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ARE LITERACY SKILLS ASSOCIATED WITH YOUNG ADULTS' HEALTH IN AFRICA? EVIDENCE FROM MALAWI

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Abstract

This study investigates whether literacy skills are a distinct dimension of education that influences young adults' health in the southeast African context of Malawi. It uses new data from Tsogolo la Thanzi, a study of young adults in southern Malawi, to achieve three aims. The first is descriptive: to demonstrate a direct assessment for measuring literacy in a population-based survey, and show that it captures variability in skills among young adults, including those with comparable levels of educational attainment. The second aim is to identify whether literacy influences young adults' health—net of their educational attainment and other confounding factors. Multivariate analyses reveal that literacy is associated with two measures of physical health: self-rated health and prolonged sickness. Because literacy is a key determinant of health, the third aim is to provide insight into how to measure it: can commonly used indirect approaches to estimating literacy (e.g., based on educational attainment or self-reports), accurately capture its prevalence and relationship with health? In a second set of analyses, bivariate results show whether, and the extent to which, indirect measures of literacy overestimate literacy's prevalence, and multivariate models assess whether indirect estimates of literacy capture its relationship with health. The findings support future efforts to incorporate literacy assessments into population surveys to accurately estimate literacy's prevalence and health benefits, particularly in contexts like Malawi where access to high-quality schools remains limited.

Keywords

Literacy; Formal Education; Adult Health; sub-Saharan Africa; Malawi

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⁶This distribution of self-rated health is nearly identical to the distribution of self-rated health among 17- to 27-year-olds in the United States. According to the 2013 Current Population Survey (CPS), 4.34 percent of young adults ages 17 to 27 years report fair/poor health, 20 percent report good health, and 75.66 percent report very good/excellent health (for more information on the CPS, and to access the data, go to:<http://www.census.gov/cps/data/cpstablecreator.html>). Research documenting distinct frameworks of health evaluations (Jylhä, Guralnik, Ferrucci, Jokela, and Heikkinen 1998) across different cultures provides insight into why, despite the precarious health context in which they live, young Malawians self-rate their health as positively as do their relatively wealthier (and healthier) U.S. counterparts. Despite known challenges of comparing self-rated health across cultural groups, numerous studies demonstrate the indicator's validity in differentiating health within diverse cultural contexts (Idler and Benyamini 1997). Supplementary analyses (not shown) confirm that self-rated health is correlated with standard demographic and socioeconomic indicators as anticipated, suggesting that, despite the skewed distribution, the measure differentiates young Malawian adults' health as intended.

Introduction

During the last thirty years, evidence from multiple social science disciplines has reached a consensus: education is a key determinant of individuals' health and survival (for reviews, see Cutler, Lleras-Muney, and Vogl 2008; Mirowsky and Ross 2003). Across diverse contexts, individuals with more formal education are healthier and live longer (Baker, Leon, Smith-Greenaway, Collins, and Movit 2011).

The vast evidence of a relationship between education and health has galvanized a large body of research seeking to explain how even a few years of school can protect individuals', and their children's, health over the life course. To date, research has focused primarily on the economic benefits (Desai and Alva 1998) and the positive social and psychological consequences (Caldwell 1979; Joshi 1994; Levine 1993) of education as the most probable pathways linking it to health. Much less is known about the health salience of basic educational skills, including literacy, that are the central goal of going to school (see Baker, Leon, Smith Greenaway, Movit 2011 for review).

Population researchers often discuss literacy, but only rarely measure or study it in its own right. The lack of research on literacy is due, at least in part, to the assumption that educational attainment is an accurate reflection of these skills (Rowe, Thapa, Levine, Levine, and Tuladhar 2005). In fact, researchers and policymakers commonly use educational attainment to approximate adults' literacy, reflecting the assumption that the two indicators are synonymous. However, in low-income settings like sub-Saharan Africa, where delayed school entry and frequent absenteeism are widespread (Grant and Behrman 2010), and access to high-quality schools is limited (Lee, Zuze, and Ross 2005), educational attainment is likely a poor proxy for even rudimentary literacy skills. A recent study leveraging data from direct literacy assessments confirms this, at least in the context of Nigeria: merely one-half of women who attended five years of primary school—a common international standard for classifying individuals as literate—could, in fact, read (Smith-Greenaway 2013).

Despite the fact that low literacy levels are likely a prominent feature of Africa's educational contexts, with few exceptions, there has been little investigation of whether literacy influences health in the region, or other low-income settings. The handful of studies that analyze literacy's health salience have focused on the mother-child dyad (Glewwe 1999; Khandke, Pollitt, and Gorman 1999; LeVine 2012; Smith-Greenaway 2013). As a result, questions of whether literacy is associated with adults' own health remain outstanding.

This paper uses data from a study of young adults (Tsogolo la Thanzi) in southern Malawi to explore whether literacy is a key aspect of education that influences health in a low-income context. Malawi, a southeast African country, is at a unique historical period when the transition to mass education is rapidly unfolding and increasing opportunities to acquire literacy, but there continues to be sizeable variability in even the most basic skills. At the same time, health risks are pervasive in Malawi and mortality rates remain at some of the world's highest levels; thus, in conjunction with its educational context, its epidemiological profile makes it an interesting place to study literacy's potential to protect adult health.

The study is motivated by three aims. The first is descriptive: to demonstrate a direct assessment for measuring literacy in a population-based survey, and show that it captures variability in skills among young adults, including those with comparable levels of educational attainment. The second aim is to determine whether literacy influences young adults' health, net of their educational attainment and other confounding factors. Multivariate analyses reveal that literacy is associated with two measures of young adults' physical health: self-rated health and prolonged sickness. These findings confirm that literacy should be incorporated into future demographic research; however, questions of how to best measure it remain. Thus, the third aim is to determine whether direct assessments are necessary, or if two commonly used indirect measures are sufficient for capturing literacy's prevalence and health benefits. Bivariate results determine whether, and the extent to which, two indirect measures of literacy—educational attainment (grade five and above = literate) and self-reports—accurately reflect its prevalence. I then use multivariate models to analyze whether these indirect measures capture literacy's association with young adults' health.

Measuring Literacy in Population Research

Literacy is a common theme in academic and policy discourse on the social determinants of population health. Researchers and policymakers agree that literacy enhances individuals' economic opportunities (Benhabib and Spiegel 1994), quality of life (Egbo 2000), and overall well-being (Grosse and Auffrey 1989).

Despite theoretical recognition of literacy's relevance to individuals' health and well-being, there is little population research on literacy in and of itself. The research that has been done suffers from measurement problems: literacy is typically measured indirectly, relying on one of two standard approaches: (1) educational attainment or (2) self-reports. In terms of the former, despite having no data on literacy, recent studies in top population journals commonly label individuals with no formal education as “illiterate” and those with some or complete primary education as “literate” (Basu and Stephenson 2005; Bhat and Xavier 2003; Burchi 2012; Lavelly 2007; Turra, Goldman, Seplaki, Gleit, Lin, and Weinstein 2005). This practice is not specific to academic circles—inferring literacy based on educational attainment has also been the de facto approach of international policy organizations such as the United Nations Education, Scientific, and Cultural Organization (UNESCO). UNESCO currently has literacy assessment projects underway (see, e.g., the Literacy Assessment and Monitoring Program [LAMP]); historically, however, the organization has estimated literacy rates by assuming that all adults with five or more years of school can read (Schnell-Anzola, Rowe, and LeVine 2005).

Inferring literacy based on educational attainment may not be problematic in high-income world regions where educational institutions are well-established. In settings where school attendance is compulsory and—at least relative to low-income countries—school quality is high, standards of education are generally enforced, and basic educational resources (e.g., textbooks and writing supplies) are available, educational attainment may be a reasonable proxy for very basic literacy skills. However, in low-income regions like sub-Saharan

Africa, assuming that literacy is universally achieved during primary school is likely more problematic.

Two factors are likely to contribute to low but variable levels of literacy across educational attainment in sub-Saharan Africa. First, there is considerable focus on getting children enrolled in school in the region, however, even among those who are technically enrolled, it is common for students to spend long periods of time away from school due to financial or family demands (Lewin 2009). School is compulsory in only some African countries, and even in these settings, economic and infrastructural shortcomings make it difficult to enforce attendance policies (Lewin 2009). As a result, issues like delayed school entry, frequent absenteeism, and years spent entirely out of school remain common in the region (Grant and Hallman 2008)—each of which are known to interfere with academic success (Zuze and Reddy 2011).

Second, even if African children consistently attend school, in many contexts, the lack of educational resources may pose an additional hurdle to literacy education. In fact, as school enrollment has increased across the region, in many countries, educational spending has either stagnated or declined, leading to lower spending per pupil in recent decades (Barro and Lee 1996). As a result, issues like overly crowded classrooms, limited school supplies, and underpaid teachers are commonplace concerns (Heyneman and Loxley 1983), which interfere with individuals' ability to master basic educational skills. Moreover, because public schools tend to have significantly fewer resources than private ones, the sizeable disparities in school quality in low-income countries are likely to lead to striking inequality in literacy skills among privately versus publically educated individuals (Jimenez, Lockheed, and Paqueo 1991).

Recognizing that literacy is unlikely to be universally achieved at a given level of education, some census and survey projects use a different indirect measure of literacy: self-reports. Respondents are typically asked whether they are able to read a standard text, such as a newspaper. Literacy data collected via self-reports could be viewed as an improvement over inferring literacy from educational attainment; however, research suggests that this technique vastly overestimates literacy at both the individual- and population- levels. At the individual-level, research has shown that anywhere from 17 percent of respondents in Bangladesh (Greaney, Khandker, and Alam 1998) to 28 percent of respondents in Nepal (LeVine, LeVine, Rowe, and Schnell-Anzola 2004) report that they are able to read when a direct assessment later confirms that they cannot. At the population-level, Schaffner (2005b) shows that self-reported literacy data overestimate true literacy rates by approximately seven percentage points among primary-educated women in Nicaragua and Ethiopia. These studies highlight the need for continued research to assess the accuracy of self-reported literacy data in other low-income contexts.

Literacy and Health in Low-Income Settings

Recognizing the potential limitations of indirect measures of literacy, a small but growing literature has used direct assessments administered by interviewers to analyze literacy's influence on demographic and health outcomes. Focused specifically on the mother-child

dyad, this literature shows that maternal literacy has unique child health and survival advantages (LeVine 2012). A portion of the association is attributable to social, economic, and contextual inequalities between women who possess literacy skills and those who do not; however, net of these disparities, maternal literacy is associated with improved child nutrition in Morocco (Glewwe 1999), lower risk of respiratory illness in Guatemala (Khandke, Pollitt, and Gorman 1999), and higher child survival in Nigeria (Smith-Greenaway 2013).

Current explanations for the child health benefits of maternal literacy center on literacy's broad spectrum of cognitive and psychological benefits (Goody 1963; Nicolopoulou and Cole 1999; Ong 1982; Uhry and Ehri 1999). For instance, research shows that literacy is associated with better comprehension of printed and auditory health information (e.g., health pamphlets and broadcast radio health messages), more effective communication with health professionals, and greater ability to facilitate treatment regimens (Dexter, LeVine, and Velasco 1998; Joshi 2004; Preston and Haines 1991; Schnell-Anzola, Rowe, and LeVine 2005; Stuebing 1997). From this evidence, researchers hypothesize that literate mothers' greater comprehension and processing of health information encourages them to adopt improved maternal and reproductive behaviors that eventually produce measurable child health advantages.

Simply extrapolating from the literature on maternal literacy and child health suggests that adults' literacy will benefit their own health. However, it is unclear whether the association operates similarly. On the one hand, literacy's health benefits for young adults could be *larger* than those documented in childhood. That is, like other social determinants of health in low-income countries (Cameron and Williams 2009), it is possible that literacy's health benefits are cumulative, resulting in a strong, positive association between literacy and health in young adulthood.

On the other hand, the varied, and arguably more complex, determinants of health in adulthood versus childhood could result in literacy having minimal, or no, effect on adults' own well-being. Apart from neonatal complications, the vast majority of children's illnesses in sub-Saharan Africa are driven by three infectious culprits: diarrheal disease, pneumonia, and malaria—each of which is preventable (Black, Morris, and Bryce 2003). Structural inequalities and environmental factors are implicated in these disease etiologies; however, adopting a few health behaviors (e.g., treating water, immunizing children, and using bed nets) can substantially reduce children's risk of contracting them. As a result, large-scale informational health campaigns throughout the region center on getting parents to adopt these health behaviors. Given the preventable nature of poor health in childhood, and the availability of information on how to do so, it is arguably unsurprising children whose mothers can read and comprehend health information experience measurable health advantages.

Conversely, in adulthood, the causes for poor health are more complex. African adults face high rates of infectious and sexually transmitted disease, including some of the world's highest rates of HIV/AIDS (Bongaarts 1996). For African women, reproductive and obstetric complications are additional causes of poor health and mortality (Hill, Thomas,

AbouZahr, Walker, Say, Inoue, and Suzuki 2007). Like much of the Global South, African adults are also experiencing a growing prevalence of non-communicable diseases like asthma, diabetes, and hypertension (Baldwin and Amato 2012). Adopting preventative behaviors can decrease adults' health risks on each of these disease fronts; however, because of the varied sources of poor health in adulthood, and its connection to individuals' romantic partners and reproductive goals, maintaining good health in adulthood is arguably a more complex enterprise than doing so in early childhood. Thus, an empirical assessment is needed to confirm literacy's health advantages at this life course stage.

Study Context

This study focuses on young adults in Malawi, a southeast African country. Like many sub-Saharan African countries, Malawi is undergoing the transition to mass education. Figure 1 provides a visualization of the country's changing educational context: whereas only 70 percent of older adults (45 to 49 years old) ever attended school, 98 percent of 15- to 19-year-olds have. In addition to increasing rates of school enrollment, more young adults are progressing to the secondary level compared to their older peers.

The educational gains among younger Malawians are largely attributable to the 1994 Universal Primary Education Initiative (UPE), which eliminated primary school fees for all students—making Malawi one of the first sub-Saharan African countries to do so (Al-Samarrai and Zaman 2007). In the year after implementation of the UPE, primary school enrollment rates rose from 1.9 million to 3.1 million (Al-Samarrai and Zaman 2007). The UPE and resulting educational expansion in Malawi has made literacy more attainable to the average young adult, making them an ideal subgroup to analyze literacy's implications for their health and well-being.

By all standards, Malawi is one of the world's poorest countries (Mundial 2001). Most families sustain themselves by subsistence farming and running small and irregular businesses. Though young Malawian adults view education as a path to a "bright future" (Frye 2012), education does not guarantee economic security. Formal employment opportunities are elusive in rural Malawi, even to those who have achieved relatively high levels of education (Swidler and Watkins 2009). In fact, the prevalence of unemployment among Malawian adults is comparable across educational levels (National Statistical Office [NSO] and ICF Macro 2011).

This study focuses specifically on young adults in the Balaka District of Malawi, which is located in the southern region of the country. The outskirts of Balaka are rural, while the town is a growing commercial center. Balaka's position on the main road connecting two of Malawi's largest cities keeps the town's open air market and bus depot busy. Newspapers printed in Chichewa—Malawi's official and most widely spoken language—are sold daily in the market. At the time these data were collected, a newspaper cost approximately MWK 150, roughly equivalent to one U.S. dollar. Given that the majority of Malawians (61 percent) live on US \$1.25 per day (World Bank Development Indicators 2012), newspapers are prohibitively expensive to the average adult. As a result, newspapers become a shared

commodity: adults—typically men—pass them around during their unstructured time, which is abundant due to limited employment opportunities (Blackden and Wodon 2006).

A one-room library in Balaka offers additional access to reading materials; however, local students complain there are few books and it is often closed (Frye 2012). Many young adults in Balaka own cell phones, and text messages offer another opportunity for individuals to use their literacy skills; however, among the study respondents, only one-quarter report that they “text” at least once each week. In summary, although the average young adult in Balaka has opportunities to use literacy skills, in the normal course of day-to-day village life, these moments are limited.

Data and Sample

I use data from Tsogolo la Thanzi (TLT), a project designed to examine how young adults in Malawi are navigating reproduction during an AIDS epidemic.¹ The TLT research team randomly selected respondents to participate from a sampling frame of 15- to 25-year-olds living in the seven kilometer radius of the center of Balaka in 2009. The study’s response rate is high: 95.6 percent of sampled adults enrolled in the study. Because TLT’s primary interest is women’s fertility and reproductive health, the study oversampled females, resulting in their representing 75 percent of the sample.

The current study focuses on young adults who were enrolled at wave 7 of TLT; this wave included the literacy assessment. Because interviews take place every four months, wave 7 occurred exactly two years after the baseline survey, at which time respondents were between the ages of 17 and 27. Of the original 2,064 young adults who participated at wave 1, 82.1 percent did so at wave 7 ($N = 1,659$). Appendix A shows that, despite attrition, the wave 1 and wave 7 samples are comparable in terms of distribution of age, gender, education, and socioeconomic status. I listwise delete 3.4 percent of cases with missing data, resulting in an analytic sample of 1,620 young adults. I weight multivariate analyses to account for the gender-stratified sample design. All interviews were conducted by trained TLT staff members in Chichewa.

Measures

Health Outcomes

Self-Rated Health—Respondents were asked, “*In general, would you say your health now is...*?” Response options in Likert-type style were poor, fair, good, very good, and excellent. Previous work shows this measure correlates with other indicators of physical, mental, and functional health and is highly predictive of mortality across diverse contexts (Idler and Benyamini 1997). Although the measure has not been formally validated in Malawi, it has been used in other southern African contexts (Dageid and Grønlie 2013; Williams, Gonzalez, Williams, Mohammed, Moomal, and Stein 2008).

¹Designed by Jenny Trinitapoli and Sara Yeatman and funded by grants (R01-HD058366 and R01-HD077873) from the National Institute of Child Health and Human Development. See <http://sites.psu.edu/tltc/> for more information.

Because the percentage of respondents who reported fair or poor health is small, I collapse extreme values to create a three-category indicator of poor/fair, good, or very good/excellent health (DeSalvo, Fan, McDonell, and Fihn 2005; Idler and Kasl 1991; Kaplan and Camacho 1983).²

Prolonged Sickness—Respondents were asked, “In the past month, how many days were you too sick to work or go to school?” From these responses, I create a binary indicator for having missed work or school for longer than one week due to sickness. See Fuller, Edwards, Sermsri, and Vorakitphokatorn (1993) for a similar measure.³

Literacy Measures

Direct Literacy Assessment—In 2010, I began collaborating with TLT’s Malawian research team to design and pilot a literacy assessment (in Chichewa). Because of the educational context, to ensure that we captured adequate variation in literacy skills, we focused the assessment on elementary-level reading and comprehension. To do so, we developed a card-matching technique: interviewers showed respondents a card with a picture and five sentences printed below it. One of the five sentences clearly matched the picture shown; the other four sentences included some relevant words but were incorrect. For example, one card included a picture of a girl dancing while two boys played drums, with the following five sentences printed below it in Chichewa: “the boys are dancing together,” “the girl is playing the drum,” “the girl is dancing and the boys beat the drums,” “the children are singing,” and “the girls and boys are dancing together.” The interviewer then asked the respondent to read aloud the sentence that best corresponds with the picture. To ensure respondents were not, by chance, guessing that the third sentence was correct, interviewers repeated the exercise with four distinct picture and sentence combinations.⁴ Interviewers then recorded (1) how much of the sentence the respondent was able to read correctly and (2) whether the respondent chose the sentence that correctly corresponded with the picture. I use this information to classify respondents as having (1) no reading skills, (2) some reading skills and some comprehension, (3) some reading skills and full comprehension, or (4) full reading skills and full comprehension. After training interviewers, we piloted the instrument among a sample of young adults in the neighboring Ntcheu district ($N = 200$) before incorporating it into wave 7 of TLT.

Indirect Literacy Measures—I use two indirect measures of literacy that are commonly used in the demographic literature. (1) Literacy based on educational attainment: according to this standard, I classify individuals as “literate” if they achieved grade five and “illiterate” if they discontinued education at or before reaching grade four. (2) Literacy based on self-

²Supplementary analyses using a logistic approach (fair/poor/good versus very good/excellent) confirm the findings are consistent with analyses using an ordinal one. See Appendix B.

³In ancillary analyses, instead of using a simple logistic model, I made use of a sequential logistic regression model approach to determine whether the results are consistent when accounting for respondents’ current work/school status. This two-stage model predicted: (1) respondents’ likelihood of working outside of the home/school enrollment, and (2) conditional on their work/school enrollment, their likelihood of recently experiencing a prolonged sickness. In addition to confirming that males and older respondents are more likely to be working/enrolled in school, the results predict an association between literacy and prolonged sickness that is nearly identical to that using the subsample of working/in school adults or the full sample shown here.

⁴TLT interviews take place in private rooms in a centrally located research center. The privacy of the interviews addresses the concern that respondents’ answers would influence one another.

reports: before respondents knew they would be administered a literacy assessment, interviewers asked, “Would you say that you can read and understand a letter or newspaper easily, with difficulty, or not at all?” I categorize respondents’ self-reported literacy status as (1) not being able to read, (2) being able to read with difficulty, or (3) being able to read easily.

Controls—The multivariate models include controls for key educational, socioeconomic, and demographic characteristics. In terms of educational background, I include a four-categorical measure of respondents’ highest level of education attained (i.e., no school, some primary, complete primary, secondary) and a binary measure of whether the respondent is currently enrolled in school (=1).⁵ In addition to these standard controls for education, based on evidence that literacy has intergenerational health advantages, I include a measure of respondents’ reports of whether neither, one, or both of their parents are literate.

In terms of socioeconomic status, I include an index of common household goods using a principal component analysis (for similar approaches, see Trinitapoli and Yeatman 2011; Bachan 2014). I also control for age (in years) and gender.

Analytic Strategy

I begin with descriptive statistics that characterize the young adults in the study. I then use bivariate statistics to demonstrate the association between educational attainment and literacy. Turning to the first set of multivariate models, I use the direct literacy assessment to analyze whether young adults’ literacy is associated with two indicators of their physical health. I use ordered logistic regression to appropriately handle the three-level self-rated health measure, and logistic regression for the binary outcome of prolonged sickness. For each health outcome, I estimate two models: Model 1 shows the zero-order association between literacy and the respective health outcome; Model 2 introduces controls to assess the stability of the association shown in Model 1.

In light of the findings based on the direct literacy assessments, in a second set of analyses, I evaluate the utility of indirect measures of literacy for capturing its prevalence and association with health. I begin with bivariate analyses comparing the indirect measures of literacy against the direct assessment to determine the extent to which they accurately categorize individuals according to their demonstrated skill level. I then replicate the multivariate analyses predicting self-rated health and prolonged sickness with the indirect measures of literacy to determine whether they capture literacy’s association with each health outcome. I estimated all models in Stata 12 using the *ologit* and *logit* commands.

Results

Table 1 characterizes the young adults in the analytic sample. Overall, young adults rate their health positively: very few report fair/poor health (3.46 percent), approximately one-

⁵In additional analyses, I controlled for educational attainment in years and confirm that doing so (1) does not alter the association between literacy and health nor (2) does it produce a significant association between educational attainment and health. Beyond controlling for education, in supplemental models I estimated the association between literacy and health among individuals with similar levels of education to confirm that the relationship operates similarly at each level of education.

third report good health (27.59 percent), and over half report very good/excellent health (68.95 percent).⁶ Nearly six percent of respondents reported a sickness that required them to miss school or work for longer than one week in the month preceding the interview.

In terms of literacy, the direct assessment shows that, on average, respondents scored just over three (ranging from one to four). The standard deviation (1.05) demonstrates that the literacy assessment captures sizeable heterogeneity in skills across the sample of young adults.

In addition to inequality in literacy skills, the results show that there is sizeable variability in respondents' educational attainment. Less than two percent of respondents have never been to school, just fewer than 40 percent have been to some primary school, and nearly 20 percent have completed primary school. Moreover, approximately 41 percent of respondents have attended secondary school. Comparing these estimates to Figure 1 confirms that young adults in Balaka are generally better-educated than the average young adult in Malawi. That is, whereas approximately 30 percent of young adults go to secondary school in Malawi (Figure 1), greater than 40 percent do in TLT's sample of young adults in Balaka. Additionally, TLT respondents report high levels of literacy among their parents: nearly two-thirds claim that both their mother and father can read.⁷ On average, respondents are just over 21 years old at the time of wave 7.

Figure 2 demonstrates the association between literacy skills and years of educational attainment. This bivariate analysis confirms that the percentage of young adults who can fully read and comprehend basic Chichewa increases linearly by educational attainment, however, literacy is generally low across each level of education. For instance, among young adults who completed the final year of primary school (grade 8), merely 40 percent could fully read and comprehend Chichewa. Even among respondents who attended some secondary school (grade 9 – grade 12), less than three-fourths could fully read and comprehend basic Chichewa. In fact, according to standard classifications (see, for example, Dancey & Reidy 2004) the strength of the correlation between respondents' highest grade completed and literacy skills is modest (Pearson's $r = .62$). In fact, it is comparable to the strength of the association between years of education and the household goods index (Pearson's $r = .53$)—two indicators that population research has long conceptualized as distinct determinants of health (Desai and Alva 1998). This suggests that young adults' educational attainment tells us little about what they actually learn in terms of literacy skills, or at least what they retain into adulthood.

In light of the considerable variability in young adults' literacy skills, Table 2 shows the estimates predicting whether literacy is associated with self-rated health. Model 1 shows that each unit increase in respondents' literacy skills is associated with a 19.3 percent increase in the odds of having better health ($p < .01$). This means respondents with full reading and comprehension skills have a 77.2 percent increase in the odds of reporting better health compared to their peers with no reading or comprehension skills.

⁷Given the low levels of schooling among older adults in Malawi (see Figure 1), and the fact that self-reported literacy data overestimate actual literacy skills in other contexts (Greaney et al. 1998; LeVine et al. 2004), this indicator likely overestimates the prevalence of literacy among respondents' parents.

Results in Model 2 shows that the size and the significance of the association between literacy and self-rated health are slightly attenuated with the inclusion of confounders. Net of educational, socioeconomic, and demographic factors, however, literacy continues to be associated with a 15.8 percent increase in the odds of reporting better health, confirming that literacy is independently associated with self-rated health among young adults in Malawi.

In addition to highlighting the health benefits of literacy, the results confirm that respondents' educational attainment is protective of their self-rated health. Young adults who have completed primary school experience a 51 percent higher likelihood of reporting better health compared to their peers who attended only some primary school. Moreover, the findings show that, as anticipated, the indicator for socioeconomic status is positively correlated with health, although the association is only marginally significant ($p < .1$). Furthermore, age is inversely related to self-rated health: each year increase in respondents' age correlates with a five percent lower likelihood of reporting better self-rated health. Results in Appendix B confirm that using a logistic regression approach (fair/poor/good versus very good/excellent) produces findings consistent with those shown in Table 2.

Because self-rated health is a subjective measure of physical well-being, I test the robustness of literacy's health significance with an objective measure of health. More specifically, I analyze if literacy is predictive of respondents having recently experienced a prolonged sickness. Model 1 in Table 3 shows the zero-order association between literacy and prolonged sickness: each unit increase in literacy is associated with a 27.5 percent lower likelihood of having experienced a prolonged sickness ($p < .01$). Model 2 demonstrates that, consistent with the findings for self-rated health, inclusion of the controls attenuates the size and strength of the association; however, the relationship is robust to confounders: each unit increase in literacy skills is associated with a 24.9 percent lower likelihood of experiencing prolonged sickness ($p < .05$). Corresponding with prior research, the results also show that females have a higher likelihood of reporting prolonged sickness (see Fuller et al. 1993).

The strong association between literacy—as measured by direct assessments—and two indicators of young adults' health, clarifies that literacy is a key dimension of the education—health story, at least in the context of Malawi. This raises questions of how to best measure literacy in future research. Are direct assessments necessary to capture both its prevalence and relationship with health, or are indirect measures of literacy sufficient?

Figure 3 depicts the association between two commonly used indirect measures of literacy and the direct assessment to determine the accuracy with which they classify individuals according to their skill level. In the first panel, I classify individuals as “literate” based on educational attainment (i.e., grade five and higher = literate). The findings show that this technique not only overestimates individuals' actual skill level, but in some instances, underestimates it. Merely 57 percent of respondents who are classified as “literate” using this approach display full reading and comprehension on the literacy assessment. That is, 43 percent of respondents considered “literate” display only some (36 percent) or no (6 percent) reading skills. Furthermore, whereas only 70 percent of respondents classified as “illiterate” using this approach indeed lack literacy skills, 30 percent display some (25 percent) or full (5 percent) reading and comprehension skills.

The second panel in Figure 3 shows that measuring literacy using self-reported data also misclassifies individuals according to their demonstrated skill level, however, to a much lesser extent. Of respondents who reported that they can “easily” read and understand a letter or newspaper, merely 62 percent displayed full reading and comprehension skills, whereas 38 percent displayed only some (36 percent) or no (2 percent) reading skills. Furthermore, among those who reported being able to read and understand a newspaper “with difficulty,” approximately one in four displayed no reading skills. These findings stand in contrast to those documented in Bangladesh (Greaney, Khandker, and Alam 1998), and Nepal (LeVine et al 2004) where upwards of 20 percent of respondents who report being able to read have zero literacy skills. This suggests that, in the Malawian context, self-reported literacy is fairly accurate in terms of very basic skills.

While the bivariate analyses confirm that indirectly estimating literacy produces flawed estimates, it is possible that, despite measurement error, these indirect measures still capture literacy’s strong relationship with health. To analyze whether this is the case, Table 4 shows results predicting self-rated health and prolonged sickness using the indirect measures of literacy. Beginning with the classification of literacy based on educational attainment, results in panel A show that, net of all confounders, individuals classified as “literate” have a significantly higher likelihood of reporting better self-rated health than do their “illiterate” peers ($p < .05$). However, in terms of prolonged sickness, the results show that measuring literacy based on educational attainment produces a statistically weaker association than the strong, inverse one documented when using the direct assessment of literacy.

Although Figure 3 shows that self-reports of literacy are fairly accurate compared to the literacy assessment, the results in panel B show that measuring literacy this way fails to capture its association with either measure of health. That is, while estimates of literacy based on self-reports are considerably more accurate than literacy based on educational attainment, in a multivariate framework, this indirect approach to measuring literacy produces no evidence of its true association with health. Together, these findings demonstrate that indirect measures of literacy have limited utility in terms of both estimating literacy’s prevalence and its relationship with health.

Discussion

The large literature on education and health has advanced our understanding of health disparities in unparalleled ways. However, to date, the literature has focused almost exclusively on the amount of education that individuals attain, with less known about the health salience of basic educational skills, including literacy. In low-income regions, like sub-Saharan Africa, where rudimentary literacy skills are far from universal—even among individuals with relatively high levels of education—I argue that studying literacy will produce new insights into the health benefits of education.

Using innovative data on young adults in southern Malawi, this study makes several contributions to the literature. The study demonstrates a time- and cost-efficient technique for assessing literacy—both reading and comprehension skills—in a large-scale survey. In doing so, I show there is considerable variability in basic literacy skills among young adults

in Malawi—even among those with similar levels of education. Basic literacy approaches universality at the highest levels of education, but even among young adults who have attended secondary school (grade 9 or higher), merely 59 percent can fully read.

The study further shows that measuring and studying literacy yields new insight into the aspects of education that benefit individuals' health, at least in the Malawian context. Prior work has established that mothers' literacy leads to child health advantages, but questions of whether literacy produces comparable benefits in adulthood have remained outstanding. The results confirm that young adults' literacy skills are independently associated with two measures of physical health: each unit increase in literacy skills is associated with 15.8 percent higher odds of experiencing better self-rated health and 24.9 percent lower odds of reporting a prolonged sickness. These effect sizes are quite, providing at least suggestive evidence that the health benefits of literacy may be cumulative. Future research that analyzes the health benefits of literacy at later life course stages will shed light on whether the health benefits of literacy accumulate with age.

Given that literacy is a key determinant of young adults' health, how can population researchers best measure it? This study assessed the utility of two indirect measures of literacy to determine whether direct assessments are necessary to capture its prevalence and relationship with health. The findings confirm that two commonly used indirect measures of literacy—educational attainment and self-reports—misattribute literacy skills to young adults who are, in fact, unable to read. Using educational attainment as a proxy for literacy is particularly problematic because it classifies sizeable percentages of young adults with at least some literacy skills as “illiterate” and comparably high proportions of those with no literacy skills as “literate.”

The fact that these indirect measures of literacy fail to accurately categorize individuals according to their skill level underscores the value of the Demographic and Health Survey's (DHS)—arguably the most widely used data source for health research on low-income countries—inclusion of an interviewer-administered literacy assessment into phase five of the project. The DHS's literacy assessment represents a major stride forward in incorporating literacy into population health research; however, comparing the DHS assessment to the approach that I used in this study alludes to its notable weaknesses. First, the DHS administers the literacy assessment only to adults with primary school or less and assumes that all adults who have ever attended secondary school can read. Results in Figure 2 show this skip pattern would dramatically overestimate literacy among young adults in the current study: 30 percent of young adults with at least some secondary school display no or only some reading and comprehension skills. Second, the DHS assessment only requires respondents to read a single sentence aloud, and it does not measure reading comprehension. In the current study, I find that 86 percent of the young adults can read at least one of the four sentences, which would classify them as fully literate according to the DHS. However, after testing respondents' ability to read three additional sentences and their comprehension of each, the literacy assessment confirms that just over one half of the young adults display full reading and comprehension. This suggests that although the DHS literacy assessment is a promising first step in incorporating literacy into population health research, by no means does it represent a gold standard. Instead, future efforts must assess all respondents' literacy

—regardless of their educational attainment—and should incorporate multiple tests of both reading ability and comprehension to more precisely differentiate individuals according to their skill level.

In addition to demonstrating the value of direct assessments for accurately estimating the prevalence of literacy, this study confirms that direct assessments are necessary to capture literacy's health benefits. If I had not measured literacy skills directly, and had relied on the indirect approaches to estimating literacy, I would have falsely concluded that literacy has little influence on health. Whereas models using indirect measures of literacy produce either inconsistent or null associations with health, the direct assessment of literacy produces unequivocal evidence of its health benefits. These results confirm that crafting literacy instruments that can be readily adapted and incorporated into population-based surveys should be a high-priority for researchers interested in health disparities in low-income countries. Although directly assessing literacy will require more time and resources than indirect estimates, this study confirms that the insight it provides into population health makes it well-worth the investment.

In establishing literacy as a powerful correlate of health, the results from this study raise further questions. A particularly pressing question is *how* literacy is associated with better health. The current literature offers conjectures, but there is no concrete evidence—leaving a need for compelling explanations for the association between literacy and health. There is increasing interest in the cognitive benefits of schooling (Schneeweis, Skirbekk, and Winter-Ebmer 2014) and, in turn, the health benefits of school-related cognition (Baker et al. 2011; Herd 2010). Current explanations of literacy's health benefits draw heavily from this cognitive and informational framework. For instance, researchers hypothesize that the association is a function of literacy's impact on how individuals' process and convey health information and, as a result, their behaviors surrounding the prevention and treatment of illness. In supplemental models, I analyzed one proposed mechanism within this framework—health comprehension; however, I found no evidence that it is a significant pathway from literacy to health. While this exploratory investigation suggests other processes are at play, sophisticated empirical approaches that use multiple measures to test multiple pathways will better clarify how literacy contributes to health disparities in low-income contexts. Research that does so across diverse contexts—particularly ones at different stages of the transition to mass education than Malawi—will provide a more nuanced understanding of literacy's health benefits across multiple settings and socio-historical periods.

While this study turns the spotlight on literacy as a powerful component of the education-health story, it does not intend to suggest that literacy will be the panacea for the vast, complex health challenges that lie in Africa's immediate or long-term futures. If literacy advances health by influencing use of health information and health services—as the current literature suggests—its ability to improve health in Africa is contingent on some minimum access to high-quality health information and services. Thus, to fully optimize its health benefits, increases in literacy must correspond with parallel improvements in economic, social, and infrastructural conditions in sub-Saharan Africa more generally.

Appendix A

Sample Comparison of TLT Respondents at Waves 1 and 7

	Wave 1		Wave 7	
	Mean (SD)/ %	Range	Mean (SD)/ %	Range
Age	19.43 (3.22)	15 - 25	21.439 (3.28)	17 - 27
Female	72.34		73.54	
Educational attainment	7.76 (2.80)	0 - 12	7.94 (2.86)	0 - 12
Ever Attended School	1.7		1.88	
Currently Enrolled in School	46.01		30.18	
Household Goods Index	0.0003 (2.38)	-3.22 - 8.14	0.0002 (2.36)	-3.35 - 8.63
N	2,064		1,659	

Source: TLT

Appendix B

Logistic Regression Results of Young Adults' Literacy Skills on Self-Rated Health as Binary Outcome

Variable	Model 1			Model 2		
	OR	Coeff.	Sig.	OR	Coeff.	Sig.
Literacy Skills	1.206	0.187	**	1.185	0.170	*
<i>Controls</i>						
Educational Attainment						
No School				1.365	0.311	0.422
Incomplete Primary (Ref)				--	--	
Complete Primary				1.443	0.367	†
Complete Secondary				0.809	-0.212	0.172
Currently Enrolled in School				1.241	0.216	0.172
Parental Literacy						
Neither can read (Ref)				--	--	
One parent can read				0.927	-0.076	0.220
Both can read				0.753	-0.284	0.200
Household Goods Index (-3.35 - 8.63)				1.064	0.062	†
Female				0.975	-0.025	0.128
Age (17-27)				0.949	-0.052	*

Source: Wave 7 TLT ; N=1,620 young adults

*** p<.001 ;

** p<.01 ;

* p<.05 ;

† p<.1

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Figure 1.
Increase in School Enrollment and Educational Attainment among Malawian Adults, by Age
Source: 2010 Malawi Demographic and Health Survey

Figure 2.

Distribution of Literacy Skills, by Educational Attainment

Source: Wave 7 TLT; N=1,620 young adults in Balaka, Malawi; Pearson's $r=0.62$

Figure 3.
Distribution of Direct Literacy Score by Indirect Measures of Literacy
Source: Wave 7 TLT; N=1,620 young adults in Balaka, Malawi

Table 1

Descriptive Statistics for Analytic Sample

Variable (Range)	%/Mean (SD)[†]
<i>Dependent Variables</i>	
Self-Rated Health	
Fair/Poor	3.46
Good	27.59
Very Good/Excellent	68.95
Prolonged Sickness	5.56
<i>Key Independent Variable</i>	
Literacy Skills (1-4)	3.16 (1.05)
<i>Controls</i>	
Educational Attainment	
No School	1.85
Incomplete Primary	39.94
Complete Primary	16.54
Secondary	41.67
Currently Enrolled in School	30.19
Parental Literacy	
Neither can read	11.17
One parent can read	21.05
Both can read	67.78
Household Goods Index (−3.35 - 8.63)	0.02 (2.34)
Female	73.87
Age (17-27)	21.48 (3.29)

Source: Wave 7 TLT ;

[†] N=1,620 young adults

Table 2
Ordered Logistic Regression Results of Young Adults' Literacy Skills on Self-Rated Health

Variable	Model 1			Model 2		
	OR	Coeff.	Sig.	OR	Coeff.	Sig.
Literacy Skills	1.193	0.177	**	1.158	0.147	*
<i>Controls</i>						
<i>Educational Attainment</i>						
No School				1.29	0.252	0.463
Some Primary (Ref)				--	--	
Complete Primary				1.51	0.411	*
Secondary				0.84	-0.176	0.177
Currently Enrolled in School				1.23	0.205	0.171
<i>Parental Literacy</i>						
Neither can read (Ref)				--	--	
One parent can read				0.92	-0.081	0.221
Both can read				0.77	-0.26	0.202
Household Goods Index (-3.35 - 8.63)				1.07	0.063	†
Female				0.99	-0.008	0.128
Age (17-27)				0.95	-0.051	*
Model Fit						
Wald-test	11.55	***		37.73	***	

Source: Wave 7 TLT ; N=1,620 young adults

*** p<.001 ;

** p<.01 ;

* p<.05 ;

† p<.1

Table 3

Logistic Regression Results for Young Adults' Literacy Skills on Prolonged Sickness

Variable	Model 1				Model 2			
	OR	Coeff.	Sig	S.E.	OR	Coeff.	Sig	S.E.
Literacy Skills	0.725	-0.322	**	0.099	0.751	-0.286	*	0.136
<i>Controls</i>								
Educational Attainment								
No School					0.802	-0.22		0.663
Incomplete Primary (Ref)					--	--		
Complete Primary					0.629	-0.463		0.402
Secondary					0.92	-0.083		0.359
Currently Enrolled in School					0.744	-0.295		0.343
Parental Literacy								
Neither can read (Ref)					--	--		
One parent can read					1.075	0.072		0.414
Both can read					1.18	0.165		0.375
Household Goods Index (-3.35 - 8.63)					1.061	0.06		0.061
Female					2.217	0.796	*	0.329
Age (17-27)					1.067	0.065		0.041
Constant	0.14	-1.99	***	0.31	0.019	-3.977	***	1.02
Model Fit								
Wald-test		10.54	***			37.87	***	

Source: Wave 7 TLT ; N=1,620 young adults

*** p<.001 ;

** p<.01 ;

* p<.05 ;

† p<.1

Table 4

Results of Young Adults' Literacy Skills on Self-Rated Health and Prolonged Sickness using indirect estimations of literacy

	a: Self-Rated Health				a: Prolonged Sickness			
	OR	Coeff.	Sig	S.E.	OR	Coeff.	Sig	S.E.
Literate based on school attainment ($\geq$ grade 5)	1.642	0.496	*	0.214	0.477	-0.740	$\dagger$	0.383
Model Fit								
Wald Test		44.580	***			45.950	***	
	b: Self-Rated Health				b: Prolonged Sickness			
	OR	Coeff.	Sig	S.E.	OR	Coeff.	Sig	S.E.
Literacy based on self-reports								
Cannot read at all								
With Difficulty	0.976	-0.025		0.272	0.872	-0.137		0.492
Easily	1.124	0.117		0.273	0.621	-0.477		0.514
Model Fit								
Wald Test		38.260	***			39.680	***	

Source: Wave 7 TLT ; N=1,620 young adults

All models control for full set of control variables

*** p<.001 ;

** p<.01 ;

* p<.05 ;

$\dagger$ p<.1