The Impact of ABS Program Participation on Long-Term Literacy Growth

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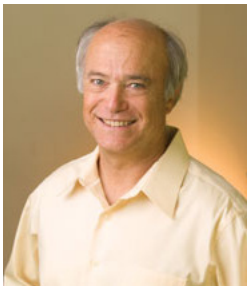

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About the Author

Dr. Reder earned his PhD from Rockefeller University in 1977, and for the next nearly twenty years he conducted research in West Africa, Alaska, and the Northwest Regional Educational Laboratory. He joined the faculty of Portland State University (PSU) in 1995. His many interests include how adults learn language, literacy skills, language education, and the role of language, literacy, and technology in everyday life. He is an active member of the Literacy, Language, and Technology Research Group (LLTR) at PSU.

As part of his research activities, Professor Reder presents and publishes regularly. He co-edited a book, *Tracking Adult Literacy and Numeracy Skills: Findings from Longitudinal Research*, that was published by Routledge in 2009. His book *The State of Literacy in America* was published by the National Institute for Literacy in 1998. In that year he also co-edited *Learning Disabilities, Literacy, and Adult Education*, published by P. H. Brookes. Dr. Reder has also authored many journal articles and book chapters.

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Research Brief:
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Introduction

National and international studies such as the recent Survey of Adult Skills[1] provide strong evidence of the need for and economic value of adult basic skills (ABS). A growing body of research indicates that there is a strong economic return to basic skills at all levels of education.[2] Estimates have been made of the potential economic benefits that would accrue from increased educational attainment and levels of basic skills.[3] There is little rigorous research, however, showing that participation in basic skills programs directly impacts the skill levels, educational attainment, or social and economic well-being of adults with low levels of education. Most research on adult literacy development looks only at short-term changes as students pass through single adult basic skills programs. Most studies use short follow-up intervals and consider only program participants, making it difficult to see longer-term patterns of program participation and persistence and to assess long-term impact of ABS program participation.[4]

Although ABS program evaluation and accountability reports typically show small gains for program participants in test scores and other outcomes, these studies rarely include comparison groups of nonparticipants, and most studies that do include such controls have not found statistically significant ABS program impact.[5] Research is needed that compares adult literacy development among program participants and nonparticipants across multiple contexts and over significant periods of time to provide a life-wide and lifelong perspective on adult literacy development and a better assessment of program impact on a range of outcome measures.

The Longitudinal Study of Adult Learning (LSAL) is one such lifelong and life-wide study. LSAL randomly sampled about 1,000 high school dropouts and followed them for nearly a decade from 1998–2007. LSAL followed both participants and nonparticipants in adult literacy programs, assessing their literacy skills and skill uses over long periods of time, along with changes in their social, educational, and economic status, offering a rich picture of adult literacy development.[6]

This is the second of a series of Research Briefs that utilize LSAL data to examine long-term impacts of ABS program participation on a range of outcome measures. Each Brief looks at a different outcome. The first Brief considers the long-term impact of participation on individuals' earnings. This second Brief examines the impact of participation on their literacy proficiency. Subsequent Briefs will examine the impact of participation on GED attainment, engagement in postsecondary education, and voting in general elections (a measure of civic engagement).

This Research Brief addresses the following research questions:

- What is the impact of participating in an ABS program on subsequent literacy proficiency?
- What is the temporal course of that impact?
- To what extent does GED attainment mediate the impact of participation on proficiency?

LSAL Design and Methodology

The overall design, methodology, population, and instrumentation of LSAL are described in detail elsewhere,[7] and only essential details are summarized here.

Population and Sample

The study population for LSAL was defined as adults who at the start of the study in 1998: lived in the Portland (Oregon) metropolitan area; were ages 18–44; had not completed high school nor were enrolled in high school or college; and were proficient but not necessarily native speakers of English. This defined population is a major segment of the target population of ABS programs operated by community colleges and other organizations in Oregon and across the country. The sample was drawn through random digit dialing, with oversampling of current participants in ABS programs to ensure adequate numbers of both program participants and nonparticipants in the sampled "panel" of 934 adults, who then were followed from 1998–2007.[8] At study onset, the LSAL population had an average age of 28 and was evenly divided among males and females, with one-third from minority groups and one-tenth from immigrant populations. Nearly one in three reported having a learning disability.

Some of these defining characteristics of LSAL's population changed over time. Everyone's age increased, of course, while some adults received GEDs and college degrees, experienced changes in their employment and family situations, or moved away from the Portland area. LSAL followed its panel members regardless of these and other changes, with about 90 percent of the original panel retained in the study until data collection ended in 2007.[9]

Interviews and Assessments

LSAL conducted a series of six periodic interviews and skills assessments in respondents' homes:[10]

Wave 1: 1998–1999

Wave 2: 1999–2000

Wave 3: 2000–2001

Wave 4: 2002–2003

Wave 5: 2004–2005

Wave 6: 2006–2007

Note that the spacing of successive interviews was one year between Waves 1, 2, and 3 and two years between Waves 3, 4, 5, and 6.[11]

The initial interview gathered background information (e.g., demographics, family-of-origin characteristics, K–12 school history). The initial and each successive interview collected information about recent social, economic, and educational activities (e.g., participation in basic skill programs; postsecondary education and training; employment, job characteristics, and earnings; household and family composition; life goals and aspirations).[12]

Literacy proficiency was assessed in each wave using alternate forms of the Document Literacy Scale of the Test of Applied Literacy Skills (TALS) developed by the Educational Testing Service. TALS assesses the ability of adults to extract and process written information in a variety of everyday document formats, such as forms, maps, tables, text displays, labels, and so forth. TALS instruments are similar to those used in many major national and international surveys of adult literacy, including the recently conducted Program for the International Assessment of Adult Competencies (PIAAC).[13] TALS measures proficiency on a 0–500 scale, with scores often reported in terms of five proficiency levels.

Participation in Adult Basic Skills Programs

In each interview, individuals were asked if they currently were participating in an adult basic skills program to improve their reading, writing, or math skills, or prepare for the GED Tests, or had done so within the preceding 12 months (asked in Wave 1) or since the time of the preceding interview (asked in Waves 2–6). Those who reported such participation were asked follow-up questions about timing, intensity, and duration of their participation. In the Wave 1 interview, they also were asked about their participation in such programs prior to 12 months before the first interview (back to the time they had dropped out of high school). These ABS program participation data were converted into variables for the number of hours of participation in each time period.

Key Findings

About two-thirds (68%) of the LSAL population had participated in an ABS program between the time of leaving high school and the end of LSAL in 2007. This is much higher than the usual reported percentage of the adult education target population that is served in a given program year. There are several reasons for LSAL's higher participation percentage: (1) LSAL's 68 percent figure includes any participation over a long period of time rather than for a single program year; (2) LSAL's population excludes adults age 45 and above, an age group usually included in official counts of the target population but one that rarely participates in programs; and (3) LSAL's figure includes *any* participation rather than the 12-hours-per-year minimum typically required for inclusion in state and federal program reports.

Participation patterns in LSAL were often complex and fragmented, with many adults having multiple episodes of participation at different times and in different programs across the years of the study.[14] **Figure 1** shows the estimated percentage of the LSAL population that ever participated

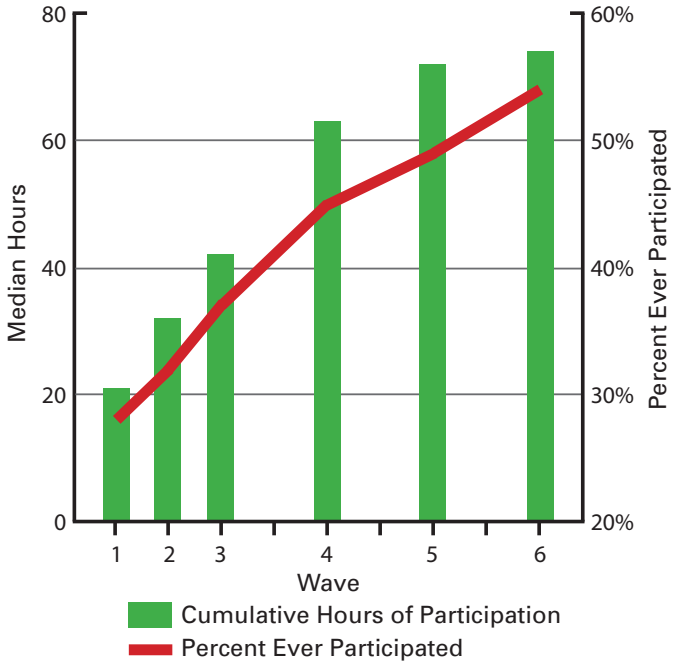

Figure 1. Percent of LSAL population who ever participated in ABS programs (line) and median hours of program attendance for those who participated (bars), by LSAL wave. LSAL waves 1–6 are placed on a time axis to represent their temporal spacing.

in an ABS program through each given wave of the study (line graph), as well as the median total hours of program attendance accumulated by participants (bar graph).[15] By the end of the study in 2007, over half (54%) of the LSAL population who had never participated in ABS programs when LSAL began had participated in ABS programs, accumulating a median of 74 hours of attendance between 1998–2006.

Figure 2 shows the distribution of the five literacy proficiency levels in the LSAL population at Wave 1 and the distribution of the proficiency levels in the comparable statewide subpopulation (in terms of age, education, and language ability) within the 1991 Oregon Literacy Survey.[16] Approximately 12 percent of the LSAL population, as well as the comparable statewide population, were at the lowest proficiency level (Level 1) and about 35 percent were at Level 2.

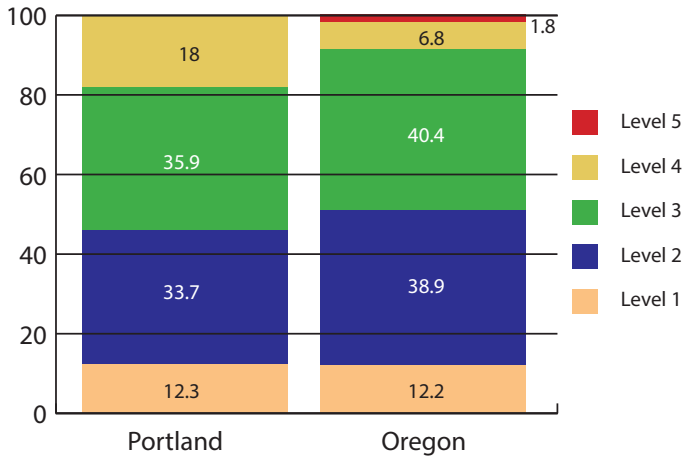

Figure 2. Wave 1 Distribution of Document Literacy in the LSAL Population and Comparable (age 18–44, no high school diploma or GED, proficient but not necessarily native speaker of English) Oregon Statewide Population. Sources: Portland: Longitudinal Study of Adult Literacy, Wave 1 (1998); Oregon: Oregon Literacy Survey (1991).

The mean Wave 1 proficiency of ABS program participants (274) was lower than that of nonparticipants (285).

Impact of Program Participation on Literacy Development

Previous studies examined changes in LSAL literacy proficiencies over time using growth curve modeling.[17] Those studies found relatively little systematic variation and modest overall growth in proficiency over time. Although the earlier research examined effects of observed characteristics on the shape of individual literacy growth curves, the effects of time-varying predictors such as ABS program participation were not included in analyses. There is, of course, good reason to expect program impact on literacy growth, since basic skills improvement and preparation for the GED Tests are core goals of ABS programs. Given the complex patterns of program participation described above, there are many ways of defining and measuring participation, comparing literacy proficiency of participants and nonparticipants, and estimating the impact of ABS program participation on literacy growth.

Because there was not a large enough sample of individuals with literacy proficiencies assessed *before* they had participated in an ABS program, it is not feasible to compare preparticipation and postparticipation proficiencies of participants and nonparticipants. Thus, difference-in-differences and treatment effects models used in the first Research Brief to assess impact of participation on earnings are not suitable for use here.[18] Instead, the fixed effects (FE) panel regression models used to assess impact of participation on earnings will be used, with literacy proficiency as the outcome variable.

Fixed Effects Panel Regressions

Care must be taken in comparing literacy growth of ABS program participants and nonparticipants. Individuals in the target population self-selected in terms of participating in ABS programs, and there may be other important differences between the two groups as well. The effects of those other differences may be confounded with effects of participation; this often is termed *selection bias* in program evaluation literature.[19] Some selection bias in LSAL could be due to differences in observable characteristics of participants and nonparticipants such as age, amount of education, race/ethnicity, immigration status, and so on.

Bias in LSAL also may occur as a result of *unobserved* individual characteristics (e.g., noncognitive attributes such as motivation and self-confidence), sometimes termed *omitted variables* bias. The analytical method used—fixed effects panel regression—eliminates bias due to all differences in time-invariant individual characteristics, both observed and unobserved. The panel regressions analyze variations in literacy over time *within* individuals in relation to observed time-varying predictor variables, including ABS program participation. This framework makes it possible to model the impact of participation on literacy as well as the time course of that impact. Effects of other time-varying variables such as GED attainment also can be examined.

Panel regressions of literacy were conducted with fixed effects of individuals and fixed effects of the six LSAL time periods. By fixing the effects of both individuals and time periods, these panel regressions highlight the effects of observable

time-varying variables, such as ABS participation, on literacy trajectories. To measure different aspects of the complex participation patterns in ABS programs, several time-varying participation variables were contrasted in various FE models. These participation variables are alike in equaling zero at time points before an individual participated and equaling zero at all time points for individuals who never participated. Added to the fixed effects of individuals and time periods in the panel regressions, these time-varying predictors provide sharp measures of the effects of program participation on literacy development.

Table 1 shows four FE panel regression models of literacy. Each of the models, A through D, contains one or two ABS program participation variables as time-varying predictors, as well as the fixed effects of individuals and time periods that are not shown in the table. The table shows estimated regression coefficients for participation variables involved in each model, along with their standard errors and *t*-statistics. Asterisks on *t*-values indicate statistical significance.

Table 1. Summaries of Four (A–D) Fixed Effects Panel Regressions of Literacy

(Regressions contain one or two time-varying measures of participation, as shown, as well as fixed effects of individuals and time periods, which are omitted from the table. See text for explanation.)

Model	Participation Variables	Coeff. in Panel Regr.	Robust Std. Err.	*t*
A	CUMHOURS	.0120	.0055	2.18*
B	YEARS	-.4884	.7035	-0.69
C	YRSCUM100	1.6491	.5636	2.93**
D	YRSCUM100 CUMHOURS	1.3076 .0071	.5488 .0055	2.38* 1.29

* p<.05; ** p<.01.

Model A examines the effect of CUMHOURS on literacy. CUMHOURS is the total hours of program participation an individual accumulated through each LSAL time point. CUMHOURS is zero at the beginning of LSAL and increases at each subsequent time point by the number of hours the individual attended an ABS program. For individuals who never participated, CUMHOURS remains at zero. The positive, statistically significant regression coefficient of CUMHOURS indicates that, within individual literacy trajectories, the more hours of participation accumulated by individuals through a given point in time, the higher their literacy proficiencies tend to be at that point in time.

In contrast, Model B examines variation of literacy in relation to elapsed time since onset of an individual's participation. Elapsed time could be relevant if, for example, program impact on literacy continues to develop over time as individuals use new skills and gradually gain proficiency. We see in Model B that the YEARS variable, measuring elapsed time since onset of participation, does *not* have a statistically significant regression coefficient. There is, thus, no significant linear increase in literacy proficiency following onset of participation as measured by this model.

Model C is similar to Model B, but sets the onset of participation to the time the individual had accumulated 100 or more hours of attendance in ABS programs. YRSCUM100 measures elapsed time since onset of participation so defined. YRSCUM100 has a statistically significant regression coefficient, reflecting a significant linear growth of impact over time following onset of a sufficient amount of attendance. The estimated regression coefficient of 1.65 for YRSCUM100 indicates that sufficient participation is associated with added proficiency gains of 1.65 points per year. Although this is a very modest change over a single year, the impact accumulates into a more substantial effect over time. For example, individuals who participated for 100 or more hours in the year preceding Wave 1 are expected to have gained an additional eight years of this proficiency growth through Wave 6, resulting in a gain of 8 x 1.65 = 13 points, which is about 0.3 standard deviations of proficiency (for the entire LSAL population). Participation impact as measured by this model had a small to moderate effect that took many years to fully develop. Thus, both total hours of participation and elapsed time since onset of participation are significant positive predictors of literacy.

Model D includes both of these variables to determine whether they are distinct predictors of literacy and which is the stronger predictor. In Model D, only YRSCUM100 has a statistically significant regression coefficient. CUMHOURS—a significant predictor in Model A—is no longer a significant predictor of literacy once effects of elapsed time following participation are taken into account.

Figure 3 on page 5 illustrates the growth of literacy over time for ABS program participants and nonparticipants. Participants are defined in this figure as individuals who attended ABS programs for 100 or more hours, and nonparticipants are defined as those who did not.[20]

Concurrent Effects of GED Attainment

Since elapsed time after participation onset is a positive predictor of literacy proficiency, it is important to examine what may be happening during the elapsed time period to drive proficiency upward. Receipt of a GED credential, for example, could mediate the impact of participation by serving as a gateway to postsecondary education, training, or other learning opportunities.[21] This can be examined by adding observable, time-varying measures of GED attainment to the FE panel regression models. The Appendix summarizes results for models in which time-varying measures of GED attainment are added to the basic FE model that uses YRSCUM100 as an ABS participation measure.

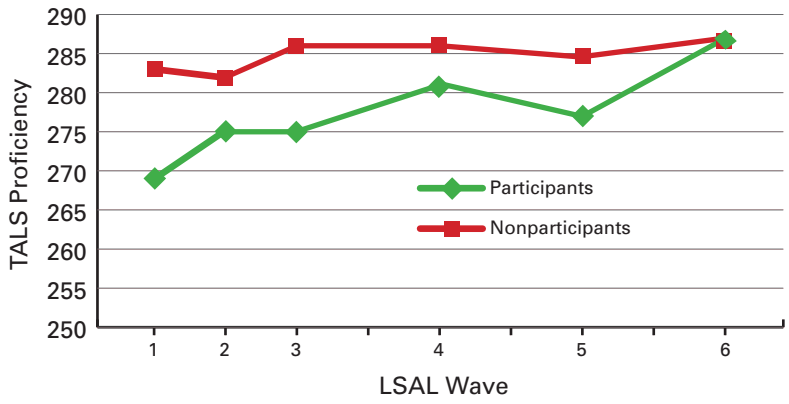

Figure 3. Mean Assessed Literacy Proficiency at Six LSAL Waves for ABS Program Participants. Participants are defined as individuals who attended an ABS program for at least 100 hours. (See text for explanation.) LSAL waves 1–6 are placed on a time axis to represent their temporal spacing.

Results of the modeling described in the Appendix indicate that both ABS program participation and receipt of the GED credential have impact on literacy development. The impacts of program participation and GED attainment have different temporal shapes. Program participation has a slowly growing and long-lived impact on literacy development, whereas GED attainment appears to have a short-lived, pulse-shaped impact.

Discussion

The fixed effects panel regressions summarized in this Research Brief indicate that individuals who participate in ABS programs tend to have higher levels of future literacy proficiency as a result of participating. Their proficiency premiums are larger with more intensive participation. Minimal levels of participation, however, may not produce significant premiums. These findings hold when time-varying measures of GED attainment are controlled.

This statistically significant but modest literacy premium takes time (on the order of years) to develop after participation. Because of the complexity of program participation patterns observed, LSAL's relatively small sample size limits the precision with which estimates can be made of how many hours of attendance or how long a follow-up period are required to see a significant literacy premium of a given size. Details vary with the measure of participation used. It is clear from the LSAL analyses conducted that higher intensities of participation (with a threshold of around 100 hours) have substantial impact on future literacy proficiency, an impact that typically takes years to develop after participation.

To illustrate this impact, consider the participants who attended ABS programs for 100 or more hours during the year preceding their Wave 1 literacy assessments. Their literacy proficiencies averaged 260 in Wave 1 and 275 in Wave 6. This is an average gain of 15 proficiency points over the eight-year interval between Waves 1 and 6, or approximately 1.88 proficiency points per year (note that this value is very close to the predictions of the YRSCUM100 model—Model C in **Table 1**).

GED attainment does not seem to mediate the long-term impact of participation on literacy but does have a short-lasting positive impact on assessed proficiency around the time of credential receipt. This "pulse" impact of GED attainment on proficiency may reflect the "brushing up" of skills or test-taking ability.

There are some important methodological limitations in this assessment of program impact on literacy development, especially when compared with the assessment of participation impact on earnings in the previous Research Brief. Although the fixed effects panel regression methods used here make visible some of the dynamics of the impact of participation on literacy changes over time, no converging propensity score matching methods could be used with the data available to contrast literacy development in reasonably well-matched groups of program participants and nonparticipants. Therefore, a corresponding degree of caution is in order.

Additional research with larger longitudinal data sets and those drawn from other contexts can help clarify some of these important details. The impact models developed here could address these questions more precisely if applied to larger longitudinal data sets that follow comparable ABS program participants and nonparticipants.

Future Research Briefs in the series look more closely at the impact of participation on GED attainment, postsecondary engagement, and voting (considered a measure of civic participation).

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8 Sampling weights calculated for each panel member were used to make estimates for the defined target population from the sampled panel data.

9 Analysis of missing interviews indicates that they were *missing at random* (MAR) with respect to the variables examined.

10 Respondents were paid for each of these sessions.

11 Individuals were interviewed at about the same time in each wave so that there was approximately constant spacing among individuals' successive interviews and assessments (e.g., a respondent interviewed in February 1999 in Wave 1 was interviewed during February 2000 for Wave 2, February 2001 for Wave 3, etc.).

12 The interview instruments are available at www.lsal.pdx.edu/instruments.html.

13 The TALS Document Literacy scale is directly comparable with the Document Literacy scale used in the 1992 National Adult Literacy Survey, the 2003 National Assessment of Adult Literacy, the 1994–1998 International Adult Literacy Survey, the 2003–2008 Adult Literacy and Lifeskills Survey, the 1991 Oregon Literacy Survey, and numerous other surveys. The Document and Prose Literacy scales used in these surveys were merged into a single Literacy scale in the 2011 PIAAC Survey of Adult Skills.

14 More detailed discussion is given in: Reder, S. & Strawn, C. (2001). Program participation and self-directed learning to improve basic skills. *Focus on Basics*, *4* (D), 14-17.

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17 Reder, S. (2009). The development of literacy and numeracy in adult life. In S. Reder & J. Bynner (Eds.), *Tracking adult literacy and numeracy: Findings from longitudinal research* (pp. 59-84). New York and London: Routledge.

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20 These data are for individuals who were assessed at all six waves.

21 Of the LSAL population, 27 percent received a GED at some point during the study. Of those who received a GED, 76 percent had participated in an ABS program (37% of GED recipients had participated 100 or more hours during a 12-month period).

Appendix: Supplementary Information and Tables

The impact of attaining a GED credential can be examined by adding observable, time-varying measures of GED attainment to the FE panel regression models. **Table A1** summarizes findings for models that add various time-varying measures of GED attainment to a basic FE model that uses YRSCUM100 as an ABS participation measure.

The variable GED in Model E is defined to equal one in the year in which the GED is received and zero at all other times. This model thus adds a relatively short-lived "pulse" of extra proficiency at the wave in which the GED is received. As the table shows, the regression coefficient for this pulse is statistically significant, indicating that proficiency scores are elevated for a short period of time around GED attainment, added to the linearly increasing YRSCUM100 impact of ABS program participation that is shown in the table to remain statistically significant. One way of understanding this relatively short-lived proficiency pulse is as a "brushing up" of skills associated with preparation for taking the GED Tests.

Model F estimates the impact of GED attainment as a step function rather than a pulse. The HAVEGED variable in Model F has value zero until the individual receives a GED and value one thereafter; for individuals who never attain a GED, HAVEGED always equals zero. Although YRSCUM100 continues to be a significant, positive predictor of literacy in Model F, HAVEGED does not have a significant regression coefficient. This indicates that the literacy premium accompanying credential receipt is short-lived as measured in this model.

Model G estimates the impact of GED attainment considered as a growth process by defining the variable YEARSGED as the number of years since the individual received the GED credential. YEARSGED equals zero before GED attainment and thereafter counts elapsed years since receipt of the credential; YEARSGED equals zero at all times for individuals who never receive the credential. Although YRSCUM100 continues to be a significant, positive predictor of literacy in Model G, YEARSGED does not have a significant regression coefficient.

Thus, both ABS program participation and receipt of the GED credential have impact on literacy development. Their impacts have different temporal shapes. Program participation has a slowly growing and long-lived impact on literacy development. GED attainment has a short-lived, pulse-shaped impact on literacy development.

Table A1. Summaries of Three (E–G) Fixed Effects Panel Regressions of Literacy

(Each regression contains the two time-varying variables shown in the table as well as the fixed effects of individuals and time periods, which are omitted from the table. See text for explanation.)

Model	Participation Variables	Coeff. in Panel Regr.	Robust Std. Err.	*t*
E	YRSCUM100 GED	1.7316 7.6188	0.5581 3.4153	3.10** 2.23*
F	YRSCUM100 HAVEGED	1.5374 3.0990	0.5775 3.7828	2.66** 0.82
G	YRSCUM100 YEARSGED	1.6884 -0.2754	0.5644 0.7058	2.99** -0.39

* p<.05; ** p<.01.