

The Rural Context and Post-Secondary School Enrollment: An Ecological Systems Approach

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This study uses an ecological systems framework to examine how indicators of individual, family, and school contexts are associated with post-secondary educational enrollment among a sample of rural youth. Structural equation modeling allows us to examine both direct and indirect effects of these contexts on school enrollment. Unique elements of the rural context lead us to expect associations between the family and school contexts and post-secondary school enrollment that differ from prior studies of urban youth. Findings of the current study are that: 1) contrary to existing studies of urban youth, indicators of family income and relationship with parents have only a small significant association with post-secondary school enrollment; 2) indicators of the school context have strong direct associations with student grades, aspirations, and self efficacy; and 3) the school context is a strong mediator in predicting post-secondary school enrollment. Implications for the existing research literature are discussed.

Over half of the school districts in the United States are located in rural areas, approximately one third of schools themselves are rural, and over 20% of the nation's students are educated in rural schools (Provasnik et al., 2007). In addition, rural schools overall are experiencing enrollment growth while non-rural schools overall are experiencing a decline, and Pennsylvania ranks sixth in the population of students attending rural schools (Johnson & Strange, 2008). These enrollment demographics underscore the significance of the number of youth attending rural schools in Pennsylvania and elsewhere. One unfortunate distinguishing feature of rural students is their longstanding trend of lower educational aspirations, achievement,

and attainment compared to youth in other residential areas (Beaulieu, Israel, & Wimberly, 2003; Blackwell & McLaughlin, 1999; Gibbs, 2004; Lichter, McLaughlin, & Cornwell, 1995; Provasnik et al., 2007). Lower rural educational outcomes may be due in part to certain resource deficits shared by schools located in rural communities.

These resource deficits include a high number of students who are in poverty, district financial distress, and tough competition for highly qualified teachers (Jimerson, 2003; Johnson & Strange, 2008; Roscigno, Tomaskovic-Devey, & Crowley, 2006). Unique rural family contexts may also play an important role. Whatever the causes of lower rural educational outcomes, individual well-being is impacted by educational achievement, as is the well-being of rural communities since economic development requires a well trained and educated work force (Barkley, Henry, & Li, 2005; Dwyer & Findeis, 2008; Gibbs, 2004; Howley, Harmon, & Leopold, 1996; Lyson, 2005). For these reasons, it is important to understand the factors that lead to post-secondary educational enrollment among students who have attended rural high schools. The process of how family, school and individual characteristics influence post-secondary school enrollment has received little attention

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when it comes to rural youth. Our findings will add to the literature by focusing on a rural sample.

For this research, we utilize structural equation models to investigate predictors of rural youth post-secondary school enrollment one year post high school. Education is a process that involves more than the influence of schools, and for that reason this study uses an ecological systems framework to examine post-secondary school enrollment among a sample of rural youth. Within this framework we focus on how family characteristics, school context, and individual factors relate to student enrollment. Structural equation models identify the direct, as well as the mediating, or indirect, processes that lead to post-secondary school enrollment. Specifically, we examine the relationships among: 1) family characteristics including parental income, parental education, and youth bonds to their parents; 2) student perception of their school of climate, and; 3) individual characteristics including self efficacy, student grades, educational aspirations, and gender in predicting post-secondary school enrollment. We begin by summarizing the existing research focusing on the relationship of family, school and individual contexts on achievement and attainment. We also include a discussion of how the complex nature of rural issues may influence rural youth's post-secondary school enrollment differently from youth overall.

The Influence of Families, Schools, and Self

In this paper, we draw on ecological systems theory to guide our research. The ecological systems framework emphasizes the multiple contextual influences on human development and behavior (Bronfenbrenner & Morris, 1998; Conger & Elder, 1994; Scaramella & Keyes, 2001). These multiple contexts include characteristics inherent to the individual as well as family, peer, school, and community settings that influence individual development (Bronfenbrenner, 1979). Using the ecological systems approach is especially important in studying the ecology of education, and how individuals perceive various contexts that influence their performance (Bronfenbrenner, 1976). It is important to understand how these multiple contexts relate to youth development and outcomes (Elder & Conger, 2000). This study considers the roles of family, of schools, of the individual and of the rural context in conjunction to document influences on youth's college enrollment.

The Role of Family

Aspects of the family context are important determinants of post-secondary school enrollment. Two key factors are parents' socioeconomic status and youth bonds or relationships to their parents. Consistent with human capital

theories of family investment, youth from more advantaged families aspire to and attain higher levels of education (Becker & Tomes, 1979, 1986; Ma & Klinger, 2000; Mayer, 2001; Sewell, Haller, & Ohlendorf, 1970). Single parents make these same investments in youth education when they have high levels of educational attainment, occupational status, and income (Biblarz & Raftery, 1999; Bogguss, 1998). Higher levels of parental income in particular are strongly associated with young adult post-secondary school attainment (Blanden & Gregg, 2004), and higher levels of parental education are also related to youth college attendance (Chenoweth & Galliher, 2004). The indirect association between parents with high levels of education and youth college attendance occurs through the transmission of values towards post-secondary education that translates to encouragement and expectations for their youth to attend college (Davis-Keane, 2005; Melby, Fang, Wickrama, Conger, & Conger, 2008). Parents with goals and expectations that support post-secondary education are more likely to have children who enroll in post-secondary institutions (Kim & Schneider, 2005). Moreover, parents with higher levels of income tend to be more actively involved in their children's schooling, which is also associated with later post-secondary school enrollment (Cabrera & LaNasa, 2001). Thus, we expect that parents with higher education and higher incomes are more likely to have youth enrolled in post-secondary school.

The relationship between the parent and child may mediate the relationship between parent's income and adolescent schooling. Also, the parent/adolescent relationship may have a direct effect on adolescent college enrollment. Having a bond with or an attachment to parents is important to development across the life span (Ainsworth, 1989; Rossi & Rossi, 1990), and affective bonds with parents continue to be important through adolescence (Greenberg, Siegel, & Leitch, 1983). Positive bonds or attachment to parents in adolescence include characteristics that allow for developing autonomy such as parents that accept their children's decisions and who will provide advice and support in the decision making process. Attachment also includes maintaining affective and close ties with parents, recognizing the importance of parents, and looking to parents as role models (Armsden & Greenburg, 1987; Kenny, 1987; Scharf & Maysel, 2007). Adolescents have better outcomes overall when parenting is supportive (Amato & Fowler, 2002), and warm and supportive parent-adolescent bonds provide young adults with support needed when making important life decisions about educational and occupational goals (Hossler, Schmit, & Vesper, 1999; Kenny, Blustein, Chaves, Grossman, & Gallagher, 2003; Kenny et al., 2007; Rossi & Rossi, 1990). Positive parent-adolescent attachments contribute to academic achievement (Hair et al., 2005) and adolescents who are receptive to

and report high levels of parental support and attachment are more likely to finish high school and attend college (Bell, Allen, Hauser, & O'Connor, 1996). The absence of strong emotional bonds with families correlates with diminished academic performance (Crosnoe, 2004). Family socioeconomic status due to low-income or poverty status may mediate parental bonding due to life stressors that make maintaining healthy and supportive relationships difficult (Allen, Boykin, McElhaney, Kuperminc, & Jodi, 2004; Kaiser & Delaney, 1996).

Thus, in accordance with an ecological systems framework, we expect both direct and indirect associations between parents' socioeconomic status and parental bonding, and post-secondary school enrollment. Direct associations result from the effect of parents' educational attainment, parents' income, and parental bonding on children's educational attainment. Indirect associations result from the effect of parents' education or income on children's educational attainment, mediated by parental bonding.

The Role of Schools

The high school context is also directly associated with future educational outcomes. Student perception of school climate is especially important to academic achievement outcomes. When students feel that their teachers care about them and when students and teachers get along well, student academic achievement improves (Crosnoe, Johnson, & Elder, 2004; Stewart, 2008). Student reports of positive student-teacher relationships are also correlated with lower drop-out rates (Lee & Burkam, 2003). In addition, schools with supportive and caring teachers are more likely to have students that like school or feel attached to school (Hallinan, 2008), which is further associated with better grades and academic motivation (Roeser, Midgley, & Urdan, 1996; Sánchez, Colón, & Esparza, 2005; Smerdon, 2002). A positive school climate where students get along with their teachers and students feel cared for by their teachers can even at times substitute as a supportive social environment necessary for fostering academic motivation and academic growth when youth come from non-supportive home environments that may increase educational withdrawal (Crosnoe, 2004; Masten & Coatsworth, 1998; Pianta & Walsh, 1996). Although prior research identifies the positive association between supportive school climates and academic achievement, there has been little discussion on how these factors relate to postsecondary enrollment, an association that is explored in this study. We expect that just as supportive school climates relate to better grades and higher achievement, a supportive or positive school climate will lead to students' greater likelihood of continuing their post-secondary education. The relationship between school climate and post-secondary college enrollment may be

an indirect effect through the effect of school climate on youth's high school achievement or GPA.

The Role of Self

In an ecological systems framework, individual characteristics are important. This certainly holds true when researching educational outcomes, as student perceptions and attitudes toward their learning can be a strong predictor of their educational success (Bandura & Locke, 2003). The process of self-efficacy or the belief or perception of one's own ability leads to well-being and achievement, goal planning, and actions towards attaining goals (Bandura, 1994, 1997; Miller & Brickman, 2004; Ryan & Deci, 2000). Students with high self-efficacy are less likely to drop out of high school and more likely to do well academically (Caprara et al., 2008). When poor self-efficacy is present, well-being and educational attainment are at risk (Bandura, 2001; Maddux, 2002; Schwan & Sklofske, 1999).

Youth who have a sense of academic self-efficacy are also more likely to have higher educational and occupational aspirations, and achieve higher grades (Bandura, 2001). Having aspirations for a college education and having high grade point averages predict college attendance (Eccles, Vida, & Barber, 2004). This may suggest a process whereby youth with high educational aspirations are more likely to act upon their goals first by achieving higher grades while in high school and then by following through with their academic aspirations (Fuligni & Witkow, 2004). Parental expectations for youth college attendance has also been found to increase student educational aspirations (Garg, Kauppi, Lewko, & Urajnik, 2002; Hill et al., 2004; Israel, Beaulieu, & Hartless, 2001), and may be a mediating factor influencing college enrollment that is not a process of self efficacy. We hypothesize that the effect of self efficacy on post-secondary school enrollment operates indirectly through school grades and educational aspirations. We also theorize that parental expectations are important for student educational aspirations, emphasizing the need for a path analysis in this study. Finally, gender is also a characteristic that relates to college enrollment. Males were once more likely to be enrolled in college; but, the gender gap has recently reversed with more women attending college than men (Hauser, 1993; Jacob, 1996). Therefore, we also include gender in this analysis as an exogenous variable.

Rural Complexity

The ecological framework also considers characteristics of the local community, beyond the individual, family and school. This analysis focuses on rural places in particular. The aspirations and future plans that students develop through high school are strong predictors of their actual

attainment (Blackwell & McLaughlin, 1999; Tabachnick, Miller, & Relyea, 2008). For rural youth, family factors may be especially important to post-secondary school attainment, and the association between family context and post-secondary school enrollment may operate differently. Although declining over time, a larger share of rural youth live in two parent families compared to their urban counterparts (McGranahan, 2001; Snyder & McLaughlin, 2004). The higher proportion of two parent families in rural areas should promote better educational outcomes. However, because rural two parent families have lower income and higher poverty rates than two parent families in other areas (Snyder, McLaughlin, & Findeis 2006), they may not provide the same benefits for children. Rural families often experience persistent poverty (Duncan, 1999; Jolliffe, 2004) and are as likely to be in poverty and have similarly limited educational attainment as those in central cities (Snyder & McLaughlin, 2004). Rural children similarly have a greater likelihood of living in poverty than metropolitan youth (Lichter & Johnson, 2007; O'Hare & Savage, 2006). Occupational status, an important element of socioeconomic status, is lower for rural families and is also closely related to rural poverty (Tickamyer & Duncan, 1990). A struggling economy with declining manufacturing jobs, service jobs on the rise, employment in part-time and varied hour jobs and persistent unemployment and underemployment also contribute to rural disadvantage (Cotter, 2002; Findeis, Rauniyar, & Hsu, 1996; Jensen, Findeis, Hsu, & Schachter, 1999; Jensen & Slack, 2003; Kusmin & Parker, 2006; McLaughlin & Coleman-Jensen, 2008). Increasing the education levels of rural community residents has been one strategy to improve community economic well-being even though the returns to investments on education fall behind that of urban communities. Despite the sometimes small returns to investments in education, education at an individual level decreases the risk of poverty and inadequate employment. It is important to focus specifically on the school enrollment of *rural* youth as both youth and their communities as a whole try to further educational achievement and attainment as a potential economic strategy.

Parent/child relationships may differ across residence, apart from differences associated with family structure and the economic context. Parenting practices in rural areas have been described as more likely to be traditional and autocratic (Stewart, Gavazzi, McKenry, & Sheidegger, 2001). Rural youth have higher risk of conflict with parents, worse relationship quality with parents, and receive less parental monitoring compared to youth from urban areas (Sharp, Caldwell, Graham, & Ridenour, 2006; Spoth, Goldberg, Neppl, Trudeau, & Ramisetty-Mikler, 2001). We know less about rural youth bonds or attachment to parents compared to urban youth, although the relationships with their families

tend to be more traditional and interdependent (Conger & Elder, 1994) with strong kin social exchanges (Hofferth & Iceland, 1998). Nonetheless, for rural youth, attending college often means a major move away from the parental home (Elder, King, & Conger, 1996; Glendinning, Nuttal, Hendry, Kloep, & Wood, 2003; Rojewski, 1999). Although part of normal adolescent development is to become autonomous and independent from parents physically and emotionally (Arnett, 1998; Blos, 1979; Erikson, 1963, 1968; Molgat, 2002; Zimmer-Gembeck & Collins, 2003), achieving autonomy does not necessarily mean that youth want to move a long distance away from the parental home, especially when they are closely attached with their family (Elder et al., 1996; Kirkpatrick-Johnson, Elder, & Stern, 2005; Spilimbergo & Ubeda, 2004). Although rural youth may leave home earlier than their urban counterparts, their moves are often not far from their parents' place of residence (Donaldson, 1986; Garasky, 2002). Hektner (1995) found that decisions toward autonomy cause conflict for rural youth when they must decide between their educational goals, which often involve moving away from their home community, or staying close and maintaining family ties. Therefore, we expect that a high level of parental bonds may hinder rather than encourage post-secondary school attainment for rural youth.

The overall purpose of schools is to promote academic achievement as well as to prepare youth to meet their future aspirations and to become productive and successful contributors to the economy. Current educational mandates require that public schools focus on complying with national educational standards that promote academic achievement (Renzulli & Roscigno, 2005). In addition to meeting educational standards set by governmental mandates, rural schools also face the challenge of helping maintain and improve the economic viability of local communities (Miller, 1993), perhaps more so than urban and suburban schools. The lack of other educational resources in many rural communities places the responsibility of building the human capital necessary to fulfill local employment needs with rural schools (Flora, Flora, & Fey, 2004). Rural schools often also serve important social and cultural functions for the community, providing a place for athletic, cultural, and social events (Lyson, 2005). Perhaps because of the multiple purposes of rural schools, they have traditionally been partners (along with church and family) in establishing norms and standards of behavior that promote attachment (Peshkin, 1978). The relationship between school climate and youth's college enrollment may be especially important in rural places where schools are often a central feature of the community.

Finally, characteristics of rural youth may differ from youth in other areas. One important difference is that rural youth's educational aspirations tend to be lower than those

of youth from other areas (Haller & Virkler, 1993; Hu, 2003). In addition to the lower educational aspirations, rural youth also have lower educational achievement (Roscigno et al., 2006) and attain less education than youth from other residential types (Roscigno & Crowley, 2001). It does not appear that rural youth academic self efficacy varies much compared to youth from urban areas (Yang & Fetsh, 2007) and, similar to trends overall, rural females are more likely to attend college than rural males (Wilson, 2007).

In sum, we expect that each of these contexts (family, school, and individual) will influence post-secondary school enrollment in accordance with the ecological systems framework. We use structural equation models to document the complexity of these relationships with school enrollment, and to identify direct and mediating influences. We begin with a description of the data and an explanation of how the factors reviewed above are operationalized in the analysis.

Data and Methods

This research uses panel data from the Rural Youth Education (RYE) study. The RYE study examines factors that contribute to educational, occupational and residential aspirations and outcomes among a sample of rural Pennsylvania youth. RYE is an on-going study that in its entirety will follow two cohorts of rural adolescents—a younger and older cohort—over an eight year period and collect four waves of data. This study uses data from the first two waves of the 11th grade (older) cohort. The first wave was collected when the older cohort was in the 11th grade during the spring of 2005, and the second wave was collected when the older cohort was one year out of high school, during the spring of 2007. The respondents were recruited from ten rural school districts in Pennsylvania in 2005.

Sampling Procedures

The sampling goal for the RYE study was to select a representative sample of rural Pennsylvania school districts that would yield a sample of approximately 1,500 rural Pennsylvania students, 750 each in the 7th and 11th grades. The procedures included four main steps. First, 243 rural school districts were identified that the National Center for Educational Statistics considered “rural” based on the U.S. Census Locale Codes of six or higher. Second, we considered regional representation of these 243 school districts across Pennsylvania’s 10 regions: Central, Northwest, South Central, Southern Allegheny, Northern Tier, North Central, North East, South West, Lehigh Valley, and South East. An initial review of the geographical distribution of Pennsylvania’s rural school districts revealed that the Lehigh Valley and South East regions contained

very few rural districts, and the rural districts that do exist in those regions are mostly surrounded by urban places. These two regions were thus eliminated from the sampling population, which resulted in a total of 227 rural school districts from which the RYE sample of school districts was drawn.

Third, secondary data from 1990 and 2000 U.S. Census School District Files and the 2003 Common Core Data from the National Center for Education Statistics were analyzed to develop a typology of rural places in Pennsylvania that considered family poverty levels, educational attainment of the adult population, and population change between 1990 and 2000. School district level census data were used to calculate median values for family poverty, the proportion of the population with a high school education, and the percent of population change between 1990 and 2000. Districts with family poverty values above the median for the state as a whole were categorized as “high poverty;” those with values below the median for the state as a whole were categorized as “low poverty.” A similar categorization scheme was used to categorize districts as “high” and “low” education and population change. Using these median values as a guide, an eight category typology was developed for all rural Pennsylvania school districts.

Next, a list of 30 potential sample school districts was randomly generated from the population of 227 rural Pennsylvania districts across regional location and within the eight place typology categories. If the schools initially selected were not distributed across geographic regions, the next school on the list was selected. If schools contacted for inclusion declined to participate, then a school from the same category (and region, if possible) was selected as a replacement. Because the school districts and students were not distributed equally across the school type categories, a stratified sample was used to ensure that at least one school district was selected from each category. The Pennsylvania Association of Rural and Small Schools (PARSS) was contacted to help prioritize the list, as were the county extension directors in each county where a selected school district was located. The final sample included 1,536 7th and 11th grade students (844 in the 7th grade and 692 in the 11th grade) enrolled in the 10 randomly selected rural Pennsylvania school districts during the 2004/2005 school year. Analyses in this study are restricted to the 11th grade cohort.¹

¹Data from the 2004/2005 NCES Common Core Local Education Agency School District Files were used to compare the RYE sample of school districts to all other rural school districts in Pennsylvania that year. Several school district indicators were examined (IEP students, total teacher FTEs, total secondary teacher FTEs, diplomas granted, and total number of students), and one-way ANOVA analyses found no significant differences between the RYE school districts and the rest of the rural Pennsylvania school districts (analyses not shown, available upon request).

Data Collection Procedures

The wave 1 RYE data was collected via an in-school survey and the sample includes 692 of the 942 eligible respondents in the 11th grade, resulting in a wave 1 response rate of 78% of all 11th grade students in the 10 districts. Weighted analyses make these students representative of the population of 11th grade students in rural Pennsylvania school districts in the 2004/2005 school year.² Wave 2 data collection for the older cohort was achieved by surveying the wave 1 RYE sample mostly via a mail survey. The first wave of data was collected in school so all responses were paper. Wave 2 data was recorded as being completed by paper (mail or phone), or alternatively the students were given the option to complete the survey through the web. Those completing paper surveys totaled 62.9%, and those completing the web totaled 37.1% of the sample. The final wave 2 data includes 381 respondents. The older cohort panel data includes 316 respondents who participated in both waves 1 and 2. This represents a panel response rate of 46.8%. The low panel response rate was due to difficulties in tracking the students after leaving high school. To address this, panel weights are applied to account and correct for sub-group differences in the panel response rate.³ In addition, to determine whether there were differences in the participants as a function of response format in relation to the variables included in the study an analysis was completed.⁴ Thus, the sample for this study consists of the 316 older cohort respondents who completed surveys at both waves of data collection.

Measures

Outcome Variable

Post-secondary School Enrollment (*Enroll*) is the outcome variable and is based on respondent self reports of

²Weighting is required because the RYE sampling frame was initially stratified into subgroups based on school district typology and geographic representation. Data from the Pennsylvania Department of Education were used to determine the probability that a particular student in a school would be included in our study, based on the number of students enrolled in the 11th grade across the eight school district types. An individual weight was calculated for each student by dividing the percentage of all rural 11th grade students in each category by the percentage of rural 11th graders in our sample in the same category. This method adjusts for distributional differences of our 11th grade sample across the school district type categories, and thus, weighted analyses make the RYE sample representative of the 11th grade students in rural Pennsylvania school districts during 2004/2005 (see Appendix A for analyses and details). In addition, although item non-response was less than 5%, to compensate for missing data and improve the accuracy of the analysis, missing data were imputed using a single imputation Markov Chain Monte Carlo method.

what their educational status was at the time of the wave 2 survey. In wave 2, students were asked “Are you currently attending or enrolled in an academic or trade/technical school?” They could select from “I am not currently enrolled in school,” “high school or GED program,” “community college,” “4-year college,” “graduate school,” “professional school,” “technical school or licensed trade program.”⁵ Students were also asked if they dropped out of school and responded either yes or no. The students who responded yes and who are not currently attending a GED program are included in the “I am not currently enrolled in school” category. The dependent variable “*Enroll*” is created by collapsing responses into three categories. Students who selected “not currently enrolled” or “high school or GED program” were coded to represent high school or less. If students selected “community college,” “technical school or licensed trade program” or “professional school,” the responses were coded to represent “two-year college”. Finally, if students reported “four-year college” or “graduate school” these responses were coded to represent “four-year college”. Enrollment is an ordered endogenous variable, where high school or less is the lowest value and “four-year college” is the highest value. It is common in the social sciences to use categorical variables in path analysis, although this requires assumptions of normality (Olobatuyi, 2006). A similar use of “enrollment” as an outcome variable is used by Roney and Wolfe (2000) in their research modeling predictors of enrollment post high school. Teachman (1987) uses similar measures of enrollment in a path model researching how family background and educational

³To address differences between respondents and those lost to attrition we conducted an analysis of the difference in the mean or distribution between those who responded in wave 1 and 2 and those who responded only to wave 1 on all independent variables included in the study. Significant differences were found among four of the variables included in the study. More students who responded in both waves have parents with four years of college, compared to those who responded to wave 1 only. More students who responded in both waves aspired to four years of college or more, compared to those who responded in wave 1 only. Students who responded in both waves were more likely to feel their school was safe and that discipline and rules in their school are fair, compared to students who responded to the survey in wave 1 only.

⁴A test to determine if the mean or distribution was significantly different by whether students responded by paper or web survey was analyzed for each of the independent variables. There was only one variable with a significant difference between paper and web survey methods, and this was student perceptions that discipline and rules are fair ($p=.01$). In addition, there was no significant difference between paper and web survey methods and how students responded to their enrollment at wave 2.

⁵Appendix B describes the distribution of the dependent variables before and after they are collapsed. Frequencies by gender are also provided.

resources predict educational attainment, and their measure also includes those currently enrolled as well as those who have completed their post-secondary education. Latent and independent variables are described next and all are drawn from the wave 1 survey.

Latent and Independent Variables

School Climate ($S_{climate}$) is a six-item latent construct that measures student perceptions of their high school climate. Items include “The students get along with the teachers (S_{galong}),” “Discipline and rules are fair (S_{fair}),” “Most of my teachers care about me (T_{care}),” “I like school (S_{like}),” “The parents are involved in the school (P_{inv})” and “I feel safe at school (S_{safe}).” The items are scored using a Likert scale of 1 (strongly disagree) to 4 (strongly agree), and a higher cumulative score indicates a more positive school climate. A reliability test using Cronbach’s alpha resulted in a score (.74) that identified the scale’s potential as a latent construct in the path model.

Parental Bonding (P_{bond}) is a five-item latent construct measuring adolescent attachment with their parents. Items included in the parental bonding scale are “I turn to my parents for advice and support (P_{adv}),” “My parents are important to me (P_{imp}),” “I feel close to my parents (P_{close}),” “When I am an adult I want to be like my parents (P_{like}),” and “My parents accept me no matter what I do (P_{acc}).” The response scale ranges from 1 (strongly disagree) to 4 (strongly agree), and a higher cumulative score indicates a stronger bond with parents. A reliability test using Cronbach’s alpha resulted in a score (.88) that identified the scale’s potential as a latent variable in the path model.

Parental Income (P_{inc}) is a proxy measure based on student responses to the question “My family can afford the things that other families can buy.” Students selected from a four-item scale ranging from strongly disagree to strongly agree. It is treated as a continuous variable in this study.

Parental College Education (P_{coll}) is a dummy variable created from responses to the questions: “How far did your mother (father) go in school?” The responses are collapsed from four educational categories: less than high school, high school, some college, and college graduate. The responses of both parents are combined in the following manner: if the father or the mother has a four year college education or more, then $P_{coll}=1$. All other responses equal 0.

Parental College Expectation (P_{expect}) is a variable indicating students’ perceptions of their parents’ expectations for them to attend college. Respondents were asked “How disappointed would your father (mother) be if you didn’t

graduate from college?” The responses ranged from 1 (not disappointed) to 4 (very disappointed). Student perceptions of mother or father disappointment are combined in the following manner: If the mother and/or the father would not be disappointed, then $P_{expect}=1$; if the mother and/or the father would be a little disappointed then $P_{expect}=2$; if the mother and/or the father would be disappointed then $P_{expect}=3$; if the mother and/or the father would be very disappointed then $P_{expect}=4$.

Gender is a dummy variable where female (0) is the reference category and male is modeled (1). *College Aspirations* (Edu_{asp}) is the response students reported to the item “how far do you want to go in school?” Students selected from one of five categories including “I don’t want to finish high school,” “I want to graduate from high school,” “I want to go to vocational/trade/business school,” “I want to attend a 2-year community college,” or “I want to go to a 4-year college or more.” These responses are collapsed into three educational aspiration categories: high school or less, 2-year community college or technical/trade school, or four years of college or more.

High School Achievement (GPA) is the student self report of grades. Students were asked “What kind of grades did you get last year?” and the response categories range from 1 (mostly A’s) to 9 (mostly D’s and F’s). For ease of interpretation, the order of grades are reversed so that 1 equals a low grade (mostly D’s and F’s) and 9 equals a higher grade (mostly A’s).

Self Efficacy ($Self_{eff}$) is a proxy measure constructed from student responses to a question on barriers that would prevent them from going to college. Response categories “I’m not smart enough” and “I don’t have good enough grades” are combined to create a proxy for self efficacy. If students indicated either of these responses as a barrier to college enrollment, they are defined as having poor self efficacy. For this study, 1 represents positive self efficacy and 0 equals poor self efficacy and is the reference category.

Analytic Plan

Descriptive analysis, confirmatory factor analysis (CFA), and structural equation modeling (SEM) were used to address the research questions. Our analyses proceeded as follows. First, descriptive analyses provided information about the sample including correlations, means, standard deviations, skew and kurtosis values for all the variables in the study. Next, using Amos 17.0, we conducted SEM that consisted of two parts. First, analysis of the measurement model (CFA) of parental bonding and school climate was estimated. Following CFA analysis, we added individual level covariates to estimate a full SEM model predicting

post-secondary school enrollment. Prior to analyses, we imputed missing data due to item non-response (less than 5% in this study) using a single imputation data set.⁶ We handled sample attrition in two ways. First, for the descriptive analysis, the mean and standard deviations were calculated using weighted data. AMOS SEM analysis does not allow for use of weights. However, we avoided biased estimates by including independent variables that might account for disproportionate sample attrition in the models (Johnson, 2008).⁷

SEM analysis incorporates validation of the measurement (latent construct) model for parental bonding and school climate with the proposed structural path model of post-secondary enrollment (Kline, 2005). This results in a full model fitting process. In addition, using SEM reduces measurement error, and efficiently estimates mediating (indirect) pathways among predicting variables (Byrne, 2001), which we expect when estimating a model predicting post-secondary school enrollment. Although regression models can adequately model mediating variables, it is often a cumbersome additive method, whereas AMOS graphic capabilities enable a visual representation of the SEM direct and indirect relationships in a single model. Also, SEM models are more appropriate for estimating models with both observed and latent variables, than are regression models (Kline, 2005). In choosing SEM as a modeling strategy, particular data assumptions are necessary and are met by our study. The outcome variable is an ordered categorical variable and the sample size is adequate (N=316).⁸ Variables used in the parental bond and

school climate latent constructs are based on a four point Likert scale that have an underlying ordinal assumption also required for SEM. In addition, both latent constructs have more than the recommended minimum of indicators (Giles, 2002). The data also meet criteria for multivariate normality.⁹ Because data normality is assumed, maximum likelihood estimation is appropriate and is used for this study.¹⁰ However, even small departures from normality can bias results, and we use a Bollen-Stine bootstrap estimation to confirm the goodness of fit.¹¹ Finally, we use common fit criteria to report goodness of fit.¹²

Results

Descriptive

Table 1 presents the means, standard deviations, Pearson correlations, skew, and kurtosis values for the variables in the study. (Variables are listed in the order they are discussed in the measures section.) With the exception of gender and student perceptions of their parents accepting them as they are (*P_acc*), all variables are significantly associated with student post-secondary school enrollment (*Enroll*). The table also shows that indicators included among the latent parental bonding construct (*P_adv*, *P_like*, *P_acc*, *P_close* and *P_imp*) are significantly related to each other as are the indicators in the latent school climate construct (*S_galong*, *P_inv*, *T_care*, *S_like*, and *S_safe*). The indicators of both latent constructs are also inter-correlated providing initial

⁶The SAS imputation procedure uses a Markov Chain Monte Carlo (MCMC) method that assumes multivariate normality, and a single imputation was used for this study as the fraction of missing was minimal and can provide reasonable results (Schafer, 1997).

⁷Variables used to create the attrition weight include gender, student self reported grades, and student educational aspirations and these variables are also included in the SEM model to reduce bias.

⁸Methods suggested to handle categorical variables that are non-normal include using an asymptotic distribution free (ADF) estimator (Muthén, 1993). However large sample sizes of 1000 or more are suggested for this method and not always possible. As we discuss in our methods section, we make every effort to account for the nonnormality of the data including using maximum likelihood estimation (MLE), and using a Bollen-Stine bootstrap estimation to confirm the results. AMOS 17.0 has a version of ADF estimation that we explored but opted not to use. We made this decision for two reasons. Initially we were concerned our sample size did not meet standards for ADF. In addition, when we compared the ADF bootstrap with the MLE bootstrap distributions the MLE method had a lower mean discrepancy, as well as a smaller standard error indicating it as a better estimation method (Arbuckle, 2007). The results of the ADF bootstrap did also confirm a good model fit so we are confident that the MLE method was adequate.

⁹Normality tests and fit index criteria that are widely accepted are used in this study. Tests for normality include skew and kurtosis normality checks. Univariate skew values between -2 and 2, and univariate kurtosis values between -7 and 7 are evidence that the data fall within an acceptable normal distribution range (Curran, West, & Finch, 1996).

¹⁰Maximum likelihood estimation can be quite robust unless variables are highly skewed or kurtotic (Muthén & Kaplan, 1985) and can handle measures that depart from normal distribution (Bollen, 1989; Jöreskog & Sorbom, 1989; Schumacker & Marcoulides, 1998).

¹¹The Bollen-Stine bootstrap transforms the raw data matrix so that the covariance structure matches the model-implied covariance matrix, and provides an adjusted p-value for the model fit (Bollen & Stine, 1992).

¹²Model fit statistics include the likelihood ratio chi-square and Bollen-Stine chi-square, with the criteria that a model with a chi-square $\leq .05$ be rejected. A second fit measure reported is the comparative fit index (CFI) and considered acceptable when the value is $\leq .95$ (Hu & Bentler, 1999). The CMIN/DF fit statistic is the sample discrepancy divided by the degrees of freedom and is referred to as the normal chi-square, and values close to one indicate a good fit (Carmines & McIver, 1981). The final measure used to determine the model fit is the root mean square error of approximation (RMSEA) and a value of less than .05 is accepted (Browne & Cudeck, 1993).

Table 1

Correlations, Means, Standard Deviations, Skew and Kurtosis Statistics for Study Variables

	Enroll									
Enroll (Outcome)	1.00									
S_Climate constructs										
S_galong	0.14	1.00								
S_fair	0.20	0.27	1.00							
T_care	0.22	0.35	0.34	1.00						
S_like	0.17	0.28	0.29	0.22	1.00					
P_inv	0.13	0.14	0.36	0.26	0.20	1.00				
S_safe	0.21	0.24	0.32	0.52	0.40	0.31	1.00			
P_Bond constructs										
P_adv	0.17	0.13	0.28	0.32	0.31	0.23	0.22	1.00		
P_imp	0.17	0.06	0.15	0.25	0.19	0.20	0.14	0.64	1.00	
P_close	0.13	0.09	0.22	0.29	0.21	0.19	0.23	0.70	0.73	1.00
P_like	0.21	0.11	0.23	0.23	0.25	0.17	0.16	0.68	0.55	0.68
P_acc	0.19	0.07	0.16	0.34	0.21	0.19	0.23	0.56	0.59	0.55
Parent characteristics										
P_inc	0.15	0.11	0.03	0.12	0.06	0.06	0.20	0.15	0.13	0.18
P_coll	0.22	0.07	0.07	0.02	0.00	0.03	0.01	0.15	0.04	0.10
P_expect	0.11	0.03	-0.01	0.05	-0.01	-0.04	0.05	-0.03	-0.01	0.01
Individual characteristics										
Gender	0.06	-0.04	-0.02	-0.03	-0.09	0.00	-0.01	-0.02	-0.05	0.05
Grades	0.50	0.18	0.24	0.27	0.30	0.07	0.18	0.26	0.27	0.20
Self_eff	0.25	0.13	0.13	0.20	0.22	0.12	0.13	0.13	0.16	0.10
Edu_asp	0.54	0.18	0.19	0.30	0.33	0.21	0.19	0.16	0.19	0.10
Mean/proportion ^a	2.20	2.77	2.33	2.75	2.41	2.40	2.82	2.92	3.44	3.15
Standard deviation ^a	0.88	0.63	0.82	2.41	0.92	0.71	0.77	0.88	0.67	0.81
Skew	-0.73	-0.82	-0.13	-0.56	-0.39	-0.33	-0.75	-0.68	-1.39	-0.81
Kurtosis	-2.21	1.50	-0.58	0.42	-0.72	-0.41	0.75	0.01	2.42	0.22

Note. Significant two-tailed correlations are in boldface. Correlations between .11 and .12 are significant at the $p \leq .05$ level; correlations between .13 and .15 are significant at the $p \leq .01$ level; and correlations .16 and above are significant at the $p \leq .001$ level. $N = 316$ are significant at the $p \leq .01$ level.

^aMean/proportion and standard deviations are calculated using weighted data.

evidence that the latent constructs correlate with each other. Gender is the only variable that has no significant correlation with other variables in the model, and student perceptions of their parents' disapproval if they do not go to college variable (*P_expect*) is only significantly correlated with enrollment. However, we keep gender and student perceptions of their parents' disapproval if they do not go to college variable in the model as important control variables. Based on skew and kurtosis criteria, all variables fall within acceptable margins for normality.

Confirmatory Factor Analysis (CFA)

Based on a review of the literature and results of previous tests of construct reliability, we test two latent constructs (parental bonding and school climate) and their correlation with each other in a CFA analyses. The original CFA model tested (not shown) did not include any covariance among indicators. We rejected this model (CMIN/DF=2.28; DF=43; P=0.000; CFI= 0.96; RMSEA=0.06; Bollen-Stine bootstrap P=.002). Using AMOS 17.0 modification indices, we add four covariance paths (see Figure 1). We fail to reject the modified model and determine that it fits these data well (CMIN/DF=1.25; DF=39; P=0.14; CFI=0.99; RMSEA=.03; Bollen-Stine bootstrap p=0.32).

Structural Equation Model

Having confirmed the latent constructs, we turn to the full SEM. The SEM tests the original hypothesized model including all possible direct and indirect paths of key variables predicting post-secondary school enrollment (see Appendix C). In addition, paths are drawn from student self reported grades (GPA) and student educational aspirations (*Edu_asp*) to predict enrollment, and direct paths from gender and parental college expectations (*P_expect*) to enrollment are also included. This model fits the data well (CMIN/DF=1.18; DF=132; p=0.07; CFI=0.99; RMSEA=0.02; Bollen-Stine bootstrap p=0.34), however we re-estimated the model to achieve a more parsimonious fit by deleting non-significant paths (see Figure 2). The final model is more parsimonious¹³ and fits these data well (CMIN/DF=1.15; DF=139; P=0.11; CFI=0.99; RMSEA=0.02; Bollen-Stine bootstrap P=0.40; PCIF=0.80).

The research reviewed above emphasizes that parental income, parental education, and self efficacy have direct relationships to educational attainment. The literature review also considers that parental income and education

may have indirect relationships with academic achievement and attainment through a relationship with parental bonding and school climate. Our final SEM model tests whether direct and indirect paths hold true for 316 rural Pennsylvania youth. The final SEM model has a strong effect and explains 42% of the variance in post-secondary education enrollment.

Direct Effects

In this discussion we focus on the significant direct paths that predict post-secondary school enrollment (see Table 2). We report the standardized coefficients in this discussion. The path from parental education (*P_coll*) to enrollment and the path from parental disappointment if youth does not go to college (*P_expect*) are the significant direct paths to enrollment among the key family independent and latent variables (*P_inc*, *P_coll*, and *P_bond*). As student perception of parent disapproval of college non-attendance (*P_expect*) increases, student enrollment increases ($\beta=0.10$, $p=0.023$). As parental education increases, student enrollment in post-secondary education increases ($\beta=0.12$, $P=0.007$). Two of the variables measuring individual characteristics have significant and direct paths to enrollment. The strongest relationships predicting enrollment exist between student self reported grades (GPA) and student educational aspirations (*Edu_asp*). As student grades increase and as educational aspirations increase, post-secondary education enrollment also increases ($\beta=0.32$, $p<=.0001$ & $\beta=0.40$, $P<=.0001$ respectively).

Indirect Effects

Table 3 identifies all the indirect effects that predict post-secondary school enrollment. Here it is evident that parental education and parental income operate indirectly to predict enrollment (from high school or less, to a two-year college, to a four-year college), but the paths are not always as we expected. Again, we focus our discussion on paths that predict enrollment. Although a direct path from the proxy measure of parental income (*P_inc*) to enrollment is not in our final model, the strongest indirect paths in the final model include the effects of parental income indicating a complete mediation model (James & Brett, 1984). Parent income significantly and indirectly influences enrollment through school climate (*S_climate*) and student self reported grades (GPA). In addition, parental income significantly and indirectly influences enrollment through school climate and student educational aspirations (*Edu_asp*). Parental income also has influence on enrollment through parental bonding (*P_bond*) and student self reported grades. This is the only relationship where parental bonding has significance. It is difficult to determine the strengths of these multiple paths

¹³AMOS provides fit indices for parsimony goodness of fit (PCFI) that takes into account the number of parameters in a model. A value above 0.50 along with non-significant χ^2 and other appropriate fit indices indicate a parsimonious fit (Byrne, 2001).

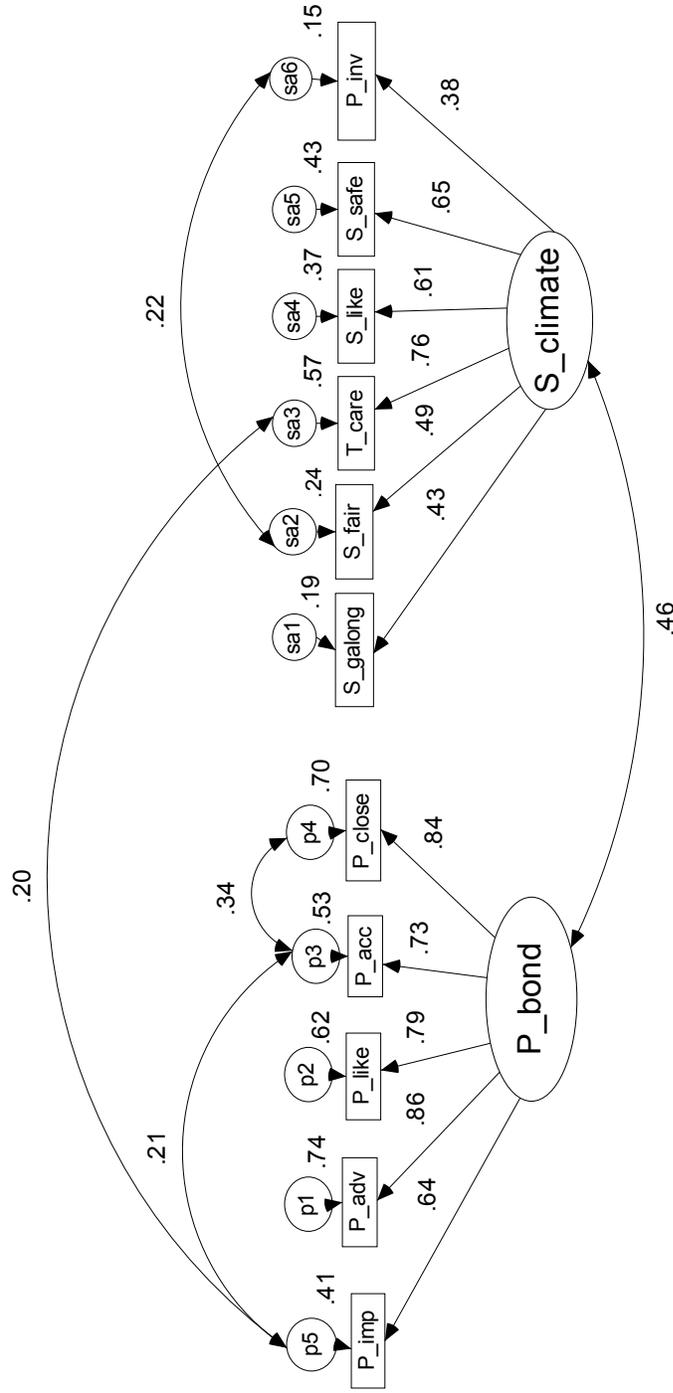


Figure 1. Confirmatory factor analysis model, standardized coefficients shown
Model Fit Indices: CMIN/DF=1.25; DF=39; P=0.14; CFI=0.99; RMSEA=.03; Bollen-Stine bootstrap P=0.32

Table 2
SEM Model Significant Direct Effects

Direct effects	Unstandardized coefficient	SE	Standardized coefficient	Critical value	P-value
P_inc ▲	0.18	0.05	0.19	3.27	<=0.001
P_inc ▲	0.06	0.02	0.19	2.75	0.006
P_coll ▲	0.13	0.06	0.10	2.04	0.042
P_coll ▲	0.07	0.03	0.12	2.21	0.027
P_coll ▲	0.10	0.04	0.12	2.69	0.007
P_expect ▲	0.07	0.03	0.10	2.28	0.023
P_bond ▲	0.26	0.11	0.14	2.48	0.013
Self_eff ▲	1.17	0.16	0.36	7.47	<=0.001
S_climate ▲	1.04	0.35	0.21	2.97	0.003
S_climate ▲	0.92	0.18	0.40	5.09	<=0.001
S_climate ▲	0.43	0.11	0.28	3.97	<=0.001
GPA ▲	0.21	0.03	0.32	6.81	<=0.001
Edu_asp ▲	0.55	0.07	0.40	8.49	<=0.001

Table 3
Significant Indirect Effects Predicting Type of Post-Secondary School Enrollment

				Decomposition ^a	Indirect effect	Critical value ^b	P-value	
P_coll	▲	GPA	▲	Enroll	0.10 * 0.32	0.03	2.07	0.038
P_coll	▲	Edu_asp	▲	Enroll	0.12 * 0.40	0.05	2.23	0.025
Self_eff	▲	GPA	▲	Enroll	0.36 * 0.32	0.11	5.06	<=0.001
S_climate	▲	GPA	▲	Enroll	0.21 * 0.32	0.07	2.74	0.006
S_climate	▲	Edu_asp	▲	Enroll	0.40 * 0.40	0.16	4.28	<=0.001
S_climate	▲	Self_eff	▲	GPA	0.28 * 0.36 * 0.32	0.03		*
P_inc	▲	S_climate	▲	GPA	0.19 * 0.21 * 0.32	0.01		*
P_inc	▲	S_climate	▲	Edu_asp	0.19 * 0.40 * 0.40	0.03		*
P_inc	▲	P_bond	▲	GPA	0.19 * 0.14 * 0.32	0.01		*

^a Indirect effects are the product of the standardized coefficients for each section of the path.

^b The Sobel test (Sobel, 1986) using the unstandardized coefficients is used to calculate the critical values and corresponding p-values.

^c Cohen and Cohen (1983) state if all components of a path are significant, then the whole indirect path can be taken as significant.

however since an assumption is made that if all sections of the paths are significant, the entire path is significant (Cohen & Cohen, 1983), and the authors are unaware of a method to calculate multiple path significance. School climate is also a complete mediator, and the paths of school climate appear to be the strongest predictors of enrollment. School climate has a mediating effect on student grades. As the value for school climate increases, student grades increase, and in turn the type of educational enrollment increases ($\beta=0.07$, $p=.0006$). School climate also has a mediating effect on student educational aspirations. As the value for school climate increases student educational aspirations increase, and in turn the type of school enrollment increases ($\beta=0.16$, $p<=.001$). School climate also has a strong mediating effect on enrollment through self efficacy (*Self_eff*) and student grades ($\beta=0.03$, $p<=.001$). Parental education (*P_coll*) also has mediating effects but does not operate through either parental bonding or school climate. The mediating effect of parental education predicting type of post-secondary education is through student grades and also through student educational aspirations, although these mediating relationships are not strong.

Discussion and Conclusions

This study uses an ecological systems framework to explore how individual, family, and school contexts are associated with post-secondary school enrollment among a rural sample one year past high school. Structural equation models uncovered both direct and indirect effects of these contexts on school enrollment yielding several key findings that contribute to the existing research literature. First, the latent variable measuring the family context, bonding with parents, has little direct influence on post-secondary school enrollment, even though other indicators of the family context are both directly and indirectly associated with school enrollment. Thus, among our rural sample, a stronger bond with parents is not a strong predictor of post-secondary school enrollment, which is contrary to findings from earlier studies (Davies-Keane, 2005). These findings support the idea that rural youth with a stronger bond to parents may experience conflict when deciding whether or not to attend post-secondary schooling, which often requires a move away from the home community. This finding is consistent with prior studies that suggest rural youth in general face this dilemma (Elder et al., 1996).

Second, indicators of the school context emerge as the strongest predictors of post-secondary school enrollment, and significant direct and indirect effects are found. Student perceptions of the school climate, the other latent variable considered, is positively associated with school enrollment indirectly through both student GPA and student educational aspirations. This study highlights the role of rural schools

as central to future educational engagement, perhaps more central than schools in other areas. This may be due in part to the central role rural schools play in many rural communities.

Third, these findings support an ecological systems framework that recognizes multiple contextual influences on individual outcomes. We find that indicators of the individual, family and school contexts are associated with post-secondary school enrollment. Moreover, in some cases, indicators of the family context are associated with school enrollment indirectly through indicators of the school context, which illustrates how these contexts intersect and influence resulting youth outcomes.

Ecological systems theory emphasizes the need to explore multiple contexts when studying youth outcomes. This study included three contexts (individual, family and school) in our exploration of factors that contribute to rural youth educational enrollment type one year post high school, and each of the three contexts had a significant role in predicting enrollment both directly and indirectly. Of the family context variables, we are able to conclude that parental education does play a direct role in predicting the type of enrollment among our rural youth sample. As parental education increases, the type of enrollment one year post high school increases (from not enrolled in college, to two year college, to four year college). In addition, parental education mediates enrollment by having a positive influence on both student self reported grades and their educational aspirations. Students' perceptions of their family income were also important, but did not have a direct relationship with the type of enrollment. Rather, parental income had a mediating relationship through parental bonding, school climate, student grades, and student educational aspirations, thereby further increasing the chance that these students will be enrolled in either a two year educational institution or four year college. Student perceptions that their parents would disapprove if they did not attend college had a direct and positive effect predicting enrollment type one year post high school.

In addition to the family context, the school context is important in predicting type of enrollment one year post high school. Although school climate had no direct effect on enrollment, the mediating effects were among the strongest relationships in the model. An increased score on school climate increased student self efficacy, grades, and educational aspirations, thereby increasing the type of enrollment one year post high school. Finally, the individual context is important to the model. Our proxy measure for self efficacy had no direct effect on enrollment but did mediate type of enrollment through student grades. Student self reported grades and their educational aspirations were strong predictors of type of enrollment one year post high school, but these relationships were mediated by the family

and school contexts with school context and self efficacy as the strongest mediators. Gender did not have a significant direct effect in this sample. However, this study did not test whether gender had moderating or mediating effects on post-secondary school enrollment. Because gender and college enrollment have been found to be associated in the past, future research will expand to include a focus on the interaction effects of gender on post-secondary school enrollment.

That family, school, and individual contexts all have a significant association to enrollment type one year post high school has some important implications for rural youth. As noted in our literature review, rural families and children have high rates of poverty and lower levels of education than the population overall, yet for our rural Pennsylvania youth, reporting higher parental education and the ability to afford things other families can afford predict enrollment in two year and four year post-secondary school settings. The direct and indirect effects among the family characteristics were significant, but the effects of school climate were stronger overall. School climate does not have a direct effect on enrollment; however, paths leading from school climate are strong predictors of enrollment emphasizing the role of school climate as mediating the effects of student self efficacy, grades, and educational aspirations. The strong effect of school climate points to the importance of rural schools in youth educational outcomes. Improvements in rural school climates especially related to a supportive and positive atmosphere may lead to higher college enrollment rates among rural youth.

Future research should examine these relationships among a broader rural sample. Rural communities across the U.S. are diverse, and it is not clear to what extent the findings reported here may apply to rural youth across the United States. In addition, although our study is important in documenting predictors of college enrollment one year post high school, future research should apply this ecological framework to consider how school climate and family factors relate to actual attainment of a college degree.

The SEM models document the complexity of relationships among youth characteristics, family characteristics, and school characteristics in predicting college enrollment. The results highlight the interrelationships among these contexts and emphasize that understanding youth outcomes requires attention to the many spheres that affect youths' daily lives, mainly their community, school, family, and the individual. In rural communities in particular, a positive and supportive school climate is an important factor predicting youth college enrollment.

Appendix A

Weighting the Sample of Rural School Districts and Rural Students

In order to adjust the sample to reflect both the distribution of school districts and students, we had to determine the probability that a particular student in a school would be included in our study. We used data from the Pennsylvania Department of Education on the number of students enrolled in each grade across the eight school district types. Table A1, Column A provides the number of 11th grade students enrolled in each category. Column B provides the percentage these students are of all rural students in 11th grade. Column C gives the number of 11th grade students in our sample in each category. Column D provides the percentage the 11th graders in each category are of our total sample of 11th grade students. By comparing Column B with Column D, it is possible to see where our sample contains a larger (or smaller) percentage of students in a category than is found for all rural students. The weight is calculated by dividing the percentage of all rural 11th graders in each category by the percentage of rural 11th graders in our sample in the same category. The purpose of the weighting is to ensure that our analysis is based on observations from 11th graders that reflect the actual distribution of rural 11th graders across the eight categories. As can be seen in Column E, below, the weight is greater than one in school districts where our percentage of students in the sample is smaller than the percentage in the category based on all rural students. The weight is smaller than one where our sample included a larger percentage of students in a category than was found in the enrollment data for all rural schools. Again, if all school districts had the same number of students this weighting procedure would be unnecessary. This method adjusts for the differences in the distribution of rural 11th graders across the school district-type categories.

Table A1
Distribution of Rural 11th Grade Students Across School District Category Typology

	Rural 11th grade students, state-wide		Rural 11th grade students, RYE sample only		
	Total in category	Percentage of statewide total	Total in category	Percentage of sample total	
Low poverty				Sample weighting ¹	
High education, Low population change	4,362	12.18	218	21.35	0.57
High education, High population change	7,484	20.90	149	14.59	1.43
Low education, Low population change	1,385	3.87	121	11.85	0.33
Low education, High population change	5,449	15.22	82	8.03	1.90
High poverty					
High education, Low population change	4,961	13.86	129	12.63	1.10
High education, High population change	2,938	8.21	65	6.37	1.29
Low education, Low population change	6,606	18.45	203	19.88	0.93
Low education, High population change	2,617	7.31	54	5.29	1.38

¹Weighting ratio is the percentage of all rural 11th graders divided by percentage of all 11th grade students in our sample. There were 35,802 11th grade students in rural school districts. The RYE sample included 1,021 11th graders.

Appendix B
 Table B1
Dependent Variable by Respondent Gender (Percentages Reported)

	Total	Female	Male
Current enrollment			
Not enrolled/high school drop out	0.3	0.5	0
Not enrolled/completed high school	22.5	24.6	19.4
Enrolled in high school/GED program	1.6	1.1	2.3
Community college	8.2	9.6	6.2
Professional school	1.3	1.6	0.8
Technical school	5.7	6.4	4.6
Licensed trade program	1.3	0	3.1
4-Year college	58.2	54.6	63.6
Graduate school	0.9	1.6	0
			Chi-square = 13.2
Enroll			
High school or less	24.4	26.2	21.7
2-Year college	16.4	17.6	14.7
4-Year college	59.2	56.2	63.6
			Chi-square = 1.7
N	316	187	129

Appendix C

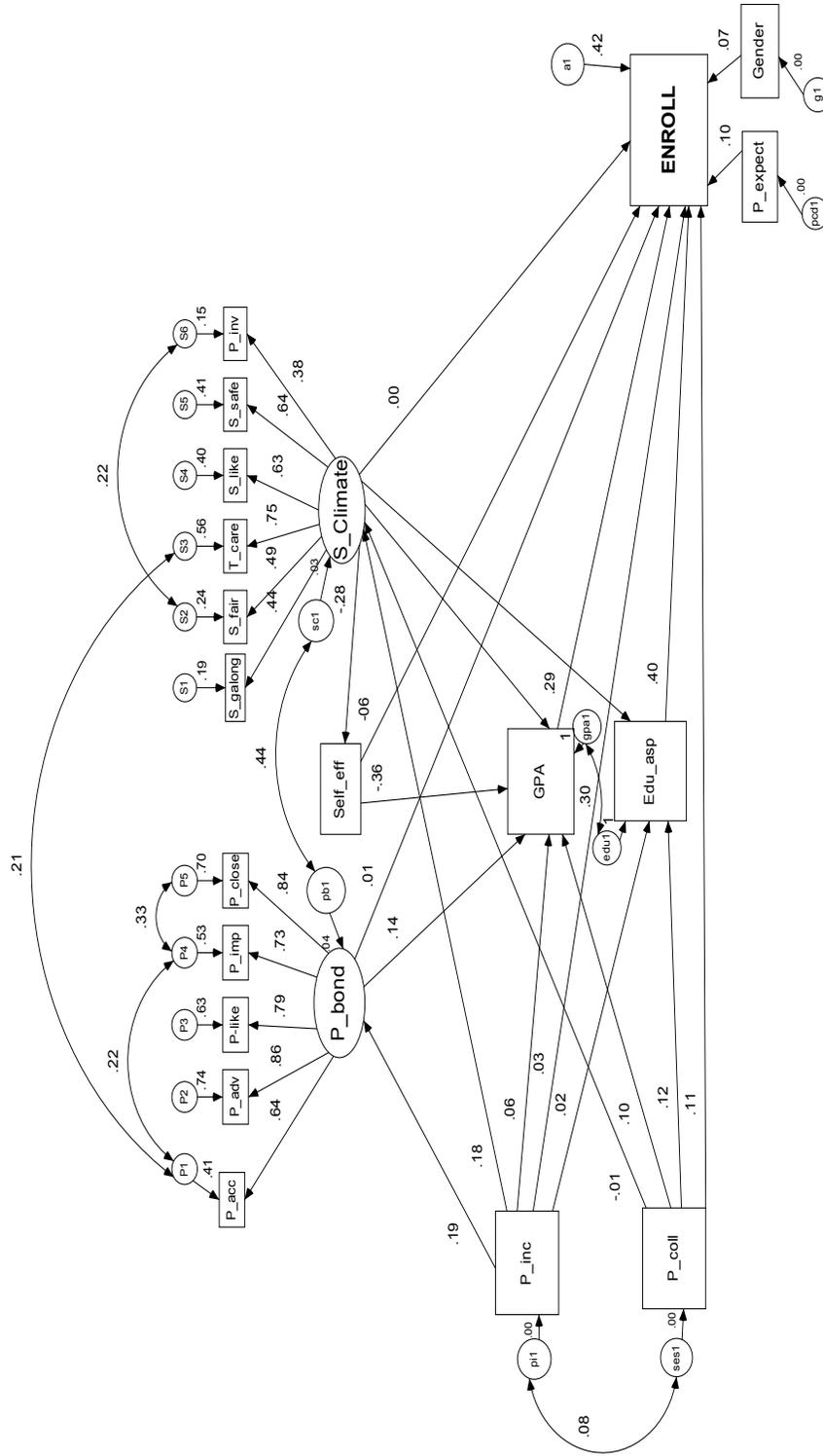


Figure C1. Structural equation model predicting post-secondary enrollment, standardized coefficients shown
 Model Critical Value=156.07; DF=133; CMIN/DF=1.18 P=0.084; RMSEA=0.02; Bollen-Stine bootstrap p=0.36
 Squared multiple correlation for enroll=0.42
 Model is recursive and therefore identified

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