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"WHAT'S SO SPECIAL ABOUT STUDYING OLD PEOPLE?"

The ethical, methodological, and sampling issues surrounding the study of older adults and ICTs

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Abstract. Generational research surrounding technology use and trends is beginning to receive more attention. Most of this research has focused on the younger generations, while ignoring those generations at the older end of the age spectrum. As research of younger generations becomes more popular, it is likely that researching older generations will also grow in popularity. There are, however, several methodological, ethical, and sampling challenges that researchers must consider when researching older adults. We draw from our multi-disciplinary meta-analysis of 622 papers that study "older adults and ICTs" to illustrate our points. Sampling challenges, for example, include defining the population under study and the difficulties of obtaining a diverse population due to traditional recruiting strategies. The paper includes suggestions on how to address some of the pitfalls, and for future methodological development.

1. Introduction

It is widely accepted that generational cohorts are shaped by the cultures in which they develop. The study of generational differences surrounding information and communication technologies (ICTs) is receiving increasing attention from researchers, as evidenced in part by the CATaC call for papers highlighting generational issues (CATaC, 2009), as well as numerous studies that focus on the Millennial generation's interaction with social networking technology. While Kaarst-Brown and Guzman (2008) presented the issues of time, cost, and access as challenges when conducting cultural ICT studies, there are additional issues when studying generational ICT issues – especially when sampling older birth cohorts[1] (Table 1).

[1] Technically "birth cohorts" is the appropriate term, whereas the term "generations" refers to studying multiple generations in one setting. For example, you would say a family is "multi-generational" if they all lived together, but grandmother is a member of the "Boomer birth cohort."

Table 1. Birth Cohorts/Generations Recognized in the United States

Birth Cohort Name (Carlson, 2009)	**Years of Birth**
The Good Warriors (World War II Generation)	1909-1928
Lucky Few	1929-1945
Baby Boomers (Boomers)	1946-1964
Generation X	1965-1982
Generation Y (Millennials/New Boomers)	1983-2001

When we speak of "different generations," we are actually referring to these "birth cohorts." Birth cohorts are thought to affect an individual through shared experiences of historical events that shape individuals in that generation. For instance, WWII shaped those in the "Good Warrior" generation, while "Millennials" were shaped by the rise of mobile technology. It is important to recognize that birth cohorts are also culturally specific. For example, the cohorts listed in Table 1 are specific to the United States, but may have similarities with others who shared the same cultural events.

Most generational research has focused on younger generations (most notably the Millennial Generation, see for example Djamasbi, Siegel, & Tullis (2010) and Weiler (2005)), or in some cases, focused on comparing Millennials with other older generations (see for example Kumar and Lim (2008)). Very little research has addressed older generations' experiences with ICTs in detail, including those of the Silent Generation, the Lucky Few, or the Good Warriors (Carlson, 2009). With studies indicating that the millennial generation is unlike previous generations of children (such as Generation X), it is more than likely that significant difference is also present at the other end of the age spectrum.

Most of the research that has involved members of older cohorts detailed in Table 1 (namely those in the Silent and Good Warrior generations) has focused on examining older adults over age 65 through an age-based lenses, rather than exploring the cultural or cohort issues that have shaped their use of ICTs (see for example Blit Cohen and Litwin (2005) and Gatto and Tak (2008)). Although viewing technology use and experiences through the lens of age can be helpful, we would argue that examining older adults from a cohort perspective would yield additional benefits. As an example taken from the younger end of the cohort spectrum, Kumar and Lin (2008) found differences and similarities when studying mobile phone perceptions among baby-boomers and millennials. A multi-generational cohort comparison is particularly important to acknowledge when studying older adults, because *different generations of older adults* can be living at a single time (Carlson, 2009). It is reasonable to expect that older adults are similarly affected by the differences in their particular cohort's experience, just as there are differences at each end of the spectrums of cohorts (Rama, De Ridder, & Bouma, 2001).

Regrettably, our findings show that even age-based research on older adults' experiences with technology is lacking (Birkland & Kaarst-Brown, 2007). Our recent bibliographic work has suggested that less than 0.01% (7:75,860 articles) of literature in

the top information systems journals addresses older users (or non-users) of ICTs[2]. Among journals that have published at least one article, that percentage only increases to 0.12% (209:167,834 articles), which is still less than one in 803 articles. More disconcerting is the fact that within several prominent journals that specialize in "aging" research, (including titles such as Educational Gerontology and Aging and Society), only 0.08-2.78% of the articles address ICT use. This indicates a huge gap in research attention paid to older adults and ICTs. Not only is there a lack of multi-generational research including older members of our societies, our findings suggest there is currently very little research on the growing segment of older adults. In the US alone, the percentage of those age 65 and older will nearly double between 2010 to 2050, increasing from 12.97% to 20.17% of the population (U.S. Census Bureau, 2008).

Obviously, there needs to be more research focusing on older adults' interaction with technology. Changes in health care information, e-government sites, and other social systems are requiring that older adults participate more fully in the new technological order. In order to fill the generational gap in current research, it is important to understand some of the challenges of studying older generations. The study of older individuals often brings sampling, ethical, and methodological issues. Although some of these challenges may be similar to the difficulties associated with studying ICTs and children (minors), researchers may be surprised by the unique challenges that surround studying older individuals. (For a full discussion of the issues related to research with children, see Stanley & Sieber (1991).)

Table 2 compares some of the differences in the types of ethical, sampling, and methodological issues between studying children, adult populations, and older adults. The following sections of this paper will focus on the challenges of studying older adults, as well as important considerations in dealing with these challenges.

2. Ethical Issues in Studying the Older Adult

Reich (1978) identifies 5 areas of potential ethical problems when researching older adults: the costs and benefits of anti-aging research, health problems which lead to over-selection, informed consent, problems of guardianship, and receiving consent from institutionalized individuals. Despite the fact that this paper was published more than three decades ago, we see these same issues identified today as gaps or problems in the empirical research conducted on older adults (Table 2).

Anti-aging research traditionally centers on biomedical studies that seek to either extend human life span or delay the process of aging. Since only limited funds exist for this research, it is important to weigh potential benefits for future generations against both the costs of participation for older individuals and how such research impacts the funding for other potential research (Reich, 1978).

[2] Birkland & Kaarst-Brown (2007). We identified journals based on standings reported by the Association of Information Systems, as well as a broader search for any journal including an article on older users. For additional details on methods used in this meta-analysis or other findings, please contact the first author.

Table 2. Synthesized Comparison of Methodological Challenges in Studying Children, Adult, and Older Adult Populations

Type of Issue	**Children & Young Adults (Under Age 18)**	**Adult Populations (Under Age of 65)**	**Older Adult Populations (Typically over 65)**
		Ethical Issues	
Cost-Benefit	Research can directly benefit participants or organizations	Research can directly benefit participants or organizations	Anti-aging research may only benefit future generations
Over Selection	Diversity in number of settings	Diversity in number of settings	Over selection of particular groups of older adults
Informed Consent	Do not have ability to give full informed consent	Ability to give informed consent assumed	May *not* have ability to give informed consent
Guardians	Consent of guardians and child required	Individual can give own informed consent	May need to work with guardians
Available Consent	Typically non-institutionalized	Typically non-institutionalized	May select institutionalized individuals for access to large n
		Methodological Issues	
Ability to use ICTs	Different levels of cognitive and physical ability based upon age; within an age group typically similar levels	Typically similar levels of cognitive and physical ability	Diverse levels of cognitive and physical abilities, but not necessarily based on age
Skill level diversity	Relatively similar amounts of technical skill among participants	Relatively similar amounts of technical skill among participants	Diverse levels of technological skills and knowledge
Untested Methods	Diverse set of well-tested methodologies	Diverse set of well-tested methodologies	Un-tested methodologies
		Sampling Issues	
Defining population	Definition of population based on age or grade, school organization, etc.	Definition of population based upon job type organization, etc.	Definition of population not standardized; population membership changes as generations age
Recruiting	Recruitment based upon organization, school setting, age or grade, etc.	Recruitment based upon organization, position, or industry status	Diverse in employment, career, living, socio-economic class, and disability status May need involvement of professional or family care givers with time or legal constraints
Stereotypes	Relatively free of stereotypes	Relatively free of stereotypes	Stereotypes may affect older adults' performance, researchers' analysis and study design

Although Reich specifically addresses biomedical research, it will be important to determine the benefits (and costs) of any experimental ICT programs or studies of existing technology use, as this research competes with funding for other pressing concerns faced by the elderly or by society at large.

A second concern is that many older adults are selected for research because they suffer from physical and mental conditions that are desirable areas for exploration, often leading to over-selection. Reich (1978) suggests that researchers should examine if the population of interest is truly "elderly individuals", or if other populations exist with the condition of interest. Although research regarding older adults and ICTs is in its infancy, future researchers should be careful not to over select "vulnerable" elderly populations for study (e.g. those economically challenged who will participate for a fee).

A third possible concern is that older adults may not be able to fully consent to a research project due to ailments or cognitive impairments associated with aging. This is particularly concerning, because at the same time that older adults are experiencing such cognitive decline, they can also experience a loss of social and economic resources due to aging, retirement, downsizing of living arrangements, and other factors. Due to loss of these resources, an older individual may fear that refusing to participate in a study may lead to loss of government sponsored pension or healthcare benefits, retirement benefits, medical care, social connections or access to other desired services (Reich, 1978). Institutional Review Boards take this concern of voluntary participation seriously and require that researchers consider this issue. For researchers studying older adults, it remains important that an older individual understands their participation is *completely* voluntary, and that they can leave the study at any time without penalty. As researchers, we need to consider that if we provide unemployed or retired participants with unique access to technologies that will be withdrawn if they leave the study, participants may perceive an implicit punishment if they leave. There are several options, including allowing continued access to certain participants who leave the study.

For those who are unable to give full consent to participate in a research study, consent from a guardian is necessary. Guardianship is assigned through judicial proceedings, resulting in an individual being declared incompetent. When an individual is declared incompetent they can no longer manage their finances, estate, vote, – or give informed consent to a researcher. Ironically, because of the seriousness of having a legal guardian appointed (and the time and effort required), many older individuals who are not fully competent may not have a "legal" guardian, even when under another's care.

In the case of older adults who are in the physical care of another because of known disabilities or impairments that may affect informed consent, we recommend that researchers obtain permission from *both* the caregiver and the older individual. If either the caregiver or older adult wishes to withdraw, this must be respected by the researcher. This solution assumes that the caregiver has the best interests of the older adult in mind, and therefore will withdraw the older adult if (and only if) they believe the research is endangering their welfare. Sadly, in some situations, the caregiver may not have the best interests of the older adult in mind, and therefore researchers must be aware of the potential risks to older participants. If an older adult shows signs of unexpected or unacceptable distress, they may need to be removed from the study. Our advice is that researchers consider including measures that assess stress or distress, even if not usually required in their type of study.

Individuals who are institutionalized in nursing homes or assisted living areas also have limited freedom and decision making ability, and there is a high potential for possible exploitation. Individuals in institutionalized settings may fear reprisal, including reduced care, if they choose *not* to participate in a study (Reich, 1978). Ironically, these settings provide a contextually consistent sample of older adults that can make them seem desirable and more accessible than older adults who live independently in distributed settings. Much like the ethical concern of over selecting older adults with cognitive or physical disabilities, we encourage looking beyond the institutionalized elderly, and seeking out other populations of older adults to answer our research questions.

Researchers more familiar with other sampling groups should take these cautions as important considerations when changing populations. Less experienced researchers interested in evolving ICT related issues of older adults are encouraged to give each of the above ethical dilemmas careful reflection. At the same time, researchers should not be discouraged or feel hindered by these or the following challenges. As always, we need to plan our research studies to ensure that elderly populations we wish to help are not taken advantage of or put at risk.

3. Methodological (Design) Issues in Studying the Older Adult

Previous research on older adults and ICTs has used a broad variety of research methodologies. In order to better understand prevalent research methodologies in this area, we again draw upon our meta-analysis of 622 papers addressing older adults and ICTs (Birkland & Kaarst-Brown, 2007). Our analysis of these 622 papers shows several limitations in predominant designs, but also sets the stage for discussing important design considerations when researching older adults and ICTs.

As noted in an earlier footnote, we built this sample through an extensive search of 10 databases using a combination of terms for "older adults" (such as senior, elderly, older adult, etc.) and for “ICTs” (information technology, computer, pc, email, etc.). In addition, we included top ranked information system journals according to the Association of Information Systems (AIS). We analyzed each paper to determine the topics addressed, research methods used, and how individuals were recruited into the study. Our thematic classification scheme found two dominant dimensions: focus on collective versus individual, and focus on humanistic versus economic issues. Papers were categorized into four main quadrants by these two dimensions: social concerns, physical and cognitive concerns, organizational concerns, and financial concerns (Birkland & Kaarst-Brown, 2007).

As noted in table 3, over one quarter of articles (25.72%) were conceptual, lacking empirical data. Sixty-nine percent of the empirical studies used predominately quantitative methods (318 or 51.12%; or 69% of the 462 empirical studies). Only 10.8% of the empirical papers used a *qualitative* design and only 7.6% of empirical studies used a mixed-method design. It is important to note that the vast majority of the research used *age* as the sampling criteria, rather than examining technology use or its effects on the older individual from a generational or cultural cohort perspective. In our view, this choice reflects conceptual, design and sampling gaps.

Table 3. Domains of Researched Issues Regarding Older Adults and ICTs by Research Method (based on Birkland and Kaarst-Brown, 2007)

			Concerns Domain						
Methods			**Social Concerns**	**Physical-Cognitive Concerns**	**Organizational Concerns**	**Financial Concerns**	**Totals**	**%**	
Quantitative	Experiment		14	19	6	3	37	**5.95**	**51.12**
	Quasi-experiment		7	35	6	1	46	**7.40**	
	Survey		45	19	10	18	83	**13.34**	
	Proto-type	*Description*	10	56	6	0	66	**10.61**	
		Evaluation	14	71	5	3	82	**13.18**	
		Simulation	0	4	0	0	4	**0.64**	
Qualitative	Structured Interview		4	3	0	1	6	**0.96**	**8.04**
	Semi-Struct. Interv.		16	6	3	1	23	**3.71**	
	Focus Groups		5	9	2	0	14	**2.25**	
	Observation		2	0	0	0	2	**0.32**	
	Ethnography		5	0	0	0	5	**0.80**	
Case Study			22	13	9	3	38	**6.11**	
Longitudinal			0	1	0	0	1	**0.16**	
Mixed Methods			22	14	4	5	35	**5.63**	
Extant/ Secondary Data			3	4	2	0	9	**1.45**	
Class or Center Evaluation			0	3	8	0	11	**1.77**	
Other: Review, Discussion or Conceptual			41	113	26	5	160	**25.72**	
Totals							**622**	**100%**	

Articles we categorized under "social issues" (such as the digital divide, technological literacy, privacy issues, engagement, and social isolation) were largely studied from a *qualitative* perspective. Interestingly, we found the greatest variation in design and methods were used by researchers studying organizational concerns (such as older adults in the workforce or providing professional healthcare training) or financial concerns (such as benefit information, inflation, or technological adoption). We don't know if this was due to researcher characteristics or the research questions.

Paradoxically, we argue that research regarding these social, organizational, and financial issues would actually benefit from further *quantitative* exploration. As an example, although small sample qualitative research has shown that technology can decrease social isolation for *some* older individuals, it is not clear if technological communication is a clear solution for the majority of older adults faced with feelings of social isolation (Clark, 2001; Haddon, 2000; Kanayama, 2003; Namazi & McClintic,

2003; Opalinski, 2001). Understanding these social issues from a quantitative perspective will clarify the relationship between the *outcomes* of technology use, and help us identify the *characteristics* of individuals who would benefit from these technologies. As researchers, we need to ask if quantitative or mixed methods studies would allow us to better answer questions such as these, and permit larger N studies across more diverse samples of older and aging adults (Kaarst-Brown & Guzman 2008).

Surprisingly, the physical and cognitive concerns that some individuals experience while aging (such as disability and impairment, dependency, and usability), were largely studied from a *positivist paradigm*, using *quantitative* methods such as experiments and quasi-experiments, ignoring richer data collection approaches. This physical and cognitive category of research focuses mainly on testing interventions, or testing if older users can use a device (such as interface or input device testing). The mostly quantitative research in this area has failed to address some of the more important aspects of using an assistive or technological device, ignoring the cultural and social opportunities enabled by a potential device.

It is important to understand that many older adults do not see themselves as "old" (Gardner, 2007) and many see assistive devices as negative representations of being less able or competent individuals (Bagnell, Onditi, Rouncefield, & Sommerville, 2006; Lesnoff-Caravaglia, 2007). Older adults may refuse to use a device they see as stigmatizing, even if they comprehend the benefits of using a device (Lesnoff-Caravaglia, 2007). More *qualitative* research is necessary in this domain to examine if devices stigmatize, and how these stigmas can be overcome. Additionally, research should focus on developing assistive devices and designs that acknowledge older adults' diverse cultural, social, and lifestyle patterns. The advantage of incorporating these issues into studies is that these technologies are more likely to be attractive to the older market and be used by those who need them (Lesnoff-Caravaglia, 2007).

As researchers, we face other issues beyond paradigm bias. Older adults, depending upon their cognitive and physical abilities, location, and involvement with technology, may arguably be *better-suited* participants for certain research methods. An older adult with limited cognitive function may not be able to participate fully in an *interview* study due to memory loss; however, an individual with cognitive disabilities may be an ideal candidate for an *observational* study. Although such individuals may not be able to rate or discuss a device that they use due to cognitive impairment, observing their interactions with the device may help researchers to understand the effectiveness and impact of such a device, particularly when studying assistive devices (such as memory devices).

Similarly, some ICTs may be inherently difficult to use for older adults with visual or fine motor skills limitations (Czaja & Sharit, 1993). Studying such technology may be nearly impossible without significant modifications. When studying older adults who are technological novices, it may be necessary for researchers to spend additional time training these individuals to use a device, or this training may need to be adapted to account for cognitive or physical abilities. These modifications may mean additional cost and/or time for the researcher, but will result in more accurate and meaningful findings.

While we encourage exploration of diverse methods, it is important to explore and pilot test how previously *untested* or *under-tested* methodologies will work. The vast

majority of studies focused on prototype creation and testing (23.61%), surveys (21.05%), and experimentation (13.54%). Methods which are underutilized, such as ethnography (1.39%), focus groups (1.04%), observation (*a startling 0.35% or less than one in 300 studies*), and mixed-method designs (5.63%) may help researchers to understand older adults' experiences and understanding of ICTs in their everyday context. This context is rapidly changing, and while most organizationally focused research is quick to grasp the dynamic competitive environment, we are remiss to ignore methods that capture this dynamism in the broader cultural context of our aging society.

Each research method and perspective has drawbacks to the information it can tell a researcher, however, opportunities exist to fill the many existing methodological gaps if we explore both established approaches and open our thinking to alternative designs and paradigms. Some methodologies that do not appear to have been used in the study of older adults and ICTs may also help researchers understand complicated issues such as generational and cohort effects. The *life history method*, which focuses on how the individual sees his or her life (Bentz & Shapiro, 1998), could be used to understand how older adults feel their lives have been affected by technological devices. Longitudinal designs could provide insight into how older adults' technology use changes over time, how generational cohorts use technology differently, and how various life events impact users over time (such as becoming part of a "sandwich" family or living in an institutional setting). Longitudinal studies could also be powerful because of their potential to sort out differences in technology use between older and younger adults that are due to "aging" rather than due to "generational differences."

We feel there are important and exciting opportunities for future research to explore the potential of new designs and underused methods to study older populations.

4. Sampling Issues

In addition to ethical and methodology (design) considerations, there are several sampling issues that researchers must be aware of when designing a study involving older adult participants. These include the difficulties of defining the older adult population, the challenges of recruiting a representative sample of older individuals (including dealing with caregivers), and the possible influence of stereotypes on interpretation of results. As a start, it is imperative that future researchers determine a standard definition for older adults, as previous studies have used many different definitions (Paul & Stegbauer, 2005).

4.1. DEFINING "THE OLDER ADULT"

Defining "an older adult" is somewhat arbitrary. In the United States, for example, Medicare and Social Security benefits begin at age 62 or 65 (Social Security Act, 2008), the Age Discrimination in Employment Act (ADEA) protects workers age 40 or older (U.S. Equal Employment Opportunity Commission, 2008), and the American Association for Retired Persons (AARP) uses age 50 as the age of membership (2008). The American Psychological Association encourages researchers to use the markers of 65-75 as "young" old, 76-85 as "middle" old, and 85+ as "old" old (American

Psychological Association, 2008). These definitions are no clearer in the European Union, Middle East, or Asia-Pacific countries. As a global community of researchers, we must define "older adults" consistently and adopt comparable terminology to refer to our participants. This will ensure that our results can be compiled and compared across studies (Birkland & Kaarst-Brown, 2007; Hayes-Bautista, Hsu, Perez, & Gamboa, 2002).

While we always anticipate some variation in sample populations, older adults are a highly diverse group in terms of race, gender, culture, and lifestyle. Several authors have suggested that older adults are also becoming more ethnically diverse (Hayes-Bautista et al., 2002). Due to differing rates of *changes in cognitive abilities,* older adults as a population also tend to have *greater* diversity than similar samples of younger individuals (Finkel, Reynolds, McArdle, & Pedersen, 2007). In addition, older adults selected by age definition (typically "age 65 and older") may increasingly include several different birth cohorts due to having very different generational and cultural experiences with technology. Since race, socio-economic class, and gender (in addition to old age) have been proposed to contribute to the digital divide, it is important for ICT researchers to also pay attention to this segmentation among the aging population (Paul & Stegbauer, 2005). As researchers, we need to acknowledge the fact that older adults are an increasingly diverse group and include this in our sampling criteria, or collect additional information about our samples to improve external validity of results.

Although older individuals are not a homogenous population, older adults do tend to have many characteristics that can make them an important and distinct sample to study. As a group, older individuals often face the challenges of a limited income, stereotypes, may be members of the same generational cohort, and often suffer a similar loss of social and capital resources at key points in their lives (American Psychological Association, 2008; Hedge, Borman, & Lammlein, 2006; Reich, 1978). As noted under discussion of methodological opportunities presented by longitudinal studies, there are important gaps to be filled by future studies that examine how generations *change* their patterns of technological use due to these losses.

The need for ongoing evaluation of samples of older adults is also important as older adults as a group *are not static;* as generational cohorts age, we can predict that there will be fundamental *changes to the group we define as older adults* (Larsen, 1993). For instance, aging baby boomers who are just beginning to enter elder adulthood are more likely to retire later, have less savings, have more debt, have used computer technology in the workforce, and be divorced compared to previous generations (Mature Market Institute: Met Life, 2005). All of these factors could affect technological usage, marketing of technology to these older adults, and the use of technology in automating everyday processes.

While it is commonly thought that the children or grandchildren of boomers (Generation X and later Millennials) will somehow avoid the information technology issues because they were born into them (Salkowitz, 2008), every generation faces new technologies, new lifestyle issues, and the challenges of working with other generations holding different assumptions about ICTs (Kaarst-Brown, 1995). While these are sampling challenges, they are present new opportunities for researchers to determine if existing research on older adults is applicable to future generations, and which results are due to aging, generational cohort effects, or a combination.

4.2. OBTAINING REPRESENTATIVE SAMPLES

Another sampling challenge for researchers is that older adults have diverse life trajectories due to a diversity of employment patterns and lifestyles, making it difficult to obtain an appropriate and representative sample of older adults in a single setting. Traditional recruitment of older adults has involved two strategies: either seeking older adults from environments in which they interact, or recruiting from the general population. Both strategies are potentially risky if the researcher is assuming homogeneity (noted above). Our meta-analysis found that almost 42% of recruiting strategies focused on non-place-based recruitment of healthy older adults, a comparison of older adults and younger individuals (mainly in technology usability studies), or non-place-based recruitment of older adults who suffer from certain health conditions (particularly in prototype studies) (Birkland & Kaarst-Brown, 2007) (Table 4).

Studies that used three less common recruiting strategies include recruiting older adults taking computer courses, in social groups and clubs, or adults who were institutionalized (those in assisted living, nursing home, and daycare centers). Studies that used *multiple sites* where older adults can be found typically used a combination of nursing homes, assisted living, and retirement communities *operated by the same organization*, again suggesting a potential oversampling bias. Few studies examined those who care for the elderly, such as healthcare providers, caregivers, and social workers (4.86%). Two recruitment strategies, recruiting older adults in the workplace (0.48%) and through website use (0.96%), remain relatively under-utilized. This is another overlooked opportunity, given the number of older adults who have returned to work or delayed retirement.

Contextual and social issues can also affect the external validity of any study intending to generalize to all older adults, including issues such as socio-economic class, disability, and place (Kazdin, 2003). Individuals from the lower social strata are unlikely to meet the income requirements to join retirement communities, assisted living, or high-cost nursing homes. Therefore, samples from these organizations likely do not represent these individuals. Similarly, lower cost institutions are unlikely to have the time or resources to sponsor or secure funding for educational computer programs. This again could lead to biases in sampling. Despite this, one obvious option for researchers is to consider community-sponsored low or no-cost programs that may provide a partial answer to issues of accessing older individuals from lower socio-economic strata.

Some older adults share in child-care in multi-generational families, and as such are unlikely to be members of formal groups of older individuals who meet during the workday. This is a mixed challenge and opportunity, as multi-generational studies present exiting potential to answer important questions facing today's society. Current economic issues may also mean that individuals from lower-socio-economic groups continue working beyond the age of the retirement due to having little or no retirement benefits or savings (Hedge et al., 2006). Researchers should remember that traditional workplace settings might hold an increasing number of older workers.

Another interesting challenge when sampling older users, is that it is often hard to discriminate the differences between the benefits of technological use and the benefits of simply being *active* (Paul & Stegbauer, 2005). An active individual is more likely to be involved in social organizations or participate in classes that offer technological help or training, which may make generalization to all elderly users even more difficult.

Table 4. Recruitment Strategies and the Domains Research Studies Address (adapted from Birkland & Kaarst-Brown, 2007)

		Issue Domain						
Recruiting Strategies		**Social Issues**	**Physical/ Cognitive Issues**	**Org Issues**	**Financial Issues**	**Total N=622**	**Percentages by Strategy and Group**	
Non-Place Based	General Recruitment	57	58	3	21	**122**	**19.61**	**36.17**
	Cross Generational	11	38	9	4	**57**	**9.16**	
	Health Condition	14	36	2	0	**46**	**7.40**	
Institutional	Assisted Living Center	5	3	0	0	**6**	**0.96**	**5.62**
	Nursing Home	4	4	1	0	**7**	**1.13**	
	Daycare Center	0	1	0	0	4	**0.64**	
	Hospital	0	1	0	0	**1**	**0.16**	
	Multiple Sites	9	8	2	2	**17**	**2.73**	
Retirement Community						**9**	**1.46**	
Educational	Computer Class	18	2	0	1	**20**	**3.22**	**4.99**
	Computer Club	3	0	0	1	**3**	**0.48**	
	Continuing Education Course	6	3	1	1	**8**	**1.29**	
Social	Community Center	1	2	1	0	**3**	**0.48**	**3.21**
	Private Non-Senior Specific Org	5	5	0	2	**10**	**1.61**	
	Senior Center	4	2	0	0	**6**	**0.96**	
	Senior Club	1	0	0	0	**1**	**0.16**	
Social Services		1	0	2	0	**3**	**0.48**	
Website Users		3	3	1	1	**6**	**0.96**	
Workplace		1	0	3	0	**3**	**0.48**	
Extant Data		3	4	2	0	**9**	**1.46**	
Professionals	Professional Care Providers	3	8	19	0	**24**	**3.86**	**6.27**
	Family Care Prov.	1	0	0	0	**1**	**0.16**	
	Web Designers	0	1	0	0	**1**	**0.16**	
	College Class	0	0	9	0	**9**	**1.45**	
	Institutional Org	0	1	2	1	**4**	**0.64**	
Unclear		2	14	0	0	**15**	**2.41**	
None		10	59	5	0	**68**	**10.93**	
Review		41	113	25	5	**159**	**25.56**	

As noted earlier, disability further complicates obtaining a sample of older adults. Due to transportation issues, older adults who are disabled and/or housebound may not participate in community programs or organizations. Many older individuals cannot drive (or choose not to), so affordable, safe, and disability-friendly public transportation must be available to and from these programs if they are to participate. A geographical consideration for researchers is that many such community programs are often only in urban areas, without reliable public transportation available from suburban or rural areas. Ironically, those who are housebound may benefit most from ICTs as a means to remain socially connected.

We encourage researchers to verify assumptions of equal access to facilities where older adults engage. When seeking representative samples of older adults, we need to be aware of social, cognitive, geographic, and economic influences on the sample, and be creative in how we define, source, and access our participants.

4.3. STEREOTYPES

Stereotypes and bias are issues researchers address as a normal part of conducting valid research. Sadly, this is especially important with the older sample. There are many pervasive stereotypes regarding older adults and their abilities, including that older adults are incapable of learning new things (Larwood, Rodkin, & Judson, 2001; Simon, 1996), are unable or unwilling to change or adapt to new situations (Rix, 2001), cannot use new technologies (Larwood et al., 2001), and are inefficient workers (Rosen & Jerdee, 1985). All of these stereotypes have been proven untrue, but despite this evidence, they persist in our society and are evident in our research (Hedge et al., 2006).

These stereotypes can have a significant negative impact when studying older adults and technology as they can influence not only how researchers approach their studies, but how older adults feel about their own abilities (Maurer, Wrenn, & Weiss, 2003). As a result of stereotype internalization, studies have shown that older adults may underrate their technological or other skills, particularly compared to younger users (Marquié, Jourdan-Boddaert, & Huet, 2002). If relying on self-reports, this internalization of stereotyping can make studying older adults and how they use ICTs very difficult. Older individuals may be more hesitant to participate in a study that uses technological devices because of this internalization of stereotypes. As researchers, we are challenged to be aware of our own biases; in the case of older samples, it is especially important to ensure that pervasive stereotypes do not interfere with the design of a study, treatment of the sample, or with the analysis or interpretation of our results.

5. Conclusion

As generational research regarding technological use and trends develops, it is important to move our focus from simply studying younger generations, to understand that generational and cultural cohort effects are universal and ongoing. A generational approach towards studying older adults' technology use and effects will likely yield the same beneficial results as generational research at the other end of the age spectrum. By taking a generational perspective in our research, we acknowledge that older adults are

not a single group of individuals with similar tastes, lifestyles, and cultural backgrounds, but are a diverse and changing set of generations. In a similar way, because older adults are quite different from the populations that technology researchers have historically studied, there are unique ethical, methodological, and sampling challenges that researchers must consider and address. It is important to note that many of the researchers who conducted the studies included in our analysis recognized the limitations of their own work. This paper hopes to facilitate generational research of older adults by reviewing these challenges. One thing is certain: researchers will increasingly find it necessary to address the very real problems of our aging societies. We hope our paper provides encouragement, considerations, and opportunities.

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7. References

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