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An Exploration of U.S. Adults' Information Processing Skills and Political Efficacy

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Abstract

In our current era of fake news and (dis)information, understanding the association between information processing skills and political efficacy in the U.S. is a significant inquiry for adult and continuing education. Data from the Programme for the International Assessment of Adult Competencies (PIAAC) was used to explore relationships between U.S. participants' information processing skills and political efficacy. We further analyzed whether the relationship varied across levels of civic engagement, formal educational attainment, immigrant status, or the range of books in the home. The results illustrate that higher levels of literacy, numeracy, and PS-TRE are associated with higher political efficacy for U.S. participants. Our research is framed in both cognitive and critical lenses, and we provide implications for practice in adult and continuing education settings.

Keywords: political efficacy, civic engagement, information processing skills, democractic education, PIAAC, literacy, numeracy, problem solving in technology rich environments, civic education, civic literacy, assessment

Adults' Information Processing Skills and Political Efficacy?: Exploring A Democratic

Ideal of U.S. Public Education

Charles de Montesquieu argued in the *Spirit of Laws* (1748) that, "the laws of education ought to be in relation to the principals of government" (Book 4, Chapter I). Montesquieu's political treatise and corresponding arguments had enormous influence on the public education policies and positions exposed by William Smith (1753), Thomas Jefferson (1816), Horace Mann (1870), and John Dewey (1900, 1916). The belief that "public schools do not serve a public so much as create a public" (National Council for the Social Studies, 2018, para 1) and similarly related democratic ideals still undergird much of United States (U.S.) education policy and stated purpose. Yet, how often do we, as researchers, attempt to review how effective our educational policies are at achieving their democratic priorities – an informed and active citizenry capable of sustaining democracy?

To investigate, we used the Organization for Economic Cooperation and Development (OECD)'s Programme for the International Assessment of Adult Competencies (PIAAC) dataset. We explored relationships between information processing skills as assessed by the PIAAC and self-reported political efficacy for U.S. adults. Because (a) functional literacy is "intimately tied to citizenship and community development" (Schneider, 2007, p. 157), and yet (b) literacy and numeracy education in the U.S. focuses upon preparedness for "college and career" with little consideration of civic or community purposes (Schneider, 2007), relationships between information processing skills and political efficacy for adults deserve scholarly attention. Political efficacy is "the feeling that individual political action does have, or can have, an impact upon the political process, i.e. that it is worthwhile to perform one's civic duties" (Campbell, Gurin, & Miller, 1954, p. 187).

As part of PIAAC's background questionnaire, participants were asked to self-rate their perceived level of political efficacy with the statement, "People like me don't have any say about what the government does" (I_Q06a). Given the roles of (a) digital technologies in literacy and numeracy practices (Bruce & Bishop, 2008; Jacobson, 2012; Thomas, 2008) and (b) social media and disinformation in recent political activity and campaigns (Charlton, 2018, de Zúñiga, 2012), there is also a need to further investigate potential relationships between information problem solving skills in technology rich environments and political efficacy (Hoffman & Schechter, 2016).

Our analysis was guided by the overarching question, "Are literacy, numeracy, and problem-solving in technology rich environments (PS-TRE) information processing skills associated with self-reported political efficacy for U.S. adults?" The PIAAC assessment is a unique opportunity to investigate this question because of its utility in assessing both self-reported political efficacy and U.S. adults' information processing skills. Given the impact of certain demographic variables on political efficacy, we also analyzed whether the relationship between information processing skills and self-reported political efficacy varied across levels of civic engagement, formal educational attainment, immigrant status, or the range of books in the home. Because PIAAC examines "information-processing skills considered essential for successful participation in the information-rich economies and societies of the 21st century" (IEA-ETS Research Institute, 2015, p.1), we approached these questions through two contrasting theoretical perspectives: (a) the cognitive lens, and (b) a critical lens applied to connections between education, power, and civic society.

Theoretical Perspectives

In the 2016 U.S. general election, the turnout rate for the voting eligible population was 60.2% (McDonald, 2017). Political participation is vital to sustaining democracies through

informed decision-making that protects individual interests (Rousseau, 1968). Political

theorists like John Stuart Mill and G.D.H. Cole first hypothesized the link between participation

and the presence of certain personality traits or social tendencies (Pateman, 1970). Political

efficacy is one of "the greatest positive predictors of political participation" (Campbell, Gurin,

& Miller, 1954, p. 187). The reciprocal relationship between political participation and political

efficacy in the US is well documented (Finkel, 1985). Relatedly, a great proportion of the

scholarship in the US on political interest and behavior is rooted in the "resource model"

(Brady, Verba, & Schlozman, 1995) and its corresponding impact on political efficacy and

participation. Education, inclusive of information processing skills, is one of the key resources

within the model.

In this section, we present research on political efficacy and the PIAAC assessment of

information processing skills from both cognitivist and critical perspectives, including social

and demographic characteristics as well as information processing skills that impact political

efficacy.

The Cognitivist Lens

A cognitive lens, both functionalist and psychological, was used in the design of the

PIAAC assessment (IEA-ETS Research Institute, 2015). The PIAAC assessment is grounded in

the premise that increases in information processing skills, as measured by Messick's (1994)

construct centered approach, promote human capital (Becker, 1993) which, in turn, spurs growth

for economies as well as engagement with social/political systems (Dinis da Costa, Rodrigues,

Vera-Toscano, & Weber, 2014). This perspective asserts that increases in knowledge position

people "to make well-informed decisions about the future, to assume responsibility for these

decisions, and to judge how their personal behavior will affect future generations, helping

individuals and society to be more stable and resilient in times of change" (Dinis da Costa, Rodrigues, Vera-Toscano, & Weber, 2014, p.11). Correspondingly, functionalist and psychological approaches cast education's impact as empowering people with skills to become more economically productive and, therefore, able to more efficiently perform their roles as citizens (LeCompte & deMarrais, 1992).

This is seen explicitly in the United States (US) Workforce Innovation and Opportunity Act of 2014 (WIOA) which prioritizes the expansion of career pathways leading to consequential careers and economic well-being for low-skilled adults and families. WIOA also compels adult-education programs to offer Integrated English Literacy (IEL) and Civics Education activities. WIOA's guidelines further outline how programs should fuse traditional English-language and civics instruction within Integrated Education and Training (IET) courses.

The Critical Lens

While acknowledging international debate regarding education's impact on political efficacy (Hayes & Bean, 1993), we also apply a critical perspective on empowerment and political efficacy. We assume "that education is the key to human dignity *and* the populist democracy of the United States" (Quigley, 2000, p. 212) and that education programs can equip people "to exercise power individually and collectively in their lives, communities, and society" (Prins & Drayton, 2010, p. 209). This ability to enact collective agency is also a central tenet in one of the seminal pieces of critical education: Freire's (1970) *Pedagogy of the Oppressed.* Freire's theory of dialogical action suggests that "the struggle for liberation is a common task…emerging from cooperation in a shared effort" (p. 176).

Critical perspectives additionally outline the importance of shared agency over economic drivers (Barker, 2005; Prins & Drayton, 2010). Shared agency in citizenship is often

developed through community or civic engagement (Munoz & Wrigley, 2012; Thomas, 2008). While the construct of civic engagement is contested (Adler & Goggin, 2005; Westheimer, 2015), we define civic engagement as "the practice of democratic deliberation" through volunteering or engaging any activity (face-to-face or online) that builds community and collaboration around a common cause (Munoz & Wrigley, 2012; Thomas, 2008). Community engagement is often a conduit for political efficacy, which allows people to utilize their educational skills and lived experiences to shape organizations that serve their interests (Bishop & Bruce, 2005, Bruce & Bishop, 2008; Knowles, Holton, & Swanson, 2015; Munoz & Wrigley, 2012).

In U.S. educational programing, we see these influences in each's states required civics education curriculum. For example, some states mandate service-learning as an additional graduation requirement (like the 2014 Code of Maryland Regulations (COMAR) 13A.03.02.06), some create Community Service Diploma Endorsements (like Act 295 of the 2012 Regular Session of the Louisiana Legislature), and some even demand passage of the U.S.C.I.S. Civics Exam for graduation (like Arizona's ARS §15-701.01 of 2015).

Educational, Social, and Demographic Characteristics Impacting Political Efficacy

Unfortunately, not all U.S. citizens or citizen groups are equally empowered to participate in the democratic enterprise. Education in the U.S. can be a "double-edged sword for democracy, simultaneously promoting and stratifying political capacities" by intersecting with socioeconomic status and other experiences to promote the greatest enrichment in political efficacy for those who are already politically and socially advantaged (Beaumont, 2011, p. 216). Westheimer (2015) refers to a "civic opportunity gap", or "unequal distribution of opportunities to practice democratic engagement" (p. 14). Some of these opportunity gaps

occur in educational programs, which operate based upon three very different visions of what constitutes a "good citizen" (Westheimer, 2015). Programs oriented toward a "Personally Responsible Citizen" model attempt to build personal responsibility "by emphasizing honesty, integrity, self-discipline, and hard work" (p. 38). A personally-responsible citizen might contribute to a food bank, for example. The second model, "Participatory Citizen", defines citizenship as active participation in the "civic affairs and the social life of the community at local, state, and national levels" (p. 40). A participatory citizen might help to organize a food drive. Finally, the "Social Justice-Oriented Citizen" model prioritizes independent and critical thinking, emphasizes the complexity of social issues, and seeks to improve society (Westheimer, 2015). Social justice-oriented citizens might explore the concept of food insecurity and act to solve its underlying causes.

Beyond curricular impacts, political efficacy and civic engagement are indivisibly linked to social class for adults: people who are marginalized due to their income and employment status perceive less control over the decisions that affect them and are far less politically involved (Abramson, 1983; Laurison, 2016).

Age, gender, formal educational attainment, immigrant status, ethnicity, and the amount of reading reported in homes can also impact civic engagement and political efficacy. Menard and Slater (2012) found that while older U.S. adults had higher percentages of voting, civic memberships, and social trust, younger adults had higher percentages of online civic participation. Similarly, Hirshorn and Settersten's (2013) review of current age group and cohort participation critiqued the current emphasis on youth and old age participation patterns. They argued for reviewing age/cohort data on civic engagement and political participation from a dynamic life course perspective, where changes in trajectories in participation may be

viewed across the lifespan and by discrete individuals or groups.

In terms of gender differences, U.S. women are more likely than men to engage in nonpolitical volunteering, community service, and local civic organizations as forms of civic engagement (Hooghe, & Stolle, 2004; Schlozman, Burns, & Verba, 1994; Stromquist, 2008). Women also have voted more often and at higher rates than men since the 1980s (Schlozman, Burns, & Verba, 1994). However, women are less engaged than males in political activities that have the largest policy impacts such as involvement with political parties, contacting their elected officials, and/or publicly expressing political opinions (Schlozman, Burns, & Verba, 1994). Few gender differences are present in online political behavior, except those that are most visible; women may avoid online political behaviors they believe could offend others (Bode, 2017).

Further, higher levels of formal educational attainment have consistently been associated with higher levels of political efficacy and corresponding civic engagement and political participation for adults (Helliwell & Putnam, 2007; Pollock, 1983; Newell, 2014). Similarly, a person's immigrant status, specifically whether they are a natural born U.S. citizen, naturalized citizen, or non-citizen resident (Munoz & Wrigley, 2012; Ramirez & Felix, 2011) also largely affects their civic engagement and perceived political efficacy. Additionally, a U.S. adult's ethnicity (Shaw, DeSipio, Pinderhughes, & Travis, 2018) as well as reported higher instances of reading and other literacy practices reported in homes (Hofstetter, Sticht, & Hofstetter, 1999) can significantly impact civic engagement and political efficacy.

Finally, Hoffman and Schechter (2016) examined adults' perceptions of their technological efficacy and online political behaviors and found that technological efficacy predicted online political expression (Hoffman & Schechter, 2016). However, participants'

skill use was identified using self-reported construct as opposed to the PIAAC's a task-based skill assessment of problem solving in technology rich environments.

Adults' Information Processing Skills and Political Efficacy

Since the PIAAC's administration, there are more quantitative studies examining the intersection of assessed academic skill proficiencies of adults and political efficacy or engagement (Dinis da Costa, Rodrigues, Vera-Toscano, & Weber, 2014; Grotlüschen et al., 2016; Stromquist, 2008). Most studies prior to the PIAAC, like Becker, Wesselius, and Fallon (1976), Greenleigh Associates (1968), Burchfield, Hua, Baral, and Rocha (2002), and Burchfield, Hua, Saxo, and Rocha (2002), reviewed educational program participation in relation to political agency or civic engagement. Two of these studies are quite dated and, moreover, none investigated the impacts of participants' academic (literacy or numeracy) skill level on political agency or civic engagement as this data has only recently become available. Previous adult literacy assessments did not include information on participants' political efficacy.

However, in 2013, the OECD, using the PIAAC study, first identified the contributions of proficiencies to social practices, including political efficacy. They found "that adults with lower levels of skills are more likely to report feeling a low level of political efficacy" for the 24 countries and regions associated with the OECD 2012 Survey of Adult Skills (p. 240). Additionally, Dinis da Costa, Rodrigues, Vera-Toscano, and Weber (2014) utilized the PIAAC data to explore the relationship between political efficacy and adults' skills in European Union (EU) participating countries. They found a positive relationship between literacy and political efficacy and a smaller but positive relationship between numeracy and problem-solving in technology-rich environments (PS-TRE).

Further, Grotlüschen, Mallows, Reder, and Sabatini (2016) examined political efficacy's relationship to literacy, numeracy, and PS-TRE for low literate populations for the 24 countries and regions associated with the OECD 2012 Survey of Adult Skills. Interestingly, they found that neither literacy nor numeracy information skill proficiency was significantly associated with political efficacy. However, they found that "both educational attainment and employment status are positively associated with political efficacy; those with more education and those currently employed have higher levels of political efficacy" for low skill populations" (p. 54). Additionally, they noted that the "effects of age, gender and immigrant status on political efficacy vary over the different practices models" (p. 54).

Yet, there has not been a study focusing exclusively on the U.S. sample in these recent analyses. Considering almost 40% of eligible U.S. voters do not vote despite a policy emphasis on democratic and civic education in the U.S. educational system, more research is necessary to understand how literacy, numeracy, and technological skills relate to political efficacy and civic participation for adults in the U.S. context.

Methodology

Organization for Economic Cooperation and Development (OECD) created the PIAAC, a cyclic, large-scale study, to assess and compare adults' skills and competencies across over 40 countries. We completed a secondary analysis of the PIAAC U.S. data files.

Data Source

Our PIAAC data source is comprised of two parts: 1) the 2012 United States assessment of the Survey of Adults Skills and 2) the Background Questionnaire (BQ) (OECD, 2012, 2013). The Survey of Adults Skills assesses information-processing skills in the domains of literacy, numeracy, PS-TRE, and reading components to describe proficiency levels across the

adult population. PIAAC is cross-sectional in nature so it can compare skill proficiencies of adults who are in different generations of life, and who were raised and educated with various values and educational systems. The Background Questionnaire collected information to better understand factors that associate with skill proficiency, specifically demographics, educational attainment, employment, social outcomes, and literacy and numeracy practices of adults. Specific to this research study, the PIAAC allows us to "understand the relationship of proficiency in information-processing skills to economic and other social outcomes" (IEA-ETS Research Institute, 2015, p. 8).

PIAAC Administrators randomly sampled the United States adult population. A total of 5,010 adults ages 16-65 living in the United States completed the PIAAC Survey and Questionnaire. After data screening and deletion of missing cases, our sample ranged from 1,553 to 4,898. Since respondents were not administered every question in the PIAAC, our sample size varied depending on the question. Most participants had at least a high school diploma (87%), were employed (67.8%), and were living with a spouse or partner (65%). About half of the sample was female, about 60% had two children or fewer, and about 13% were foreign-born. Most respondents' parents had also obtained a high school diploma or better.

Dependent Variable

In order to answer our research question, political efficacy was our dependent variable. The PIAAC U.S. background questionnaire contained the statement, "People like me don't have any say about what the government does" (I_Q06a). Participants had five outcome choices: 1) strongly agree, 2) agree, 3) neither agree nor disagree, 4) disagree, 5) strongly disagree. Strongly disagree is the highest level because of the negatively worded question. We

chose variable I_Q06a as our dependent variable due to its categorization by the PIAAC U.S. Background Questionnaire and corresponding Public Use File Codebook with the variable label of "About yourself – Political efficacy- No influence on the government."

Independent Variables

Our main independent variables were the participants' cognitive scores on literacy, numeracy, and PS-TRE. As a result of our review of factors/characteristics impacting political participation and efficacy (e.g. Menard & Slater, 2012; Newell, 2014; Stromquist, 2008), we were additionally interested in several demographic variables known to impact political efficacy which were included in the PIAAC as follows: civic engagement, age, gender, nativity (immigrant status), educational attainment, and literacy skill use as measured by number of books in the home. We also included demographic variables which frequently impact analysis of social phenomena including ethnicity, employment status, whether the participant lives with a spouse or partner, number of children, total number of people living in a household, and parents' educational attainment (e.g. Hofstetter, Sticht, & Hofstetter, 1999; Munoz & Wrigley, 2002). Additionally, we included participants' socioeconomic status as determined by their reported gross earnings (income). Because each country developed gross earnings based on local currency, we reported national deciles rather than dollars.

Data Analysis

To determine if the independent variables were related to self-reported political efficacy, an ordinal logistical regression, a multivariate statistical technique used to predict the probability of group membership to a categorical dependent variable, was conducted to rank values since the real distance between categories was unknown (Tabachnick & Fidell, 1996). Participants were not administered every literacy, numeracy, and PS-TRE question in the

PIAAC; instead, they responded to a small portion of the entire assessment. Therefore, plausible values were computed as an approximation of consistent estimates of respondents' individual test scores. We used the analytical techniques accounting for weights and plausible values as outlined by Pokropek and Jakubowski (2013) as well as the *Technical Report of the Survey of Adult Skills (PIAAC)* and *The Survey of Adult Skills: Reader's Companion* (OECD, 2013b, 2013c). Finally, interaction models were run to determine whether the relationship between self-reported political efficacy and literacy, numeracy, and PS-TRE varied by levels of civic engagement, formal education attainment, immigrant status, or the range of books in the home.

Results

To answer our research question, *are literacy, numeracy, and technological problem-solving skills (PS-TRE) associated with self-reported political efficacy?,* we begin by focusing on skill measures. Following that presentation, we show how the independent control variables and interactions of variables impact the results.

Table 1 presents descriptive statistics for literacy, numeracy, and problems-solving in technologically rich environments. PIAAC literacy levels range from below level 1 through level 5 while OECD defines proficiency as level 3. Americans scored from 103 to 406 with an average of 272, placing average U.S. adults in level 2. Performing in level 2 means adults use basic paraphrasing and inferencing when reading whereas proficiency (level 3) is defined as being able to identify, interpret, and evaluate one or more pieces of information with varying levels of inference. Likewise, PIAAC proficiency levels for numeracy range from below level 1 to level 5 with level 3 as proficient (defined by OECD). American's numeracy scores ranged from 32 to 444 (average = 255), again placing adults in level 2. Adults in level 2 conduct simple

measurement of two or more calculations and interpret simple graphs (American Institute for Research, 2014). Proficient level 3 is categorized as adults who understand and work with mathematical patterns, proportions and basic statistics. The problem-solving scores ranged from 108 to 432 (average = 277), placing American adults in level 1. PS-TRE levels ranged from below level 1 to level 3 with proficiency defined in level 2. American's average score indicates adults use few steps and minimal monitoring when problem-solving whereas proficiency is met when adults complete tasks that require some navigation across pages and applications for problem-solving that require evaluation of reference and inferential reasoning (AIR, 2014).

Table 1 presents the percentage breakdown for each variable. Within each variable, several options are possible and "(ref)" is listed by the highest level of that variable. This "(ref)" means that the designated option is the reference group for that variable, and we compared all other groups within that variable to this highest-level group. For example, there are five levels or groups within the variable civic engagement. The reference group is '*every day'* so 'never' is compared to '*every day*.' Likewise, 'less than once a month', 'less than once a week but at least once a month', and 'at least once a week but not every day' are compared to '*every day*.' This planning test enables us to compare everything to the highest-level group, but not within or between the groups (e.g. 'never' is not compared to 'less than once a month'; 'never' is only compared to 'every day').

For political efficacy, 44% of the sample disagreed or strongly disagreed with the statement "People like me don't have any say about what the government does," while 36% of the sample reported that they agreed or strongly agreed with the statement. In other words, there were slightly more sampled participants who were likely to feel that they have a say in what the government does.

Results of our regression analyses predicting self-reported political efficacy from literacy, numeracy, and PS-TRE before accounting for any control variables are presented in Table 2. Models 1a, 2a, and 3a demonstrate that literacy, numeracy, and problem solving in technology rich environments are all positively and significantly (at the $p = < .001$ level) associated with political efficacy. When adults' scores for the three information processing skills increase by ten points, they have .7% literacy, .6% numeracy, and .6% PS-TRE greater odds of being in a higher self-reported political efficacy category. This means that as the adults' information processing scores raised, the participants believed they had more say in the government. Since the question is worded negatively, "People like me don't have any say in what the government does," then 'strongly disagree' is a positive outcome. So, when we say adults move to a 'higher' political efficacy category, we indicate they progress from 'strongly agree' (which means adults believe they have no say) to 'agree,' then to a neutral/not-sure category 'neither agree or disagree' to 'disagree,' and finally, the highest category, 'strongly disagree.'

Other characteristics that may be associated with both political efficacy and skills in literacy, numeracy, and PS-TRE are explored within the control variables included in Models 1b, 2b, and 3b (Table 3). Even when controlling variables, literacy, numeracy, and PS-TRE are still significantly associated with political efficacy, although effect sizes are quite small (OR = 1.005, 1.003 and 1.004 respectively). For example, adults' increase on skill level by 10 points is associated with .5% literacy, .3% numeracy, and .4% PS-TRE greater odds of being in a higher political efficacy category (e.g. moving from 'strongly agree' to 'agree' through each of the categorical levels).

Yet, many control variables were much more strongly associated with self-reported

political efficacy than were literacy, numeracy, and PS-TRE. For example, we found that

adults age 55 or older had about 45% literacy, 43% numeracy, and 49% PS-TRE greater odds

of being in a higher political efficacy category than the adults ages 25 to 34. In other words, if

information processing scores were equal across the sample, older adults were over 40% more

likely to be in a higher political efficacy category than younger adults across all three

information processing categories. Perhaps not surprisingly, we found that gender is also

strongly associated with self-reported political efficacy. Interestingly, females had 21%

numeracy greater odds of being in a higher political efficacy category than males. Also,

participants who scored in the top tenth percentile of income had about 43% literacy and 44%

numeracy greater odds of having a higher self-reported political efficacy score, than adults in

the 10-25 percentile income category.

Next, we ran several interaction models specifically with educational attainment,

immigrant status, books in the home, ethnicity, and civic engagement. After examining the

interactions between literacy, numeracy, and PS-TRE across educational attainment, we found

one significant (although rather weak) and negative interaction coefficient for literacy. This

finding means literacy skills are more positively associated with higher self-reported political

efficacy for people who have above high school educational attainment than for those who

have a high school diploma or less.

The interaction coefficient for literacy and numeracy with immigrant status were

positive and significant (although rather weak). This demonstrates that people who were born

in the U.S. have higher literacy and numeracy scores associated with greater self-reported

political efficacy ratings than those who were born in a foreign country. This finding is not

true, however, of PS-TRE.

We found no significant interactions by range of books in the home for literacy, numeracy, or PS-TRE skills; the associations between self-reported political efficacy and the three skill areas appear the same, regardless of the number of books in the home.

We also found no significant interactions by ethnicity for literacy, numeracy, or PS-TRE. This suggests that the associations between self-reported political efficacy and the skills are the same across all ethnicities. We also tested interactions in unadjusted models (without any control variables), and the interaction results were unchanged.

Finally, we found no significant interactions by levels of civic engagement for literacy, numeracy, or PS-TRE. This finding implies that the associations between skills and political efficacy are the same across all self-reported levels of civic engagement.

Discussion

To further illustrate the main finding of this paper, we present a scenario. Two adults are similar on all their control variables, including nativity, number of children, et cetera. We will select two men named Doug and Dan who are 59 years of age, possess a college degree, are employed, white, and are in the top fiftieth percentile of U.S. earnings. Doug has a literacy score of 360 and reports he agrees with the statement that he does not have much say in the government. Dan has a literacy score of 370, so he has about .5% higher chance of believing he has a say in the government. If Dan has a higher numeracy score and a higher PS-TRE score, this increases his chances (.3% numeracy and .4% PS-TRE) of reporting higher political self-efficacy when accounting for all other identical characteristics. The results illustrate that U.S. adults with higher literacy, numeracy, and PS-TRE information processing skills as outlined by the PIAAC assessment also had higher self-reported political efficacy. This contribution is significant as it explicitly ties higher assessed educational skill levels (as opposed to education

levels or self-reported skills) to political efficacy. In other words, higher skilled individuals have higher levels of political efficacy. This finding using a representative U.S. sample reinforces the relevance and importance of democratic ideals undergirding much of U.S. educational policy – those with more educational skill are more likely to engage in democratic processes.

However, although the participants with higher information processing skills, as assessed through the PIAAC, believed they had more say in their government, the impact of selected variables on the model merits further discussion. In this paper, we chose to include all results, including those with small odds ratios, because we did not want to minimize or cancel any of our findings. We sought to bring the most clarity and explanation possible to enrich our methodological model.

When examining the current findings in conjunction with the previous literature around information processing skills and political efficacy, an interesting pattern emerges. First, income remained predictive of political efficacy (Laurison, 2016) as those with higher incomes believed they had a greater input into government affairs. Similar to the work of Menard & Slater (2012), age was significantly related to participants' self-reported political efficacy on the PIAAC, even after accounting for educational skill level. Specifically, older adults believed they had more say in what the government does regardless of educational skill level. Females also self-reported much higher rates of political efficacy irrespective of information processing skill. This finding also reinforces the work of Hooghe & Stolle (2004) who note women's higher rates of political and civic engagement when compared to men.

Our findings emphasizing nativity's impact on political engagement correspond to the work of Munoz & Wrigley (2012), Ramirez & Felix (2011), and Waldinger & Duquette-Rury

(2016). Higher literacy and numeracy skills were more protective of self-reported political efficacy for people who were born in the U.S. than for those who were born in a foreign country. Many immigrants remain "excluded [by policies or practices meant to disenfranchise] from [the] polity…. and millions of people spend long stretches of time with [little to no] option for formal political participation" (Waldinger & Duquette-Rury, 2016, p. 58). Given this context, education's impact on political engagement is significantly contracted for foreign born participants.

Lastly, the findings of the current study, much like Newell's 2014 study, also emphasize the impact of educational attainment on adults' political efficacy above and beyond their assessed skills. Adults with higher educational attainment reported much higher political efficacy.

Conversely, the findings of the current study did not reinforce the relationship identified by Hofstetter, Sticht, & Hofstetter (1999) between adults' self-reported home literacy practices and resources and political efficacy. The number of books in the home was not associated with political efficacy after accounting for adults' information processing skills. Also, importantly, unlike the work of Shaw, DeSipio, Pinderhughes, and Travis (2018), the results did not find a significant relationship between adults' ethnicity and political efficacy after accounting for information processing skills. However, this result may serve to highlight one of the authors' closing points – that intersectionality across ethnicity, gender, and sexuality deserves scholarly attention. Without looking at how demographic factors coalesce to impact political efficacy, researchers are left with an incomplete understanding of the phenomena at hand.

Finally, of particular interest were the findings on civic engagement. Although research suggests civic engagement often fosters adults' political efficacy (Bishop & Bruce, 2005, Bruce

& Bishop, 2008; Munoz & Wrigley, 2012), the findings of this study establish that the relationships between self-reported political efficacy and literacy, numeracy, and PS-TRE did not differ by levels of civic engagement. However, a critical reading suggests this finding may be misleading due to the survey item's construction. The survey question did not isolate participants' perceived time for civic engagement activities, nor differentiate between different visions of citizenship as identified by Westheimer (2015). Lastly, in a very large omission, the question did not provide any online/social media examples of engagement in the prompt (Hoffman & Schechter, 2016; Munoz, & Wrigley, 2012).

Framing the Results with the Cognitive and Critical Lenses

When viewed through the cognitive lens adopted by PIAAC and grounded in the human capital tradition (Becker, 1993), the results highlight the importance of educational skill development across all three domains (literacy, numeracy, and PS-TRE) as an additional mechanism empowering adults in the U.S. to engage in the political arena. Since those with higher information processing skills also reported higher self-efficacy, continued support (political and fiscal) for adult and continuing educational programs as an avenue for increasing citizenship and community development outcomes is warranted. Further, the findings on the importance of educational attainment point to the importance of policies that foster an increase in adults' access to tertiary educational opportunities.

However, when approaching the results from a critical lens, we note that conflating even a marginal increase in educational skill and increased self-reported political efficacy is overly simplistic and individualistic as indicated by the substantial impact of the control variables on the model. Educational programs focused on skill without grounding in a critical, socio-political context (i.e., those that focus on college and career, but ignore community and citizenship) may

not foster a marked increase in political efficacy for disenfranchised groups. Instead, uncritical skill driven instruction can possibly serve to reproduce stratifying social systems, as evidenced by the impacts of income, gender, and immigrant status on the results of this study. Similarly, Centellas and Rosenblatt's (2018) research also suggests that not all adult educational experiences actually improve political efficacy. In fact, they found that some opportunities for civic education may have the opposite effect for marginalized adult populations and, as a result, increase the racial political efficacy gap (Centellas & Rosenblatt, 2018).

Implications for Practice

Building upon UNESCO's (2016) call for educators, library and information specialists, media specialists, and publishers to teach, encourage, and promote media and information literacy for all populations, we argue that educational curricula for adult and continuing education settings should incorporate a more explicit focus on participatory, critical, and social justice-oriented perspectives (Westheimer, 2015), particularly for marginalized and historically disadvantaged groups. Given the shifting media climate, including the online proliferation of fake news and disinformation (UNESCO, 2016), an explicit focus on critical media and information literacy within education programming across settings is vital to enabling citizens "to take part in political and social life in a democratic society" (p. 4). For example, Adult Basic Education (ABE), General Equivalency Diploma GED, and continuing education programming could include inquiry and/or service-learning projects around a critical community need as a platform for teaching both productive and consumptive media literacy (Garcia, Seglem, & Share, 2013).

A second implication for education is the need to provide more opportunities for learners to civically engage, or practice agency, in authentic settings, including online and face-

to-face environments. This could include (1) a guided analysis of and participation in a digital

conversation stemming from a local community concern like #BlackLivesMatter or #gogreen,

or (2) opportunities to participate in or provide direct or indirect service to local community

advocacy groups of interest to learners. These experiential educational opportunities are not

only ripe for reinforcing academic skills in education settings, but also "respect the view of the

world held by the people" (Freire, 1970, p. 95), and, therefore, could serve to expand/reinforce

political efficacy through issues important to adult learners and their local communities.

Limitations and Suggestions for Future Research

There are several limitations to note about this study. Since we accessed a public data

source, we had no influence upon the data collected. For example, the PIAAC does not include

religious variables, yet we know religious affiliation, church attendance, and religiosity are also

important drivers of civic engagement and political efficacy (Driskell, Lyon, & Embry, 2008;

Smidt, 1999). Further, all the items on the Background Questionnaire were self-reported and

subject to participants' honesty. Also, the PIAAC asked participants for the number of books in

the home rather than amount of time spent reading and types of reading (i.e. books, magazines,

websites). With today's emphasis on digital reading, the number of books in the home may not

adequately represent the amount and range of reading completed by participants. Perhaps most

importantly, the political self-efficacy and civic engagement items on the survey do not and

cannot capture the full range of civic and political activities in which U.S. adults are involved,

such as writing letters to an editor, posting comments on online political articles/discussion

boards, and many more. Further, we are not able to determine "how" citizenship status affects

civic engagement and political efficacy since the data can only provide descriptive and predictive

results with no causality among factors.

This study used the 2012 Programme for the International Assessment of Adult Competencies (PIAAC) data set to examine literacy, numeracy and technology skills for the entire population of U.S. adults in relationship to political efficacy. Given our findings, one suggestion for future research would be to examine political efficacy and educational skill levels for specifically targeted subgroups within the U.S. population. These analyses would be possible as a result of the U.S. PIAAC National Supplement, or second round of data collections, where an additional 3,660 adults were surveyed from three targeted subgroups: 1) unemployed adults (age 16-65), 2) young adults (age 16-34), and 3) older adults (age 66-74) (Rampey et al., 2016). Additionally, qualitative studies that deeply explore participants' perspectives on political efficacy should be updated to account for the current socio-political context.

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Table 1: Descriptive Statistics for Political, Literacy, Numeracy, PS-TRE, and Control Variables

Percentages or mean		(std)	Min	Max
Literacy	271.80	(48.30)	102.7	406.62
Numeracy	254.98	(55.50)	32.55	444.12
PS-TRE	277.27	(43.17)	108.80	432.35
Political efficacy				
Strongly agree		15.5%		
Agree		20.9%		
Neither agree nor disagree		19.2%		
Disagree		33.1%		
Strongly disagree		11.3%		
Levels of civic engagement				
Every day (ref)		2.5%		
Never		43.8%		
Less than once a month		25.6%		
Less than once a week but at least once a month		15.9%		
At least once a week but not every day		12.3%		
Gender				
Female		53.6%		
Male		46.4%		
Educational attainment				
Above high school (ref)		46.7%		
Less than high school		12.9%		
High school		40.5%		
Number living in household				
Seven persons or more in the household (ref)		2.9%		
One persons in the household		19.8%		
Two persons in the household		28.4%		
Three persons in the household		17.4%		
Four persons in the household		18.4%		
Five persons in the household		9.1%		
Six persons in the household		4.0%		
Nativity				
Foreign born		13%		
United States born		87%		
Age				
55 or older (ref)		21.3%		
16-24		16.7%		
25-34		20.9%		
35-44		19.5%		
45-54		21.6%		
Mother's educational attainment				
Attend college or more (ref)		27.0%		

Did not complete high school	25.9%
Complete high school	47.1%
Father's educational attainment	
Attend college or more (ref)	28.9%
Did not complete high school	26.5%
Complete high school	44.6%
Home status	
Living with a spouse or partner	65.1%
Not living with a spouse or partner	34.9%
Number of books at home	
More than 500 books	5.5%
10 books or less	18.1%
11 to 25 books	18.2%
26 to 100 books	32.4%
101 to 200 books	15.5%
201 to 500 books	10.2%
Income (in deciles)	
90 or more (ref)	6.8%
Less than 10	11.7%
10 to less than 25	24.7%
25 to less than 50	25.4%
50 to less than 75	18.2%
75 to less than 90	13.2%
Employment status	
Employed	67.8%
Unemployed	32.2%
Number of children	
Four children (ref)	17.8%
One child	24.3%
Two children	36.3%
Three children	21.6%
Ethnicity	
White	66.2%
Hispanic	11.1%
Black	12.8%
Other Race	7.4%

Note: Means and standard deviations for literacy, numeracy, and PS-TRE were calculating using the PIAACDES method within PIAACTOOLS in Stata to account for plausible values.

N=4,898 for literacy and numeracy

N=4,103 for PS-TRE

All values are weighted

Table 2: Regression analyses predicting self-reported political efficacy from literacy, numeracy, and PS-TRE before accounting for any control variables

	LITERACY Model 1a		NUMERACY Model 2a		PS-TRE Model 3a	
	OR	95% CI	OR	95% CI	OR	95% CI
Literacy	1.007***	.006-.008	-------	-------	-------	-------
Numeracy	-------	-------	1.006***	.005-.007	-------	-------
PS-TRE	-------		-------	-------	1.006***	1.005-1.007

*p<.05; weighted; two-tailed tests
**p<.01; weighted; two-tailed tests
***p<.001; weighted; two-tailed tests
N problem solving (4098); Literacy & Numeracy (4886)

Table 3: Regression analyses predicting self-reported political efficacy from literacy, numeracy, and PS-TRE with control variables

	LITERACY Model 1b		NUMERACY Model 2b		PS-TRE Model 3b	
	OR	95% CI	OR	95% CI	OR	95% CI
Literacy	1.005***	.003-.007	-------	-------	-------	-------
Numeracy	-------	-------	1.003**	.001-.005	-------	-------
PS-TRE	-------	-------	-------	-------	1.004***	.002-.007
Levels of civic engagement						
Every day (ref)	-------	-------	-------	-------	-------	-------
Never	.862	-.673-.377	.882	-.651-.399	.752	-.868-.299
Less than once a month	1.206	-.343-.718	1.260	-.299-.761	1.107	-.483-.686
Less than once a week but at least once a month	1.435	-.186-.908	1.460	-.168-.925	1.266	-.364-.835
At least once a week but not every day	1.659	-.048-1.060	1.697	-.025-1.082	1.500	-.203-1.013
Male	.837	-.360-.005	.796*	-.411- -.044	.864	-.344-.051
Educational attainment						
Above high school (ref)	-------	-------	-------	-------	-------	-------
Less than high school	.777	-.637-.134	.743	-.686-.092	.665	-.917-.102

High school	.927	-.279-.128	.905	-.303-.105	.903	-.315-.112
Number living in household						
Seven persons or more in the household (ref)	-------	-------	-------	-------	-------	-------
Two persons in the household	.716	-.900-.231	.726	-.885-.245	.835	-.826-.465
Three persons in the household	1.068	-.493-.624	1.084	-.477-.639	1.315	-.362-.909
Four persons in the household	.735	-.860-.244	.744	-.847-.256	.828	-.820-.442
Five persons in the household	1.051	-.523-.622	1.060	-.514-.631	1.253	-.420-.871
Six persons in the household	1.048	-.607-.701	.726	-.594-.713	1.319	-.468-1.021
Foreign born	.931	-.334-.191	.979	-.282-.239	1.061	-.246-.364
Age						
55 or older (ref)	-------	-------	-------	-------	-------	-------
18-24	.595	-1.079-.039	.616	-1.044-.074	.582	-1.159--.076
25-34	.555***	-.915--.263	.570**	-.888- -.237	.517***	-1.017--.301
35-44	.662**	-.711- -.113	.674*	-.693--.095	.669	-.730--.075
45-54	.833	-.448-.083	.837	-.443-.088	.838	-.470-.116
Mother's Educational Attainment						
Attend college or more (ref)	-------	-------	-------	-------	-------	-------

Did not complete high school	.922	-.394-.231	.910	-.406-.219	.865	-.474-.183
Complete high school	.847	-.400-.067	.838	-.410-.057	.818	-.443-.041

Father's Educational Attainment

Attend college or more (ref)	-------	-------	-------	-------	-------	-------
Did not complete high school	.835	-.472-.111	.815	-.496-.087	.877	-.437-.175
Complete high school	.961	-.274-.194	.957	-.277-.190	.959	-.284-.199
Not living with a spouse or partner	.847	-.390-.058	.833	-.407-.043	.910	-.336-.148

Number of books at home

More than 500 books	-------	-------	-------	-------	-------	-------
10 books or less	1.006	-.463-.476	.981	-.489-.450	1.036	-.454-.525
11 to 25 books	.822	-.642-.249	.827	-.637-.256	.805	-.673-.240
26 to 100 books	.958	-.459-.374	.950	-.467-.366	.944	-.482-.367
101 to 200 books	1.140	-.306-.569	1.125	-.320-.555	1.132	-.323-.572
201 to 500 books	1.414	-.128-.822	1.435	-.114-.836	1.443	-.119-.853

Income

90 or more (ref)	-------	-------	-------	-------	-------	-------
Less than 10	.899	-.600-.386	.835	-.672-.310	.905	-.630-.430

10 to less than 25	.600	-.900--.121	.572**	-.948--.169	.565**	-.993--.148
25 to less than 50	.787	-.558-.080	.743	-.614-.020	.821	-.535-.140
50 to less than 75	.706	-.638--.059	.677**	-.678--.102	.728	-.622--.014
75 to less than 90	.789	-.530-.056	.764	-.562-.023	.768	-.567-.038
Unemployed	.744	-.703-.112	.756	-.687-.128	.838	.538-1.303
Number of children						
Four children (ref)	-------	-------	-------	-------	-------	-------
One child	1.341	-.020-.606	1.342	-.018-.607	1.321	-.059-.616
Two children	1.343	.021-.569	1.349	.026-.573	1.323	-.019-.579
Three children	1.230	-.089-.503	1.242	-.079-.513	1.182	-.154-.488
Ethnicity						
White (refe)	-------	-------	-------	-------	-------	-------
Hispanic	1.089	-.102-.272	1.081	-.109-.265	1.100	-.109-.299
Black	1.136	-.049-.304	1.136	-.049-.304	1.151	-.048-.330
Other Race	.864	-.369-.076	.855	-.380-.065	.839	-.418-.066

*p<.05; weighted; two-tailed tests
**p<.01; weighted; two-tailed tests
***p<.01; weighted; two-tailed tests
N=Literacy and Numeracy (1777) Problem (1553)
Bonferroni corrections used for Type I protection (.05/number of tests for category has more than two levels. (such as Education attainment, Number of books els..)