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The Language Divide—
The Persistence of English Proficiency as a Gateway to the Internet:
The Cases of Armenia, Azerbaijan, and Georgia

Abstract

Understanding sociodemographic barriers to adoption and use of the Internet continues to be an important research topic, especially considering the increased importance of access and use of information and communication technologies around the world. Extending a digital divide framework, this study analyzes the influences on and relations among awareness, adoption, and (frequent) use of the Internet in the developing countries of Armenia, Azerbaijan, and Georgia. Data from nationally representative samples fit a model predicting that age, economic well-being, education, urbanness, and English proficiency all influence each Internet digital divide. Age, education, and urbanness are the primary determinants of awareness of the Internet. Language proficiency is the second most important determinant of adoption and the most important influence on use. Despite growing Internet adoption, inequality remains, based on sociodemographic and economic status at each Internet divide. In addition, for these linguistically isolated states, English proficiency being a strong influence on adoption and use indicates a further divide between elites and nonelites.

Keywords: Armenia, Azerbaijan, Georgia, Internet, technology, language, English, digital divide

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In some parts of the world, socioeconomically driven divides have declined (Katz & Rice, 2002). Further, the policy and academic conversation has evolved from information and communication haves and have-nots to more detailed discussions of multiple or second-level divides "after access," involving skill and use (Bonfadelli, 2002, 2003; Hargittai & Hsieh, 2013). Despite the progressing conversation, there remains a need to study and understand barriers to awareness and adoption, without which use does not exist.

This study looks at the former Soviet states of the Caucasus (Armenia, Azerbaijan, and Georgia), where educational attainment is quite high but economic conditions are difficult. Second, these states are global linguistic minorities, so citizens of these states must rely on foreign language skills to use the Internet. These countries provide an excellent context for

revisiting the more basic digital divides of awareness, adoption, and use, because, although awareness of the Internet has grown in recent years, adoption and use remain low or moderate. Unlike earlier studies of demographic determinants of adoption and use of the Internet in which lack of awareness that the Internet existed explained a great deal of nonuse (Chigona, Beukes, Vally, & Tanner, 2009; Donner, Gitau, & Marsden, 2011; Katz & Aspden, 1997a, 1997b; Katz, Rice, & Aspden, 2001; LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007), the current study analyzes influences on Internet adoption and use in a high-awareness context. And this study specifically examines the role that foreign language skill has on awareness, adoption, and use, because dependence on a foreign language to access the Internet is a notable barrier in these countries. As the Internet becomes a more important tool and information source in these countries, these sociodemographic and language inequalities are amplified.

This study's primary focus, then, is the relative influence of primary sociodemographic factors as well as language skills on three main aspects of the digital divide: awareness, adoption, and usage, in three Caucasus countries, using nationally representative survey data. Contributions of this study include distinguishing influences across the three divides, the inclusion of the language factor, and the comparison across countries different from the familiar ones in digital divide research.

Research Context

Case countries. When compared globally, all three countries of the Caucasus—Armenia, Azerbaijan, and Georgia—have both high poverty levels and high educational attainment (European Commission, 2011). Table 1 shows the value and relative rank of these three countries globally on four key United Nations Development Programme (2013) indicators and the overall Human Development Index.

Table 1. Key Development Indicators, 2012.

Country	Median age	Gross national income per capita (purchasing power parity)	Mean years of schooling	Urban population %	Human Development Index rank[a]
Armenia	33.4 (125)	7,952 (111)	12.3 (38)	64.2 (111)	(87)
Azerbaijan	30.4 (110)	15,725 (71)	11.8 (31)	54.1 (88)	(76)
Georgia	38.1 (143)	6,890 (116)	13.2 (13)	53.0 (82)	(79)

Figures are indicator values and (ranking out of 187 countries).
[a]Lower values indicate higher "human development" in this index .
Source: United Nations Development Programme (2013).

But within the countries, there is concern about widening inequality (European Commission, 2011; Falkingham, 2005). Analysis of the digital divides of Internet awareness, adoption, and use is one way to explore social inequality there. The less privileged in these

countries already have poor access to social and economic opportunities (Pearce, 2011) and elites in these societies are already greatly advantaged (Aliyev, 2014; Bezemer & Lerman, 2004). Thus, lower awareness, adoption, and use of this important technology may exacerbate inequality and obstacles to social and civic resources and participation.

Armenia has been challenged since independence by internal instability, political strife, a frozen conflict with neighboring Azerbaijan (Heritage Foundation, 2008), and high out-migration (Agadjanian & Sevoyan, 2014; Bellak, Leibrecht, & Liebensteiner, 2014). *Azerbaijan*, despite the challenges faced by the frozen conflict, has come into great oil wealth in the past decade that should continue for the foreseeable future. Despite the wealth, poverty is high and infrastructure remains poor, especially outside of the capital (International Monetary Fund, 2013). Politically, the current president has moved the country toward "full-fledged authoritarianism" (Frichova Grono, 2011). *Georgia*'s transition to independence was challenging, involving a civil war and two secessionist conflicts. In 2004, a new reformist government began to modernize to varying degrees of success. By 2010, the situation had calmed down (with the exception of a 2008 war with Russia), and reforms continue, although a new generation of reformists now hold power (Freedom House, 2013).

***Language in the post-Soviet sphere*.** Language plays an important identity role in post-Soviet societies (Blauvelt, 2013; Kleshik, 2010; Pavlenko, 2013). In the Soviet period, the Caucasus were unique in that their national languages were considered *official* languages, so government materials, media, and education were provided in both Russian and the local languages (Pavlenko, 2008). As Blauvelt (2013) explains it, Russian was not a *foreign* language per se, but a second native language, regardless of how well an individual spoke it. Although Russian never became the *dominant* language in the Caucasus, high fluency in Russian was necessary for one to get ahead in the non-Russian Soviet republics. Traditionally, the second language of choice would have been Russian; however, today more young people are opting to learn English as well (Blauvelt, 2013; Shafiyeva & Kennedy, 2010).

Armenian. Armenian is an Indo-European language with no strong relationship with other languages (Comrie, 1987) and a unique script dating to the fifth century. The script has not been well supported in computer operating systems, nor did a single encoding system dominate early computer use. It is common for Armenian to be written in Latin script, developing into an informal orthography. Five to six million people speak Armenian (Grimes, 1992), although it is difficult to determine the number who can read and write, because for many speakers Armenian is a heritage language spoken in the household, while they use another language at school and work (Petrossian, 1997).

Azerbaijani. Azerbaijani is closely related to Turkish. As Azerbaijani people lived under various empires, competing scripts (Perso-Arabic, Latin, Cyrillic) were used over different periods. In particular, during the Soviet period, Azerbaijanis in the Republic of Azerbaijan used Cyrillic, while Azerbaijanis in Iran used Perso-Arabic. After the collapse of the Soviet Union, Azerbaijan decided to use the Turkish Latin script. The move to the Turkish Latin alphabet benefits Azerbaijanis because there is no need for a special encoding script on personal computers or mobile phones (although ç becomes c, ı becomes i, ə becomes e or a, but in the context of a sentence, the replacement letter makes sense). There are likely about 20 million Azerbaijani speakers in the world. However, like Armenians, heritage speakers as well as the

different scripts used mean that it is challenging for Azerbaijanis to communicate with one another via text.

Georgian. Georgian is a complex language that is unrelated to any other language. Georgian also has a unique script that has been a barrier for using technology, although writing in Latin script is a common workaround. Between 4 million and 5 million people speak Georgian, but with some heritage speakers, it is unknown how many are literate.

To put these languages in context with English (3rd most native speakers in the world) and Russian (8th), Turkish is 21st, Azerbaijani is 48th, Armenian is 100th, and is Georgian 124th ("List of Languages," n.d.).

***English proficiency*.** English has become a popular second language choice (Blauvelt, 2013; Shafiyeva & Kennedy, 2010), but English language education is not widely available in these countries. Urbanites and the rich have greater access to schools with English instruction, as well as to private tutoring (Pearce, 2011). Individuals who are inclined to learn English and become proficient at it may be doing so because they want to be successful, have better job opportunities, become a part of the global marketplace, learn more about the outside world, or have greater mobility, possibly to leave the country (Dogancay-Aktuna & Kiziltepe, 2005; Nino-Murcia, 2003; Park, 2011; Petzold & Berns, 2000; Ustinova, 2005; Vaezi, 2008). They also may want, through English proficiency, to show status or feel more "democratic" or "Western" or "international" or "modern" (Dogancay-Aktuna, 1998; Hasanova, 2007, 2010; Johnson, 2003; Nino-Murcia, 2003; Petzold & Berns, 2000; Ustinova, 2005).

Digital Divide—Concept and Influences

Concept. The *digital divide* is any divide or gap between people (organizations, social groups, or geopolitical entities) in their communication technology awareness, adoption or ownership, use, and skill (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Hargittai & Hsieh, 2013; Katz & Rice, 2002; van Deursen & van Dijk, 2010, 2013, in press; van Dijk, 2005). A digital divide implies one or more social divides, in terms of access to information, knowledge, and other resources, and thus more general social inequalities and power differences (Bonfadelli, 2002, 2003). Two competing hypotheses propose the effect of technology on social inequality.

The first hypothesis is the *mobilization thesis*: Socially marginalized individuals will be empowered as they gain access to new technologies. In this perspective, Internet use in general, and different online activities in particular, foster a more inclusive society, and increased participation in economic and political life, through access to capital and reduced cost of information, communication, and coordination (DiMaggio et al., 2004; Helsper, 2012). Forms of capital (economic, cultural, social) are considered by some to be the overall mediating influence between access, use, and engagement (Selwyn, 2004).

The second hypothesis is the *normalization thesis* or the Matthew Effect, whereby the "rich get richer" (DiMaggio et al., 2004; Haight, Quan-Haase, & Corbett, 2014; Helsper, 2012; van Dijk, 2005): Information and communication technologies will benefit those who are better off in society already. Differences in sociodemographics, access, skills, interests, and infrastructure all represent variations in abilities, costs, and barriers, so more usage, activities, and benefits flow to those with greater resources, abilities, and information needs (DiMaggio et al., 2004; Zillien & Hargittai, 2009). Some differences may decrease over time (such as basic

access), some differences may expand (capital), and some may be replaced (from dial-up to broadband) (van Dijk, 2005).

Although the term *digital divide* generally implies differences in adoption or use based on socioeconomic divisions, there are many dimensions, levels, and typologies of this divide (Hargittai & Hsieh, 2013; Hilbert, 2011a; Selwyn, 2004; van Dijk, 2005). In general, these include a sequence of divides from awareness, access, adoption, use, content creation, and skills to outcomes (Pearce & Rice, 2013; van Deursen & van Dijk, 2010, 2013, in press; van Dijk, 2005). For a user to gain access to information and communication, he or she must be *aware* that the technology or resources are available (Katz & Rice, 2002; Rice, McCreadie, & Chang, 2001). Following awareness, one has the opportunity to access/*adopt* information technologies (DiMaggio et al., 2004; van Dijk, 2005; van Deursen & van Dijk, 2010, 2013, in press). Given adoption, subsequent *use* of the Internet can provide access to knowledge, technology, communication, control, goods/commodities, and knowledge of and ability to exercise rights (van Dijk, 2005; Riceet al., 2001).

Sociodemographic influences. Primary individual-level *digital divide influences* (the focus of this study) include age, sex, economic well-being, location, education, and, in many countries, English skills. The following sections briefly summarize the justifications for including these influences.

Age. Younger people have the highest adoption rate and levels of use of the Internet because of earlier exposure and training, peer use, and greater comfort with new technology (Bonfadelli, 2002; Grazzi & Vergara, 2014; Haight et al., 2014; Katz & Rice, 2002).

Sex. Most studies find that men use the Internet more than women do (Katz & Rice, 2002), both because of more prior exposure to technology and work-related needs. The gender gap in general has disappeared or has diminished in many developed countries, but not as much in developing countries (Grazzi & Vergara, 2014).

Economic well-being. Economic well-being is positively related to Internet adoption because of the greater ability to afford the related costs (Chinn & Fairlie, 2007; Grazzi & Vergara, 2014; Haight et al., 2014; Katz & Rice, 2002).

Urbanness. In Former Soviet countries, the division between rural, regional urban cities, and the capital is stark; rural areas face greater poverty (Falkingham, 2005) and lower medical and educational opportunities (Buckley, 1998). Rural areas generally have less telecommunications infrastructure, and thus lower levels of technology adoption and use. However, once provided access, rural residents may benefit more from communication technologies because it allows them to overcome the barriers of distance from urban centers and preexisting exclusion (Mehra, Merkel, & Bishop, 2004; Warren, 2007).

Education. Educational attainment is positively related to Internet adoption because of greater awareness, training, capabilities, and ability to evaluate content (Grazzi & Vergara, 2014; Haight et al., 2014; Rice et al., 2001).

Language influences. The context of the Caucasus countries allows us to explore implications of language skills as another yet understudied influence on the digital divide components.

English language and the Internet. English opens doors to the digital world (Hargittai, 1999), but it also creates a barrier for those who lack proficiency. We argue that English can be a barrier to Internet access and use in two ways: technology and content.

First, much of the *technology*, including both *hardware* and *software*, required to get on the Internet requires some proficiency in a global language. Although hardware and devices were initially available in only a few languages, technology companies realized the potential to expand into new markets, so *localization* and *internationalization* (adapting operating systems and software into different languages and taking into consideration regional differences) increased (Aykin, 2004; Bondurant, 2011; Braman, 2012). Nonetheless, the least commonly spoken languages were lower priorities for localization, even in operating systems for mobile phones ("List of Best Selling Mobile Phones," n.d.; "The Most Popular Phone in the World," 2010). However, smartphones now provide greater opportunities for those who speak less common languages to use the technology ("Android 3.2 Platform," n.d.; Apple, 2011). Nonetheless, even with some operating systems localizing and internationalizing mobile phones, not having English skill remains a barrier to use (Wijetunga, 2014). Although the dominance of English in these areas has decreased, it will likely continue to be the most common language of hardware technology for some time (Crystal, 2001; Paolillo, Pimienta, & Prado, 2005).

Second, Internet *content* is a different barrier created by the dominance of the English language (Baasanjav, in press; Cobb, 2006; Viard & Economides, in press). Obtaining and sharing information is more difficult when using a language that is poorly represented online (Paolillo et al., 2005). Even for a popular language like Spanish, for native Spanish speakers, English proficiency was the strongest predictor of Internet health information–seeking behaviors (De Jesus & Xiao, 2012). Although the exact percentage of English content is up for debate (Gerrand, 2007; Paolillo et al., 2005), most original static web content is available in English, although only 27% of Internet users in 2010 were English speakers (Ananiadou, McNaught, & Thompson, 2012). However, with the move to social media, which allows for more interpersonal communication with other speakers of one's language, the Internet has become more useful to those with no or low foreign language skills. Further, Google Translate provides more access to foreign language content, although the quality of translation varies greatly (Ananiadou et al., 2012). However, English proficiency is required for much content, especially for some of the most beneficial uses, such as distance learning courses or health resources, and for quick browsing. At an individual level, Ferro, Helbig, and Gil-Garcia (2011) found that Italians with stronger English skills were more likely to access the Internet; as did Singh, Zhou, Williams, Kendall, and Kaushik (2013) in rural India. Grazzi and Vergara (2012) found that minority language status is a barrier to ICT adoption. However, Hargittai (1999) examined English fluency in various countries as a determinant of Internet use, with nonsignificant results.

Russian language and the Internet. Most citizens in the three countries under consideration speak Russian (from 75% in Azerbaijan to 95% in Armenia). Russian proficiency in these states is a complex construct (Fierman, 2012), and motivations for it are quite varied. Thus, we do not assess the role of Russian proficiency in these digital divides.

Hypotheses About Influences on Internet Awareness, Adoption, and Frequent Use

Based on this prior research and reasoning about these basic influences as well as language influences on three primary digital divide stages (awareness, adoption, and use), we

derive the following sets of hypotheses concerning the three divides. We note that these sociodemographic characteristics are often correlated (urbanness and education or economic well-being, for example), but we will account for this analytically.

Awareness of the Internet will be correlated with **H1.** Age (younger); **H2.** Sex (male); **H3.** Economic well-being (higher); **H4.** Education (higher); and **H5.** Urbanness (more urban); but not with English proficiency, because awareness is driven by many modes of communication that would not require knowledge of a foreign language.

Adoption of the Internet will be correlated with **H6.** Age (younger); **H7.** Sex (male); **H8.** Economic well-being (higher); **H9.** Education (higher); **H10.** Urbanness (more urban); **H11.** English proficiency (more proficient); and **H12.** Awareness of the Internet.

More frequent use of the Internet will be correlated with **H13.** Age (younger); **H14.** Sex (male); **H15.** Economic well-being (higher); **H16.** Education (higher); **H17.** Urbanness (more urban); **H18.** English proficiency (more proficient); and **H19.** Adoption of the Internet.

Method

Sample

Data come from the Caucasus Barometer, a face-to-face survey administered by the Caucasus Research Resource Center (n.d.) once every year in the fall since 2006 and funded by the Carnegie Foundation (www.crrccenters.org). Surveys were translated and back-translated into the languages of the country. The sampling universe for the 2011 Caucasus Barometer was all adult residents, in each country, in November. The design used multistage area probability sampling. Primary sampling units were electoral precincts. The sampling frame was divided into three "macro-strata" by settlement type: rural, urban, and capital. The secondary sampling unit was electoral districts, the third was households (via a random route method), and the final was individual respondents (following the Kish, 1949, procedure). Participation in the survey was voluntary and anonymous. The response rate was 70% in Armenia (N = 2,365), 75% in Azerbaijan (N = 1,481), and 70% in Georgia (N = 2,287) (the Caucasus Barometer annually has a 70–90% response rate).

Measures

Table 2 provides the wording and response scales for all measures and descriptive statistics for the combined data and for each country.

Table 2. Descriptive Statistics, Combined and by Country.

	Combined	Armenia	Azerbaijan	Georgia
N	6,133	2,365	1,481	2,287
Age	*M* = 47.38	*M* = 48.5	*M* = 42.81	*M* = 49.15
	SD = 17.89	*SD* = 17.85	*SD* = 15.88	*SD* = 18.64
	R = 18-103	*R* = 18-92	*R* = 18-92	*R* = 19-103
Gender				
0 Male	43.5%	44.9%	52.9%	35.9%
1 Female	56.5	55.1	47.1	64.1
Urbanness				
0 Rural	33.4%	29.6%	33.6%	37.2%

1 Urban	33.5	31.6	33.2	35.8
2 Capital	33.1	38.8	33.2	27.0
Education				
1 No primary education	1.0%	0.8%	0.9%	1.4%
2 Primary education	3.0	3.3	2.3	3.3
3 Incomplete secondary education	9.7	9.1	13.0	8.1
4 Completed secondary education	33.4	31.1	48.5	26.0
5 Secondary technical education	23.0	26.2	13.7	25.8
6 Incomplete higher education	3.9	4.4	3.1	4.0
7 Completed higher education	25.2	23.8	18.3	31.0
8 Postgraduate	0.5	0.9	0.1	0.3
	M = 4.90	*M* = 4.92	*M* = 4.55	*M* = 5.10
	SD = 1.50	*SD* = 1.48	*SD* = 1.39	*SD* = 1.55
Best description of family's financial situation				
1 We don't have enough money even for food	28.9%	35.4%	20.9%	27.3%
2 We have enough money for food but not clothes	35.9	32.0	38.3	38.5
3 We can buy food and clothes, but not more expensive things	27.2	26.7	30.1	25.8
4 We can buy some expensive things like a refrigerator	4.3	3.7	6.4	3.6
5 We can buy anything we want	1.3	1.4	1.4	1.1
	M = 2.11	*M* = 2.03	*M* = 2.27	*M* = 2.10
	SD = 0.93	*SD* = 0.95	*SD* = 0.92	*SD* = 0.89
English proficiency				
1 No basic knowledge	68.9%	62.8%	76.4%	70.4%
2 Beginning	15.3	17.4	14.0	13.9
3 Intermediate	10.8	14.8	6.0	9.8
4 Advanced	3.3	3.8	1.9	3.8
	M = 1.48	*M* = 1.59	*M* = 1.32	*M* = 1.46
	SD = 0.82	*SD* = 0.88	*SD* = 0.68	*SD* = 0.83
Of total, Aware Internet: 0 no, 1 yes	91.8%	97.4.%	84.2%	90.9%
Of total, Use Internet				
0 Never	58.7%	62.4%	74.3%	63.2%
1 Less than monthly	5.9	4.7	6.3	6.8
2 Monthly	2.5	2.5	2.6	2.4
3 Weekly	7.3	8.1	5.9	7.3
4 Daily	17.5	22.7	6.8	19.7
	M = 1.04	*M* = 1.23	*M* = 0.58	*M* = 1.13
	SD = 1.61	*SD* = 1.71	*SD* = 1.22	*SD* = 1.65
For "Never" use, primary reason for				

nonadoption: 0 no, 1 yes				
The Internet is too expensive	1.6%	1.3%	1.5%	2.0%
No phone line or modem or other way to connect	9.7	4.6	23.8	4.9
No access to a computer	29.1	37.4	5.8	36.7
Not interested in the Internet or don't want to use it	18.9	19.7	15.4	20.7
Don't need to use the Internet	19.6	16.9	24.1	19.4
Don't have time to use the Internet	4.0	4.2	6.3	2.0
Don't know how to use the Internet	14.0	12.4	17.8	13.0
The Internet is immoral or distasteful	0.4	0.6	1.8	0.1

Age. Respondents were asked to report their year of birth; age was computed by subtracting that year from the survey year. ***Sex.*** The interviewer noted the respondent's sex. ***Economic well-being.*** Although many studies use income as a single indicator of socioeconomic status, certainly income is not a complete or direct measure of total economic well-being (Falkingham, 1999; Ringen, 1998). We use a consensual poverty measure, where the greater the number of consumable items absent, the greater the degree of material deprivation (Ouellette, Burstein, Long, & Beecroft, 2004). These measures have been shown to be most appropriate in the post-Soviet context (Falkingham, 1999), because income is low, irregular, and often not official. The scale used here (described by Rose, 2002) asked "What phrase best describes your family's financial situation?" and provided five choices.

Education. Respondents were asked to self-report their education level as one of eight categories. ***Urbanness.*** Interviewers determined whether the household was located in a rural location, an urban regional city, or the capital city. Urban regions in post-Soviet countries are defined as a settlement with more than 10,000 residents and the majority must not be employed in agriculture (Buckley, 1998). We consider these three categories as somewhat arbitrary boundaries on a fundamentally continuous variable from least to most urban (see Cossman, Cossman, Cosby, & Reavis, 2008). ***Language.*** Respondents were asked "What is your English language knowledge?" with four levels of proficiency.

Internet awareness. Respondents were asked, "How frequently do you use the Internet?" and given the option to answer "I do not know what the Internet is," which was coded as no awareness, or "not using the Internet." Those who indicated awareness but nonadoption were asked to select which of 10 ***Reasons for not adopting*** was the most important. ***Internet adoption.*** Respondents who responded that they had ever used the Internet were categorized as "Internet adopters." ***Internet use.*** Adopters were asked, "How frequently do you use the Internet?" and provided five possible levels, from *never* to *daily*. Cases in which the respondent was not asked because they were aware nonadopters were coded as *never*.

Results

Preliminary Analysis

Prior to hypothesis testing, several statistical analyses were performed to examine basic assumptions of path analysis. Missing values analysis (Tabachnick & Fidell, 2007) and Little's (1988) Missing Completely at Random test showed minimal missing values and no systematic relationship in the pattern of missing values. Normality, kurtosis, and skewness were not significantly different from acceptable criteria; there were no univariate or multivariate outliers; and no multicollinearity beyond what would be theoretically expected. Table 3 provides the correlations, means, and standard deviations for the variables of the combined three-country sample (individual country tables are available).

Table 3. Correlation Matrix, Means, and Standard Deviations, Combined.

Vars	Age	Sex	Econ	Edu	Urban	Eng	Aware	Adopt	Use
Age		.06***	–.22***	–.14***	–.05***	–.34***	–. 18***	–.43***	–.42***
Sex			–.06***	–.02	.01	.07***	–.04**	–.05***	–.04***
Econ				.25***	.13***	.27***	.06***	.31***	.32***
Edu					.32***	.41***	–.26***	.39***	.40***
Urban						.29***	–.14***	.29***	.31***
Eng							–.15***	.49***	.53***
Aware								–.08***	–.07***
Adopt									.91***
M	47.4	0.57	2.11	4.90	1.00	1.48	0.92	0.33	1.03
SD	17.9	0.50	0.93	1.50	0.82	0.82	0.27	0.47	1.69

* $p < .05$. ** $p < .01$. *** $p < .001$.

A multivariate analysis of variance was conducted to test for differences between the countries. The overall difference was significant (Wilks' $\Lambda = .91$; $F(6,11724) = 91.32$, $p < .01$, with a partial η^2 of .05; thus, the significance is generally due to the large sample size.) Pairwise comparisons showed that significantly more Armenians were aware of the Internet than Azerbaijanis or Georgians and that significantly more Georgians were aware than Azerbaijanis.

There were also significantly more Armenians and Georgians than Azerbaijanis who had both adopted the Internet and frequently used the Internet. Furthermore, while these three countries share a great deal of history and culture and followed similar development paths during the Soviet era, there are substantive cultural, economic, and political differences that may influence Internet awareness, adoption, and use. Thus, the three countries will be analyzed separately as well as in combined form.

Multivariate Results

Causal model. Structural equation modeling (via Mplus; Muthén & Muthén, 2010)—the testing of direct, indirect, and total effects through path modeling (Bollen, 1989)—was used to test the fit of the path model representing hypotheses H1 through H19. The purpose here is to assess the unique contributions of each sociodemographic and language factor on each digital divide stage, and the overall fit of the hypothesized models, within and across the three countries, to understand the strength of each unique variable's contribution to different outcomes (Hayes, 2009; Holbert & Stephenson, 2003; Little, Card, Bovaird, & Crandall, 2007).

Table 4 provides the path models with coefficients and variance explained, and model fit statistics. Figure 1 displays the overall model with coefficients and their significance for each path, combined, and for each country. The overall model fit for the combined data was excellent, with a nonsignificant χ^2, root mean square error of approximation of .002, and a comparative fit index (CFI) of 1.00. The model explained 10% of the variance in awareness, 38% in adoption, and 84% in use.

Table 4. Results for Hypotheses, Paths, Errors, and Residuals, Combined and by Country.

Path	Combined	Armenia	Azerbaijan	Georgia
Awareness:				
H1: Age→Awareness	–.17***(.012)	–.17***(.020)	–.12***(.020)	–.32***(.023)
H2: Sex→Awareness	–.03**(.012)	–.01(.020)	–.00(.020)	–.01***(.024)
H3: Econ→Awareness	–.02(.013)	.01(.021)	–.02(.020)	.03(.026)
H4: Edu→Awareness	.22***(.013)	.13***(.022)	.25***(.021)	.22***(.024)
H5: Urb→Awareness	.06***(.013)	.01(.027)	.16***(.021)	–.04(.024)
Variance explained	.10***(.007)	.06***(.009)	.14***(.014)	.19***(.019)
Adoption:				
H6: Age→Adoption	–.31***(.011)	–.34***(.017)	–.37***(.016)	–.25***(.023)
H7: Sex→Adoption	–.05***(.010)	–.06***(.016)	.02(.016)	–.14***(.000)
H8: Econ→Adoption	.08***(.010)	.14***(.08)	.11***(.016)	.01(.022)
H9: Edu→Adoption	.18*** (.011)	.18***(.018)	.15***(.018)	.14***(.024)
H10: Urb→Adoption	.14***(.011)	.16**(.017)	.17***(.018)	.11***(.022)
H11: English→Adt	.24***(.012)	.17***(.019)	.21***(.018)	.31***(.023)
H12: Awareness→Adt	.02*(.011)	.02(.017)	.03(.017)	.01(.024)
Variance explained	.38***(.010)	.40***(.016)	.44***(.016)	.33***(.020)
Use:				
H13: Age→Use	–.02**(.006)	–.04***(.009)	–.02*(.010)	.00(.013)
H14: Sex→Use	.00(.005)	–.00(.008)	–.01(.009)	–.02(.012)
H15: Econ→Use	.03***(.005)	.01(.008)	.05***(.009)	.01(.012)
H16: Edu→Use	.01*(.006)	.01(.009)	–.00(.010)	.02(.013)
H17: Urb→Use	.04***(.006)	.03**(.008)	.06***(.012)	.03*(.012)
H18: English→Use	.08***(.006)	.05***(.009)	.09***(.010)	.13***(.014)
H19: Adoption→Use	.85***(.005)	.87***(.007)	.82***(.009)	.81***(.011)
Variance explained	.84***(.004)	.87***(.005)	.83***(.006)	.80***(.009)
Error:				

Awareness	3.40***(.070)	6.50***(.140)	2.65***(.111)	2.91***(.127)
Adoption	.20**(.064)	.54***(.138)	.56***(.093)	.19(.128)
Use	-0.17***(.026)	–.01(.040)	–.14**(.044)	–.27***(.058)
Residual:				
Awareness	.90***(.007)	.94***(.009)	.86***(.014)	.82***(.019)
Adoption	.62***(.010)	.61***(.016)	.56***(.016)	.67***(.020)
Use	.16***(.004)	.13***(.005)	.17***(.006)	.20**(.009)
Goodness of Fit indices:				
χ^2 (Bollen & Long, 1993; Browne & Cudeck, 1992) (*df* = 2)	9.13*	2.48	5.76	2.57
RMSEA (Bentler, 1990)	.002	.010	.029	.014
TFI (Bollen, 1989)	.995	.999	.999	1.00
CFI (Bentler, 1990)	1.000	1.000	.993	.998
BIC	17325.10	4388.17	6955.56	4096.83

* p <.05, ** p <.01, *** p <.001 Note: Values for paths are standardized beta coefficients and (standard errors).

RMSEA = Root Mean Square Error of Approximation; IFI = Incremental Fit Index; CFI = Comparative Fit Index; BIC = Bayesian Information Criterion

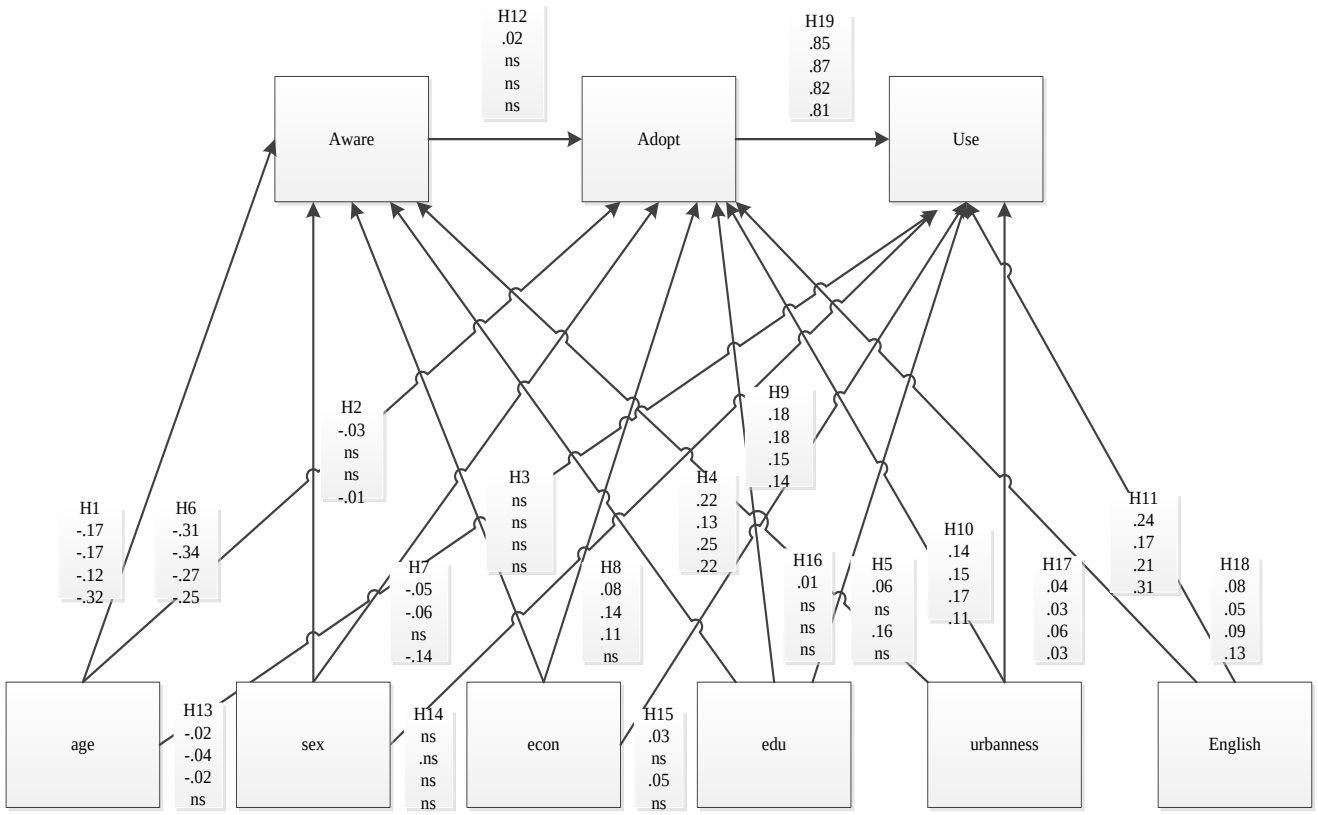

Figure 1. Fitted model of hypothesized relationships.

Note: The four values for each hypothesis path, from top to bottom, are: Combined, Armenia, Azerbaijan, and Georgia. All valued coefficients are statistically significant. See Table 4 for detailed coefficients, significance, and model fits.

Combined data. All the hypothesized influences except economic well-being significantly predicted *awareness*. All the hypothesized influences significantly predicted *adoption*, though the effect of awareness was just barely so. All the hypothesized influences, except sex and just barely education, significantly predicted greater *use*.

Differences across countries. Results for the separate countries were similar (in terms of both strength and significance of paths) to the overall combined results, with the following exceptions (and even here, often the difference was just on either side of significance). For all three models, χ^2 was nonsignificant, and CFI was .993 or higher. In *Armenia*, sex and economic well-being were predictors only of adoption, not awareness or use. Education was not a significant influence on use, and urbanness was not on awareness. In *Azerbaijan*, sex and education were not significant influences on use. Economic well-being was only significant for adoption and frequent use. And in *Georgia*, age was not a significant predictor for use. Sex was

only a significant predictor for awareness and adoption, and economic well-being was only a significant predictor of adoption.

Discussion

Limitations

Many more detailed categories of the three stages used here are possible, such as continuous nonadopters, potential/likely adopters, continuous adopters, discontinuous adopters (or drop-outs), different usage types, and reinventers (Katz & Rice, 2002; Selwyn, 2004). A fuller model would, of course, include a range of outcomes associated with use and require an over-time design to test causality.

By studying three countries at once, we have the opportunity to compare states with shared histories. However, there are substantial cultural, political, and economic differences between these countries that contribute to Internet awareness, adoption, and use (see Pearce, Freelon, & Kendzior, 2014; Pearce & Rice, 2013; Pearce, Slaker, & Ahmad, 2013 for single country studies that delve more into these issues).

There are also potentially other individual and societal level influences not included in this model, although the variance explained is quite high. Also, given the high correlations between many of the sociodemographic variables used in this model, it is possible that there is conflation between variables or that that there are unmodeled variables that are correlated to multiple sociodemographic variables or that are proxies for actual true casual variables (see Little et al., 2007). However, the present model does include the major influences from the digital divide literature.

Finally, a range of macro-socioeconomic factors should be included in multicountry analyses to better explain Internet divides and outcomes, such as infrastructure (phone density, electricity consumption), policy (pricing, regulations), market entrants and new features, and economics (gross domestic product, service sector, government effectiveness) (Chinn & Fairlie, 2007). The national telecommunication services policies trend toward regulatory liberalism (privatization, competition, broadband access) and the accompanying price reductions and feature increases alter the cost–benefit ratio of innovations, and therefore the adoption rate (Gruber & Verboven, 2001).

Influences on Digital Divide Stages of Awareness, Adoption, and Frequent Use

Based on the structural equation model analyses, we note the primary influences on each of the three digital divide stages, overall and for each country. We also highlight relative influences and the particular role of language skills, salient for countries with non-English languages.

***Awareness*.** Although *awareness* of the Internet in these three countries is high (from 84.2% to 97.0%), older people and those with less education are still the most likely to be unaware of the Internet. In Azerbaijan, being female and rural are additional barriers to awareness; in Georgia, being female is a barrier.

Reasons for nonadoption. For some of those aware of the Internet but who have not adopted it, various barriers were cited (see Table 2), including economic, material/technical, and motivational. Given the profile of an aware nonadopter as being older, less proficient in English, not as well educated, more rural, less well-off economically, and female, we see that, at least with the self-reported reasons for not adopting, there is still diversity in perceived barriers.

Of course, the demographic characteristics in our quantitative analysis are not unrelated to these barriers. For example, lack of economic well-being and rural location may be related to motivational barriers, and educational attainment may be related to the language skill barrier (Van Dijk, 2005). In fact, there were some significant sociodemographic differences between the different reasons for not going online. For example, the most urban respondents cited lack of time as the primary reason for not going online, while more rural respondents indicated lack of access. Older participants said that they did not need the Internet, did not want to use the Internet, and did not know how to use the Internet, as reasons for nonuse, while younger participants lacked time and had privacy concerns. And poorer participants cited material reasons, specifically the lack of a computer, for not using the Internet.

Adoption. Age is the strongest predictor of Internet adoption, followed by English proficiency. Despite our speculation that greater localization and more social media activities may reduce the need for English proficiency, this does not seem to be the case. English proficiency plays a notable role in one's ability to adopt the Internet. Education and economic well-being also influence Internet adoption. Additionally, urbanness matters; this is unsurprising, as those living in urban areas have greater opportunities and more choices for Internet access than those in rural areas. We also note that the influence of sex (negative for women) is slightly less (especially so in Georgia) on awareness than on adoption, possibly implying more socioeconomic barriers for women to move on to the stage beyond awareness (Hilbert, 2011b), although adoption here is measured at the household level. The general lack of a relationship between *awareness* and *adoption* is explained by high awareness in these countries and thus little available variance.

Use. *Frequent use* of the Internet was most explained by English language proficiency and urbanness, controlling for adoption. The lack of influence by age, economic well-being, and education on frequent use was likely due to the adoption gaps. Once an individual overcomes the (substantial) adoption gap, frequent use is not as much of an issue, and likely varies for more personal or activity-related reasons. Thus, similar to Hilbert's (2011b) results, women are no less likely to use the Internet, once awareness and adoption divides and other sociodemographic factors are taken into account.

Relative influences. The structural equation modeling path coefficients for the combined data, which control for shared variance and confounds across variables, show a differentiated pattern of influences on the three divides (Table 3). Crossing the adoption gap requires more resources than becoming aware of the Internet. The influences of age, economic well-being, and urbanness are about twice as strong for adoption than for awareness. The influence of sex is almost the same low value (−.05), while education is a weaker influence (.18 compared to .22), but is still slightly less influential than English language proficiency (.24). So education is a greater barrier to even becoming aware of the Internet than it is to actually adopting it, especially in Azerbaijan and Georgia. All the influences on adoption are also more than twice as strong than they are for use. Indeed, the influences on use are all quite weak (none greater than .08 for English proficiency), and sex (and almost education) are not significant. Using the Internet more frequently requires fewer additional socioeconomic resources than gaining access to and adopting it.

***English proficiency*.** People in these three countries, all with minority languages, even though more than 75% speak Russian, depend on English proficiency to adopt and use the Internet. This is particularly relevant given that none of the three countries has strong English proficiency in general. It raises the question of how English proficiency can be such a strong predictor of adoption and use, especially controlling for the effect of education, wealth, age, and urbanness.

As noted, English likely plays a role in both using hardware and managing content. An Armenian or Georgian Internet user will need to be familiar with the Latin alphabet to get online. These Internet users are also likely to seek English content—for entertainment or learning purposes or for information generally—requiring additional English skills. Perhaps English language and Internet use are elements of a larger latent construct involving Western orientation, outward looking, internationalism, cosmopolitanism, or something like acquisition of social capital (economic, cultural, and symbolic). Individuals who are inclined to learn English and become proficient at it may be doing so because they want to be successful, have better job opportunities, become a part of the global marketplace, learn more about the outside world, or have greater mobility, possibly to leave the country, to show status through English language proficiency, or feel more "democratic" or "Western" or "international" or "modern." Using the Internet may also be driven by a desire to learn more about the outside world (Mercer, 2005) or to show status or prestige (Johnson, 2003). As Tananuraksakul (2010, p. 914) concludes, for non-native English speakers using English in their home country, "English extends their face; societal space; positive identity, relational identity, personal identity, and identity negotiation competence; choices and opportunities in employment; and pursuit of higher education abroad and success." Thus, this English language relationship with Internet use may have implications for the elite and nonelite divide in these states. As some believe the "sole inspiring vision of a better future" in these states is a Western one (Roberts & Pollock, 2009, p. 595), will those Internet users with English proficiency be poised to have a better future than their fellow citizens?

Although this study has demonstrated a relationship between English proficiency and Internet use (as have Park, Roman, Lee, & Chung, 2009), directionality remains a question. Although some people do want to learn English to use the Internet (Nino-Murcia, 2003; Vaezi, 2008), Dholakia, Dholakia, and Kshetri (2003) state, "it is unlikely that a potential adopter would learn English language and acquire computer skills solely for the purpose of using the Internet" (p. 15). Supporting both sides, Warschauer (2002) argues that language and technology are development tools at both the individual and the societal levels and that English proficiency and technology skills are gained simultaneously.

Conclusion

Overall, in these three post-Soviet Caucasus countries, the greatest gap is *adoption*, and influences on *use* are weaker than those on *awareness*. More educated youth are more *aware* of the Internet; younger, more highly educated people and those with more English proficiency are more likely to *adopt* the Internet; and those with more English proficiency *use* it more. Therefore, digital divide models should take into account that the strength of particular influences may vary over the adoption life cycle. Furthermore, the knowledge gap implications

of English proficiency—that those already privileged enough to have English skills and technology access and skills will increase their skills with use—are noteworthy.

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