Impact of COVID-19 lockdown on IADL functioning for people with disabilities using internet-connected assistive devices: Global online survey

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INTRODUCTION

Since the 2007 launch of the iPhone, using internet-Connected Assistive Devices (iCAD), like accessible smartphones, tablets, apps, etc., have increasingly become essential for completing Instrumental Activities of Daily Living (IADL) for People with Disabilities (PWD);[1]. An iCAD is defined as any information communication technology/electronic device or software that assists with promoting, maintaining, and/or enhancing the ability of a PWD to live independently in society [2]. One iCAD device, the smartphone is widely popular, as in 2020, 3.8 billion or 48.41% of the global population were smartphone users [3]. Starting in December 2019, the Coronavirus pandemic, also called COVID-19, rapidly manifested itself as a lethal and sudden global health emergency in 2020. To contain the spread of the pandemic, most countries imposed lockdowns or movement and behavior restrictions of differing intensities. These lockdowns resulted in drastic lifestyle changes ranging from: social distancing, working/educating from home, and limiting travel to urgent or essential needs [4].

IADL, like traveling, banking, and shopping, are higher level activities that enable a PWD to live independently at home and in the community. Technology like iCAD play a crucial role in enabling PWD, comprising more than 15.6% of the global population, to complete IADL independently [5,6]. The COVID-19 lockdown restrictions significantly impacted the ability of PWD to complete IADL independently. Identification of specific IADL domain breakdown for PWD during the lockdown would be crucial from a public health point of view. Currently, a dearth of research exists on specific IADL domains that have been negatively impacted by COVID 19. The available research predominantly focuses on how PWD are disproportionately and negatively impacted by the pandemic; have increased risk of morbidity and mortality from COVID-19; have problems with support services and reduced access to health care; and emotional/psychological sequelae of the lockdown [7,8,9]. As a result, we conducted a study called the **CO**rona virus **P**andemic **IN**ternet connected devices effectiveness **G**auging (COPING) Study. The primary objective of this study was to conduct a global online survey, the COPING study, to determine whether level of satisfaction with completing IADL for PWD using iCAD changed from pre-COVID to during COVID.

METHODS

Design

The COPING study was across sectional, online, global study that used snowball sampling and was conducted using the Qualtrics research platform. This study was approved by the Institutional Review Boards of the University of Arkansas at Little Rock and the University of Texas Medical Branch. The risk posed to any participants from completing the on-line survey was low to none. Informed web-based consent was obtained from all participants.

Participants

The data of 188 PWD from six countries or continental regions were analyzed for this study. Participants were recruited through circulation of solicitation emails and digital flyers that contained a brief description of the study, along with a hyperlink to participate in the study. The solicitation emails and digital flyers were circulated globally to: disability advocacy and peer support groups, non-governmental organizations, higher education institutions, public and private limited companies, and social media sites for PWD. A snowball sampling technique was incorporated to aid with recruitment. The inclusion criteria for participating in the study were: being 18 years of age or older and able to complete an online survey in English at the 5th to 7th grade reading level or over the phone with a study investigator. Through the COPING study, we collected data both from people with and without disabilities. However, this study is limited to the data from PWD.

Procedure

After providing web-based informed consent, participants were required to complete one 15–20-minute online survey using the Qualtrics® Research Platform [10]. Qualtrics® is an encrypted, password protected online research platform that can be used to collect and securely store research data. For this study, Qualtrics was programmed to delete personal identifiers from the survey data prior to exporting de-identified data to the study investigators. Part one of the study survey consisted of a Demographics questionnaire that was used to collect information including: age, gender, ethnicity, disability/diagnosis, country of residence, level of education, employment status, etc. Answering questions in the Demographics questionnaire was optional. Part two of the study survey consisted of answering the Electronic Instrumental activities of daily living Satisfaction Assessment (EISA) questionnaire. The EISA instrument (Quamar, 2018), to the best of our knowledge, is the

first-ever self-report tool specifically designed and validated for assessing satisfaction with performing IADL by PWD using iCAD. The first administration of EISA retrospectively assessed satisfaction with performing IADL for PWD using iCAD **prior to the** COVID-19 lockdown. The second administration of EISA assessed satisfaction with performing IADL for PWD using iCAD **during the** COVID-19 lockdown. The participants were free to stop taking the survey and opt out of the study at any time; however, only participants who completed the EISA first and second administrations fully were retained for this study. Also, any participants who, because of their disability, were unable to independently access the Qualtrics survey, were assisted over phone by a study investigator, to complete the survey.

RESULTS

For this study, we decided to explore responses from persons with disabilities only, which provided us with a sample size of 188 persons from six countries and continental regions. Table 1 displays demographic characteristic of our study sample having disabilities ranging from hearing or visual impairment, progressive neurological disorders, to musculoskeletal disorders. However, because of the variety of disabilities, the authors categorized the disabilities under the headings of sensory, neurological, musculoskeletal, or multiple impairments as well as a category titled 'other.' Statistically significant findings were that more people with disabilities were working prior to COVID then were working during COVID (McNemar-Bowker Test, 12.89, 3 df, p=.005).

We used the **E**lectronic **I**nstrumental activities of daily living **S**atisfaction **A**ssessment (EISA) instrument, a self-report outcome tool specifically designed and validated for assessing satisfaction with performing IADL for PWD using iCAD. The EISA assesses satisfaction with the following 10 IADL domains: 1) transportation; 2) finances; 3) health; 4) meals; 5) shopping; 6) communication; 7) household/emergency; 8) work/school/volunteering; 9) memory/planning and organization; and 10) leisure [1]. Although, memory/planning and organization is not a conventional IADL domain, it was included in the EISA scale, as it is vital for completing IADL, and is supported by iCAD [2]. **Table 2** presents the findings of the EISA administered twice, asking the study participants to answer the first EISA as their **pre-COVID** satisfaction compared to the second EISA as their satisfaction **during COVID**. We used Wilcoxon Signed Ranked statistics to compare satisfaction rates pre-COVID to post-COVID ratings on the EISA. We also applied a Bonferroni correction, with a resulting significance level of p<0.005.

Variable	**Mean (SD)**	**Range**
Age	50.15 (± 16.77)	18-93 years
	Frequency	**Percentage**
Gender:		
- Female	122	65.24
Ethnicity		
- Black/African American	14	7.4
- American Indian or Alaska Native	1	0.5
- Asian American	20	10.69
- White/Caucasian	135	71.8
- Hispanic/Latino	11	5.9
- Other	6	3.19
Disability Type		
- Sensory Impairment	49	27.37
- Neurological Impairment	28	14.89
- Musculoskeletal Disorder	22	12.29
- Mental Health Issue(s)	23	12.85
- Multiple Disabilities	48	26.82
- Other	9	5.03
Reside in:		
- United States	169	91.35
- Canada	4	2.16
- United Kingdom	3	1.62
- Australia	2	1.08
- India	2	1.08
- North Africa	5	2.70
Education Level		
- Undergraduate Degree	49	26.06
- Graduate Degree or Higher	86	45.74
- Other	53	28.19
Employment*	**Pre-COVID**	**During COVID**
- Employed/school/volunteer	116 (61.7%)	101 (53.7%)
- Not employed or not at school	23 (12.2%)	36 (19.1%)
- Retired	42 (22.3%)	44 (23.4%)
*Significant at p=.005		

TABLE 1. Study Demographic Variables of Persons with Disabilities (n =188)

DISCUSSION

In the current mobile technology based lifestyles, using iCAD has become essential for PWD for performing IADL. The COVID-19 lockdown movement restrictions made it incumbent for PWD to rely on iCAD for performing IADL. The COPING study, to the best of our knowledge, was the first ever global online survey assessing the change in satisfaction with performing IADL for PWD using iCAD, from pre-lockdown to during COVID 19 lockdown. This analysis is particularly poignant from a public health point of view because identification of specific IADL domain breakdown during a pandemic, would help develop public health measure policy guidelines. These guidelines would help ensure adequate support services, and preventative measures for PWD to live safely and independently during a national disaster or pandemic scenario. Use of the EISA instrument enabled identification of specific IADL domains that were impacted negatively by the pandemic

lockdown. These six domains were: transportation, banking, shopping, health, nutrition, and leisure. The results of this study highlight the six IADL domains that were negatively impacted and can be performed using iCAD; however, the use of iCAD for these domains would need to be reinforced with acceptable standards of formal and informal support services, to reduce PWD morbidity and mortality during a pandemic or national disaster.

Of significance was the difference in employment pre-COVID compared to during COVID among participants. Pre-COVID, 116 participants were employed, at school, or a volunteer, whereas during COVID, 101 participants were employed, at school, or a volunteer, differing at $p<0.000$. In the EISA domain of work/school/volunteer, satisfaction with completing those tasks with iCAD increased during COVID compared to pre-COVID. However, this increase in satisfaction was not statistically significant.

A limitation of the study was that the pandemic lockdown was not enforced uniformly globally. Further, even in countries where a lockdown was imposed, the restrictions in movement/socialization were not uniform, which could have affected participant's satisfaction scores on the EISA instrument as well as compensation strategies participants were using to cope with the pandemic. Another limitation was that the EISA instrument was not validated and culturally adapted to the different countries represented by our participants. However, since most of the participants included in the sample for this paper were from the US and other developed countries, we anticipate participants had similar lived experiences upon which to base their survey responses.

Table 2

Satisfaction with iCAD Use for the following IADLs:	**Pre COVID (Time 1)**	**During COVID (Time 2)**	**Significance**
Transportation*	1.60	1.84	.001*
Banking*	1.39	1.55	.002*
Shopping*	1.63	2.01	.000*
Health*	1.85	2.13	.000*
Nutrition*	1.65	1.92	.000*
Communication	1.29	1.39	.012
Household and Security Needs	1.59	1.61	.523
Memory	1.49	1.62	.045
Leisure*	1.85	2.13	.000*
Work/School/Volunteer	1.95	2.13	.030

Key: EISA = Electronic Instrumental activities of daily living Satisfaction Assessment; *Correlation is significant at the $p<0.005$ level with Bonferroni Correction

TABLE 2: EISA Satisfaction Ratings with iCAD Use for IADL tasks pre-COVID to during COVID.

CONCLUSION

The COPING study has helped identify specific IADL domains for PWD using iCAD, who's satisfaction with performance was negatively impacted by the COVID-19 pandemic lockdown. These IADL domains were: transportation, banking, shopping, health, nutrition, and leisure. The data from this study provide valuable insight into IADL domains that were affected negatively due to reduced face-to-face interaction with caregivers and/or peers. This further provides important data to conduct future validation studies about which IADL domains are relatively more dependent on caregiver/peer support compared to IADL domains that are not affected. Finally, the results of this study have far-reaching global implications for coping with pandemics/natural disasters and promoting optimal potential for PWD in the age of iCAD. Data from this pilot study would provide a foundation for carrying out further studies exploring the efficacy of using iCAD to promote independence, reduce isolation, and foster community participation for PWD.

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