Refereed Articles

Educational Attainment, Literacy Skills, Nativity, and Motivation to Learn Among Middle-Aged Adults in the United States

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Abstract: Research on factors associated with motivation to learn (MtL) is limited, particularly among middle-aged adults and immigrants. This study examines educational attainment, literacy skills, and nativity (foreign-born vs. native-born) as predictors of MtL in middle-aged adults living in the United States. Nationally representative data of middle-aged adults between the ages of 40 and 65 years were obtained from the 2012/2014 Program for International Assessment of Adult Competencies (PIAAC). Structural equation models were used to assess the validity of the latent MtL construct and to examine the associations with the selected determinants in middle-aged adults. Postsecondary education degrees and higher literacy skills were linked with greater MtL. However, foreign-born individuals had lower MtL than their US-born counterparts. Educators and researchers should be aware of lower educational attainment, limited literacy skills, and being an immigrant as possible demoting factors of MtL, and in turn, barriers to lifelong learning participation among middle-aged adults.

Keywords: literacy, level of education, motivation to learn, lifelong learning, immigrants

> "...EDUCATION COMMUNITIES NEED TO MAKE CONTINUOUS EFFORTS TO ENHANCE THE FOUNDATIONAL SKILLS SUCH AS LITERACY IN THE GENERAL POPULATION..."

Continuing education and training over the life course, or lifelong learning, is a crucial economic enabler for the aging workforce and a fast-changing economy. Skills learned early in life are obsolesced at an increasing speed due to rapid shifts in the global economy and the skillsets in demand. Due to the

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need to continuously add new skills to the repertoire of the aging worker over the life course, lifelong learning has become necessary for all workers to remain economically viable in a time of globalization and technological advancement (Feinstein et al., 2008; Lim et al., 2018). Lifelong learning and skill development are particularly important for ensuring employability and maintaining labor force participation among middle-aged and older workers, as initial formal education in earlier life stages may no longer be sufficient (Lim et al., 2018; Tikkanen, 2017). Population aging necessarily leads to an increasingly larger number of middle-aged and older workers in the global workforce (U.S. Bureau of Labor Statistics [BLS], 2020). By 2029, workers aged 55 and older are projected to be the largest segment of the labor force and about 45% of the labor force will be aged 45 and older. The proportion of the United States labor force aged 55 and older is projected to be nearly doubled between 1999 and 2029 (12.7–25.2%) (U.S. Bureau of Labor Statistics [BLS], 2020). Yet, in the United States, less than half of adults (age 16 years and older) participate in any form of lifelong learning, with even lower rates among middle-aged and older adults (Desjardins, 2015). The purpose of the current study is to examine motivation to learn (MtL) in relation to educational attainment, literacy skills, and nativity (US-born vs. foreign-born/immigrants) in the understudied sub-population of middle-aged adults.

Research suggests that knowledge acquired in formal educational programs at younger ages could be the foundation for lifelong learning (Biagetti & Scicchitano, 2013). In addition, positive experiences with previous education promote further learning activities (Boeren, et al., 2010; Chang & Lin, 2011; Renkema, 2006). For instance, successful learning and educational experiences (e.g., degree attainment) are likely to increase one's confidence (e.g., self-efficacy) and desire for further learning, thereby leading to increased participation in subsequent learning activities (Head et al., 2015; Kyndt et al., 2011). Moreover, lack of education is linked with fewer workplace training opportunities. For instance, less qualified employees usually have limited opportunities to participate in work-related education and training (Kyndt et al., 2011).

Basic skills, such as literacy and numeracy, are related to adult education and training (AET) participation. For instance, a study that examined AET, reported positive and significant relationships between basic skills (both literacy and numeracy) and AET participation among individuals between 25 to 65 years old in the United States (Liu et al., 2019). Basic skills can be considered a part of one's readiness to learn, and as such, lack of literacy skills is likely to discourage adults to participate in lifelong learning (Smith et al., 2015).

The importance of educational attainment and basic skills points to one plausible pathway—MtL—to lifelong learning. Indeed, attitudes toward learning are thought to be essential to promoting lifelong learning. Prior research has shown a positive relationship between self-efficacy and intent to learn (Renkema et al., 2009). Individuals who are motivated to learn are more likely to pursue further learning opportunities (Kyndt et al., 2011; Liu et al., 2019). Additionally, MtL may maximize education and training outcomes and, therefore, can play a critical role in promoting lifelong learning (Boeren et al., 2010; Gutiérrez-Carvajal et al., 2019). In short, adults with greater MtL are more likely not only to participate in AET but also to benefit from AET, compared to those without.

One of the primary reasons for low AET participation rates is lower MtL among adults in the United States. At the same time, MtL has been understudied among the adult population in general, and older adults in particular. This is problematic as participation in learning activities tends to decline with age (Boeren et al., 2010; Renkema, 2006), highlighting a negative relationship between age and MtL, and in turn, lower engagement in lifelong learning (Renkema et al., 2009). At the same time, research on age-related differences in MtL has shown somewhat mixed results. For instance, Gegenfurtner and Vauras (2012), using data collected over the past

25 years, found that MtL does not decline over time in the workforce, instead it actually increases with age. With limited ranges of age, and young employees being overrepresented in the data, the study also assumes that motivation to participate in learning activities remains constant as age progresses (known as motivational maintenance) for at least young and middle-aged adult learners (Gegenfurtner & Vauras, 2012). Therefore, participation in lifelong learning activities may be the most beneficial for middle-aged adults as a significant amount of time in the middle-age phase of life is spent in the workforce.

Another gap in the MtL and lifelong learning literature is the differences between native-born and foreign-born (immigrants) individuals. Data show that immigrants often have less proficient literacy skills, lower labor force participation rates, and fewer opportunities for lifelong learning (e.g., employer-sponsored training) than native-born individuals (Basso et al., 2017; Støren & Børing, 2018; Toso et al., 2013; Vézina & Bélanger, 2019). Interestingly, Liu and colleagues (2019) found that being a first-generation immigrant was negatively related and being a second-generation immigrant was positively related to AET participation (Liu et al., 2019). Given the increasingly diverse aging populations in the United States, more studies on the native-born and immigrants are urgently needed to better understand how to promote lifelong learning in the United States.

Despite the importance of educational attainment, foundational skills (e.g., literacy), and MtL for lifelong learning participation, empirical research focusing on the complex relationships between literacy skills and MtL in middle-aged adults and immigrants is scarce. Due to the lack of MtL and/or lifelong learning participation (e.g., lower human capital—e.g., knowledge and skills relevant to economic benefits), middle-aged immigrants (i.e., foreign-born individuals) may be at the greater risk of being left behind in the current society in numerous ways including social, political and cultural participation, and labor force participation (e.g., job security and career advancement).

Theoretical Perspective

Our research was designed in view of the theoretical models of adult education participation by Boeren et al. (2010) and Boeren (2017). According to Boeren et al. (2010), participation in lifelong learning is determined by a series of characteristics such as socioeconomic (e.g., education), sociodemographic (e.g., gender), sociocultural (e.g., cultural/social participation), and psychological factors (e.g., desire). Learning participation is strongly linked to one's motive or intention to engage in further learning (Gorges et al., 2016). The individual characteristics and psychological factors such as MtL jointly determine the likelihood of lifelong learning participation. In addition, past research suggests that adult education participation is a visible outcome of MtL and MtL is inseparable from culture (Ginsberg & Wlodkowski, 2009; Wlodkowski & Ginsberg, 1995). Brookfield (1993) suggests that motivation and self-directed learning is connected to cultural tradition and is often influenced by one's access to learning resources and opportunities. At the same time, associations across the lifelong learning determinants are yet to be rigorously investigated. The goal of the current study is to investigate whether educational attainment, literacy, and nativity are linked with MtL among the middle-aged adults in the United States.

Research Questions and Hypotheses

Specifically, we address the following research questions: Among middle-aged adults in the United States.

(1) Are literacy skills associated with motivation to learn?
(2) Is educational attainment associated with motivation to learn?
(3) Is nativity associated with motivation to learn?
(4) Are there any differences in the effects of educational attainment and literacy skills on motivation to learn between the US-born and foreign-born middle-aged adults?

We hypothesized that higher educational attainment and higher literacy are positively associated with MtL, and being an immigrant is negatively associated with MtL. Also, we hypothesized that, in terms of MtL, immigrants who tend to face educational and skill disadvantages, benefit more from educational attainment and literacy skills than the native-born.

Method

Data

Data come from the 2012/2014 Program for International Assessment of Adult Competencies (PIAAC) US public-use file (PUF), which is provided through the National Center for Education Statistics (NCES) of the US Department of Education (National Center for Education Statistics (NCES), 2019). PIAAC is a large-scale assessment of basic skills including literacy, numeracy, and digital problem-solving skills. Since these three skill domains are highly correlated, and in general, literacy is a robust indicator of overall basic skills (OECD, 2013), this study focused on the literacy measure. In PIAAC, literacy is defined as "understanding, evaluating, using, and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential" (Lennon & Tamassia, 2016, p. 3). PIAAC's literacy assessment, which employed complex sampling design, computer-adaptive testing, and item response theory, is arguably one of the most methodologically sophisticated large-scale assessments of skills in the United States. The PIAAC United States PUF provides nationally representative measures of literacy skills for adults aged 16–74-years (n = 8670). PIAAC also provides a series of demographic, socioeconomic, and education-related information, as well as sampling weights and replicate weights for statistical analysis. Based on a typical age range to describe the middle age, our final analytic sample (n = 3151) included respondents aged between 40 and 65 years.

Measures

Outcome—Motivation to learn: Four PIAAC survey items (5-point Likert-type response scale) were used to construct a latent MtL variable (see Figure 1 for all four survey items). The four-item MtL construct has been validated in previous studies for the general adult populations (Gorges et al., 2016) and among adults 50 and older (Gutiérrez-Carvajal et al., 2019). In this study, the validity of this construct was re-examined with our sample of US adults between 40 and 65 years (see below in the *Methods* section and *Results* section).

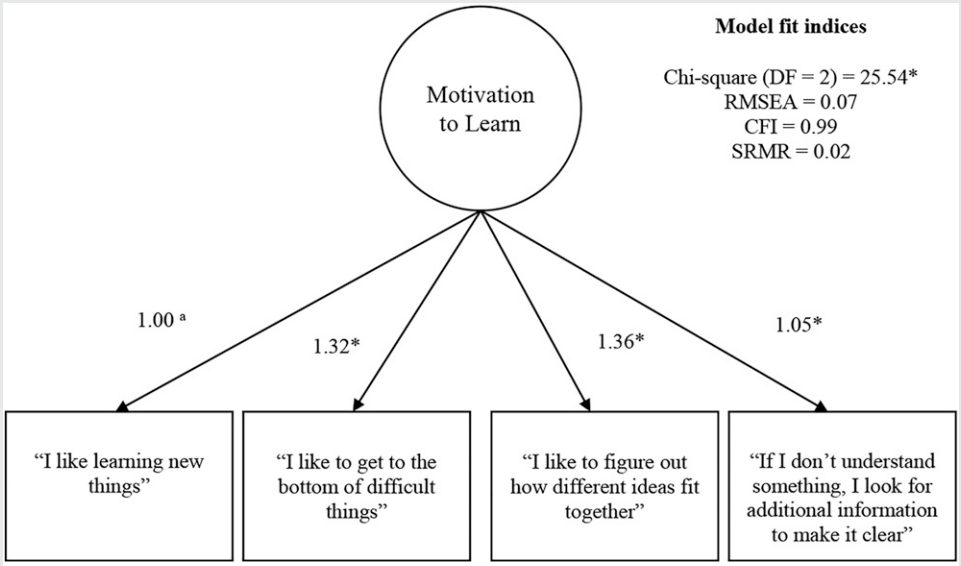
Predictors—Literacy skills: Literacy skills are recorded as a set of ten plausible values ranging from 0 to 500 points. These ten plausible values were estimated based on participants' performance on the literacy assessment items (see Lennon & Tamassia (2016) for more details). For example, one of the assessment items asked the respondents to identify which muscles benefit most from using a particular exercise equipment based on a chart. Higher scores indicate greater proficiency. Detailed descriptions of PIAAC's literacy skill assessment have been published elsewhere (e.g., Goodman et al., 2013).

Educational attainment: Educational attainment was dichotomized to indicate college education or higher (1: postsecondary education, associate degree, or higher) versus less than a college education (0).

Nativity: Nativity reflects whether a participant reports he or she was born in the United States (0) or born in a foreign country (1).

Covariates: Additional sociodemographic variables include age in six 5-year bands (40–44, 45–49, 0–54, 55–59, and 60–65); gender (female versus male [reference group]); race/ethnicity as dichotomized to denote White (reference group), Black, Hispanic, or other; and income level (1–5 = the lowest income to the highest income quintile). Those who were not employed at the time of the survey were added to the lowest individual income level because those who were not employed were considered no income in PIAAC. A health status measure indicates good

Figure 1. Motivation to learn measurement model with the estimated factor loadings and model fit indices. Note: Robust full information maximum likelihood estimator was employed. a. the factor loading is fixed to one to provide a unit to the latent variable. Response categories for the items are 1–5 = not at all—to a high extent. RMSEA = room mean squared error of approximation; CFI = comparative fit index; SRMR standardized root mean square residual. In the PIAAC data, six items were used for the readiness to learn (six items) construct but per Gorges et al. (2016) and Yamashita et al. (2019), four items were selected for the motivation to learn construct in this study. *$p < 0.05$.



(excellent, very good, and good) or fair/poor self-rated health. These covariates were chosen based on their theoretical relevance to MtL (Boeren, 2017; Boeren et al., 2010).

Analytic Approach

We constructed a structural equation model to examine whether educational attainment, literacy skills, and nativity were associated with MtL (Brown, 2014). The analysis was conducted in two steps. First, confirmatory factor analysis (CFA) (Brown, 2014) was used to examine the validity of the four-item MtL latent construct (see Figure 1) in the target sub-population—middle-aged adults (40–65 years old) in this study. The robust maximum likelihood (MLR) estimator was used and one of the factor loadings was fixed to one to define the unit of the latent MtL construct. This model was evaluated with the currently recommended set of fit indices including model chi-square statistic, comparative fit index (CFI >0.90), root mean squared error of approximation (RMSEA <0.10), and standardized root mean square residual (SRMR <0.10) (Kline, 2016). Importantly, at the time of this study, generating the aforementioned model fit indices for models with plausible values and replicate weights was not feasible using common statistical

packages. Therefore, ten equivalent structural models, each with a unique plausible value, were estimated to document the range of model fit indices.

After obtaining evidence for the validity of the four-item MtL construct (see the *Results* section) with the analytic samples in this study, we developed a structural model. Unconditional models were used to examine the baseline associations, and then a fully conditional model with all covariates was estimated. Per our preliminary analysis and examination of the model fit, the covariance between the literacy skills and educational attainment was added to the estimation to improve model fit indices. This decision is reasonable given the known associations between education and literacy skills (Rampey et al., 2016). A multigroup analysis was conducted to test the difference between foreign-born versus US-born groups. The full information maximum likelihood (FIML) was used to include the cases with missing values for the model estimations. The sampling weights (SPFWT0) and 80 replicate weights (SPFWT1-80) were applied as appropriate in all analyses. Statistical significance was determined at the *p*-value of less than 0.05.

The power analysis was conducted using the algorithm that is developed by Preacher and Coffman (2006). Based on the type I error rate of 0.05, desired statistical power of 0.80, and the hypothesis testing with RMSEA (null = 0.05 vs. alternative = 0.08), the minimum required sample size was 469. We concluded that our statistical models had sufficient statistical power. Data were prepared per the guideline by Yamashita et al., 2020 and all the statistical analyses were conducted using Mplus version 8 (Muthén & Muthén, 1998-2017).

Results

Table 1 presents the weighted descriptive summary for the full analytic sample, as well as by nativity and educational attainment. Motivation to learn (MtL) and literacy skills vary greatly by nativity (i.e., foreign-born vs. US-born) and by educational attainment (college or higher vs. less than college). Approximately 15% of PIAAC respondents were foreign-born. The average literacy score (272.99) for US-born participants were significantly greater than that (230.71) for foreign-born participants, and greater among those with higher educational attainment (295.30). Overall, foreign-born participants were more likely to be younger, female, and Hispanic. Foreign-born participants also had slightly lower educational attainment when compared to the US-born participants, although the difference was not statistically significant. The average literacy skills (294.30) for middle-aged adults with a college degree or higher was significantly higher than that (248.32) for their counterparts. Those with a college degree or higher were disproportionately White, had higher incomes, and reported better self-rated health than those with no college-level education.

Figure 1 shows the measurement model for the latent MtL construct. This model showed an adequate model fit and suggested the construct validity [χ^2 (2) = 25.54; $p < .05$; CFI = 0.99; RMSEA = 0.07; SRMR = 0.02] for the nationally representative sample of adults aged 40–65 years. Table 2 shows the estimated coefficients from the structural models (see Figure 2 for the path diagram). Results showed that higher educational attainment (b = 0.17, $p <$ 0.05) and higher literacy skills (b = 0.01, $p < 0.05$) were associated with greater MtL after adjusting for the covariates. Yet, foreign-born individuals were more likely to have lower MtL (b = −0.15, p < 0.05) than those who were born in the United States, after adjusting for the covariates.

Table 3 shows the estimated coefficients in the multigroup models by nativity. Having a college degree or higher was a significant predictor of greater MtL for both foreign-born (b = 0.39, $p <$ 0.05) and US-born individuals (b = 0.16, $p < 0.05$) than the counterparts without a college degree. Additionally, the difference between the groups (foreign-born and US-born individuals) was also statistically significant (b = −0.23, $p < 0.05$), suggesting that the effect of having a college

Table 1. Weighted Descriptive Summary for Full Sample and by Nativity and Educational Attainment.

	Full sample	Nativity		Educational attainment	
		Foreign-born	US-born	College or higher	Less than college
	(*N* = 3151)	(*n* = 471)	(*n* = 2680)	(*n* = 1234)	(*n* = 1917)
	M(SE) or % (SE)	M(SE) or % (SE)	M(SE) or % (SE)	M(SE) or % (SE)	M(S.E.) or % (S.E.)
Motivation to learn (MtL)					
"I like to learn new things" (1–5)	4.12 (0.02)	3.97 (0.06)	4.15 (0.02)*	4.36 (0.72)	3.96 (0.92)*
"I like to get to the bottom of difficult things" (1–5)	3.94 (0.02)	3.71 (0.06)	3.98 (0.02)*	4.06 (0.87)	3.87 (1.00)*
"I like to figure out how different ideas fit in" (1–5)	3.74 (0.02)	3.57 (0.06)	3.77 (0.02)*	3.93 (0.87)	3.63 (0.99)*
"If I don't understand something, I look for additional information to make it clear" (1–5)	4.12 (0.02)	4.00 (0.08)	4.14 (0.02)	4.29 (0.74)	4.01 (0.90)*
Literacy skills (0–500 points)	266.64 (1.21)	230.71 (3.93)	272.99 (1.23)*	295.30 (1.65)	248.32 (1.60)*
Nativity					
Foreign-born	14.94 (0.47)	—	—	14.30 (0.95)	15.37 (0.77)
US-born	85.06 (0.47)	—	—	85.70 (0.95)	84.63 (0.77)
Educational attainment					
College degree or higher	39.15 (0.55)	37.44 (2.40)	39.44 (0.65)	—	-
Less than college	60.85 (0.55)	62.56 (2.40)	60.56 (0.65)	—	-
Age group					
40–44	18.87 (0.53)	23.08 (1.57)	18.05 (0.58)*	19.80 (0.97)	18.13 (0.81)
45–49	20.68 (0.79)	21.38 (2.06)	20.44 (0.88)	21.63 (1.41)	19.94 (0.92)
50–54	21.02 (0.87)	24.20 (2.31)	20.66 (0.98)	19.73 (1.26)	22.08 (1.11)
55–59	19.19 (0.79)	17.48 (1.48)	19.26 (0.80)	18.93 (1.06)	19.03 (0.89)
60–65	20.24 (0.66)	13.96 (1.56)	21.60 (0.75)	19.92 (0.81)	20.81 (0.95)
Sex					
Female	52.67 (0.68)	54.70 (2.69)	52.89 (0.68)	53.68 (0.90)	52.76 (0.95)
Male	47.33 (0.68)	45.30 (2.69)	47.11 (0.68)	46.32 (0.90)	47.24 (0.95)

(continued)

Table 1. (continued)

	Full sample	Nativity		Educational attainment	
		Foreign-born	US-born	College or higher	Less than college
	(*N* = 3151)	(*n* = 471)	(*n* = 2680)	(*n* = 1234)	(*n* = 1917)
	M(SE) or % (SE)	M(SE) or % (SE)	M(SE) or % (SE)	M(SE) or % (SE)	M(S.E.) or % (S.E.)
Race/ethnicity					
White	70.27 (0.97)	20.34 (1.84)	79.02 (1.10)*	77.34 (0.70)	65.73 (1.17)*
Black	12.08 (0.90)	12.18 (2.56)	12.06 (0.49)	8.60 (1.04)	14.28 (0.43)
Hispanic	10.88 (0.41)	44.83 (2.61)	4.93 (0.43)	5.58 (0.70)	14.30 (0.64)
Other	6.78 (0.90)	1.78 (0.67)	4.00 (0.86)	8.48 (1.04)	5.69 (1.01)
Income quintile					
1- lowest	38.92 (0.88)	40.17 (2.45)	38.67 (1.00)*	25.70 (1.44)	47.25 (1.24)*
2	11.77 (0.66)	17.30 (2.29)	10.82 (0.59)	7.63 (0.89)	14.39 (0.89)
3	13.99 (0.79)	14.46 (1.97)	13.91 (0.83)	12.02 (0.99)	15.24 (1.21)
4	16.23 (0.79)	12.21 (1.72)	16.93 (1.02)	19.44 (1.70)	14.20 (1.01)
5- highest	19.10 (1.02)	15.85 (2.40)	19.67 (1.16)	35.21 (2.10)	8.92 (0.91)
Health status					
Excellent/good	79.32 (0.96)	75.14 (1.81)	80.04 (1.10)*	90.91 (0.86)	71.85 (1.33)*
Fair/poor	20.68 (0.96)	24.86 (1.81)	19.96 (1.10)	9.09 (0.86)	28.15 (1.33)

Note: Sampling and replicated weights were applied. Lowest income quintile includes those currently out of work, including retired. Significance determined using weighted ANOVA, t-tests, and chi-square tests. * $p < 0.05$; SE = standard error.

Table 2. Estimated Coefficients from Models on Motivation to Learn (N = 3151).

Variables	Model 1 b (SE)	Model 2 b (SE)	Model 3 b (SE)	Model 4 b (SE)
Literacy skills (0–500 points)	0.02 (0.00)*			0.01 (0.01)*
Foreign-born (vs. US-born)		−0.17 (0.06)*		−0.15 (0.06)*
College degree (vs. less than)			0.26 (0.03)*	0.17 (0.03)*
Age group (by 5-year intervals)				−0.06 (0.01)
Female (vs. male)				0.02 (0.03)
Race/ethnicity (vs. White)				
Black				0.22 (0.06)*
Hispanic				0.13 (0.06)*
Other				0.03 (0.06)
Income quintile (1–5)				0.03 (0.01)*
Excellent/good health (vs. poor/fair)				0.07 (0.04)
Model fit indices				
Chi-square (degrees of freedom)	44.53–55.79 (16)*	19.79 (5)*	56.77 (5)	106.50–113.45 (32)
RMSEA	0.04–0.05	0.04	0.07	0.03–0.04
CFI	0.98–0.99	0.99	0.98	0.96–0.97
SRMR	0.03–0.04	0.01	0.03	0.02–0.03

Note: Models predict motivation to learn (MtL), a latent variable described in the methods section and shown in Figure 1. Models were estimated using full information maximum likelihood (FIML) in Mplus version 8.0. Model fit indices show the range of observed values over ten fitted models in models including plausible values for literacy skills (see the *Methods* for more detail). Sampling and replicate weights were applied. * $p < 0.05$; b = estimated coefficient; SE = standard error; RMSEA = room mean squared error of approximation; CFI = comparative fit index; SRMR standardized root mean square residual.

degree or higher on MTL was greater among foreign-born individuals than the US-born counterpart. At the same time, the positive effects of literacy skills on MtL were equivalent among the foreign-born and native-born middle-aged adults.

Discussion

This study addressed four research questions with regard to educational attainment, literacy, and foreign-born in relation to MtL among the United States middle-aged adults. Based on the available empirical evidence and theoretical propositions (e.g., Boeren, 2017), we hypothesized that there are positive associations between higher educational attainment, higher literacy skills, and MtL among middle-aged adults in the United States. Additionally, we hypothesized that foreign-born middle-aged individuals have, on average, lower MtL than their native-born counterparts. Findings from the current study supported our hypotheses. We found positive associations of educational attainment as well as literacy with MtL among middle-aged adults. These results suggest that socioeconomic (e.g., education) characteristics as well as the basic skills like literacy are an

Table 3. Multigroup Models of Nativity on Motivation to Learn (Mtl) (N = 3151).

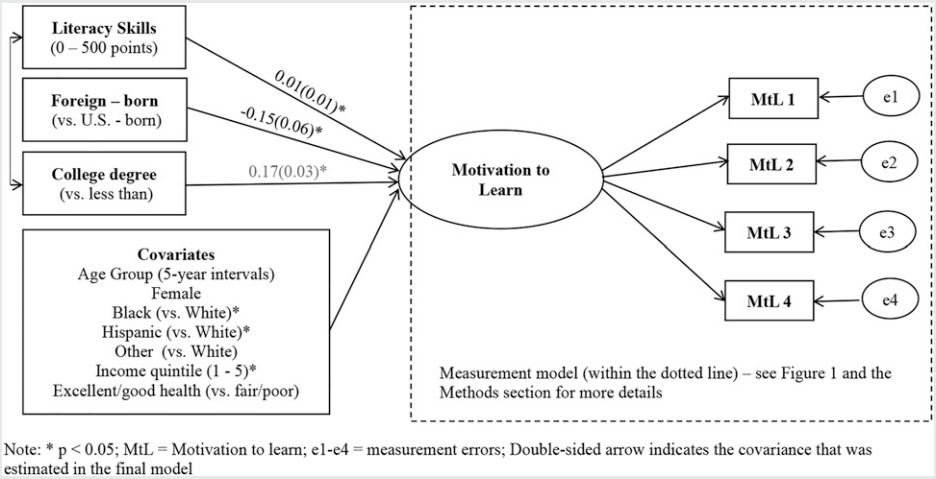
Variables	Foreign-born	US-born
	b (SE)	b (SE)
Literacy skills (0–500 points)	0.01 (0.01)	0.01 (0.01)*
College degree (vs. less than)	0.39 (0.11)*	0.16 (0.03)*
Age group (by 5-year intervals)	0.01 (0.03)	−0.01 (0.02)
Female (vs. male)	−0.01 (0.08)	0.03 (0.03)
Race/ethnicity (White = ref)		
Black	0.42 (0.14)*	0.19 (0.06)*
Hispanic	0.09 (0.12)	0.13 (0.11)
Other	−0.26 (0.15)	0.21 (0.09)*
Income category (1–5)	0.01 (0.03)	0.03 (0.01)*
Excellent/good health (vs. poor/fair)	0.02 (0.11)	0.08 (0.04)
Model fit indices		
Chi-square (degrees of freedom)	157.69–169.49 (64)*	
RMSEA	0.03–0.04	
CFI	0.96–0.97	
SRMR	0.02–0.03	
Difference in the coefficients between foreign-born and US-born		
Literacy skills	0.00 (0.01)	
College degree	−0.23 (0.11)*	

Note: Models predict a latent motivation to learn (MtL) construct, described in the methods section and shown in Figure 1. Models were estimated using robust full information maximum likelihood (FIML) in Mplus version 8.0. Model fit indices show the range of observed values over ten fitted models, each with unique literacy plausible value. Sampling (SPFWT0) and replicate weights (SPFTW1-80) that were provided in the 2012/2014 Program for International Assessment of Adult Competencies (PIAAC) data were applied. * $p < 0.05$; b = estimated coefficient; SE = standard error; RMSEA = room mean squared error of approximation; CFI = comparative fit index; SRMR standardized root mean square residual.

important predictor of MtL and ,in turn, lifelong learning, aligning with Boeren and colleagues' (2010) adult education participation model. Also, higher educational attainment and literacy skills may indicate positive experiences in previous adult education and training, and greater readiness for further learning (Smith et al., 2015). Last, we found that, among middle-aged adults, foreign-born adults had lower MtL than those who were born in the United States. Lower MtL among immigrants might be partially due to lower educational attainment and literacy skills, in combination with the lack of English proficiency and culturally appropriate learning opportunities (Støren & Børing, 2018; Toso et al., 2013).

Additionally, our multigroup analyses revealed that the benefits of higher educational attainment are greater among immigrants than the native-born in the United States. Financial stress, lack of

Figure 2. Path diagram of the final model and estimated coefficients (standard errors). Note: * $p < 0.05$; MtL = motivation to learn; e1–e4 = measurement errors; double-sided arrow indicates the covariance that was estimated in the final model.



information about postsecondary education and work, and family responsibilities are some of the known barriers that immigrants often face when considering additional education or completing a degree (Erisman & Looney, 2007). Research has shown how positive experiences of higher education enhance attitudes toward learning in the years after high school graduation (Kyndt et al., 2011; Head et al., 2015). On one hand, immigrants generally value education and have high expectations about their educational futures (Erisman & Looney, 2007; Turcios-Cotto & Milan, 2013), which may indicate greater MtL and lifelong learning participation among highly educated immigrants. On the other hand, the middle-aged immigrants with lower educational attainment may face additional disadvantages such as the lack of educational opportunities that are designed for middle-aged immigrants to promote and maintain MtL, and lifelong learning participation.

Implications/Future Research

While education and literacy skills are consistently associated with greater MtL among the middle-aged adult population, our study identified the disadvantages immigrants face, and differing benefit of education on MtL between immigrants and native-born in the United States. Therefore, education policies and intervention programs that take educational background and basic skills into consideration are likely to promote MtL of all adult populations and arguably more so to those with lower educational attainment and literacy skills. Increasing educational attainment at the population-level in the later adult life stages is somewhat unrealistic and unlikely to contribute to the lifelong learning. Yet, providing basic skill training and education programs for adults in mid-life stage may enhance one's MtL and, in turn, lifelong learning participation. The middle-aged adults could benefit from greater MtL and lifelong learning in multiple ways such as employment, retirement, health, and social participation in later life. Basic skill training for the middle-aged adults is currently uncommon. Also, within group differences such as differing motivation to learn by nativity among highly educated middle-aged adults is an important insight to promote future adult education. For example, any recruitment effort may pay closer attention to cultural and linguistic differences among highly educated adults to address the motivation to learn gap

among the middle-aged adults with similar educational background. Without the basic skills, any efforts to promote MtL and lifelong learning may face additional challenges including the readiness to learn complex and advanced topics. Given the exceptional circumstances of the past year 2020, future research may consider comparative analysis of the pre- and post-COVID-19 pandemic periods to revisit the roles of education, literacy skills, and nativity in the context of motivation to learn, when more data become available.

Limitations

Several limitations in this study should be noted. First, macro-level factors such as economic climate and structural and institutional barriers, which may be linked to MtL, are not available in the PIAAC data. Therefore, our findings and discussion should be limited to the individual-level or the national average, and as such, should not be extrapolated to community, state, or regional variations. Future study needs to analyze the community and macro-level factors using multi-level analytic strategies (Boeren et al., 2010; Roosmaa & Saar, 2017). On a relevant note, the PIAAC 2017 PUF data were available at the time of this study but the 2012/2014 data were more suitable for the current study due to the greater sample size of foreign-born respondents. Second, the model fit indices were not estimated in a conventional manner due to the literacy plausible values and replicate weights in the PIAAC data. The replicate weights are necessary in estimating the correct standard errors in the statistical models. Our approach to test all plausible values were arguably one of the few reasonable options but it cannot rule out potential bias of the model fit indices. Finally, use of the cross-sectional data with the model specification in this study does not allow any causal inferences. The directionality of any associations is only based on the theoretical propositions.

Conclusion

Despite limitations, the current study added new empirical evidence for the MtL and lifelong learning literature. Due to the globalization, rapid technological change, and increasingly diverse populations in the United States, greater emphasis needs to be placed on lifelong learning over the life course. Our findings suggested that educational attainment and literacy skills are positively linked to MtL, which is critical for enhancing lifelong learning participation in the middle-aged adults. Additionally, our study provided empirical evidence showing that middle-aged immigrants with lower educational attainment may be at the greater risk of lifelong learning divide due to their lower MtL.

Education policies and programs tailored to support the needs of immigrants who are rapidly increasing segments of the United States population should be more extensively examined to grow access to lifelong learning. Our research findings can guide the adult and continuing education administrators, program developers, and instructors to consider specific resource allocations (e.g., supplemental basic literacy skill training) and more active recruitment as well as encouragement for the middle-aged adults with lower educational attainment, lower literacy skills, and immigrants. It should also be noted that among highly educated and motivated middle-aged adults, immigrants were less likely to be motivated than the US-born counterparts, and therefore, such systematic and arguably cultural difference should not be overlooked in future lifelong education programs.

Educators and researchers should consider appropriate literacy levels of adult education programs and cultural sensitivity to promote lifelong learning among immigrants in the United States. At the same time, regardless of educational attainment, education communities need to make continuous efforts to enhance the foundational skills such as literacy in the general population while paying close attention to possible sub-populations like the middle-aged immigrants who are at the higher risk of a lifelong learning divide.

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