Asset Ownership and Academic Achievement Among Youth in Ghana: Examining Associations Based on Asset Type and Academic Subject

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Abstract

This cross-sectional study examined the relationships between asset type and academic achievement among Ghanaian junior high school students. Results suggest that the positive relationship between asset ownership and academic achievement depends on the type of asset and academic subject. Homeownership was positively and significantly associated with math achievement. Ownership of transport-related assets was positively and significantly associated with English achievement. Findings have implications for asset-building programs to promote academic proficiency and progress for all youth.

Key words: academic achievement, assets, English, Ghana, junior high school, math.

Although academic achievement is influenced by a range of different factors, family economic resources have been shown to be a consistent predictor of academic achievement (Corak, 2013; Hair, Hanson, Wolfe, & Pollak, 2015; Morrissey, Hutchison, & Winsler, 2014; Mungai, 2012; Timæus, Simelane, & Letsoalo, 2013; Woldehanna & Hagos, 2015). Families with adequate economic capital may be able to purchase or access resources such as books, additional training, and other educational tools that promote learning and maximize academic potential. Many studies have used household income as a measure of economic capital. Although income is a valid indicator of household economic resources, its accuracy
and reliability are limited, particularly in resource-limited countries. In Ghana, for instance, many adults work in informal labor markets (Chowa et al., 2012; Ghana Statistical Service, 2014) where incomes are highly variable or seasonal. Taking a cross-sectional snapshot of income may produce an unreliable picture of household economic well-being.

Because of income data limitations, we used asset ownership as an indicator of a family’s economic resources and a potential predictor of youth academic achievement. Asset ownership may provide a more accurate long-term gauge of economic capital because assets are accumulated over time and last longer. Also, a growing body of theoretical and empirical work has shown that asset ownership has independent effects on academic achievement apart from income (e.g., Elliott, 2013; Grinstein-Weiss, Shanks, & Beverly, 2014; Schady et al., 2015; Williams Shanks & Robinson, 2013). However, few studies in sub-Saharan Africa (SSA) have examined the influence of household asset ownership, particularly beyond savings, on academic outcomes. In particular, fewer studies in SSA have explored the relationship between achievement in different academic subjects and various types of assets. Further, many studies in SSA have created indices to aggregate observed measures of a household’s asset ownership and living conditions. Although an index is helpful because it combines numerous items and different categories of assets (e.g., household durable goods, household building materials, and livestock) and reduces items to a one-dimensional score, an index may not give an accurate picture of the relationship between different types of assets and academic outcomes. For instance, by aggregating livestock, mode of transportation, and household durable goods into one score, we cannot identify how each type of asset affects distinct academic outcomes. Thus, our objective is to examine whether the relationship between asset ownership and academic achievement varies depending on the type of asset owned and academic subject. This study aims to address gaps in knowledge by examining the association between four types of assets—house, land, mode of transportation, and livestock—and math and English scores of Ghanaian youth. To our knowledge, this is the first study in Ghana to concurrently examine the relationships between these four types of assets and math and English scores of youth.

Education in Ghana

Compulsory education in Ghana consists of 6 years of primary school and 3 years of junior high school (JHS). Since the 1980s, Ghana has invested significantly in compulsory education. Government expenditure on education as a percentage of gross domestic product increased from 2.7% in 1980 to more than 8.1% in 2011. The number of JHS students increased by almost 20% from 2005 to 2010 (Ghanaian Ministry of Education [GMoE], 2010). Introduction of ancillary programs such as free tuition have contributed to improved educational outcomes. Most notably, enrollment increased and the dropout rate decreased. However, despite increased investment, academic achievement of JHS students has not improved. In 2012–2013, 3.5% of JHS students in public schools repeated a grade (GMoE, 2013). Less than half of JHS students receive a sufficient grade in the Basic Education Certification Exam to qualify for admission to senior high school (Ajayi, 2011). In addition, Ghana has consistently trailed other African nations in international comparisons of student academic achievement (Martin, Mullis, Foy, & Stanco, 2012; Mullis, Martin, Foy, & Arora, 2012).
Further, access to education, academic standards, and academic achievement vary widely in the country, especially between urban and rural settings. In 2012–2013, Greater Accra—one of the most urbanized regions in the country—had the highest JHS net enrollment ratio at 61% of all 12- to 14-year-olds (GMoE, 2013). During the same year, only 33% and 35% of all 12- to 14-year-olds in the rural Upper East and Upper West regions, respectively, were enrolled in JHS. Studies also show decreased educational access and academic achievement for girls and those with lower economic status (Nguyen & Wodon, 2014; Senadza, 2012). Although the number of girls enrolled in JHS is increasing, historically, boys outnumber girls in JHS enrollment. In 2012–2013, female JHS enrollment in public schools accounted for 47% (or 545,796 girls) of the total enrollment (GMoE, 2013). Further, costs associated with schooling place a greater burden on economically poor households and have led some parents to question the value and benefits of education (Akaguri, 2014; Akyeampong & Rolleston, 2014). This may contribute to reduced rates of education and less academic achievement among youth from lower income households.

Education and Gender

Differences in education attainment between girls and boys remain substantial in many countries, and Ghana is no exception. In a Ghanaian study by Porter et al. (2011), findings indicate that boys were more punctual than girls because of the household chore demands on girls, including sibling care and market attendance. In the same study (Porter et al., 2011), parents were reported to be more reluctant to allow girls to walk long distances to go to school, which resulted in girls having higher levels of truancy and dropout. A combination of heavy work demands on girls in rural communities in particular, when coupled with long walking distances to school, leads to late enrollment, poor attendance, and early withdrawal from school.

Sociocultural and religious factors are barriers to girls’ education. Early and forced marriages are imposed on girls to protect them from premarital pregnancy, which is considered shameful. These practices hinder girls’ educational progress and restrict girls’ rights to education. In northern Ghana, where female genital mutilation is practiced, girls’ participation in education is limited after this rite of passage to “womanhood.” Generally, there is a practice of persuading girls to take different subjects than those taken by boys with an explanation that girls should take the “softer” subjects, which translate as arts and language classes. However, religious schools are more likely to implement this practice (Bamora, 2010). For example, in the Volta region of Ghana young virgin girls are offered to serve village priests at shrines to compensate for the sins of family members (Tanye, 2008). Caregivers’ beliefs also contribute to how the education of girls is prioritized and whether it is positioned at the same level as boys (Wolf, McCoy, & Godfrey, 2016). In their study, Wolf et al. (2016) found that when caregivers endorsed educating boys more than girls then attended school at significantly lower rates than when caregivers encouraged girls to be educated.

Asset Ownership and Education

Overall, the current body of research supports the positive association between asset ownership and education (e.g., Elliott, Destin, & Friedline, 2011; Glewwe, Krutikova, & Rolleston, 2017; Grinstein-Weiss et al., 2014; Schady et al., 2015; Spaull & Taylor, 2015).
Owning more assets is positively associated with higher school enrollment, attendance, and completion among youth in resource-limited countries (Crea et al., 2013; Hedges, Mulder, James, & Lawson, 2016; Jones & Schipper, 2015; Schady et al., 2015; Spaull & Taylor, 2015; von Fintel, Zoch, & Berg, 2017). In one of the first cross-national studies on assets and education, Filmer and Pritchett (2001), using data from 35 low- and middle-income countries, found that students from families in the top 20% of the asset index stayed in school longer than students whose families occupied the middle 40% or the bottom 40% of the asset index. Students from low-asset families (i.e., those in the bottom 40% of the asset index) did not complete primary school (Filmer & Pritchett, 2001). Assets that positively influence education outcomes include household durable goods (Chowa, Masa, Wretman, & Ansong, 2013; Filmer & Pritchett, 1999; Kerr, 2017), land (Menon, van der Meulen Rodgers, & Nguyen, 2014; Shafiq, 2007), farm equipment (Cockburn & Dostie, 2007; Hedges et al., 2016), and modes of transportation (Filmer & Pritchett, 1999; Montgomery & Hewett, 2005). As illustrated, most studies in SSA focus on the relationship between asset ownership and indicators of educational outcomes (e.g., school enrollment and attendance). Fewer studies have examined the relationship between asset ownership and subject scores. Studies that investigate the association of asset ownership with examination scores suggest a positive impact. In Uganda, asset ownership measured by accumulated savings in a bank account has been shown to have a positive association with children’s school attendance and examination scores (Curley et al., 2010). In Ghana, ownership of home durable goods is associated with higher scores (Chowa et al., 2013).

Empirical evidence also suggests that asset ownership has mixed effects on school attendance and completion. Assets that require substantial amounts of time to maintain may be negatively associated with school attendance and completion. For instance, ownership of agricultural crops decreases school attendance, reflecting the amount of time needed to plant, maintain, and harvest the crops (Cockburn & Dostie, 2007). However, ownership of farm equipment (e.g., plows and sickles) increases school attendance, reflecting a lower demand for labor. In another study, assets in the form of livestock have mixed effects on schooling and labor demand (Dillon, 2013; Hedges et al., 2016). When men are sick, children are more likely to be withdrawn from school to care for animals. Also, youth who combine work and school may not get the full benefit of their education because they have less time to do homework or study for exams, or they may be exhausted and unable to pay attention in class.

Further investigation of the differential effects of assets on child education will provide the information that policy makers and program development practitioners need to develop interventions that are sensitive to the effects of different types of assets on child education. Asset transfer interventions, for example, should incorporate assets that will aim to not only improve livelihood outcomes but also ensure that overall child wellbeing is maintained in the long run.

Findings from this study will contribute to the body of knowledge that takes into account differentiated views of assets and disentangle asset effects on children’s educational outcomes to demonstrate that some assets have negative effects on education. This body of knowledge will provide a nuanced framework to employing an asset-based approach to improving child education outcomes.
Methods
Study Design and Sample

This study used a cross-sectional design. We analyzed the baseline data from a youth financial inclusion and development project in Ghana. The Ghana study’s research design is described in Chowa et al. (2015). The original study used a cluster randomized design with 100 schools. The 100 schools were randomly assigned to treatment or control groups. Fifty schools were randomly assigned to two treatment groups and the other 50 schools to a control group. Half (n = 25) of the 50 treatment schools were randomly assigned to an in-school banking program and the other half (n = 25) were assigned to a marketing outreach campaign. The study protocol was approved by the Institutional Review Boards at the University of Ghana, the University of North Carolina at Chapel Hill, and Washington University in St. Louis. Local research staff met with prospective participants (and a parent or an adult guardian, if the participant was a minor) to explain the project. Recruitment occurred at schools. Informed consent (and assent for those under 18 years old at the time of data collection) was obtained from all study participants. A parent or an adult guardian signified in writing their permission for the minor to participate in the project. For minor participants, we first obtained consent from a parent or an adult guardian. After receiving an adult informed consent, we obtained the assent of the youth.

The sample consisted of youth whose parents were interviewed in the baseline survey. Although 6,252 youth were included in the baseline survey, only 4,576 adult caregivers were interviewed. Of the 4,576 adult caregivers interviewed at baseline, 3,083 were parents of the youth. Because prior research suggests that youth academic achievement is influenced by parental socioeconomic status, our sample comprised youth whose parents were interviewed at the baseline, which allowed us to control for observed parental variables. Missing data on outcome and predictor variables reduced the final sample size to 2,825 pairs of youth and parents. Bivariate comparisons showed that the study sample differed significantly (p < .05) from youth and their parents who were excluded because of missing variables on three covariates (i.e., academic self-efficacy, and expectations of math and English scores). Youth did not differ significantly on any of the five asset-ownership variables or either outcome variable.

Study Setting

The study was conducted in eight of 10 administrative regions in Ghana, including Ashanti, Brong-Ahafo, Central, Eastern, Greater Accra, Northern, Volta, and Western. These eight regions account for more than 90% of the country’s population. In 2010, about a third of Ghana’s population were between 15 and 35 years old, and close to a quarter of all Ghanaians were between 10 and 19 years old (GSS, 2014). Within the eight regions, the proportion of youth 10–14 years old in the regional population ranged from 9.6% in Greater Accra to 12.7% in Brong-Ahafo. Additionally, the proportion of youth 15–19 years old varied from 9.7% in Greater Accra to 11.1% in Central. Furthermore, the study setting was determined based on the catchment area of the financial service provider in the main Ghana study (Chowa et al., 2015). Fifty-four districts from the eight regions served by the financial institution partner were included in the study. Additionally, 100 public schools were randomly selected, using simple random sampling method, from an eligible pool of 581 public schools located in the 54 districts served by the financial service provider. At each school, between 61 and 63 youths were randomly selected to be part of the study.
Data Collection and Sources
Data were collected using an interviewer-administered questionnaire. All interviewers were locally trained and fluent in the local languages. Data used in this study were collected in 2011 and 2012. The baseline questionnaire included information on youths’ educational, health, psychosocial, and financial characteristics. Youth and their household socioeconomic characteristics, including ownership of assets, were also available in the baseline data. These questionnaires are available at https://gsdi.unc.edu/youthsave-ghana/.

Variables and Measures
Outcome Variables
Outcome variables were students’ summed examination and continuous assessment scores in math and English collected from school records. In addition to determining progression to the next grade level, these academic scores represent a portion of students’ Basic Education Certificate Examination (BECE). BECE is taken by junior high school students at the end of their ninth year of basic education and is the main examination for admission into senior high or vocational schools. The continuous assessment score was the total of all quizzes and assignment scores given during the academic term, and students take the examination at the end of the term. Because different schools use different proportions of the continuous assessment and examination scores to calculate final scores, we normalized the scores across all schools so that continuous assessment and examination scores each account for 50% of the total grade for the term for each course. Both measures were interval-level variables with values ranging from 0 to 100. A high value indicates high achievement in the subject.

Explanatory Variables of Interest
Four different types of assets were included in the study: house, land, mode of transportation, and livestock. All asset items were reported by youth. Two measures of asset ownership were dichotomous (i.e., house and land) and two measures were continuous (i.e., mode of transportation, and livestock). House or homeownership referred to whether a youth’s family owned a home (coded as 1 for yes or 0 for no). Land referred to whether a youth’s family owned a plot of land (coded as 1 for yes and 0 for no). Mode of transportation referred to ownership of a canoe or boat, bicycle, motorcycle, or other vehicles (e.g., cars and trucks). Livestock referred to ownership of six types of animals: chickens, cows, donkeys, goats, pigs, and sheep. For mode of transportation and livestock, ownership referred to the number of asset items owned by the household. We created indices for transportation-related assets and livestock ownership using the method recommended by Filmer and Pritchett (1999, 2001) and Moser and Felton (2007). Higher scores suggest that a family owns more of that type of asset.

Covariates
Covariates included youth demographic controls (i.e., gender and age), parent and household socioeconomic variables (i.e., marital status, employment type, education level, household monthly income, and number of economic dependents), and student trait variables (i.e., academic self-efficacy, commitment to school, planned effort, future orientation, and academic expectations).
Gender was a dichotomous variable coded as 1 for male or 0 for female. Age of youth was the youth’s age when baseline data were collected in 2011. Parent’s educational level was created with dummy variables using the following groups: no formal education (reference category), primary, secondary, and tertiary. Marital status was a dichotomous variable coded as 1 for married or 0 for not married. Employment status was a dichotomous variable coded as 1 for formally employed (i.e., receiving regular wages or salaries as an employee) or 0 for not formally employed (i.e., receiving irregular wages or salaries from engagement in the “informal” sector). Household income was a continuous variable defined as the household’s total monthly income from full- or part-time work, rental properties, pension, and remittances. The number of economic dependents was a continuous variable measured as the number of individuals 14 years old and younger who rely on the head of household for food, shelter, clothing, and other basic needs.

All student traits variables were continuous and measured using preexisting scales. We measured academic self-efficacy using an eight-item, 10-point, Likert-type scale ranging from 0 (cannot do at all) to 10 (highly certain can do) adapted from Muris (2001). A high value indicated a high level of academic self-efficacy. We measured commitment to school using a nine-item, 10-point, Likert-type scale that ranges from 0 (strongly disagree) to 10 (strongly agree) adapted from the Rochester Youth Development Study (Thornberry, Lizotte, Krohn, Farnworth, & Jang, 1991). A high value indicated a high level of commitment to school. We measured planned effort by asking youth how many hours per week on average that they spend on school work outside of school. A high value indicated a higher level of planned effort. We measured academic expectations by asking youth what scores they expect to get in their math and English classes. Both measures of academic expectations were interval-level variables with values ranging from 0 to 100 (Destin & Oyserman, 2009). Finally, we used two dimensions of future orientation: orientation toward success and uncertainty of the future (Chowa & Masa, 2015). Orientation toward success was measured using a six-item, 10-point, Likert-type scale ranging from 0 (strongly disagree) to 10 (strongly agree). A high value on this scale indicated higher level of future orientation. We measured uncertainty of the future using a five-item, 10-point, Likert-type scale ranging from 0 (strongly disagree) to 10 (strongly agree). A lower value on this scale indicated higher level of future orientation. Both measures of future orientation were adapted from the School Success Profile Survey (Bowen, Rose, & Bowen, 2005).

**Analysis Plan**

Our analysis plan included several steps, each undertaken separately for each sample. First, we performed principal component analysis to determine the weights for each of the separate multi-item asset indices (i.e., livestock and mode of transportation). Details about this topic and method can be found in Filmer and Scott (2012), and Moser and Felton (2007). Second, we conducted diagnostic tests and residual analyses. Results indicated that household monthly incomes were highly skewed and not normally distributed. To reduce the influence of extreme observations on regression coefficient estimates, we transformed household monthly income using inverse hyperbolic sine transformation to handle observed zero values (Burbidge, Magee, & Robb, 1988; Friedline, Masa, & Chowa, 2015). Third, we examined the relationship between asset ownership and academic achievement using multivariable linear regression based on the ordinary least squares method. In the multivariable
models, we controlled for youth demographics, student traits variables, and parental/household characteristics. In addition, because of the hierarchical nature of our data (i.e., students were nested within schools), we adjusted for the effect of clustered data by using robust standard errors. Robust standard errors are appropriate because our models may have violated the assumption of linear regression regarding independence of observations. In our data, youth were independent across schools but not necessarily within schools. Last, we conducted sensitivity tests to check robustness of findings. These sensitivity models were consistent with the primary multivariable models, except the livestock and mode of transportation assets were recoded into categorical variables using quartiles. For these additional model with quartiles, the lowest quartile was the reference category.

**Results**

**Sample Characteristics**

Table 1 presents descriptive statistics. There were equal percentages of boys and girls, and the average age of youth was 15 years. The average math and English scores were nearly 53 of 100 points. Among parents, 26% had no formal education, only 12% worked as regular employees in the formal sector, and 78% were married. The average monthly income was USD 132, and 51% of families owned a house.

**Multivariable Results**

Table 2 presents results of regression analysis of the relationships between ownership of different types of assets and Ghanaian youths’ math and English scores. The second (math) and third (English) columns of Table 2 show findings from the primary multivariable model (i.e., using binary home and land ownership variables and interval-level indices for livestock and transport-related assets). The fourth (math) and fifth (English) columns display findings based on our sensitivity models.

Multivariable results indicated that all four asset variables (house, land, mode of transport, and livestock) were positively associated with math grades (Table 2, column 2). However, only the effect of homeownership on the math grade was statistically significant. Youth whose families owned a house scored at least two points higher in math than youth from families that did not own a house. Male gender and academic expectations of math grades were consistent significant predictors of math grades. Commitment to school positively influenced the math grade, and the relationship approached statistical significance. No parent/household covariate was a significant predictor of the math grade.

Three asset variables (house, land, and mode of transport) were positively associated with the English grade. The fourth variable, livestock ownership, was negatively associated with the English score. However, only the effect of mode of transport ownership was statistically significant. Other things being equal, each one-point increase in the mode of transportation asset index increased math grade by more than one point. Consistent with the math score, the academic expectations for the English grade were consistently and positively associated with the English score. Age was negatively associated with the English score, and the relationship approached statistical significance. The planned effort was also negatively associated with English score, and the relationship approached statistical significance.
Commitment to school positively and significantly influenced the English grade. No parent/household covariate was significantly associated with the English score.

Sensitivity results were consistent with the primary models. For example, homeowner-ship remained a statistically significant and positive predictor of the math grade. None of the other asset variables were significantly associated with the math and English scores. However, inclusion of the quartiles showed a more nuanced and nonlinear relationship between math and English scores and asset ownership. For example, livestock ownership

<table>
<thead>
<tr>
<th>Variables</th>
<th>% or M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome variables</strong></td>
<td></td>
</tr>
<tr>
<td>Math score</td>
<td>52.63 (17.35)</td>
</tr>
<tr>
<td>English score</td>
<td>52.98 (17.56)</td>
</tr>
<tr>
<td><strong>Youth demographics</strong></td>
<td></td>
</tr>
<tr>
<td>Gender (girls)</td>
<td>50%</td>
</tr>
<tr>
<td>Age in 2011</td>
<td>15.14 (1.92)</td>
</tr>
<tr>
<td><strong>Youth academic traits</strong></td>
<td></td>
</tr>
<tr>
<td>Academic self-efficacy</td>
<td>61.09 (9.85)</td>
</tr>
<tr>
<td>Commitment to school</td>
<td>77.76 (9.31)</td>
</tr>
<tr>
<td>Planned effort</td>
<td>7.62 (4.82)</td>
</tr>
<tr>
<td>Orientation toward success</td>
<td>52.19 (6.91)</td>
</tr>
<tr>
<td>Uncertainty of future</td>
<td>5.77 (7.27)</td>
</tr>
<tr>
<td>Grade expectation (math)</td>
<td>66.80 (16.20)</td>
</tr>
<tr>
<td>Grade expectation (English)</td>
<td>67.68 (16.25)</td>
</tr>
<tr>
<td><strong>Parent and household covariates</strong></td>
<td></td>
</tr>
<tr>
<td>Education level (no formal education)</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>63%</td>
</tr>
<tr>
<td>Secondary</td>
<td>5%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>6%</td>
</tr>
<tr>
<td>Employment type (informal)</td>
<td>12%</td>
</tr>
<tr>
<td>Marital status (not married)</td>
<td>78%</td>
</tr>
<tr>
<td>Household monthly income in USD*</td>
<td>132.12 (205.07)</td>
</tr>
<tr>
<td>Number of economic dependents</td>
<td>2.71 (1.84)</td>
</tr>
<tr>
<td><strong>Asset-ownership variables (variables of interest)</strong></td>
<td></td>
</tr>
<tr>
<td>Own land (does not own land)</td>
<td>38%</td>
</tr>
<tr>
<td>Own home (does not own house)</td>
<td>51%</td>
</tr>
<tr>
<td>Own livestock</td>
<td>4.45 (6.07)</td>
</tr>
<tr>
<td>Own mode of transportation</td>
<td>0.60 (0.88)</td>
</tr>
<tr>
<td>N</td>
<td>2,825</td>
</tr>
</tbody>
</table>

Note. % = percentage distribution for categorical variables; M (SD) = mean (standard deviation) for continuous variables. Reference group is shown in parentheses for a categorical variable.

*Exchange rate used is GHS 1 = USD 0.66, approximately the rate when the baseline survey was conducted.
Table 2. Multivariable Regression Results of the Association of Assets, Youth, and Parent Characteristics with Academic Achievement

<table>
<thead>
<tr>
<th>Variables</th>
<th>Academic achievement outcomes</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Math β (Robust SE)</td>
<td>English β (Robust SE)</td>
<td>Math β (Robust SE)</td>
<td>English β (Robust SE)</td>
</tr>
<tr>
<td>Land ownership</td>
<td>0.97 (0.86)</td>
<td>0.84 (0.81)</td>
<td>0.97 (0.84)</td>
<td>0.71 (0.79)</td>
<td></td>
</tr>
<tr>
<td>Home ownership</td>
<td>2.23 (0.98)*</td>
<td>0.99 (0.98)</td>
<td>2.22 (0.91)*</td>
<td>0.93 (0.90)</td>
<td></td>
</tr>
<tr>
<td>Livestock index</td>
<td>0.07 (0.07)</td>
<td>−0.04 (0.07)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode of transportation index</td>
<td>0.73 (0.61)</td>
<td>1.27 (0.52)*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assets (in quartiles)

| Livestock index (lowest = 0)     | −0.11 (1.27)                  | 0.27 (1.17)          |
| High                             | 0.02 (1.28)                   | 0.22 (1.39)          |
| Highest                          | 0.71 (1.41)                   | −0.32 (1.36)         |

Mode of transportation index (lowest = 0)

| Low                              | −1.84 (2.35)                  | −2.43 (2.34)         |
| High                             | 0.91 (1.13)                   | 1.76 (1.00)*         |
| Highest                          | 1.99 (1.40)                   | 2.69 (1.21)*         |

Youth covariates

| Gender (girls = 0)               | 1.83 (0.85)*                  | 0.97 (0.87)          | 1.80 (0.85)*         | 0.88 (0.87)          |
| Age in 2011                       | −0.35 (0.27)                  | −0.54 (0.28)*        | −0.35 (0.27)         | −0.55 (0.29)*        |
| Academic self-efficacy           | −0.04 (0.07)                  | −0.09 (0.07)         | −0.04 (0.07)         | −0.08 (0.07)         |
| Commitment to school             | 0.11 (0.07)*                  | 0.12 (0.06)*         | 0.12 (0.07)*         | 0.12 (0.06)*         |
| Planned effort                   | −0.02 (0.10)                  | −0.16 (0.08)*        | −0.02 (0.10)         | −0.16 (0.08)*        |
| Orientation toward success       | −0.03 (0.06)                  | 0.02 (0.06)          | −0.03 (0.06)         | 0.02 (0.06)          |
| Uncertainty of future            | 0.02 (0.09)                   | 0.02 (0.09)          | 0.02 (0.09)          | 0.02 (0.09)          |
| Grade expectation (math)         | 0.11 (0.03)***                | −0.11 (0.03)***      |                      |                      |
| Grade expectation (English)      | —                             | 0.24 (0.03)***       | —                    | 0.24 (0.03)***       |

Parent and household covariates

| Education level (no formal education = 0) |                      |                      |                      |                      |
| Primary                                  | −1.66 (1.14)           | −1.46 (1.03)         | −1.60 (1.13)         | −1.36 (1.02)         |
| Secondary                                | 1.44 (1.49)            | 2.70 (1.48)*         | 1.57 (1.47)          | 2.97 (1.50)*         |
| Tertiary                                 | 0.57 (1.94)            | 1.64 (2.15)          | 0.71 (1.87)          | 1.84 (2.10)          |
| Employment type (informal = 0)           | 1.91 (1.19)            | 0.23 (1.16)          | 1.77 (1.18)          | 0.19 (1.15)          |
| Marital status (not married = 0)         | −1.06 (0.91)           | −1.13 (0.89)         | −1.10 (0.89)         | −1.15 (0.87)         |
| Household monthly income in USD*         | −0.40 (0.38)           | −0.28 (0.37)         | −0.39 (0.38)         | −0.27 (0.36)         |
| Number of economic dependents           | −0.00 (0.17)           | 0.13 (0.18)          | −0.01 (0.17)         | 0.11 (0.18)          |
| Constant                                 | 45.86 (8.27)***        | 41.67 (7.70)***      | 45.89 (8.29)***      | 41.50 (7.70)***      |
| F value                                  | 4.68***                | 7.89***              | 4.50***              | 7.97***              |
| R²                                       | .0368                  | .0684                | .0381                | .0704                |

Note. SE = standard error.

*p ≤ .10, ‘p ≤ .05, ***p ≤ .001, two-tailed test.
was only a negative predictor of the math grade for youth in the low quartile. Contrasted with youth in the lowest quartile, youth in the low quartile scored lower in math. Similarly, livestock ownership was only a negative predictor of English grade for youth in the highest quartile. Contrasted with youth in the lowest quartile, youth in the highest livestock quartile scored lower in English youth in the low and high quartiles scored higher in English contrasted with youth in the lowest quartile. However, none of the associations between livestock ownership quartiles and math and English scores were significant.

The relationship between ownership of transportation-related assets and academic achievement also appeared to be nonlinear. Youth in the low quartile scored lower in math and English in contrast with youth in the lowest quartile. Youth in the high and highest quartiles scored higher in math and English. In particular, youth in the highest quartile scored nearly two points higher in math and more than two points higher in English contrasted with youth in the lowest quartile. However, only the relationship between the highest quartile and English grade was statistically significant. The relationship between high quartile and English grade approached statistical significance. The use of quartiles when examining the relationships between asset ownership and math and English scores of Ghanaian youth suggests at least two things: a potentially nonlinear relationship (particularly for livestock and transport-related assets) and larger math and English score disparity between lowest and highest asset quartiles.

**Discussion**

This study examines the relationships between asset ownership and the math and English scores of youth in Ghana, and the results suggest that, overall, asset ownership is positively associated with math and English scores. Findings also show that the positive relationship between asset ownership and math and English scores depends on the type of asset and academic subject. Homeownership was positively and significantly associated with math scores. The mode of transportation ownership was also positively and significantly associated with English scores. These findings are consistent across primary and sensitivity models, which suggests that the observed association may be robust. Although the relationships between other types of asset variables and math and English scores (e.g., homeownership and English, land ownership and math and English, mode of transport ownership and math, and livestock ownership and math) were not statistically significant, the positive direction of the relationships is notable.

By examining the relationships between different types of assets and math and English scores separately, we demonstrate that—although asset ownership in general influences math and English scores positively—there are variations in direction and magnitude of effect by type of asset. Owning a greater variety of assets seems to positively influence math scores but not English scores in our sample of Ghanaian youth. We find that ownership of land, a home, a mode of transportation, or livestock positively influences math scores, but only homeownership, landownership, or mode of transportation ownership positively predicts English scores. Alternatively, livestock ownership has a negative association with English scores. In addition, the coefficient size of the association between asset ownership and math scores is generally higher than the coefficient size of the association between asset ownership and English scores. For instance, homeownership was associated with at least
a two-point increase in math scores but only a one-point increase in English scores, which suggests that asset ownership has a stronger positive association with math scores.

Inclusion of quartiles for livestock and transportation asset indices provides evidence of nonlinearity indicated by both positive and negative relationships between asset indices and math and English scores. The nonlinearity suggests that accumulating assets below or above a certain threshold influence math and English scores in different ways. For example, accumulating livestock above 6.73 points (or the 75th percentile) was negatively associated with English scores but not math scores. On the other hand, accumulating transportation-related assets below 0.34 (or the 50th percentile) was negatively associated with both math and English scores. While it could be argued that accumulation of more assets can have positive associations with the math and English scores of youth, this may not be the case when households accumulate more livestock or too little transport-related assets. The accumulation of more or less assets of each type may limit households’ abilities to leverage wealth for providing educational opportunities for youth. For instance, accumulation of one bicycle and one motorcycle may be limited to personal use of the household, in particular for the older members of the household. Having more than one bicycle or motorcycle, on the other hand, may allow households to diversify the use of such assets such as to generate income or to permit younger members of the household to use the bicycles to get to school. Similarly, owning more livestock may result in youth spending more time herding and taking care of the animals. In turn, spending more time in the field may reduce time spent in the classroom or time devoted for studying and doing homework.

Consistent with Sherraden’s (1991) propositions, we may be able to explain the positive association between asset ownership and youths’ math and English scores by examining: (a) the direct financial effect of asset ownership on a household’s ability to purchase school-related materials and (b) the indirect effect of asset ownership on attitudes and behaviors. Household asset ownership may increase the ability of youths and parents to purchase books, uniforms, and school supplies; pay fees for school and extracurricular activities; and attend school beyond free and compulsory education. Although the assets included in our study are not “liquid,” these assets may provide families with adequate cash flows to purchase or have access to school-related materials that make it easier for the youth to learn and perform better in school. For instance, families who own land can lease it or plant crops to generate income. Houses or rooms within the house can be rented. Livestock can be sold for cash or used to generate income (e.g., selling of their milk). Motorcycles, boats, and bicycles can be sold or leased or used to transport people for a fee. A mode of transport can also reduce the time it takes youth to travel from home to school, which allows students to come to school on time or less tired from walking long distances.

Asset ownership may also indirectly affect school-related attitudes and behaviors, which may contribute to higher academic achievement. For instance, youth who believe that their families have enough economic resources to pay for school may be able to better prepare for final exams, focus on getting higher scores to advance to the next grade level, and plan for schooling beyond the free and compulsory education. This may lead to increased academic efforts, expectations, and achievement. The indirect attitudinal and behavioral effects of asset ownership could be as important as its monetary or financial impact in predicting
higher course scores (Chowa & Masa, 2015). In addition, asset ownership may foster house-
hold stability characterized by desirable parent–child interaction and lower levels of stress. 
In turn, household stability may promote greater involvement of parents in their children’s 
education both inside and outside their homes. For instance, parents may be more motivated 
to attend school-related meetings and activities and/or help their children with their assign-
ments, which, in turn, may encourage young people to study and do well in school. 
Alternatively, households with fewer assets (and lower economic status) may experience 
more frequent and higher levels of stress, which, in turn, may negatively affect family com-
munication and parent–child relationships. Deterioration of household stability may also 
adversely influence children’s academic performance through lack of tangible (e.g., financial) 
or intangible (e.g., emotional) support from the parents.

Our findings are consistent with research in the United States that shows a more con-
sistent positive and significant association between asset ownership and math scores than 
asset ownership and English scores (Orr, 2003; Zhan, 2006). Our findings also are consistent 
with research conducted in the United States that shows that the relationship between asset 
ownership and academic achievement varies by type of asset (Elliott et al., 2011). However, 
most studies in the United States have used net worth and liquid assets (e.g., savings) as 
measures of asset ownership, which rely on readily available and more reliable sources. 
Obtaining similar reliable measures of asset ownership in Ghana is more challenging. Price 
data and market values can be difficult to obtain in many resource-limited countries, par-
ticularly in economies characterized by high levels of informal activities (e.g., bartering). 
We used the same procedure put in place by international organizations (e.g., the World 
Bank and United Nations Development Program) to collect information about household 
asset ownership in resource-limited countries by asking youths to report assets their families 
own. When asking people what they own from a list of assets, there is often more likelihood 
of recall.

Our findings also suggest that being male, having a commitment to school, and academic 
expectations are consistent and significant predictors of math and English scores. Higher 
aademic expectations and commitment to school (measures youths’ agreement about the 
importance of school) may help students develop positive feelings about, or greater motiva-
tion for, and interest in school subjects, which may result in higher academic achievement 
(Bandura, 1997; Chowa et al., 2015; Gonida & Leondari, 2011; Khaola, 2014). Results also 
suggest that girls remain at an academic disadvantage, possibly because of differences in 
parents’ expectations of boys’ and girls’ economic contribution to their families later in life. 
Some parents continue to have higher expectations of boys’ academic achievement than 
girls’ because of cultural and customary influences. Boys often are expected to become self-
sufficient breadwinners and household heads. In some cases, teachers buy into the normalcy 
of gender differences (e.g., the stereotype that boys’ education has higher economic returns 
than that of girls’ education), which may be reflected in how they question or praise boys 
and girls in the classroom (Kyei, Apam, & Nokoe, 2011). In addition, classroom dynamics 
(e.g., seating assignments or bullying and harassment), dominant group’s norm, and gender-
based differences (e.g., differences in the process or maturation between boys and girls) 
may hamper girls’ active participation and engagement in the classroom (Akerlof & Kranton, 
2010; Dolan, Ryus, Dopson, Montgomery, & Scott, 2014).
Limitations

The study has limitations. First, we used cross-sectional data, which cannot definitively establish the direction of the relationship, causality, or variation of academic achievement over time. Issues of reverse causality and potential confounding may undermine study findings. Second, we investigated the effects of a limited number of assets (e.g., house, land, mode of transportation, and livestock) because these are the assets on which we collected data. Although the types of assets used in the study are appropriate for Ghana, we may have omitted other types of assets that influence young people’s math and English scores. Future studies should examine the role of other types of assets, including liquid assets (e.g., savings) on Ghanaian youths’ academic outcomes. A growing body of literature has shown that savings have a more direct and stronger influence on course scores than other types of assets (e.g., Grinstein-Weiss et al., 2014). Further, some of the asset indicators used in the study are not informative enough to differentiate assets based on quality or size. For instance, because we are unable to differentiate land ownership by size or homeownership by quality of construction materials, we are unable to examine whether the effects of these assets vary depending on these specific characteristics. Third, although we included predictors that have been shown to influence course scores, our models generated low $R^2$, which implies that other important predictors of youth academic achievement may have been omitted.

Conclusions

In general, asset ownership has a positive association with math and English scores. Multiple assets (e.g., house, land, mode of transportation, and livestock) are positively associated with math scores. In contrast, homeownership, landownership, and mode of transportation ownership are positively associated with English scores. Our study presents evidence that the association between asset ownership and academic scores of Ghanaian youths depends on the type of asset and academic subject. Because course scores may determine other educational outcomes (e.g., school completion, transition to higher levels of education, and how much youths will pay for higher education and what courses they can take), our findings have important implications for programs and interventions to promote academic proficiency and progress for all youths. Our findings suggest that allowing and helping families to own and accumulate assets may start to level the playing field for all youth so they can maximize their human capital potential.

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