference is not in bold due to non-significant differences for the univariate tests.

context characteristics on individuals and subgroups (Howley, 2003; D'Amico et al., 1996). We assumed neither, given the evidence for both, across theoretical and contextual studies, and the demonstrated influence of both basic needs and environmental influences in education.

Evidence in this study supports a case for state-level differences in rural students' motivation, beyond local, community-level differences, and apart from more global shared human needs. Most data available for state-level differences focuses on achievement, rather than motivation, yet motivation functions as a bridge from educational experience to learning and consequent achievement. We acknowledge that the state-level significant differences here may, to a degree, reflect and overlap with regional differences that cannot be divided in our sample, but could be addressed in a future study. Given the diversity of states, we add the caveat that we are not asserting similar differences for all states, only observing that in this particular sample, we did find the significant contrast at that level. As we could find no such previous precedent, we report these findings, which may be replicated and extended in future studies.

The present study adds an interesting mid-level analysis of academic motivation, neither local nor global, but with focus on rural schools, divided at state lines. One might argue that it is no surprise to see differences in school motivation across state lines, as school resource allocation and policy are to some extent made at the state level. However, the data here add information on students' perceptions that preclude policy alone as an explanation. Though students were different, they described their teachers' motivating practices in similar ways, yet responded differently to them. This representation of the internal dynamic process of students' motivation leads us to a fresh interpretation and understanding of rural high school students' motivations and consequent needs. It informs policy and intervention design beyond the recognition that rural is different from non-rural, but also underscores that rural is not undifferentiated. The systematic parsing of data at multiple levels (whole-sample, state, and school), as we have done here, can help begin to answer the question of where the grey space of rural motivational differences might be defined.

Acknowledging Differences

School size is an important difference among rural schools and our schools in Colorado were significantly smaller than the schools in Indiana (IN: 719 & 295; CO: 172 & 28), in addition to being located slightly farther from urban centers. These smaller schools also had smaller student-teacher ratios which may affect teacher practice and consequent student perceptions of teaching and motivating strategies.

The literature diverges on the effects of school size. Benefits can be identified from greater resources and funding, attraction of highly qualified teachers, and more diverse and advanced courses, generally considered advantages of large schools (e.g., Haller, Monk, Spotted Bear, Griffith, & Moss, 1990; Lee, Smerdon, Alfelf-Liro & Brown, 2000; Yan, 2006). However, students also experienced achievement gains due to small class size, more teacher relatedness, and the lower incidence of violence usually prevalent in smaller schools (Fowler, 1995; Fowler & Walberg, 1991; Howley, 2002; Rural School and Community Trust, 2010). Additionally, both sets of characteristics may be further influenced (or confounded) by locale (e.g., rural vs. urban), resource issues (e.g., socioeconomic status), and elements of resource or policy-driven artificiality (e.g., school-within-school urban structures or rural multi-school consolidation) (Howley & Howley, 2004; Raywid & Schmerler, 2003). Overall, school size studies are difficult to align and compare due to differences in methods, outcomes and (somewhat ironically) definitions of "small" and "large" school size (Arnold et al., 2005).

Although these schools reflect the profile characteristics of the rural high schools in their own states, these factors were less similar across the between-state analysis. This may be seen by some as a limitation or confound in the comparison. Another difference between the school subsamples by state is their ethnic diversity, as the schools in Colorado have a higher percentage of ethnic minority students than those in Indiana (IN: 1%; CO: 23%). This difference, like that of school size, may have affected the state-level analysis to some degree. However, we chose to use the samples that reflected the state rural populations, rather than to introduce artificiality by controlling or selecting out these factors.

Nature of the Data

The present study used only quantitative data, which, in light of particular interest in local differences, may be seen as limiting. However, the quantitative data enhanced clarity of comparisons that enabled us to identify points of similarities and divergence on key motivational variables and outcomes. It provided the *what* and *how* of rural area differences, but not the *why*. To address that question, additional explanatory research is certainly indicated, utilizing rich qualitative data sources.

Implications for Future Research

Continued research on state-level differences is called for, including how these differences relate to theoretical assertions of the universality of human needs. Further research on the levels of difference in motivational profiles

among rural areas is of particular importance to the rural educational community. A focus of this research should be the role of classroom environments and teacher practice as they interface with local differences of culture and the perceptions of various student subgroups. Such research should include additional detail of the effects on school engagement, achievement, and aspirations.

Addressing the subject-area differences in motivation indicated by this and previous research is clearly called for, given the contrasts in findings. The U.S. government has emphasized math and science subject areas, along with rural schools, as targets for educational improvement and is allocating vast resources to these concerns. Research can help develop a more thorough, contextually-sensitive understanding of how rural high school students perceive and engage in math and science classes, and how their postsecondary aspirations link to their school investment.

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