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Schools, Their Spatial Distribution and Characteristics, and Fertility Limitation*

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Abstract

This paper investigates the complex relationship between various dimensions of women's educational context and their later life contraceptive use. Using data from rural Nepal on all the schools that ever existed in one community, I create geographically weighted measures of school characteristics—specifically teacher and student characteristics—that capture exposure to the complete array of schools and investigate the direct relationship between these dimensions of school characteristics and contraceptive use. These analyses provide new information on the broader issue of how social context influences the adoption of innovative behaviors by exploring the wide-reaching effects of school characteristics on individuals. Findings show that the gender of teachers and of other students, and the level of teacher education are all related to women's use of contraception; that increased exposure to these school characteristics throughout the study area, but not necessarily at the closest school, is related to higher rates of contraceptive use; and that school characteristics early in the life course can have long-term consequences for individual behavior.

This study aims to shed light on the relationship between educational context and childbearing behavior. Its basis lies in two areas of research: the effects of school characteristics on academic outcomes (Card and Krueger 1996; Heyneman and Loxley 1983; Lloyd et al. 2003) and the effects of educational attainment on childbearing, fertility limitation, and contraceptive use (Blossfeld and Huinink 1991; Caldwell 1980; Lloyd, Kaufman, and Hewett 2000). Using this foundation, I examine the link between dimensions of school contexts and fundamental transitions in childbearing behaviors, illuminating the breadth of educational influences on social change and family behaviors.

The study focuses on rural Nepal, a setting that for theoretical and empirical reasons is ideal for investigating these relationships. Many of the theories regarding the effects of changing social context on childbearing behaviors were designed to describe places like Nepal—places that have only recently experienced rapid changes in both social institutions and demographic behaviors (Caldwell 1982; Easterlin and Crimmins 1985; Montgomery and Casterline 1993, 1996; Thornton and Lin 1994). And equally important, the study site in rural Nepal serves as the source of unique longitudinal data documenting the entire local population and a rich set of school characteristics. This study is therefore able to link detailed measures of variation in school characteristics across geographic space and time

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with individuals' contraceptive use over time. The result is new empirical evidence regarding the consequences of multiple dimensions of school characteristics, including spatial dynamics, for non-academic behaviors.

This study adds to the research literatures on social change, education, and fertility in three ways. First, it presents a clear synthesis of multiple theoretical approaches and delineates the complex relationship between school characteristics and individuals' childbearing behavior. Because this approach explores how the characteristics of all community schools affect all community members—not just those attending the schools, it moves beyond previous work focused on the effects of educational attainment and/or school characteristics on contemporaneous childbearing behaviors. Second, the study investigates multiple school characteristics (specifically teacher and peer characteristics) that better elucidate the process through which schools influence individuals. Third, this research provides new information on the range of the consequences of variations in school characteristics by looking specifically at fertility limitation rather than educational outcomes; by incorporating all women in the community instead of limiting the analysis to only students; and by focusing on the long term, rather than short term, effects of school characteristics.

THEORETICAL BACKGROUND

Schools and Childbearing Behavior

This study examines a fundamental shift in social demographic behavior: the transition from high fertility and no contraceptive use to low fertility and widespread contraceptive use. A long history of research from multiple disciplines has pointed to the introduction and spread of schools as one catalyst for this transition (Axinn and Barber 2001; Becker 1991; Cleland and Rodriguez 1988; Coleman 1990; Notestein 1953; Wickrama and Lorenz 2002). Much of this literature focuses on how educational attainment is related to fertility behaviors, finding that higher attainment among individuals and their parents is related to lower fertility and increased contraceptive use. Here, the focus is on how the characteristics of the schools people live near or attend are related to fertility behaviors.

This study is guided primarily by theories of ideational change. These theories hold that changes in social context – operating through social effects such as social learning and influence – lead to changes in individual behaviors, such as contraceptive use (Caldwell 1982; Cleland and Wilson 1987; Casterline 2001; Montgomery and Casterline 1993, 1996). Individual behaviors change with social context through social interactions in which network or group members introduce new ideas or behaviors to other members. There are multiple ways these interactions may lead to behavioral changes—for instance, individuals may learn new information that affects their ideas and subsequent behaviors or they may change their behavior to conform to group norms (Montgomery and Casterline 1993, 1996). The new ideas may be Western values from imported educational systems (Caldwell 1982; Caldwell, Reddy, and Caldwell 1985), knowledge about contraceptive methods (Hermalin 1983), knowledge of and desire for consumption goods (Freedman 1979), attitudes and values vis-à-vis family connections (Thornton and Lin 1994), or the relative benefits of having many children versus fewer, better educated ones (Becker 1991).

In terms of school effects, ideational diffusion may operate independent of an individual's own educational experiences. Previous research finds that having more educated neighbors or family members, or even living near a school either in childhood or later in life, are all related to lower fertility and more contraceptive use regardless of direct educational experiences (Axinn and Barber 2001; Anh et al. 1998; Cleland and Rodriguez 1988; Kravdal 2002; McNay, Arokiasamy, and Cassen 2003; Moursand and Kravdal 2003). Whether schools and school characteristics influence individual fertility behavior through ideational

change and diffusion is a fundamentally different question from whether a person's own education or direct experiences with specific school characteristics are related to their fertility behaviors, an important question examined elsewhere (c.f. Axinn and Barber 2001; Blossfeld and Huinink 1991; Cleland and Rodriguez 1988; Vavrus and Larsen 2003).

School characteristics—The education literature is inconsistent regarding the effects of school structural characteristics and resources on a variety of student outcomes, with review papers citing about half as many studies with negative or no effects as with positive effects (c.f. Card and Kruger 1996; Hanushek 1986; Hedges, Laine, and Greenwald 1994; Konstantopoulos 2009; Rockoff 2004). However, the bulk of this literature has focused on student achievement as the outcome of interest, typically measured by test scores. Research looking at other outcomes has consistently found significant effects of various aspects of school quality (Card and Krueger 1992, 1996b; Mensch et al. 2001). By building on this latter research and the ideational diffusion framework, this research contributes new information to the education literature, which typically focuses on material inputs when examining school effects.

The structure and resources of schools in Nepal are likely to have fertility effects for several reasons. Because life in Nepal is highly gender segregated, Nepalese women are far more likely to engage in social networks and work environments with other women and girls than with men and boys. In fact, men and women do not usually have close relationships outside their immediate families. Since these social interactions are mechanisms through which schools may influence individual behaviors, it follows that the likelihood of women being influenced by schools rises with the school exposure of girls and women. Furthermore, new school-related ideas are more likely to be instilled (and subsequently diffused) when school exposure is both long and of high quality. This can be thought of as a dose effect—exposure over a longer period with a greater intensity may result in a stronger effect on students (Zajonc 1968) and on those who interact with them. Within this theoretical and empirical context, any school dimensions that enhance the number of girl students attending school, the length of their attendance, or the quality of their educational experience are likely to increase diffusion of school-engendered ideas within women's social networks in Nepal.

Several school characteristics in rural Nepal may be particularly important to the length of girls' school attendance and the quality of their education. Three are covered here: student gender ratios, teacher gender ratios, and teacher education. Living near a school with a significant proportion of girl students may encourage both school enrollment and length of attendance among girls. And attending a school in rural Nepal with a significant proportion of girl students may increase the salience of education and create a more gender-equitable learning environment (Konstantopoulos 2009; Lloyd, Mensch, and Clark 2000; Sathar et al. 2003). More equitable treatment of girls has been linked to both improved educational outcomes and delayed sexual debut (Lloyd, Kaufman, and Hewett 2000; Mensch et al. 2001). Single-sex schooling has been linked to improved educational outcomes for girls (Jimenez and Lockheed 1989), more equitable attitudes about gender roles, and more liberal (i.e., Western) attitudes about women's roles in society (Lee and Lockheed 1990; Mael 1998). These outcomes are likely to influence women's childbearing attitudes and behaviors either directly (among students/former students) or indirectly (through network diffusion).

Research indicates that female teachers may be able to enroll more girl students, keep them enrolled for longer periods of time, and teach them more effectively than their male counterparts (Bettinger and Long 2005; Dee 2007; Leigh 2010; Sonnert, Fox, and Adkins 2007; Warwick and Jatoi 1994). Because male teachers may discriminate against girl students, a higher proportion of female teachers may counter this effect (Mensch and Lloyd 1998). Female teachers may also serve as role models for both students and women in the

community (Nixon and Robinson 1999). Additionally, the presence of female teachers may be an innovation in itself, encouraging other women to consider the options of wage labor, an education, or a career.

Research on teacher education yields mixed findings. Highly educated teachers may be better able to convey the material to their students and to keep students enrolled in school longer (Card and Krueger 1992; Mensch and Lloyd 1998). More educated teachers may also garner more respect from students and community members, thereby increasing their social influence during interactions. Previous research has linked teachers' education to student educational attainment and enrollment (Card and Krueger 1992; Heyneman and Loxely 1983; Liu, Lee, and Linn 2010; Southworth 2010). However, a substantial amount of research, mostly in the U.S., has failed to find significant effects of teacher education on students' academic performance (Goldhaber and Hansen 2010; Leigh 2010; Rivkin, Hanushek, and Kain 2005). Teacher training is included in this study because theory suggests it may be important to girls' schooling outcomes in Nepal.

School effects on non-students—Because new ideas learned in school diffuse throughout social networks via social interactions, we would expect the influence of schools to extend beyond their walls (Bongaarts and Watkins 1996; Casterline 2001; Montgomery and Casterline 1993, 1996). Because people's social networks are not homogeneous (Rosero-Bixby and Casterline 1993), individuals who never attended school are likely to interact with children and neighbors who have attended school or who work at schools. Women who interact with other women who have been influenced in their childbearing attitudes via school attendance may change their own childbearing attitudes and contraceptive behavior to align more closely with these peers, even if they themselves have not attended schools. These diffusion effects may be particularly strong in a setting like Nepal, where communities are small and consist of individuals and families who have regular contact and intimate knowledge of one another's lives—that is, where the local channels of social interactions are high (Bongaarts and Watkins 1996; Brofenbrenner 1970; Smith-Lovin and McPherson 1993; Valente, Watkins, and Jato 1997). Because schools are influential at least partly through these social interactions, school characteristics and resources are expected to affect the attitudes and behavior of all community members, not just students or former students.

Spatial distribution of schools—By focusing on diffusion effects, there are additional issues to consider regarding the spatial distribution of and geographic access to schools. Diffusion processes can occur over a vast physical space. As people live their daily lives they move around to different physical spaces and interact with others who come from different places or have had different life experiences. As a result, women in rural Nepal have social interactions while shopping, collecting fodder, or tending the fields with women outside their immediate households or neighborhoods whose school exposure is likely different from their own. These heterogeneous interactions are particularly likely in rural Nepal because school enrollment is not determined by residential zoning, individuals often walk great distances to collect fodder or graze animals, and fields are generally located on the periphery of neighborhoods.

Schools are generally associated with a specific geographic location and each school is different, resulting in different distributions of school characteristics across space. Prior research finds that the physical proximity of community services is a key determinant of fertility behavior (Entwisle et al. 1997). More recent research demonstrates that limiting analysis to only the nearest service or building may not fully capture the social context – the spatial distribution of many buildings matters (Brauner-Otto et al. 2007; Downey 2006; Hipp 2007). For instance, one can be influenced by multiple schools in a community.

Consider a young woman responsible for taking the livestock to communal grazing lands. She may be accompanied by a woman from a different neighborhood. If both women went to school, it is likely they attended different ones, which may or may not have been the ones closest to their neighborhood. The effect of one school diffuses to this other network member through the women's daily interactions.

From a more methodological perspective, consider the situation where two schools are equidistant from an individual's residence, but in opposite directions. How does the researcher decide which school has the most influence? In these cases consideration of the entire mix of schools and school qualities within a reasonable distance may be more appropriate. However, it may be difficult, if not impossible, to determine the maximum distance at which a school may influence an individual. Previous research provides some evidence that the effects of stationary features of social context, like schools, have a continuous distribution, much like distance itself, with schools in closer proximity having greater influence on the individual than those farther away (Brauner-Otto et al. 2007; Downey 2006).

In consideration of the study setting, the nature of diffusion effects, and evidence on social context effects, this study conceptualizes schools in a spatially sensitive manner and incorporates multiple schools in a rather wide spatial area.

Pace of diffusion—Ideational and behavioral diffusion occurs over time. The process of introducing ideas or behaviors to a social context, the related communications occurring thereafter in social networks, and the subsequent changes in ideas or behaviors of group members all require time to play out. Previous theoretical and empirical research clearly demonstrates that early life experiences and social context influence later life behaviors (Cherlin, Kiernan, and Chase-Lansdale 1995; Elder 1977; Garces, Duncan, and Currie 2002; McLanahan and Sandefur 1994; Yabkiu, Axinn, and Thornton 1999). More specifically, research indicates that school context in childhood affects later life fertility, income, and educational attainment (Axinn and Barber 2001; Axinn and Yabiku 2001). Accounting for this lagged (and long-term) influence, the current study analyzes the effects of school characteristics in childhood on subsequent fertility behaviors. This is a fundamentally different approach, involving different mechanisms, from those used in prior analyses of how schools or education affect contemporaneous fertility behavior.

Alternative Explanation

The above discussion of how school characteristics may influence individual behavior relies on ideational change theories. However, there may be other explanations for any observed effects that challenge this hypothesis. For example, ideational change does not occur in isolation. In fact, it may be that any observed relationship between schools and women's contraceptive use is spurious and is really due to other social changes such as the spread of markets/businesses and wage labor opportunities (Thornton and Lin 1994; Entwisle, Casterline, and Sayed 1989; Entwisle, Mason, and Hermalin 1986; Sathar et al. 2003). However, in the rural Nepal setting, schools are generally the first of the non-family, community organizations to be established (Axinn and Yabiku 2001), predating and perhaps even inducing the establishment and growth of markets, wage employers, and the like (Caldwell 1986). Despite this general pattern of contextual change, it will be important to account for other aspects of social change or community modernization in the analyses.

SETTING, DATA, AND METHODS

Data from the Chitwan Valley Family Study (CVFS) conducted in Nepal are used to test the study predictions. Community characteristics, including the availability of schools, and

individual behaviors, including contraceptive use, have changed significantly in Nepal over recent years. Until the 1950s, Chitwan was covered with virgin jungle and thinly inhabited by indigenous ethnic groups. In the 1950s, the government began clearing parts of the jungle, implemented malaria eradication efforts, and instituted a resettlement plan leading to the in-migration of many different ethnic groups. By the late 1970s, roughly two-thirds of this valley was cultivated and the first all-weather road was completed, linking Narayanghat (the main town in the study area) to India and eastern Nepalese cities. Subsequently, other major highways were constructed, making Narayanghat the transportation hub for the entire country. This led to the rapid expansion of schools, wage labor, markets/businesses, and health services. The first school opened in Chitwan in 1954 and by 1996 it took the average individual only about 10 minutes to walk to the closest school. Educational enrollment has risen from virtually zero in the 1960s to 100% of both sexes attending school for at least one day by 1996 (Beutel and Axinn 2002). However, students are not staying continuously enrolled, graduation rates are low, and women are completing about 3 fewer years of schooling on average than men (Yabiku and Schlabach 2009).¹

Since Chitwan Valley was opened for settlement, health services run by various parties, including the government, entrepreneurs, and nongovernment organizations, have spread rapidly. Contraceptives, ranging from condoms to oral contraceptive pills to Depo-Provera to sterilization services, are available for free or at a nominal cost from a wide range of health service providers including hospitals, health clinics, family planning clinics, natural healers, and pharmacies. In 1996, 30 percent of health service providers offered contraceptives at no cost and virtually all offered them for fewer than 5 Nepalese rupees (or 6 US cents). As a result, almost all residents in the study area were living within a 5 minute walk of a health service provider offering free or very low cost contraceptives. Additionally, condoms can be bought at neighborhood stores.

As these structural and community-level characteristics were changing, individual childbearing behaviors were also changing. The Total Fertility Rate dropped from 6-plus children in the 1960s to approximately 4.6 by 2001, and contraception to limit fertility was virtually nonexistent until recent years (Banister and Thapa 1981; Ghimire 2002; Suwal 2001; Tuladhar 1989).

In addition to being an ideal setting to study rapid structural and behavioral changes (the changes of interest in school context and contraceptive behavior occurred within the lifetimes of Chitwan's current residents), the study area is somewhat contained geographically – bounded by jungle on one side, one of the largest rivers in Nepal on another side, and the major highway running from India to Kathmandu on the third side. These unique temporal and geographic characteristics, along with the rich CVFS data, provide an excellent setting for evaluating the effects of community context on fertility behavior.

Data

In 1996, the CVFS collected information from residents of a systematic sample of 151 neighborhoods in Western Chitwan Valley. Every resident between the ages of 15 and 59 in the sampled neighborhoods and their spouses were interviewed using surveys and Life History Calendars. All interviews were conducted in Nepali, the most common language in Nepal.

¹Unless otherwise noted, all Chitwan specific calculations are made using the CVFS data.

Following these data collections, starting in February 1997, the CVFS began collecting monthly prospective data on contraceptive use for all the individuals in the selected households.² Ninety-five percent of the original respondents participated in this phase, yielding 4,646 individuals aged 13–80 with both 1996 interviews and prospective contraceptive method records.³ Information for these individuals has been collected on a monthly basis for 126 months.

Analyses are conducted on data gathered from 969 women⁴ in the CVFS who were between the ages of 15 and 44 in 1996, were married at some point in the data collection period, and had not used contraception prior to the 1996 interview.⁵ The sample is restricted to these child-bearing aged, non-sterilized women given the interest in contraceptive behavior, and to married women because, in this setting, premarital sex is extremely rare.⁶

In 1995, the CVFS collected School History Calendars (SHC) for all 145 schools that ever operated in the study area from 1945 to 1995, regardless of operating status at the time of data collection. The SHCs, collected using the Neighborhood History Calendar (NHC) technique developed by Axinn, Barber, and Ghimire (1997), gathered information on student enrollment and staffing. The calendar method of data collection has been demonstrated to collect valid retrospective data (Caspie et al. 1996; Freedman et al. 1988), and the NHC technique combines archival, ethnographic, and structured interview methods to yield measures of community-level characteristics not constrained by physical boundaries or dependent on the memory of one individual.

The CVFS also collected NHCs for all 151 neighborhoods in the study area. These are detailed accounts of neighborhood resources such as schools, markets, and health services. In this rural setting, a neighborhood defines a cluster of approximately 5 to 15 households – comprising a group of individuals who have daily face-to-face contact. These neighborhoods are typically located at the junction of unpaved, rough roads and are surrounded by farmland. To carry out necessary daily work such as gathering firewood or water, tending animals, or farming, individuals often walk several kilometers, passing different neighborhoods, schools, and community services along the way. Additionally, activities that occur within the household, such as helping children get ready for school, take place in the open courtyards in front of the house, in plain view of neighbors and those who pass by. This close living and open display of behaviors in this setting makes it useful for examining exposure effects.

Measures

Childbearing behavior: Contraceptive use—To investigate the transition in childbearing behavior, this study focuses on women's contraceptive use. Contraceptive use is measured as a transition from not ever having used contraceptives to using contraceptives

²Data collection for the 1996 individual interview occurred over a period of 6 months from July-Dec. As a result, the interval between this interview and the first month of the prospective data collection is larger than 1 month and varies across respondents. In all analyses, I include a dummy variable equal to 1 if the person month is this first "month" and zero otherwise.

³Households that move out of the study area are tracked and interviewed.

⁴While the vast majority of research on fertility has focused on women only, a small and growing body of research conceptualizes childbearing behavior at the couple level (Axinn and Barber 2001; Thomson 1997). The empirical evidence from this work demonstrates that both husband's and wives' characteristics have separate, independent effects on the couples' fertility and contraceptive use. Because wives characteristics maintain separate and independent effects, I follow the majority of the literature on childbearing transitions and focus on women only.

⁵This sample also excludes women who were missing data on any of the variables included in these analyses.

⁶Limiting the sample to women who had not used contraception raises the possibility of left censoring. However, when I change the sample to include only women under age 25, for whom previous contraception use is extremely low, the substantive conclusions drawn from the analyses do not change. I also estimated models using samples of that include all women ages 15–44 and women ages 15–44 who had not previously been sterilized—the findings from all of these models were virtually identical to those presented here.

of any type (e.g., sterilization, spouse's sterilization, Depo-Provera, IUDs, Norplant, oral contraceptive pills, condoms). The Nepalese, like many other South Asians, generally use long-term methods such as sterilization, Depo-Provera, IUDs, or Norplant, and tend to use these and even more temporary methods like pills and condoms to stop rather than delay childbearing (Axinn 1993; Axinn and Yabiku 2001; Ghimire 2002; Suwal 2001; Tuladhar 1989). Eighty-nine percent of women using Depo and 80% of those using pills reported that they wanted no more children and 80% of women who used any type of contraceptive method eventually become sterilized or use Depo-Provera, IUDs, or Norplant to end childbearing. Because contraceptive use is typically used to terminate childbearing, discontinuation is low even for more temporary methods. As a result, it is the initiation of contraceptive use that is a pivotal life event in this setting and the dependent variable used to illustrate the relationship between school characteristics and changes in childbearing behavior. The first use of a contraceptive method is an appropriate measure to gauge social diffusion as it represents a novel behavior that demonstrates fertility intentions.⁷

Event history models, described below, use a time-varying, dichotomous variable equal to 1 the month the respondent first used a contraceptive method and 0 in months prior. In this sample, 57 percent of the women began using contraception between 1997 and 2006.

School characteristics—Three measures are used to capture how childhood education context may influence individual behavior through ideational change and social interactions (via increasing enrollment and attainment): (1) the percent of students enrolled in each school who are girls, (2) the percent of teachers in each school who are women, and (3) the percent of teachers in each school who have at least a college degree. These measures are all based on the SHCs and refer to the year the respondent was 13 years old. Capturing exposure to schools in childhood is important because this is a developmental period where goals and attitudes are explored and formed. Methodologically, age 13 is a crucial point because it allows me to include measures of the respondent's community during childhood (age 12 and younger) as controls. The CVFS asked a series of questions regarding the respondent's neighborhood during childhood directing the respondent to think of the neighborhood she lived in before age 12 when answering. In order to incorporate these additional controls, and maintain proper temporal ordering, the key independent variables refer to the schools following this period.

Changes in schools over time—Figure 1 shows how the numbers of schools and their characteristics have changed over time in Chitwan. Years are along the x-axis and number of schools is along the left-hand y-axis. The line with the triangles shows the number of schools open in a given year and clearly shows an increase over time demonstrating the spread of mass education. The remaining lines show the mean, across open schools, for the characteristics mentioned above and refer to the right-hand y-axis. One can see that the specific characteristics of schools have changed at different rates over time.⁸ However, the upward slopes of all the lines demonstrate that the numbers of schools, and the prevalence of certain characteristics, have been increasing.

Spatial distribution of school characteristics—Figures 2–4 show how each of these three school characteristics vary spatially across Chitwan and over time. Each circle on the maps represents a school open in that specific year and the larger the circle the

⁷Although sexually transmitted diseases and infections are becoming more prevalent in Nepal, and condom use to prevent their transmission is of obvious social importance, the research presented here is concerned with contraceptive use as it relates to childbearing behavior.

⁸It is worth noting that only two schools were ever completely single-sex schools—they had only male students and it was only for a short time period. No schools are designed to be single-sex schools.

value for that characteristic. Looking across panels within each figure we see how the increasing prevalence over time of each characteristic looks across space. As you move down the figure we see there are more schools (dots) and each characteristic is more common (the dots are larger). By looking across all three figures we see that some schools may be high on one characteristic but not on another. For instance, schools with fairly even gender distributions of students are located throughout the study area (Figure 2). However, college educated teachers (Figure 4), and to a lesser degree female teachers (Figure 3), appear to be clustered in the upper right of the study area, where the major town Narayanghat is located. Additionally, we can see that student bodies become more gender equitable at a faster rate than the teachers. These variations across the three characteristics are important because they reveal that these measures are in fact capturing different aspects of schools.

School characteristics: geographically weighted—To understand more about the spatial dimension of school effects, measures are created that incorporate information on all the schools in the study area, capturing the spatial distribution of schools and school characteristics. Geographically weighted averages are used for each of the three school measures, represented as:

$$S_{cnt}^{**} = \left(\sum_{l=1}^{145} \frac{S_{clt}}{W_{ln}} \right) / \sum_{l=1}^{145} W_{ln} \quad (\text{equation 1})$$

where S_{cnt}^{**} is the geographically weighted average of school characteristics for characteristic c (e.g., percent of female teachers) and neighborhood n in the year t (the year the respondent turned 13). S_{clt} is the characteristic c offered by school l in the year t , and W_{ln} is the weight for school l and neighborhood n . Because previous research and the theoretical framework employed here predict that aspects of social context farther away will have less influence than those closer to the individual, I define W_{ln} as the distance between school l and the center of the neighborhood n . Distance was calculated “as the crow flies” using latitude and longitude coordinates for the neighborhood and the school and is in meters. Because households in neighborhoods are clustered closely together the geographic location of the center of the neighborhood very closely approximates the geographic location for all households.⁹ The weighting ensures the closest school is most influential with the influence for the other schools decreasing as distance increases. The summation over 145 schools is because that is the total number of schools that ever existed in Chitwan.¹⁰ Previous research has found that this geoweighted approach best captures community context in this setting (Brauner-Otto et al. 2007). Table 1 presents descriptive statistics for these geographically weighted measures at the individual level for the year the respondent turned 13.

School characteristics: closest—Because the characteristics of the closest school are assumed to be the most significant, two measures are used to control for its potential influence. All models include a measure of how long it takes to walk from the respondent’s neighborhood to the closest school (measured in kilometers) and the value (not geoweighted) of the specific characteristic for the closest school. For instance, a model will

⁹I do not have geographic coordinates for individual households.

¹⁰As an example consider the measure of female teachers. In the first step, for each school-neighborhood pair in a year (specifically the year the respondent turned 13 years old) I divide the percent of teachers who were female (S_{clt}) by the distance between that school and that neighborhood (W_{ln}) to create a weighted measure of female teachers. Next, I sum all of these weighted measures for one entire neighborhood—that is, I add up the weighted measure of female teachers for each of the 145 schools that were open that year. Finally, I divide this by the sum of the distances between that specific neighborhood and all of the open schools. In the end, I have a neighborhood level variable that refers to the individual’s current neighborhood when she was 13 years old. Note, not all 145 schools were open in every year and only schools that were open in that specific year were included in these calculations.

include the geoweighted average of the percent of teachers who are women, the percent of teachers who are women at the closest school, and the length of time it takes to walk to the closest school. The descriptive statistics for these measures are also in Table 1.¹¹

Controls—As with all studies exploring the effects of social context on individuals, these analyses face threats to the validity of conclusions about causal connections. Three major areas of concern are: (1) any observed relationship between schools and contraceptive use is spurious and is really due to other social changes affecting both, (2) the measures of school characteristics are really proxy measures for other community characteristics, and (3) individuals with ideational and behavioral similarities may choose to live in specific communities, so that selective migration decisions produce spurious associations between school characteristics and individual outcomes.¹² The data used here allow these potential threats to be addressed, although certainly not eradicated. The data are highly detailed and much more comprehensive than other data sets – garnering extensive measures on the neighborhoods, individual characteristics and experiences, and other community members' characteristics that may influence school characteristics, neighborhood choice, and individual's childbearing behavior.

Neighborhood characteristics—When investigating contraceptive use the availability of health services is of particular concern because we know that access to contraceptive methods is related to actual contraceptive use (Brauner-Otto et al. 2007; Entwisle et al. 1996; Freedman and Takeshita 1996). I include a continuous measure of the distance between the respondent's neighborhood and the nearest health services (measured in minutes by foot) when the respondent was 12 years old.¹³ Descriptive statistics for these and all neighborhood control measures are presented in Table 2.

Community modernization: To capture the potential community modernization effects, measures are used for access to markets and employers—characteristics commonly thought of as modern organizations that influence fertility. Dichotomous variables measure whether (1) a market, defined as a place with two or more contiguous shops where goods and services are sold for money, and (2) a large employer, defined as an employer with at least 10 paid employees were within an hour's walk of the respondent's neighborhood when she was 12 years old. The availability of transportation is also important (Sathar et al. 2003), particularly when we are concerned with schools throughout the study area. A third dichotomous measure captures whether a bus stop was within an hour's walk. All of these structural dimensions of community modernization have been found to influence fertility in other studies in this setting (Axinn and Yabiku 2001; Brauner-Otto et al. 2009). The three measures are summed to create an index measure of the number of community services

¹¹Almost all of the schools in the study area started with kindergarten or first grade; only two were solely high schools. Because the theory is not specific to an individual's attendance, and high schools may have a similar effect as primary schools, all schools are included in the analyses. Tests of models that excluded the two high schools yielded virtually the same results as those presented here.

¹²A fourth area of concern is bias resulting from unmeasured geographic influences—it is possible that women growing up in proximity to each other were more similar in their later life contraceptive behavior than those living at a greater distance, at least partly due to unmeasured spatially embedded social network influences. If women never moved then the neighborhood level random intercept (discussed below) would completely account for these unmeasured spatial effects. Unfortunately, women do move and while I have full life histories of all geographic moves, I do not have detailed enough geographic identification to include a neighborhood specific effect for childhood location or to estimate a spatial regression model based on childhood location. However, models that control for the number of geographic moves a woman had (i.e. the risk of spatial autocorrelation) yield estimates identical to those presented here implying that the risk of unmeasured spatial influences does not undermine the analyses in this paper.

¹³Access to contraception is also influenced by the individual's or family's resources or wealth. As in many poor, subsistence farming based settings wealth is difficult to measure in money in Chitwan. I investigated two measures of household wealth used in other research using these data (Brauner-Otto 2009)—the number of livestock and consumer durables owned. Neither was statistically significant.

available in childhood. This measure has been used in other research with these data (e.g., Axinn and Yabiku 2001; Brauner-Otto et al. 2007).

Individual experiences: Substantial bodies of literature provide evidence that education, work, living experiences, media exposure, participation in groups, parental characteristics, and receipt of health services all influence family related behaviors (Axinn and Yabiku 2001; Barber et al. 2002). As a result, measures of these individual-level experiences and characteristics are used.¹⁴

Analyses incorporate two measures of experiences with community services and organizations: a continuous variable for the number of years of schooling a woman obtained by before age 13 (mean is about 4 years); and an index of the respondent's other non-family experiences. The index is created, as in previous research (Axinn and Yabiku 2001; Ghimire et al. 2006; Yabiku 2005),¹⁵ by summing eight dichotomous variables equal to 1 if the respondent had worked for pay outside the home, lived away from her family, visited a health post, seen a movie, listened to the radio, watched TV, or participated in a club or group¹⁶ by age 12 and 0 otherwise.

Migration is controlled by including a variable equal to 1 if the respondent ever lived in the neighborhood before she was 13 years old.¹⁷

Parental characteristics: Previous research has found that parental characteristics are important predictors of neighborhood choice and family-related behaviors (Axinn and Thornton 1992, 1993; Barber 2000, 2001; Thornton and Camburn 1987). Consequently, dichotomous measures are used to control for father's and mother's education (ever went to school), father's employment (ever had non-family employment before respondent's age 12), and whether parents ever used a contraceptive. A count measure of the respondent's mother's number of children ever born is also included.

Ethnicity: Additionally, because ethnicity in Nepal is complex and likely related to an individual's behaviors (Acharya and Bennet 1981; Bista 1972; Fricke 1994; Gurung 1980), dichotomous variables are used to control for five classifications of ethnicity: high-caste

¹⁴Other important individual characteristics that may influence the timing of contraceptive use include demand side facts such as ideal and obtained family size. I explored a time-varying measure of the number of children born and a measure of ideal family size (the Coombs Scale) measured in 1996. The number of children born does influence the timing of contraceptive use—those who have had more children use contraception earlier. But, including this in the model does not change the effect of childhood school characteristics. The measure of ideal family size was not statistically significant. I do not include either measure in the final models because they would be mechanisms through which childhood school characteristics would influence later life contraceptive use.

¹⁵I also estimated models with these measures entered as separate dichotomous variables and models with an index of only the most common experiences. Only visiting a health service was positively and significantly related to the hazard of contraceptive use. Importantly since these are included only as control measures, the different model specifications did not change the substantive results regarding the relationship between school characteristics and the hazard of contraceptive use. Also, because of collinearity among these measures and with the measures of childhood community context I elected to include these measures as an index and not as separate measures.

¹⁶Groups refers to social groups and community based groups focusing on issues including women's issues, seed dispersion, and micro-loans.

¹⁷Since migration was common in this sample, I also took several additional steps to assess the sensitivity of my results to varying assumptions regarding migration. I tested multiple alternative migration controls in these models including the age at which the respondent first lived in the selected neighborhood and whether she moved into the selected neighborhood before she married (marriage is a major reason Nepalese women migrate). Neither measure yielded results substantively different from those presented here. However, even with these controls, migration (or rather the reason for moving) may still be creating a spurious observed relationship between school characteristics and contraceptive use. Therefore, I also estimated models with interaction terms between migration status and the school characteristics and with a sample of only non-migrants. The interaction terms were not statistically significant and the effect estimates from the models with only non-migrants were similar to those presented here. Unfortunately, the small sample size resulted in larger standard errors and the estimated effects of school characteristics with the non-migrant sample were not statistically significant.

Hindu, low-caste Hindu, Newar, Hill Tibeto-Burmese, and Terai Tibeto-Burmese, with High-caste Hindu as the reference group.

Birth cohort: Dichotomous variables for four birth cohorts are used: 1981–1977 (age 15–19 at the 1996 survey), 1976–1972 (age 20–24 at the survey), 1971–1967 (age 25–29 at the survey), and 1966–1952 (age 30–44 at the survey), with the 1981–77 birth cohort as the reference group.

Analytic Strategy

The breadth of the CVFS allows estimations of complex models of the relationship between schools, school characteristics, and contraceptive use. Discrete-time event history techniques are used to estimate the models (Allison 1982). Person-months of exposure are the unit of analysis, and I consider women to be at risk of contraceptive use after they marry for the first time. For women who marry before February 1997, the hazard begins in the first month of the prospective data collection; otherwise, it begins the month after the respondent marries. Two series of dummy variables account for seasonal variation and the baseline hazard. The first series accounts for the calendar month—12 dummy variables with one excluded as the reference. The second accounts for the year—11 dummy variables with one excluded as the reference.

Because the individuals in the CVFS are clustered, with several individuals living in the same community, multilevel models are estimated to account for this data structure. Techniques for multilevel modeling are well developed and have been widely applied in fertility and school research (Entwisle, Casterline, and Sayed 1989; Mason et al. 1983; Raudenbush and Bryk 2002). The multilevel hazard analysis proposed in Barber et al. (2000) is used to estimate discrete-time hazard models with random neighborhood level effects (commonly known as a random intercepts model). Because the outcome of interest (contraceptive use) has only one destination state and is measured as a dichotomous variable, logistic regression is an appropriate estimation technique (Allison 1982; Guilkey and Rindfuss 1987).

RESULTS

Table 3 shows the models of the geographically weighted average of school characteristics of the entire study area on the hazard of contraceptive use. The coefficients displayed are the multiplicative effects on the odds of contraceptive use (the odds ratios). An exponentiated coefficient greater than 1.00 represents a positive effect, less than 1.00 a negative effect, and equal to 1.00 no effect. Because the frequency of contraceptive use in any one-month interval is quite small, the odds of contraceptive use are very similar to the rate, and results are often discussed in terms of rates.

Overall, we see evidence that student and teacher characteristics have a long-term influence on individuals' contraceptive use. Looking at Model 1 we see that the percent of students who are girls is positively and significantly related to the hazard of contraceptive use – that is, women exposed to schools with higher percentages of girl students had significantly higher rates of contraceptive use.

Technically, a 1 percent increase in the geographically weighted average of the proportion of students who are girls corresponds with a 3 percent higher rate of contraceptive use (Model 1). But what does a 1 percent increase in a respondent's geographically weighted average mean? The answer depends on the specific school characteristic, year, school, and neighborhood in question. When schools were first being built in the study area, obtaining a 1 percent increase in the geoweighted average of any one school characteristic was fairly

easy. For instance, the geoweighted average could have increased by 1 percent if the percent of students who were girls doubled to 40% in one school in the most remote section of the study area, the southwest corner, in 1965. A similar change at a school located in Narayanghat, the major town in the northeast section of the study area, would yield a 7 percent increase in the geoweighted average. Those same changes 20 years later would hardly change the geoweighted average at all. More substantial increases in the percent of students who were girls, such as making half the students girls at three schools, would raise the geoweighted average by as much as 6 percent if the schools were remote or 19 percent if they were near Narayanghat. While these latter changes may be unrealistic goals over a short time period, it is fair to say that reasonable increases in girls' participation in education would yield substantively meaningful changes in behavior.

As this discussion shows, the specific time period may be important—the effect of these school characteristics may change over time. I estimated models with interactions between the geographically weighted measures of school characteristics and period (the calendar year the respondent turned 13), but did not find any statistically significant interactions. This is likely because the geographically weighted averages incorporate some of the period effect we are often concerned with. Typically when we think of contextual effects changing over time it is at least partly because their distribution over space changes—as things like teachers with college degrees become more common the marginal effect of each one may be lessened. By measuring that distribution and incorporating it into the measures of school characteristics I do not find any residual period effect. Period may also be accounted for by the measure of the number of schools open when the respondent was 13 (which was positively and significantly related to the hazard of contraceptive use).

The measures of girl students at the closest school and distance to the closest school were not statistically significant.

In Models 2 and 3 we see that the percent of teachers who are women and are college educated are significantly related to contraceptive use – women exposed to schools with higher percentages of female or college educated teachers had significantly higher rates of contraceptive use. Here the comparable measures of the closest school were not statistically significant.

It may seem surprising that the characteristics of and distance to the closest school were not significant, but several reasons may explain these findings. First, the broad conceptualization and resulting geoweighted measures of school context more closely match the theory than do the measures of the closest school. Because diffusion effects are assumed to influence individuals through a range of social channels, physical proximity is less important. The analytic measures do incorporate distance, and results suggest that although proximity is important, it is not the most important component of school characteristics in terms of their influence on contraceptive use. Second, the closest school is not necessarily the one that the respondent attended. Many of the women (30%) never attended school and, because enrollment is not determined through residential zoning, those who did attend may not have gone to the school closest to their neighborhood. Third, consider the outcome in question here: later life contraceptive use. It may very well be the case that characteristics of the closest school influence academic outcomes. Fourth, and perhaps most important, we should remember that the lack of statistical significance cannot be interpreted as indicating no influence, only a non-significant effect.

Not surprisingly, for all three school characteristics, in models without the measures of the closest school, the estimates for the geoweighted average measures were similar to those shown here.

Because all three the geoweighted measures incorporate much of the same information, the distance between each school and neighborhood, they are all highly correlated with one another. This correlation precludes their use in one model to assess their independence from one another. Based on their varied distributions over space (see Figures 2–4), we can be confident that the three measures are capturing different dimensions of schools (also, correlations run at the school level indicate the same). But we are unable to say for certain that each characteristic operates independently.

Turning now to the control measures, we note that few of the measures motivated by the alternative explanations were statistically significant. None of the measures designed to capture community modernization or individual experiences were statistically significant. Although many measures of alternative explanations are included here, it is still possible that other operationalizations of these explanations, or measures related to other alternatives, would yield different findings. New data collection that explicitly captures the processes involved in building and supporting schools would be particularly informative on this question.

Women's own education and her parents' education were not related to her rate of contraceptive use. These education findings are in fact similar to those in other studies using these same data, and suggest that both the spread of mass education and the transition in childbearing behaviors are still in their early stages (Axinn and Barber 2001; Axinn and Yabiku 2001). There is a complex interaction between cohort and education in these data—likely because education has become more widespread among younger cohorts. When the controls for birth cohort are removed from the models, women's own education is positively related to contraceptive use. Nevertheless, because the focus of these analyses is not own or parents' schooling, the models include the full array of controls.¹⁸

To further explore the relationship between schools, education, and contraceptive use models are estimated separately for women who had ever attended school and those who had not (not in tables). The estimates of school characteristic effects were larger among the sample of non-students than students. Interaction terms between the school characteristics and the women's own education were statistically significant, implying that those estimates were in fact different from each other.

DISCUSSION

This paper aims to increase understanding of fundamental sociological questions regarding the relationship between education and fertility. By examining new measures of school context and their relationship to the transition from high to low fertility this work sheds light on the mechanisms through which schools influence individuals' behavior and provides new information on the complex relationship between school context and contraceptive use across geographic space.

The analytic results indicate that greater exposure to girl students, female teachers, and college-educated teachers in adolescence is associated with increased contraceptive use to limit childbearing later in life. Although these effects are what we would expect in this

¹⁸I also tested models that used a continuous measure of respondent's age in 1996 as control. Models with only age and with both age and the four birth cohort measures yield virtually identical results to those shown here. A dichotomous measure of whether the respondent had ever attended school was also not statistically related to the hazard of contraceptive use. Models with interaction terms between the respondent's own educational attainment and birth cohort yielded some significant contrasts. The effect of education for those in the youngest cohort, aged 15–19, was greater than for those in the oldest cohort, age 30–44, and the effect for those age 20–24 was less than the effect for those age 15–19. Including these interaction terms does not change the effect estimates of the key independent variables, school characteristics.

setting given previous findings that (1) these school characteristics are associated with improved academic outcomes for students and (2) higher academic outcomes are associated with lower fertility and increased contraceptive use, they have not been previously documented. Furthermore, this study provides evidence that school characteristics influence all of the women in the community, not only students, expanding what researchers typically consider the realm of influence for schools.

Substantively, these findings reveal several important pathways for schools, and potentially other community organizations, to influence individuals. First, they indicate the importance of gender equality in social structures. The significant effect found for the proportion of female students in local schools implies that gender equality in educational enrollment could lead to real, transformative increases in contraceptive use and childbearing behavior. The importance found for proportions of female teachers and students also shows that as role models and as members of the community women can be catalysts for social change and adoption of innovative behaviors. Because ideas and behaviors diffuse through a population via social networks, school characteristics that influence these networks will affect women's behaviors outside of any effects of individuals' educational attainment. In a setting like Nepal, where social networks are generally segregated by gender, a few women in key positions can stimulate widespread behavioral change. Research and community work on women's businesses and networks have demonstrated this in other settings (Bhuiya and Chowdhury 2002; Hossain and Knight 2008; Khander, Samad, and Khan 1998). The work presented here adds to this knowledge by demonstrating the potential for other community arenas, beyond small business ventures, in which women can be influential actors.

To minimize the effects of extant community-level variation in gender equity – and thereby isolate the effects of student and teacher gender – this research controls for many measures of community context likely also to capture gender equity. However, the effects of school characteristics found here do not need to be independent of the overall level of gender equity in order to be important influences. Future data collection efforts designed to capture the social interactions between teachers, students, and women in the community may be better able to ascertain the mechanisms through which these school characteristics influence women's fertility behaviors.¹⁹

A second substantive finding is that the level of teacher education can have a significant effect on behavior in the community around the school. While there is much debate in the U.S. over teacher credentials in American schools, far less attention is paid to this issue when discussing schools in poor countries like Nepal. The findings presented suggest an important differential influence of having highly qualified teachers in rural, poor settings like Nepal. The results also suggest a new line of research on school effects in the U.S. Instead of focusing only on how school characteristics influence educational outcomes, it may be important to explore their relationship with non-academic outcomes such as family formation behaviors.

By investigating the effects of school context on subsequent rather than concomitant childbearing behavior, this study also touches on important life course dynamics vis-à-vis the significance of educational context in shaping life trajectories. The theoretical mechanisms at work in the research presented here are also different from those in prior research on how education and schools influences contemporaneous behavior in that they are concerned with wide-spread contextual influence. This work explores the potential for

¹⁹To capture these diffusion effects more directly I included a measure of social interaction (Montgomery and Casterline 1996; Rosero-Bixby and Casterline 1993). Whether the respondent named a friend who had used contraception in 1996 was not statistically significant. Future research should explore other more direct operationalizations of social influences.

long-term effects of school context via the influence on individuals' decision-making frameworks through their social interactions.

It may be that some of the long-term effect occurs by influencing later life exposure to these same or other aspects of school and community context (Caldwell 1986). Early exposure to specific school characteristics may motivate women to live near similar schools later in life or even to change the schools in their later life communities. In this situation, the relationships presented here represent the overall effects of school characteristics early in the life course and later exposure could be a mechanism through which the effect occurs. Additional research is necessary to fully explore this complex relationship. However, it is worth noting that previous research in this setting has found that childhood exposure to schools and other aspects of social context maintain strong effects on later contraceptive use, even after controlling for later life exposure and education (Axinn and Barber 2001; Axinn and Yabiku 2001).

Finally, the findings regarding the geoweighted measures of school context are noteworthy. Recall that the geoweighted measures of school characteristics were statistically significant while those of the closest school were not. This is not surprising given the specific theoretical model applied here—one that places multiple types of interactions (those with children, neighbors, and teachers) at the crux of how school context influences the individual. These geographically weighted measures better capture a physically wide-ranging aspect of social context—the appropriate level of operationalization for this hypothesized relationship.

The significance of the geographically weighted measures of the entire school context has important implications for future conceptualizations of social context. To understand the full range of effects that changes in social context have on individual behavior, we need to incorporate individuals' entire context into our theories and models. These analyses demonstrate that when looking at the effects of social context it is not enough to examine individuals' own experiences or exposure to only the closest aspect of each dimension. Unfortunately, our theories have not developed to incorporate how context over space is related to individual behavior. Several recent studies have shown the importance in carefully conceptualizing context and have provided examples, much as this paper does, that this conceptualization must incorporate specific features of the setting and of the social problem being studied (Brauner-Otto et al. 2007; Downey 2006; Entwisle 2007; Hipp 2007). However, we are still a long way from having clear guidelines or frameworks for how to theoretically conceptualize and empirically examine spatial dynamics of multilevel problems. Future theoretical work should address this weakness to provide guidance for empirical models.

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Figure 1.
Description of Change Over Time in Number of Schools and School Characteristics.
Chitwan, Nepal

Figure 2.
Percent of Students at Each School Who are Female Across CVFS Study Area, Chitwan,
Nepal

Figure 3.
Percent of Teachers at Each School Who are Female Across CVFS Study Area, Chitwan,
Nepal

Figure 4.
Percent of Teachers at Each School With a College Degree Across CVFS Study Area,
Chitwan, Nepal

Table 1

Descriptive Statistics, Measures of School Characteristics, Individual Level at Age 13

	Mean	SD	Min [*]	Max
Geoweighted average				
Percent of students who are girls	1.32	4.20	0.07	47.86
Percent of teachers who are women	0.32	1.35	0.01	17.76
Percent of teachers with college degrees	0.41	1.60	0.01	26.37
Closest school				
Distance to the closest school	10.66	8.55	0	90
Number of schools open	93.41	20.11	37	123
Percent of students who are girls	36.54	17.24	0	77.35
Percent of teachers who are women	10.56	14.85	0	66.67
Percent of teachers with college degrees	9.86	16.54	0	100

N=969

* When zero has two decimal places minimum values are not exactly zero, they are numbers slightly larger than zero that become zero when only two significant digits are shown.

Table 2**Descriptive Statistics, Controls**

	Mean	SD	Min	Max
Neighborhood characteristics, age 12				
Distance to nearest health service (minutes by foot)	31.54		0	240
Index of number of non-family organization within 1 hour before age 12	2.27	0.97	0	3
Individual experiences				
Years of schooling before age 13	4.12	3.15	0	10
Index of non-family experiences before age 13	2.09	1.38	0	6
Lived in 1996 neighborhood when aged 13	0.46		0	1
Parental characteristics				
Father ever went to school	0.41		0	1
Father ever worked for pay outside the family	0.45		0	1
Mother ever went to school	0.11		0	1
Mother's children ever born	5.79	2.36	1	19
Parents ever used contraceptives	0.39		0	1
Ethnicity				
High caste Hindu	0.47		0	1
Low caste Hindu	0.09		0	1
Newar	0.07		0	1
Hill Tibeto-Burmese	0.15		0	1
Terai Tibeto-Burmese	0.22		0	1
Birth cohort (age in 1996)				
1981–1977 (ages 15–19)	0.44		0	1
1976–1972 (ages 20–24)	0.23		0	1
1971–1967 (ages 25–29)	0.13		0	1
1966–1952 (ages 30–44)	0.19		0	1

N=969 women.

Table 3

Multilevel Hazard Model Estimates: School Characteristics at Age 13 and Contraceptive Use in Chitwan, Nepal

	1	2	3
School characteristics--geoweighted average			
Percent of students who are girls	1.03 ** (2.39)		
Percent of teachers who are women		1.08 * (2.07)	
Percent of teachers with college degrees			1.07 * (2.18)
School controls			
School characteristics--closest school			
Percent of students who are girls	1.01 (1.58)		
Percent of teachers who are women		1.00 (−0.05)	
Percent of teachers with college degrees			1.00 (1.55)
Distance to closest school age 13	0.99 (−1.19)	0.99 (−1.32)	0.99 (−1.40)
Number of schools open (not geoweighted)	1.03 *** (3.97)	1.02 *** (3.58)	1.03 *** (3.84)
Controls^a			
Neighborhood characteristics, age 12			
Distance to nearest health service	1.00 (1.10)	1.00 (1.10)	1.00 (1.30)
Index of non-family organizations within 1 hour before age 12	1.05 (0.92)	1.06 (1.00)	1.06 (1.01)
Individual experiences			
Years of schooling before age 13	1.00 (−0.09)	1.00 (−0.12)	1.00 (−0.16)
Index of non-family experiences before age 13	0.99 (−0.27)	0.99 (−0.22)	0.99 (−0.30)
Parental characteristics			
Father ever went to school	0.88 (−1.27)	0.88 (−1.18)	0.89 (−1.08)
Father ever worked for pay outside the family before respondent age 12	1.09 (0.87)	1.09 (0.87)	1.08 (0.80)
Mother ever went to school	1.02 (0.14)	1.02 (0.13)	1.03 (0.20)
Mother's children ever born	0.97 (−1.31)	0.97 (−1.27)	0.98 (−1.19)
Parents ever used contraceptives	0.96 (−0.45)	0.97 (−0.32)	0.97 (−0.31)
Ethnicity ^b			
Low caste Hindu	1.19 (1.05)	1.18 (0.98)	1.18 (1.00)
Newar	1.06 (0.29)	1.04 (0.21)	1.03 (0.14)
Hill Tibeto-Burmese	1.26 (1.56)	1.22 (1.35)	1.22 (1.35)
Terai Tibeto-Burmese	0.99 (−0.07)	0.97 (−0.24)	0.99 (−0.06)
Birth cohort ^c			
Cohort 1: Born 1976–1972 (age 20–24 in 1996)	1.73 *** (3.27)	1.64 ** (2.97)	1.68 *** (3.14)
Cohort 2: Born 1971–1967 (age 25–29 in 1996)	1.73 * (2.11)	1.52 * (1.71)	1.63 * (1.97)
Cohort 3: Born 1966–1952 (age 30–44 in 1996)	0.68 (−1.01)	0.52 * (−1.90)	0.58 (−1.57)
Lived in this neighborhood before age 13	0.75 * (−2.25)	0.75 * (−2.23)	0.75 * (−2.24)
Intercept	0 *** (−8.01)	0 *** (−8.02)	0 *** (−8.31)
−2 Residual Log Pseudo-Likelihood	500875	500576	500714

	1	2	3
Neighborhood level variance	0.08	0.08	0.08
Number of observations (person months)	64027	64027	64027

^a Includes dummies for calendar month and year and for first month of prospective data collection.

^b Reference category is Upper caste Hindu.

^c Reference group is born 1981–1977 (age 15–19 in 1996)

* P < .05, one tailed test;

** P < .01, one tailed test;

*** P < .001, one tailed test