Current Population Survey Volunteer Supplement Data: Variance Estimates by the Replication Method

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Abstract

The article shows the value of ensuring data users are aware of intricacies with using survey data to infer the volunteerism characteristics of the U.S. population. Understanding volunteerism population trends in the United States (U.S.) is important for researchers and administrators. Although this paper uses complex statistical methods, it presents easy-to-understand information on the U.S. volunteer population. Readers are provided with the statistical program used to create detailed population estimates and their variances. Analyst used microdata files from 2011 through 2015 from the Volunteering Supplement of the Current Population Survey. Study used volunteer, race, and ethnicity information from a total of 445,148 survey respondents over the 2011-2015 period. Between-group comparisons suggest Non-Latino-Whites (NLW) had the highest rate of volunteerism of any other race-ethnic group. For the most part, results suggest volunteerism rates may not differ significantly between Non-Latino-Blacks (NLB) and Non-Latino-Others (NLO). Latinos (LAT) had the lowest rate of volunteerism than any other race-ethnic group. Temporal trends suggest volunteerism rate decreased for NLWs and NLOs and did not change for LATs and NLBs.

Key Words: variance, replicate, weights, demography, sociology, equity

Introduction

There is a detrimental gap in the volunteerism literature. No previous study has shown how replicate weights can be used to conduct between-group differences. The purpose of this paper is to show how replicate weights can be used to compare groups. Since its implementation in 2002, the Volunteering Supplement of the Current Population Survey (CPS), sponsored by the U.S. Census Bureau and United States (U.S.) Bureau of Labor Statistics (BLS), is a primary source for estimating the demographic characteristics of the population who volunteers (DSMD, 2006). Over decades, investigators have used data from the Volunteering Supplement of CPS to study:

- demographic characteristics of U.S. individuals who volunteer (Pho, 2004),
- spousal influence on volunteering (Rotolo & Wilson, 2006),
- gender segregation in volunteer work (Rotolo & Wilson, 2007),
- greater propensity of those who do volunteer work to respond to surveys (Abraham, Helms,& Presser, 2009),
- proxy responses generally underreport volunteering (Nesbit, 2010),
- disaster relief service volunteers (Rotolo & Berg, 2011),
- the relationship between military service and volunteering (Nesbit & Reingold, 2011),
- and compare it with other major volunteering studies (Nesbit, 2011),
- between-state differences in volunteerism (Rotolo & Wilson, 2012),
- Hispanic volunteering (Carreno, 2012),
- impact of policies on volunteerism (Nesbit & Brudney, 2013),
- what affects Hispanic volunteering (Wang, Yoshioka, & Ashcraft, 2013),
- volunteerism amongst Millennial generation (Ertas, 2016),

- to produce community-level volunteering measures (Neymotin, 2016),
- 2005-2015 trends in volunteer mentoring (Raposa, Dietz, & Rhodes. 2017),
- How individual's demographics draws them to different kinds of volunteer organizations (Nesbit, 2017),
- to show inflow of immigrants affects volunteering in receiving communities (Freire & Li, 2018), and
- to investigate linkages between labor market experiences and volunteer activities (Wiertz & Lim, 2019).

While the vast body of work, using data from the Volunteering Supplement of the CPS, includes the use of complex statistical methods, there is a notable gap in the literature. The use of *replicate weights* is almost non-existent in studies using data from the Volunteering Supplement of the CPS. This is a detrimental limitation because replicate weights can help researchers produce high-quality measures of variance (i.e., range of precision in estimate) for the sample-derived estimates. According to statistical theory, the Standard Error (SE) of an estimate captures how an inferred characteristic of the population varies across multiple samples. Because we cannot ever know the true SE of any estimate from the Volunteering Supplement of the CPS, we estimate sample SEs. Replicate weights allow the single Volunteering Supplement of the CPS sample to simulate multiple samples. Simulating multiple samples allows us to generate more precise SE estimates to improve the quality of confidence intervals.

Because not everyone in the population is administered a survey, statisticians produce population "estimates"—i.e., scientifically derived guesses. Quantitative researchers are aware that population estimates are accompanied by a measure of accuracy. By using a variance measure, data interpreters can then give statements such as: "there may be between 90 and 110 volunteers". In this instance, the Lower Confidence Limit (LCL) would be 90 and the Upper Confidence Limit (UCL) would be 110. By using confidence limits, data users will be more aware of the complexities involved with inferring population characteristics from sample data. The specific aim of this analysis was to show how replicate weights can be used to produce high quality variance estimates.

The use of replicate weights to produce variance measures for sample estimates is common amongst researchers using American Community Survey (ACS) Public Use Microdata Sample (PUMS) files. For example, previous work has highlighted the value of using variance estimates to infer characteristics of the population from ACS data (Siordia & Le, 2013; Siordia 2014a; Siordia 2015a), to point out the use of proxy responses in ACS (Siordia, 2014b), and presence of response allocations in ACs (Siordia & Young, 2013; Siordia, 2015b). Similar data treatments are absent in the literature using data from the Volunteering Supplement of the CPS. This analysis shows how replicate weights can be used to produce easy-to-understand, but statistically sophisticated, estimates of the population to compare between-groups and withingroups over time.

Methods

Data

Study used Volunteer Data File and Non-Response Replicate Weight Data Files from the Volunteering Supplement of the CPS to explore between-group differences and within-group differences over time (i.e., temporal trends) between 2011 and 2015. Anyone with an internet connection can access all these public-use microdata files. The CPS is a monthly survey of approximately 60,000 occupied households (approximately 150,000 adults), from all 50 states and the District of Columbia. The CPS questionnaire is a completely computerized document

that is administered by Census Bureau field representatives across the country through both personal and telephone interviews. Interviewers were provided with a two-hour home study for completing the basic CPS labor force exercises, supplement exercises, and a practice interview concerning the supplement. To be eligible to participate in the CPS, individuals must be 15 years of age or over and not in the Armed Forces. People in institutions, such as prisons, long-term care hospitals, and nursing homes are ineligible to be interviewed in the CPS. Proxy responses were allowed if attempts for a self-response were unsuccessful. The person who responds is called the *reference person* and usually owns or rents the housing unit (Kostanich & Dippo, 2002). All persons eligible for the labor force items of the basic CPS were also eligible for the volunteer supplement.

The analysis only focused on years 2011 through 2015 because the Non Response Replicate Weight Data Files are readily available for data 2011 onward, because the Volunteering Supplement of the CPS was not administered in 2016, and because it underwent substantial modifications in 2017. The analytic sample only includes individuals with useful information for one of the volunteer questions: the race, and ethnicity question. From the available 756,185 observations in the five files, 70% (530,521) were eligible to participate in the volunteering supplement. From those eligible to participate with the Volunteering Supplement of the CPS, 84% (445,148) of observations were included in the analysis. This means 16% (85,373) of individuals were excluded from analysis because they did not have a yes or no response to one of the volunteering questions.

Volunteerism Questions

Two questions were used to determine if a person was a volunteer: (1) *Since September 1st of last year, have you done any volunteer activities through or for an organization*?; and (2) Sometimes people don't think of activities they do infrequently or activities they do for children's schools or youth orgs as volunteer activities. Since September 1st of last year, have you done any of these types of volunteer activities? If persons responded with a "yes" to either of these questions, they were coded as being a volunteer.

Variance Estimate via Replicate Weights

To determine the characteristics of a population by using a probability sample, researchers could repeatedly conduct sample selection, data collection, and estimation creation. The dispersion of the estimates from the replicated studies could then be used to measure the variance of the full sample (DSMD, 2006). Because this is not feasible, data creators " draw a set of random subsamples from the full sample surveyed each month, using the same principles of selection as those used for the full sample, and to apply the regular CPS estimation procedures to these subsamples, which are called replicates" (DSMD, 2006: Page 14-1). The theoretical basis for the successive difference method discussed by Wolter (1985) informed the successive difference replication method proposed by Fay and Train (1995).

The 160 replicate weights in the Volunteering Supplement of the CPS can be used to create the 160 replicate estimates necessary to calculate total variance. The total variance for a point estimate can be calculated by plugging the replicate weight estimates and the point estimate into the following formula:

$$Var(\hat{x}_0) = \frac{4}{160} \sum_{i=1}^{160} (\hat{x}_i - \hat{x}_0)^2$$

where \hat{x}_0 is the point estimate using the weight for the full sample and \hat{x}_i are the 160 point estimates using replicate weights. Readers should note some researchers using the Volunteering

Supplement of the CPS use Generalized Variance Functions (GVFs) to create Margin of Error (MOE) for estimates.

Statistical Approach

The statistical program, written in Statistical Analytics Software, version 9.4 (SAS Institute, Cary, NC), is given in the Appendix. Analysis used 95% confidence intervals to determine when between-group and within-group over-time differences merit further research attention. The study does not adopt the traditional *statically significant* language that is ubiquitous in quantitative literature. There are many reasons for using the proposed approach. The American Statistical Association has argued statistical significance is *not* the only informative metric (Wasserstein & Lazar, 2016), and for decades statisticians have discussed the misuse of P values (Gigerenzer, 2004; Goodman, 2008; Cummings & Koepsell, 2010; Gelman & Loken, 2014; Greenland, Senn, Rothman, Carlin, Poole, Goodman, & Altman, 2016; Chavalarias, Wallach, Li, & Ioannidis, 2016; Van Calster, Steyerberg, Collins, & Smits, 2018). As a result, the study only used confidence intervals (CIs) to ascertain the importance of between-group and within-group temporal differences. Readers should be aware that the absence of statistical significance does not unequivocally mean the association is uninformative or unimportant. The statistical program produces multiple measures of variance. The current analysis provides the following for each of the year-, volunteer status-, race-ethnicity-specific groups:

- unweighted count,
- population weighted count,
- 95% lower confidence limit,
- 95% upper confidence limit, and the

• Coefficient of Variation (CV).

The CV is the SE of the estimate divided by the estimate expressed as percentage. Smaller CV indicate a narrower confidence limit. SE is the square root of the estimate of variance.

Results

Table 1 presents descriptive statistics stratified by year, volunteer status, race, and ethnicity. Descriptions for the acronym headings are provide below the table. From Table 1, readers will be able to contrast the number of individuals who actually participated in the survey (unweighted count) and how population-weighted estimates compare. Detailed information in Table 1 can be used in different ways. For example, by comparing unweighted and weighted numbers, readers will be able to see that on average, each LAT and NLB survey respondent represents more of their counterparts that NLWs and NLOs. More technically, LATs and NLBs on average have higher population weights than NLWs and NLOs. For example, in 2011, about 3,178 (5,297,962÷1,667) LATs were represented by one LAT who actually participated with the survey and number for NLWs is 2.371. These types of calculations will also show that information on fewer people is being used in more recent surveys to infer the characteristics of the population. That is, on average survey respondents were assigned larger population weights in 2015 that in 2011. This phenomenon may explain why most population estimates are less stable in 2015 than in 2011-i.e., Coefficient of Variation (CV) are higher in 2015 than in 2011 for five out of eight groups (V:LAT, V:NLW, V:NLO, NV:LAT, and NV:NLO). Note the table provides all the necessary information for those who decide P values are necessary. The pvalue can be searched after computing z-score as follows:

$$z = (Wgt_1 - Wgt_2) \div \sqrt{\left(\frac{Wgt_1 - LCL_1}{1.96}\right) - \left(\frac{Wgt_2 - LCL_2}{1.96}\right)}$$

where (Wgt - LCL) is the MOE and comparisons are being made between one estimate

(Wgt₁) and another (Wgt₂).

Table 1

	Group	Unw	Wgt	LCL	UCL	CV
	V: LAT	1,667	5,297,962	4,997,531	5,598,393	2.9%
	V: NLW	21,348	50,608,069	49,743,922	51,472,215	0.9%
	V: NLB	1,831	5,831,900	5,466,094	6,197,707	3.2%
	V: NLO	1,459	3,699,552	3,457,151	3,941,953	3.3%
20	NV: LAT	9,000	30,091,327	29,785,539	30,397,115	0.5%
	NV: NLW	44,913	112,556,274	111,684,759	113,427,788	0.4%
	NV: NLB	6,934	22,590,204	22,199,520	22,980,888	0.9%
	NV: NLO	5,193	12,781,061	12,514,718	13,047,404	1.1%
	Group	Unw	Wgt	LCL	UCL	CV
	V: LAT	1,704	5,787,830	5,466,173	6,109,486	2.8%
	V: NLW	20,747	49,673,496	48,851,729	50,495,263	0.8%
	V: NLB	1,873	6,082,801	5,752,656	6,412,946	2.8%
910	V: NLO	1,496	4,148,435	3,873,990	4,422,879	3.4%
2	NV: LAT	9,201	31,977,932	31,651,322	32,304,541	0.5%
	NV: NLW	44,704	112,/16,/22	111,909,624	113,523,820	0.4%
	NV: NLB	6,/24	22,525,999	22,1/3,1/6	22,878,823	0.8%
	NV: NLO	5,151	14,314,535	13,982,272	14,646,798	1.2%
	Group	1 71C	wgt	LCL	UCL	2.00
	V: LAI V: NI W	1,/10	0,017,300	5,005,090	0,309,310	3.0% 1.0%
		19,079	40,100,980	47,239,223	49,002,734	1.0%
3	V. NLD	1,002	3 969 351	3,181,733	<i>J</i> ,808,923	2.9%
102	NV · LAT	8 876	32 534 185	32 176 079	32 892 290	0.6%
	NV· NI W	43 194	114 679 521	113 761 616	115 597 426	0.070
	NV· NLB	6 816	23 760 356	23 383 731	24 136 981	0.1%
	NV: NLO	5.151	15.114.051	14.806.972	15.421.130	1.0%
	Group	Unw	Wot	LCL	UCL	CV
	V·LAT	1 721	6 164 646	5 782 775	6 546 517	3.2%
	V: NLW	19.136	47.661.371	46.748.561	48.574.181	1.0%
	V: NLB	1.781	5.942.379	5.593.718	6.291.040	3.0%
14	V: NLO	1,467	4,047,791	3,783,284	4,312,297	3.3%
20]	NV: LAT	8,975	33,295,472	32,907,082	33,683,863	0.6%
	NV: NLW	44,258	115,642,870	114,738,623	116,547,118	0.4%
	NV: NLB	7,088	23,779,678	23,392,166	24,167,190	0.8%
	NV: NLO	5,399	15,508,395	15,178,091	15,838,699	1.1%
	Group	Unw	Wgt	LCL	UCL	CV
	V: LAT	1,651	6,355,833	5,929,007	6,782,659	3.4%
	V: NLW	17,211	47,218,990	46,402,191	48,035,790	0.9%
	V: NLB	1,688	6,018,628	5,676,271	6,360,986	2.9%
15	V: NLO	1,262	4,102,294	3,807,794	4,396,794	3.7%
20	NV: LAT	8,499	34,347,571	33,921,677	34,773,464	0.6%
	NV: NLW	41,322	116,256,341	115,440,854	117,071,829	0.4%
	NV: NLB	6,887	24,281,746	23,912,244	24,651,249	0.8%
	NV: NLO	5,021	16,216,180	15,856,791	16,575,569	1.1%

Detailed statistics by volunteer status, race, and ethnicity

V=Volunteer; NV=Non-volunteer; LAT=Hispanic; NLW=Non-Hispanic-White; NLB= Non-Hispanic-Black; NLO= Non-Hispanic-Other; Unw=Unweighted; Wgt=Weighted; LCL=Lower Confident Limit at 95%; UCL=Upper Confident Limit at 95%; CV=Coeficient of Variation

Figure 1 shows how data from Table 1 can be used to create easy-to-understand visualizations of volunteerism data. Data were extracted from Table 1 to provide one betweengroup comparison and two within-group over-time comparisons. The CIs for LATs and NLWs were used to visualize the potential number of volunteers per-year. In technical terms, 95% CIs can be used to safely expect ninety-five percent of population estimates to be within two SEs of the mean of all possible sample estimates. Albeit esoteric, this statement captures the idea that when we are using a sample of the population, we can only scientifically guess the "true" population characteristic. Following previous advice, if CIs overlapped at all between-groups or within-group over-time, then it was inferred that there may have been *no* difference between-groups and/or within-group over-time.

For example, doing a between-group comparison, we see NLWs had higher rates of volunteerism that LATs. That is, NLWs' CIs were higher than LATs' and their CIs did not intersect at any point. Because the CIs did not intercept at any point, the between-group difference may signal the difference in volunteerism rate between NLWs and LATs merits further research attention. Doing a within-group and over-time comparison, we see that for LATs, all their CIs intersected at around 15% across all the five years under observation. We could interpret this to mean that the volunteerism rate for LATs from 2011 to 2015 may *not* have changed. That is, the true population characteristics may not have varied over five year period. In stark contrast, we see that temporal trend for NLWs did decrease (e.g., CIs in 2011 and 2015 do *not* intercept).

Figure 1

Visual representation of confidence intervals for Hispanics (LAT) and Non-Hispanic-Whites



(NHW):Between-group comparisons and temporal trends

Discussion

The study fills a detrimental gap in the volunteerism literature by showing how replicate weights can be used to produce easy-to-understand high-quality statistics when using microdata from the Volunteering Supplement of the CPS. In particular, the analysis found that between-group comparisons suggest NLW had the highest rate of volunteerism than any other race-ethnic group. For the most part, results suggest volunteerism rates may not have differed significantly between NLB and NLO. LAT had the lowest rate of volunteerism of any race-ethnic group.

Temporal trends suggest volunteerism rate decreased for NLWs and NLOs and did not change for LATs and NLBs.

Albeit novel and valuable for literature on volunteerism, the analysis has several limitations. For example, the analysis did not discuss how data editing protocols (e.g., fixing of erroneous or missing information) or use of proxy respondents may further affect the quality of the estimates and their measures of variance (i.e. MOE). Future studies should explain how much data editing is occurring with survey responses to volunteerism behaviors. Even though advance methods were used to produce direct estimates of variance, further consideration should be given to more complex estimation techniques (Mai, Ha, & Soulakova, 2019). Analysis is also limited in that it did not show how to use replicate weights in regression analysis. Future work should help researchers understand how replicate weights can be used in regression models.

Researchers and administrators should be aware that inferring population characteristics from samples requires great care. Policy makers make decisions based on their belief that data interpreters are providing the correct information. We must remain studious interpreters for data. We are inferring the volunteerism behaviors in the U.S. by using information on less than 0.1% of the population. We must be careful how we discuss population trends. When possible, use replicate weights to create high-quality measures of variance. We must insure we interpret the most truthful version of reality that can be offered by the information gathered from a very small sample of the population. In doing so, we will hopefully increase policy makers' trust in data interpreters.

The current investigation has serious implications for administrators of volunteers. To help their organizations, administrators of volunteers must have a basic understanding of volunteerism patterns in the population. When administrators of volunteers have a clear and true picture of what is happening in the volunteer population, they can adjust their recruitment and retention protocols. For example, the present study indicates that organizations that primarily (or exclusively) rely on NLW or NLB volunteers should have their administrators give serious consideration to the fact that rate of participation if declining for both groups. Hence, administrators in these types of organizations should review their recruitment and retention protocols to determine if they need to be redesigned to include new options (e.g., recruiting from other race-ethnic groups). By having a clear and true picture of volunteerism patterns in the population, administrators of volunteers will be able to make the necessary changes to safeguard their organization. This is why administrator of volunteers should continually seek professional development, to expand technical skills and become skilled consumers of complex data. Volunteerism is an important element in the fabric of society. Efforts should continue to explore how it can be expanded in all groups. To do so, we must diligently interpret data with great care.

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Appendix

Statistical program written in SAS 9.4

```
/*
   -----+
| Programmer: csiordia@gmail.com
  carlos.siordia@hsc.wvu.edu |
1
+----+
| Specific Aim
| A.Merge two datasets:
  1.CPS Sept Volunteer Supplement
   2.CPS Sept Volunteers Supplement
     Non Response Replicate Weights |
1
| B.Produce population estimates |
| C.Produce measures of variance
+----+*/
/*
+----+
| First Step |
+-----
           .
__+______
| Merge files:
| 1.Person Level Supplement File
| 2.Person Level Replicate Weight Files |
  Note: Only keeps analytic sample |
+----
        _____
| Merge by:
| 1.Unique household identifier (gstnum)|
   2.Unique person identifier (occurnum) |
   Note: Both only valid within month |
Т
+----+*/
/*
+----+
| Second Step |
+----+
| Produce estimates |
+----+*/
 %LET lok=insert routing of folder containing data files here;
 LIBNAME raw "&lok.";
 OPTIONS MPRINT CLEANUP SYMBOLGEN SPOOL NOFMTERR LINESIZE=200 PAGESIZE=max;
%MACRO Volunteering;
 %DO i=11 %TO 15 %BY 1;
/*First step*/
  DATA aa(KEEP=qstnum occurnum pes1 pes2 age pesex prdthsp ptdtrace pwnrwqt);
   SET raw.sep&i.pub;
   q=INPUT(qstnum, 8.);DROP qstnum;RENAME q=qstnum;
   o=INPUT(occurnum, 8.); DROP occurnum; RENAME o=occurnum;
   IF(("&i."*1)=11)THEN DO;age=(peage*1);END;
      ELSE IF(("&i."*1) ge 12) THEN DO; age=(prtage*1); END;
   RUN:
  PROC SORT DATA=aa; BY qstnum occurnum; RUN;
  DATA bb;
  SET raw.sep&i.rw;
  ARRAY rw {161} repwgt0-repwgt160;
  DO i=1 TO 161;
  rw{i}=(rw{i}/10000);
  END;
  RUN;
  PROC SORT DATA=bb; BY qstnum occurnum; RUN;
  DATA AnalyticSample;
  MERGE aa bb;
   BY gstnum occurnum;
       IF(pes1=1) or (pes2=1) THEN volunteer=1; *Yes;
   ELSE IF(pes1=2)or(pes2=2)THEN volunteer=2;*No;
   ELSE
                          volunteer=3; *Missing/other;
      IF(prdthsp ge 1) THEN race=1;*LAT;
   ELSE IF(ptdtrace=1) THEN race=2;*NLW;
```

```
ELSE IF(ptdtrace=2) THEN race=3;*NLB;
   ELSE IF(ptdtrace ge 3) THEN race=4; *NLO;
   ELSE
                      race=5;*Missing/other;
   KEEP qstnum occurnum pwnrwgt repwgt0-repwgt160 volunteer race;
   IF(volunteer in(1,2)) and (race in(1,2,3,4)) THEN OUTPUT;
   RUN:
/*Second step*/
  %DO x=1 %TO 4 %BY 1;
   %DO j=1 %TO 2 %BY 1;
    PROC MEANS DATA=AnalyticSample SUM NOPRINT;
     WHERE(volunteer=&j.) and(race=&x.);
     VAR pwnrwgt repwgt1-repwgt160;
     OUTPUT OUT=bbb SUM=est rw1-rw160;
     RUN;
    DATA y&i._v&j._r&x.(KEEP=group race unw wgt lcl ucl cv se moe);
     RETAIN group race unw wgt lcl ucl cv se moe var;
     SET bbb END=eof;
     IF( n =1)THEN sdiffsq=0;
     ARRAY repwts {161} est rw1-rw160;
      DO i=2 TO 161 BY 1;
       sdiffsq=(sdiffsq+(repwts{i}-repwts{1})**2);
      END;
     IF eof THEN DO;
      var=((4/160)*sdiffsq);
      se=ROUND(((var)**0.5),.01);
      moe=ROUND((1.96*se),.01);
      cv=ROUND((se/est),.00001);
      lcl=ROUND((est-moe),.1);
      ucl=ROUND((est+moe),.1);
      race=("&x."*1);
      wqt=ROUND(est, .1);
      unw= freq ;
      LENGTH group $16;
      group="yr&i. v&j. r&x. ";
      OUTPUT;
     END:
    RUN;
   %END;
  %END;
 %END;
%MEND Volunteering;
%Volunteering;
/*
+---
    _____
| Print data out to multiple Excel files |
| Each XLSX file will have data for one year |
 ----+*/
%MACRO sTak;
 %DO j=1 %TO 2 %BY 1;
  %DO i=11 %TO 15 %BY 1;
   DATA y&i. v&j.;SET y&i. v&j. r1-y&i. v&j. r4;RUN;
  %END;
 %END:
 %DO ii=11 %TO 15 %BY 1;
  DATA year&ii.;SET y&ii. v1-y&ii. v2;RUN;
  PROC EXPORT DATA=year&ii. OUTFILE="&lok.\Year&ii..xlsx" DBMS=EXCEL REPLACE;RUN;
 %END:
%MEND sTak;
%sTak:
 QUIT;
```

Usability of Volunteer Brokerage Websites: The Why and How of User Testing

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Abstract

Dutch volunteer centers offer online volunteer brokerage via their websites. Usability is a crucial factor for the success of this service. It determines whether or not visitors or potential volunteers stay on the website and a match can be made. In this article, user testing is applied to the websites of five volunteer centers. The results provide information on the usability of these specific websites. In addition, other volunteer centers are offered insight into the various problems of usability and a tool to test this.

Key Words: usability, website, volunteer brokerage, volunteer centers, the Netherlands

In 1988, the Netherlands gained access to the Internet for the first time and today access is common practice (Van Hoek, 2018; Olsthoorn, 2014). In 2017, almost all Dutch households (98%) had access to the Internet and 85% had a broadband connection. The comparable average figures for Europe are 87% and 85%. The Netherlands also scores high with 87% in terms of mobile internet use in 2017. The average for Europe is 65% (CBS, 2018). 86.1% of Dutch citizens aged 12 or older used internet almost every day in 2017. In 2012 this was only 76.2% (CBS Statline, 2018b).

The widespread availability and easy accessibility of the Internet has led to an increasing digitization of activities in various areas of society. This also applies to volunteer brokerage (Stubbe & van Dijk, 2006; Ploegmakers et al., 2011; Terpstra et al., 2008). Volunteer brokerage involves "bringing together supply and demand in volunteer work" (Stubbe & van Dijk, 2006, p. 11). The supply comes from volunteers and the demand from volunteer-involving organizations. The supply of volunteers in the Netherlands is considerably. According to national research data (CBS Statline, 2018a; Smeets & Arends, 2017), half of Dutch people over the age of 15 took part in volunteering in 2016. Men and women were equally represented. Men were particularly active in sports, youth, hobbies, trade unions, politics and district or neighborhood while women were more active in schools and care. The share of volunteers was highest among 35- to 45-year-olds (57%), followed by 15to 25-year-olds (54%) and 45- to 55-year-olds (52%). The higher educated (bachelor/master, PhD) more often worked as a volunteer than the lower educated: 60-62% compared to 35%. The supply, however, lags behind demand. Many Dutch organizations that work (together) with volunteers are faced with a shortage or volunteers (Hustinx et al., 2015). The expectation is that this shortage will only increase in the coming years due to the introduction of the new Social Support Act in 2015. Pursuant to this law, Dutch citizens are expected (more than before) to care for family members, friends and neighbors who can no longer do so

themselves. This takes time and as a result people have less time to participate in volunteering (Movisie, 2017; de Wit & Bekkers, 2017).

Volunteer centers are important providers of volunteer brokerage in the Netherlands (van Gilst et al., 2015). In the period 2008-2010, research has been done to determine how the success rate of volunteer brokerage by volunteer centers in the Netherlands can be optimized. The results showed that motivation and feelings of pride and respect on the part of the volunteer can make an important contribution to the success of volunteer brokerage and should (more explicitly) be integrated into the volunteer brokerage process (van Gilst et al., 2011; 2015).

During this investigation a third factor emerged that is related to the increasing digitization of contemporary society. This factor concerns the usability of volunteer brokerage websites that volunteer centers are using more and more in addition to the traditional offline service they provide. When websites are not usable, there is a risk that users (potential volunteers) are discouraged and abandon the website (Gomez, 2010; Nielsen, 2012). This means that no match will be made. For this reason, an additional study has been conducted focusing on the usability of volunteer brokerage websites. The study aimed to answer three questions:

How can the usability of volunteer brokerage websites of volunteer centers be studied?
 What kind of information does a usability study of the websites of volunteer centers

provides?

3. How can other volunteer centers benefit from this information?

The present article reports on the outcomes of this study. Prior to this, the impact of digitization on volunteer brokerage is described.

Impact of Digitization on Volunteer Brokerage

There are around 240 volunteer centers in the Netherlands (Ploegmakers et al., 2011).

They offer various services of which volunteer brokerage is one of the most important ones.

The first (two) volunteer centers in the Netherlands were established in the first half of the

1970's. The establishment coincides with the beginning of the era of digitization. Many digital

developments have taken place since then (Table 1).

Table 1

Digital Developments

Year	Digital developments	Year	Digital Developments
1971	first e-mail over a computer network	2005	YouTube (video sharing website)
1975	personal computer	2006	Facebook (social networking website) public; Twitter (news and
			social networking website)
1981	introduction IBM-PC for home and office use	2008	4G for mobile data traffic; breakthrough Facebook
1986	CD-ROM (data storage)	2009	breakthrough Smartphone's; WhatsApp (messaging app)
1988	CD-recordable (write once and read many times)	2010	iPad; cloud computing made public, Instagram (photo and video
			sharing app) public
1993	www open to companies and individuals	2011	introduction speech technology (Apple's Siri) for consumers
1995	internet explorer; e-mail becomes popular with a	2014	breakthrough VR and AR (which simulate reality or add information
	larger audience		to reality)
1997	launch search engine Google; Wi-Fi world standard	2016	network deployment in the Netherlands for Internet of Things
			(network of devices connected to the internet for exchanging/
			collecting data)
2000	Bluetooth; digital photography	2018	handling personal data regulated by European General Data
			Protection Regulation
2001	BitTorrent (file sharing system); Wikipedia	2019	strong increase in use of artificial intelligence in companies; rise
			blockchain technology (database for transactions that is exchanged
			between 2 parties)
2003	Skype (voice /video calls via the Internet);	2020	test with 5G network in Europe
	LinkedIn (social networking website for		
	professionals)		
Source	Burgering, 2018; Gijzemijter, 2019; Sociaal-Econon	iische Ra	ad, 2016; KPN, 2019; Veraart, 2008

As can be derived from Table 1, hardly any digital tools were available during the early days of volunteer centers. A quality management manual published in the nineties (Heinsius, 1998), indicated that computers were at that time standard equipment of local volunteers centers. The deployment of an automated system for the registration and reporting of data was promoted in the manual. Written descriptions or computer prints of volunteer vacancies were kept in binders and could be viewed by potential volunteers. Communication was done in writing, verbally and visually. E-mail and internet were not used. In 2000 this had already changed. Most volunteer centers made use of automated systems. In addition to the binders, computers were (sometimes) used to search for volunteer vacancies. Furthermore, the use of e-mail and brokerage via the Internet were increasing (Heinsius, 2000).

Around 2003, there were several digital systems on the market that supported the process of volunteer brokerage. Some of these systems made it possible to enter, manage and view information about volunteers, organizations and volunteer vacancies via the internet. Other systems were minimally or inaccessible via the Internet (van Hal & Warns, 2003). Digitization of the volunteer brokerage process continued in the years thereafter. Volunteers were enabled to search for and react to volunteer vacancies directly via websites of volunteer centers. Digital (online) volunteer brokerage became more and more popular. Surveys (Stubbe & van Dijk, 2006; Ploegmakers et al., 2011; Terpstra et al., 2008) carried out in 2005, 2007 and 2010 among Dutch volunteer centers showed a shift from personal (offline) volunteer brokerage. The average numbers of digital matchings per month per volunteer center in those years were respectively 21.7, 33.3 and 86. The comparable average numbers of personal matchings per month were: 17.1, 32.9 and 45.0.

Despite the growing popularity of digital brokerage, volunteer centers continue to offer personal brokerage. The results of an online survey (van Gilst et al., 2011) among volunteer centers in the Dutch province South Holland revealed that 86% of volunteer centers offered personal brokerage as well as digital brokerage. Only one volunteer center operated exclusively online as a broker and another one exclusively offline.

From the beginning of 2000 social media became increasingly important. Not only individuals, but also companies became more active on social media. Frequently used social media in the Netherlands are Facebook, Twitter, Hyves, YouTube and LinkedIn (Heerschap & Ortega, 2013). An inventory of the websites of the 28 volunteer centers that participated in

the aforementioned online survey in South Holland (van Gilst et al., 2011), shows that especially Facebook (100%) and Twitter (75%) are often used. LinkedIn (36%) YouTube (29%) and Instagram (29%) are much less used.

It is clear that digitization has led to many changes in the daily practice of volunteer brokerage, with the biggest change being a shift in focus from offline to online volunteer brokerage.

Studying the Usability of Volunteer Brokerage Websites

The International Organization for Standardization (ISO, 2018, 9241-11) defines usability as "the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use". Usability relates to the outcome of interacting with the system. In case of a website, it reflects the ease of using the website. Usability is an important attribute of a website. When a website is difficult to use, people will abandon the website and may never return (Nielsen, 2012). Gomez (2010) showed that 88% of online consumers are less likely to return to a website after a bad experience.

A commonly used method to study usability is user testing. According to this method, users are asked to perform a series of representative tasks on a website without any help. The researcher only observes what happens. The users are asked to think aloud (Loranger, 2016; Nielsen, 2012). According to Nielsen (2012), an authority in the field of user testing, five users provide the best test results.

In 2016, user testing was applied to study the usability of five volunteer brokerage websites of volunteer centers. The five volunteer centers, whose websites were included in the study (Table 2), had previously participated in an online survey in the Dutch province South Holland (Van Gilst et al., 2015). They are selected on the basis of three variables (Table 2). These variables are related to the size and working area of the volunteer center and determine the supply and demand of organizations and volunteers (Ploegmakers et al., 2011).

Table 2

Characteristics of Selected Volunteer Centers

Characteristics	Number of paid	Self-dependent	Number of inhabitants
Volunteer center	employees		municipality of establishment
VC1	> 5	yes	>250,000
VC2	3 - 5	no	100,000 - 250,000
VC3	3 - 5	no	100,000 - 250,000
VC4	0 - 2	yes	20,000 - 50,000
VC5	0 - 2	no	<20,000

Each website was tested one by five different test users. The recruitment of test users started in the researchers' own network. Recruited test users were asked to identify other potential test users in their social networks. This is referred to as snowball sampling (Baarda et al., 2009). Hinderer Sova and Nielsen (2003) emphasize the importance of using representative test users, in this case potential volunteers. However, no (generalizable) information was available on this group. Therefore, gender and age of active volunteers (see Introduction) were taken into account when selecting. The recruitment of 35- to 45-year-old respondents in particular was difficult. Among the test users were 13 women and 12 men, ranging in age from 21 to 75 years. The 55- to 65-year-olds (36%) were overrepresented in the group of test users and the 35- to 45-year-olds (4%) were underrepresented in comparison with the national figures. Almost half (48%) of the test users did already volunteer. The composition of relevant tasks (Table 3) was based on research information (van Gilst et al., 2015) about volunteer brokerage and a quick scan of the selected websites by two researchers. The tasks were presented one by one on cards.

Table 3

Test User Tasks

	-
No.	Test user tasks
1.	You have decided to start volunteering in X (= municipality where central office volunteer center
	resides). Use your own research engine to find a website that makes this possible.
2.	You have arrived on the right website. You want to read more information about the organization.
3.	You have scanned the website, but still have some questions. Find a way to contact the organization.
4.	You are satisfied with the information and decide to search for an interesting volunteer job. Find a
	suitable job for you. Please explain why this job is suitable. What do you look for?
4a.	You do not exactly know what kind of job is suitable for you. Find a way to determine what suits you.
	(Only for websites that provides tests.)
5.	You found a volunteer job that interests you. Apply for this job.
5a.	To complete the application, you need to be logged in. Log in. It is a test. You do not have to send
	anything. (Only for websites with login procedure.)

After performing the tasks, test users were asked to specify their opinions on certain elements of the website on a Likert(type)-scale of 1-5. They were also asked to explain their scores. The scoring list consisted of 13 items (Table 4). The items were based on the general principles of interaction design of Nielsen (1995) and the dimensions of usability of Quesenbery (2004).

Verbal comments of the test users were taped and notes were made during the tests. Comments and notes were transcribed and coded. The coding system was based on the tasks and scoring list. Coding was done by two independent researchers using Atlas.ti software (Evers, 2004). The coding results were compared and overall, most codes agreed with each other. When there were differences, they were discussed until agreement was reached. In case no consensus was reached, a third researcher would make the final decision. However, this did not occur.

Before describing the outcomes of the user tests, some limitations of the study should be noted. The generalizability of the outcomes is limited because only five volunteer brokerage websites were tested. However, the greatest value of the study lies in its exemplary function for other volunteer centers that maintain similar volunteer brokerage websites. Secondly, data were lacking on the target group, that is, potential volunteers. The composition of the test panels was therefore based on data on active volunteers. The last limitation has to do with the testers. Because this was testing and not normal circumstances, people may have acted differently or socially desirable.

Results User Testing

On all websites, test users encountered problems when performing the tasks. The most common problems per task are described. It is also indicated on which website(s) these problems occurred.

Almost all test users (88%) used similar word combinations when searching for the right website (task 1): "name of municipality" combined with "volunteer work" or "volunteer". Especially with one website this did not lead to the intended result. This website (VC2) belonged to a volunteer center which was part of an umbrella organization and the volunteer brokerage website was part of the website of the umbrella organization. When looking for information about the volunteer center (task 2) test users were especially interested in information about confidentiality, the history of the volunteer center, what it does, and who runs it. Many test users (48%) indicated that under normal circumstances they would look immediately for volunteer vacancies and skip or postpone the search for general information. At the websites of VC1 and VC4 information on the volunteer center was untraceable. At the other three websites, the information was limited and generally insufficient for test users.

Every website offered two or more (traditional) contact options via the main menu. All users found at least one of these options (task 3). At one website (VC1) this caused some problems, because the contact information was not in the main menu but was somewhat hidden in the footer. Calling and emailing were by far the most preferred ways for test users to get in touch. Social media like Facebook (4) and Twitter (3), which were linked to four of the five websites, were not used. The task of finding a suitable volunteer job (task 4) revealed various problems. The first problem was finding an overview of available volunteer vacancies. This was the case with two out of five test users of the websites VC1, VC2 and VC5. Secondly, the search process at one website (VC5) was complicated by the lack of tools to search the list of available volunteer vacancies. Test users had to scroll the whole list (\pm 75) to find a vacancy of their choice. Users of the other four websites could search using category/keyword functionalities. At another website (VC4) the search process was complicated by a lack of volunteer vacancies. At one point in time only two vacancies were available. Finally, some test users had problems with the description of the vacancies. Information on the target group/person and time investment was missed at three (VC1, VC3, VC4) and one website (VC5) respectively.

Two of the five websites (VC1, VC5) provided one or more tests to help people determine which volunteer job suits them. Users had difficulty finding these tests (task 4a). The tests offered were: a talent scan, a test for young people, and a test for activities in the care sector. A criticism with regard to the talent scan on website VC5 was that the test results were not directly linked to the available volunteer job opportunities.

Problems that arose during the application (task 5) at two websites (VC1, VC3) could be traced back to an unclear or confusing explanation of the procedure. Nevertheless, all users were able to complete the application process.

The Likert(type)-scale scores of elements of the website were generally high (Table 4). At least 60% of the test users gave a score of 4 or 5. This percentage was even higher, 80% or more, at elements such as colors, contrast, feasibility of interaction, appropriateness and engagement. Score 1 was not given at all. Score 2 was given occasionally for ease of use (VC2), terms and grouping (VC3, VC4, VC5), contrast (VC2), layout (VC2), readability (VC2), appropriateness (VC5), ease of learning (VC3, VC4), engagement (VC2, VC4), and efficiency (VC1, VC3). In their comments, test users regularly (36%) attributed their low

scores to the comprehensibility of words in navigation menus and on pages.

Error tolerance was not taken into account in the overall consideration of the scores because only test users (6) who had an error message were asked to give a score for error tolerance. Error messages occurred on three websites (VC1, VC2, VC4). Half of the error tolerance scores were low. This had to do with the fact that no solutions were offered to correct the error.

Table 4

Scoring List and Test Users' Scores

Scoring list	Questions	VC1	VC2	VC3	VC4	VC5
		scores	scores	scores	scores	scores
Based on general	principles of interaction design of					
Nielsen (1995)						
Ease of use	Do you find the navigation of the	4, 4, 5,	5, 3, 2 ,	4, 3, 3,	4, 4, 4,	5, 4, 3,
	website easy to use?	4, 5	5,5	5,4	3,4	4,3
Terms &	Do you find the terms and groups on	4, 4, 4,	4, 5, 3,	4, 3, 2 ,	3, 5, 4,	4, 5, 5,
grouping	the website clear?	5,3	3, 5	5,3	2,4	5,2
Colors	What do you think of the colors used	4, 5, 4,	5, 4, 4,	4, 4, 5,	4, -, 4,	4, 4, 4,
	on the website?	5, 5	3, 5	4, 5	4,4	5,3
Contrast	What do you think of the contrast on	4, 5, 4,	5, 2 , 3,	5, 4, 4,	4, 5, 3,	4, 5, 4,
	the website?	5, 5	4,4	5,4	4,4	5,3
Layout	What do you think of the layout of the	4, 5, 5,	4, 3, 2 ,	4, 3, 3,	4, 4, 4,	5, 4, 3,
	website?	3, 3	4, 5	5,4	3,4	5,4
Visibility	Are the website's interactions (buttons,	4, 3, 5,	4, 3, 5,	4, 4, 4,	4, 5, 4,	3, 3, 4,
interactions	URL-links, texts, and such) clearly	5,3	5,5	5,4	4,3	5,4
	visible?					
Feasibility	Is it clear what is interactive, how to do	-, 5, 5,	4, 5, 5,	5, 3, 5,	3, -, 3,	4, 5, 5,
interactions	the action and when it is completed?	5,4	5, -	5,4	5,4	5,4
Readability	Do you find the website readable?	4, 5, 3,	5, 2 , 4,	3, 3, 3,	3, 5, 3,	5, 5, 5,
		5,4	4, 5	5,4	4,3	5,4
Appropriateness	Do you find the texts appropriate for	4, 4, 5,	-, 5, 4,	5, 4, 3,	3, 5, 4,	2, 4, 4,
	the website?	5,5	5,3	5,4	4,4	5,3
Based on usability	dimensions of Quesenbery (2004)					
Ease of learning	Did you need to learn new things to	4, 4, 5,	4, 5, 3,	4, 2, 4,	4, -, 2,	5, 4, 4,
	understand the website? With other	4,4	3,4	5,3	3,4	4,3
	words: Can you use the website better					
	on a second visit?					
Engagement	Do you like to use the website?	4, 4, 4,	5, 3, 4,	4, 4, 4,	4, 4, 3,	5, 4, 4,
		5,4	2,5	5,4	2,4	5,4
Efficiency	Does the website contribute to the	2, 5, 5,	5, 5, 4,	5, 4, 2,	4, -, 3,	5, 4, 4,
	efficient completion of the tasks?	5,3	3,5	5,3	3,4	4,3
Error tolerance	Does the website help to resolve or	-, -, -,	-, -, -,	-, -, -, -,	1, -, -,	-, -, -, -
	prevent errors?	3,-	2,4	-	2,4	,-

Conclusions and Recommendations

For more than four decades, volunteer centers in the Netherlands offer the service of volunteer brokerage. During this period digitization developed. This has resulted in the expansion of brokerage opportunities and a shift from offline (personal) to online volunteer brokerage via a website.

Usability is important for the success of a website and it can be evaluated through user testing. User testing was applied to measure the usability of five volunteer brokerage websites of volunteer centers. These websites were each subjected to a test by five users. The results showed that test users of these websites encountered various problems while performing the user tasks. There were problems on every website. The problems that were mentioned by test users had to do with either the structure or the content of the website. General structural problems included poor findability of items and lack of appropriate tools, among other things. No/insufficient information and inadequate supply of volunteer vacancies are examples of content problems that test users often encountered. In addition to the general problems, there were also many specific problems that were related to one specific website or test user. By tackling the problems, the websites will become considerably more usable for users in general. This will reduces the chance of users leaving the website and being lost as volunteers. For other volunteer centers the results of the user tests imply that usability is not a matter of course and that it is worthwhile to test their own websites. By means of the user tests insight is provided into the kind of problems users of similar websites encountered while looking for volunteer opportunities. Other volunteer centers can use this insight to critically consider their own websites and (possibly) make adaptations. The test results can also be an incentive for other volunteer centers to study the usability of their own websites. With user testing, a method is provided to do so.

35

It is recommended to perform user tests regularly because a website is constantly changing. The structure and in particular its content are constantly changing. Most volunteer centers probably will not have the knowledge and experience to carry out user tests themselves. They can outsource it to a professional company. However, this is a costly affair. An alternative is to recruit an expert volunteer for testing. Collaboration can also be sought with a technical college/university and let students carry out user tests.

A somewhat remarkable result of the tests was that users did not use the social media available on four websites when searching for contact options. Users preferred traditional contact options. It is interesting to do further research on this, in order to make optimal use of these media. In addition, it is also interesting to investigate to what extent improvement of usability leads to an increase of matches.

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Peace Corps, the 50plus Initiative, and Volunteer Early Termination

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Abstract

Over the past twenty years, there has been a substantial increase in the number of older Americans committing their time to volunteer service programs. Peace Corps, a federal agency that places Volunteers in developing countries' neediest communities for two-year assignments, has embraced this trend. Starting in 2006, Peace Corps launched a targeted marketing campaign, termed the '50plus Initiative,' to recruit older Americans to serve as Peace Corps Volunteers. By 2008, Peace Corps applications from people aged 50 and over had risen by more than 40%. According to Peace Corps policy, there is a strong desire to recruit, process, and place applicants who profile to become Volunteers that will complete these two-year assignments. Volunteers that do not complete their two-year assignment reduce the agency's ability to contribute to the project goals and objectives that have been jointly established by the Peace Corps and the host country and may negatively affect the Peace Corps' relationship with the host country and/or host communities. This study explores the relationship between older Americans serving in the Peace Corps and their rate of early termination as well as their length of service.

Key Words: Peace Corps, volunteerism, older Americans

The Rise in Volunteerism among Older Americans

As members of the baby boomer generation continue to enter retirement age, there has been a substantial increase over the past twenty years in the number of these older Americans committing their time to volunteer and service programs (Tang, Morrow-Howell, & Hong 2009; Corporation for National and Community Service 2006). With many adults enjoying good health well into old age, a growing number of seniors have the stamina to commit to volunteer and service programs (Manton, Gu, & Lamb 2006). Additionally, personal resources of time, experience, skills, and knowledge allow these adults to seek novel and innovative opportunities to contribute to others' welfare (Gerencher 2007; Cheek, Piercy, & Grainger 2013). Researchers have presented many factors that may encourage older Americans to seek out volunteer opportunities during their retirement. These include feelings of altruism and empathy (Penner & Finkelstein 1998), a desire to establish, strengthen, and maintain relationships (Okun & Schultz 2003), a strong sense of community with others (Okun & Michel 2006), attitudes of concern for the next generation (McAdams & de St. Aubin 1992), and a search for variety and meaning in life (King 2000). Overall, improved health, available time, and a driving desire to positively contribute to society have led volunteer and service programs that recruit older Americans to respond by growing in number and scope (Morrow-Howell 2010).

The 50plus Initiative at Peace Corps

Peace Corps has long welcomed older Volunteers, but the agency concedes that the twoyear overseas volunteer experience has traditionally been embraced by young, recent college graduates (Pope 2009, Peace Corps 2010). In 2006, as the commitment to volunteerism among older adults continued to rise, Peace Corps decided to embrace and capitalize on the trend. That year, Peace Corps launched the '50plus Initiative', a targeted marketing campaign to recruit older adults to serve as Peace Corps Volunteers (Lough and Xiang 2014). Peace Corps reasoned that these older Americans had significant professional work experience and technical expertise, are often more mature than the traditional college-aged Volunteers, and bring a unique and desired technical skill set to the host country that enhances and complements the work of the more generalist Volunteers (Peace Corps 2010). The agency also developed a recruitment website marketed directly to older Americans interested in serving as Peace Corps Volunteers, complete with FAQs and the relevant facts about medical care, social security payments, and living situations (Peace Corps 2017b). The website stresses the flexibility that older Americans will have in choosing what country they are sent to, what job they will do, and when they will begin their service. This marketing, called 'role flexibility', highlights the amount of choice older Americans will have to set their own schedules and activities, and has been shown to be a key factor in successful volunteer programs for older Americans (Freedman 2001). To demonstrate their commitment to increasing the number of older Americans serving overseas, the agency adopted an indicator in their 2009-2011 Performance Plan to increase the number of applications from people aged 50 and over (Peace Corps 2009). Two years after the launch of the initiative, Peace Corps applications from people aged 50 and over had risen by more than 40% (Pope 2009).

Early Termination in Peace Corps

There is a strong desire at Peace Corps to recruit and place applicants who profile to become Volunteers that will complete two-year assignments. The Peace Corps Manual, Section 284 (Peace Corps 2017a), states the agency's expectation that once a person becomes a Peace Corps Volunteer, that person has committed themselves to two years of service:

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"Service in the Peace Corps is voluntary, but once the commitment to serve is made, expectations are created on the part of the Peace Corps, the host country, and cooperating agencies. By accepting an invitation, individuals commit themselves to serve the people of the host country to the best of their abilities for a specified period, usually about two

years, within the framework and support systems established by the Peace Corps." However, the Peace Corps Manual explains that there are circumstances under which a Volunteer cannot or should not remain in service until their planned completion date. The agency refers to these Volunteers as "early terminations" (Peace Corps 2017a). According to the agency's own internal assessment, Peace Corps has been concerned with and attentive to early termination rates since its inception (Peace Corps 2010). Indeed, the agency currently collects and analyzes early termination data using a variety of methods, publishes the data annually, and uses the information to discuss ways to improve Volunteer retention with its host countries (Peace Corps 2010). Explaining the reasons for tracking the early termination rates, the agency states that Volunteers that do not complete their two-year assignment reduce the agency's ability to achieve the project goals and objectives that have been jointly established by the Peace Corps and the host country, and may negatively affect the agency's relationship with the host country and its communities (Peace Corps 2016). Demonstrating their commitment to lowering early termination rates, the agency included an indicator in their 2003-2008 Strategic Plan using early termination rates as an indication of their performance (Peace Corps 2004). For the agency's 2009-2014 Strategic Plan, the performance indicator was changed to enhance the length of Volunteer service (Peace Corps 2009). In the agency's 2010 internal review of their policies, processes, and practices, agency leadership adopted recommendations to continue to collect and

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analyze early termination rates, as well as to develop action items when these rates get too high in a particular country of service (Peace Corps 2010).

Summary and Importance

The literature agrees that the numbers of older Americans committing themselves to volunteer service programs has grown and will continue to grow. Peace Corps' 50plus Initiative indicates the agency's desire to capitalize on this trend. A review of Peace Corps publications also reveals that the agency is attentive to the early termination rates and lengths of service of its Volunteers, has a method for tracking them, and actively works to lower early termination rates and increase lengths of service.

Upon review of the Peace Corps' early termination and length of service data, it is clear that the data is entirely descriptive in nature, with no analysis of the relationship or reasons behind the relative differences in early termination rates for various demographic characteristics. Additionally, while a review of the literature indicated that much research has been completed on the rise of volunteerism among older Americans as well as the reasons behind this trend, no literature could be found on older Americans' ability to complete a service program or their level of commitment to a lengthy volunteer assignment. Indeed, Morrow-Howell (2010) suggests that the retention of older volunteers in service programs is a research area that is currently underdeveloped.

Therefore, the purpose of this quantitative study is to explore the relationship between older Americans serving in the Peace Corps and their rate of early termination, as well as their length of service. The importance of understanding this relationship is twofold: 1) As the goals and objectives of Peace Corps projects are jointly established by the agency and the host country, it is important to know if the influx of Volunteers aged 50 and over is augmenting or weakening the Peace Corps' ability to achieve these goals and objectives, as measured by their ability to complete two years of service; and 2) As a federal agency that utilizes American taxpayer dollars to recruit, screen, and place its Volunteers, it is important to know if the Volunteers attributed to the 50plus Initiative provide a good return on investment, as measured by their ability to complete two-year assignments as Peace Corps Volunteers.

Hypothesis

As the literature offers no insight into older Americans' ability to complete a service program nor their level of commitment to a lengthy volunteer assignment, an initial hypothesis for this study is difficult to generate. Older Americans may have higher completion rates and longer lengths of service than their younger colleagues due to their more advanced skill sets and higher sense of utility and productivity due to these skills. Additionally, host countries in Peace Corps typically have a high appreciation for the experience and wisdom that older Volunteers bring, which may increase completion rates and length of service (Pope 2009). However, given that older adults are more likely than younger people to experience chronic conditions that limit their ability to perform certain activities, the extent to which Peace Corps is able to accommodate the changing capacities and health of older adults may negatively affect their ability to complete their service (Morrow-Howell, Hinterlong, Sherraden, et al., 2003).

Therefore, the hypotheses for the chi-square test, which will test the relationship between the early termination rates between Peace Corps Volunteers aged 50 and over and those below the age of 50 will be represented as follows:

H₀: There is no relationship between early termination rates and age group

H_a: There is a relationship between early termination and age group

The hypotheses for the independent samples t-test, which will compare the mean lengths of service between Peace Corps Volunteers aged 50 and over and those below the age of 50 will be represented as follows:

H₀: $\mu_{50\text{plus}} = \mu_{\text{Under 50}}$

Ha: $\mu_{50 \text{ plus}} \neq \mu_{\text{Under 50}}$

METHODS

As the Peace Corps launched its 50plus Initiative in 2006, a dataset that contained all Peace Corps Volunteers that served during the five-year timeframe from 2007 to 2011 was utilized. The dataset was obtained using a SQL database query which was executed by the author during his employment at Peace Corps Headquarters. Setting a start date for the dataset of January 1, 2007 allowed one year for those older Americans recruited in 2006 to clear the application process and begin Peace Corps service in their host country. Setting an end date for the dataset of December 31, 2011 provided a robust dataset that allowed this study to explore Volunteers' early termination rates and lengths of service during the first five years of the 50plus Initiative.

The dataset was cleaned in a variety of ways. First, there are two ways that a Volunteer may begin their Peace Corps service. They may be transferred from another Peace Corps country due to conditions in that country beyond Peace Corps' control, or they may begin their service as a new Peace Corps Volunteer. In order to not inflate length of service numbers, this study was limited to Volunteers that began their service as new Peace Corps Volunteers. Therefore, transferred Volunteers were removed from the dataset. Second, there are three ways that a Volunteer may conclude their Peace Corps service: 1) they may complete their service as scheduled; 2) they may be separated from their service prior to the planned completion date; or

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3) they may pass away during their service. This study was limited to Volunteers that completed

service or were separated from service. Therefore, Volunteers that had died during their service

during this timeframe were removed from the dataset.

The final dataset contained records for 15,521 Peace Corps Volunteers that served during the 2007 to 2011 timeframe. The primary variables utilized in this study are described in Table 1.

Table 1

TABLE 1. Description of Variables							
Variable	Variable	Variable	Variable				
Number	Name	Data Type	Description				
1	Birth Date	Continuous	Indicates the full birth date of the Volunteer				
2	Start Data	Continuous	Indicates the first day of a Peace Corps Volunteer's service,				
2	Start Date	Conditious	including their training				
			Calculated from the Volunteer's birth date and start date.				
3	Age	Continuous	The variable is therefore the age at which the Volunteer				
			started their service				
			Indicates the final day of a Peace Corp Volunteers' service,				
4	End Date	Continuous	and includes those that both successfully completed their				
			service and terminated their service early				
5		Categorical Binary	Indicates whether the Peace Corps Volunteer successfully				
	Ena Code	categorical, binary	completed their service or terminated their service early				
			Recoded from the age variable. It is a binary variable that				
6	Age Group	Categorical, Binary	places all Volunteers into one of two groups: 'Under 50' or				
			'50 plus'				
			Calculated from the Volunteer's start date to their end				
7	Length of Service	Continuous	date, and represents the length of their Peace Cops service				
	_		in days				

Description of Variable

This study utilized SPSS to look at the relationship between Volunteers in the 'Under 50' and '50 plus' age groups. More specifically, the study utilized a chi-square test to analyze the relationship between the two age group categories and the 'End Code' categorical variable. The study then utilized an independent samples t-test to compare the mean lengths of service of the two age groups.

ANALYSIS and DISCUSSION

Descriptive Statistics

To set a foundation for the analysis, Figure 1 presents a histogram of the ages of all Volunteers in the dataset (n=15,521). The average age of Volunteers is 27.07 years, with the majority of Volunteers in their early-to-mid 20s and a noticeable group of Volunteers in their late 50s to early 60s, which increases the overall mean.



Figure 1. Age at Start of Peace Corps Service (2007-2011)

For the purposes of this study, the data was then recoded into two age groups: Volunteers under the age of 50 (Under 50) and Volunteers aged 50 and over (50 Plus). Presented in Table 2 and Figure 2, the Under 50 age group comprises 93% of the new variable (n=14,495), and the 50 Plus age group comprises 6.6% of the variable (n=1,024). While these two age groups are

substantially different in size, both still contain a large enough number of cases on which to run statistical tests.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 50	14495	93.4	93.4	93.4
	50 Plus	1024	6.6	6.6	100.0
	Total	15519	100.0	100.0	
Missing	System	2	.0		
Total		15521	100.0		

Table 2. Binary Age Groups



Table 3 and Figure 3 present the descriptive frequencies for each Volunteers' end code.The end code variable is binary, consisting of Volunteers that completed a full two years of

Peace Corps service (76.1%, n=11,818) and those that were separated from Peace Corps prior to completing the full two years of service (23.9%, n=3,703). Again, these two groups are substantially different in size, but both still contain a large enough number of cases on which to run statistical tests.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completed Service	11818	76.1	76.1	76.1
	Separated from Service	3703	23.9	23.9	100.0
	Total	15521	100.0	100.0	

Table 3. Peace Corps Service End Code



Table 4 and Figure 4 present the descriptive statistics for each Volunteers' length of service. In Figure 4, the histogram shows the wide range of time served in Peace Corps. The data in Table 4 shows us that the minimum number of days served was zero and the maximum was

2072, indicating that some Volunteers quit as soon as they stepped foot off the plane in their country of service and some Volunteers extended their service for a third, fourth, or even fifth year. The high standard deviation (s=262.2) reflects this wide range of time served. The mean number of days served is 703.6, which is approximately 26 days short of a full two years of service.



Figure 4. Length of Service

	N	Minimum	Maximum	Mean	Std. Deviation
Length of Service	15521	0	2072	703.60	262.222
Valid N (listwise)	15521				

Chi-Square Test

Using the age group and end code variables, a chi-square test assessed the relationship between age group and early termination. A chi-square test is appropriate for these variables as there is a simple random sample of Peace Corps Volunteers, all individual expected counts are one or more, and no expected counts are less than five. Additionally, the variables are mutually exclusive and are categorical, making the chi-square test ideal for testing this relationship. As a reminder, the following hypotheses are being tested:

H₀: There is no relationship between early termination rates and age group

H_a: There is a relationship between early termination and age group

In Table 5, we see that there is a difference in the expected count from the observed count of early terminations of 164.8. At 1 degree of freedom, this difference leads to a high Pearson's x^2 statistic of 156.349, as seen in Table 6. The x^2 statistic gives us a p-value of <.001 at the α =0.05 level. This finding means we must reject the null hypothesis and accept the alternate hypothesis that there is a statistically significant relationship between age group and early termination.

			END_(
			Completed Service	Separated from Service	Total
Binary Age Groups	Under 50	Count	11203	3292	14495
		Expected Count	11038.2	3456.8	14495.0
		Residual	164.8	-164.8	
	Over 50	Count	615	409	1024
		Expected Count	779.8	244.2	1024.0
		Residual	-164.8	164.8	
Total		Count	11818	3701	15519
		Expected Count	11818.0	3701.0	15519.0

Table 5, Binar	v Age Groups '	* END CODE	Crosstabulation

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	156.349 ^a	1	.000		
Continuity Correction ^b	155.402	1	.000		
Likelihood Ratio	140.267	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	15519				

Table 6. Chi-Square Tests

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 244.21.b. Computed only for a 2x2 table

As the chi-square test only shows the probability of an existence of a relationship between age group and early termination from Peace Corps, further measures of association are necessary to measure the magnitude of this relationship. For the purposes of this study, the lambda measure was used, as we are interested in the affect that the nominal variable 'age group' has on the likelihood of the nominal variable 'early termination'. Table 7 shows us that the value of lambda is .000. Since lambda uses the scale 0-1, this indicates that there is no relationship between the two variables. This is surprising, as the x² statistic was quite high. However, the lambda measure is quite conservative, as it fears making a Type I error. The lambda measure shows that there is no improvement in predicting the dependent variable (end code) when we know the independent variable (age group). This makes sense, as even though the observed count of early terminations among the 50 plus age group was higher than the under 50 age group, there was still a large number in the 50 plus age group that completed their service. So predicting the end code from the age group will prove difficult or even impossible.

			Value	Asymptotic Standard Error ^a	Approximate T	Approximate Significance
Nominal by Nominal	Lambda	Symmetric	.000	.000		.b
		Binary Age Groups Dependent	.000	.000	b	b
		END_CODE Dependent	.000	.000	,b	.b
	Goodman and Kruskal tau	Binary Age Groups Dependent	.010	.002		.000°
		END_CODE Dependent	.010	.002		.000°

Table 7. Directional Measures

a. Not assuming the null hypothesis.

b. Cannot be computed because the asymptotic standard error equals zero.

c. Based on chi-square approximation

Since the lambda measure is so conservative, the Phi and Cramer's V values were calculated as well. These measures will not allow us to draw any directional conclusions about the two variables, but they will tell us the extent to which the two variables 'hang around together'. Table 8 shows us that the Phi and Cramer's V values are both .100. Again, this indicates that no relationship could be found between the two variables, and confirms the original findings from the lambda measure.

		Value	Approximate Significance
Nominal by Nominal	Phi	.100	.000
	Cramer's V	.100	.000
N of Valid Cases		15519	

Table 8. Symmetric Measures^c

c. Correlation statistics are available for numeric data only.

Independent Samples t-test

Using the age group and length of service variables, an independent samples t-test was utilized to compare the mean lengths of service of the two age groups. An independent samples t-test is appropriate for these variables because there is a simple random sample of two distinct populations of Peace Corps Volunteers and the length of service variable is a continuous variable. This makes the independent samples t-test ideal for comparing the two means. As a reminder, the following hypotheses are being tested:

H₀: $\mu_{50 \text{ plus}} = \mu_{\text{Under } 50}$

Ha: $\mu_{50 \text{plus}} \neq \mu_{Under 50}$

As seen in Table 9, the mean length of service for Volunteers under 50 years of age is 708.3 days. This is actually five days longer than the mean for all Volunteers in the dataset, which Table 4 told us was 703.6 days. The mean length of service for Volunteers aged 50 and over is 637.7 days. This tells us that the Volunteers aged 50 and over served, on average, 70 fewer days than Volunteers under the age of 50.

	Binary Age Groups	N	Mean	Std. Deviation	Std. Error Mean
Length of Service	Under 50	14495	708.34	257.246	2.137
	50 Plus	1024	637.68	316.625	9.895

Table 9. Group Statistics

To see if this difference in the means is significant, we look at the independent samples test table in Table 10. First, the significance value for Levene's test is less than 0.05, so we can not assume equal variances. Therefore, we use the second row of the table to answer our hypothesis. The p-value for our test is .000, indicating that the difference in the means is statistically significant. We can therefore reject the null hypothesis, and accept the alternate hypothesis that the mean lengths of service between the two age groups are not equal. This conclusion is strengthened by the 95% confidence interval of the differences, which ranges from a lower limit of 50.8 days to an upper limit of 90.5 days.

Table 10. Independent Samples Test										
Levene's Test for Equality of Variances				t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Differ Lower	e Interval of the ence Upper
Length of Service	Equal variances assumed	173.342	.000	8.353	15517	.000	70.652	8.458	54.073	87.231
	Equal variances not assumed			6.980	1120.463	.000	70.652	10.123	50.791	90.513

Conclusion

The purpose of this quantitative study was to explore the relationship between older Americans serving in the Peace Corps and their rate of early termination as well as their length of service. From the chi-square test, it was initially found that there is a statistically significant probability of the existence of a relationship between the Peace Corps service end code and the 50 plus and Under 50 age groups ($x^2 = 15.349$, p-value<.001). However, the lambda, Phi, and Cramer's V measures of association told us that no relationship existed. From this data, it can be concluded that Peace Corps is unable to predict a Volunteer's end code simply by looking at their age group. From the independent samples t-test, it was found that the difference between the mean lengths of service between the two age groups is statistically significant (mean difference = 70 days, p-value<.001). From this data, it can be concluded that Volunteers in the 50 plus age group will serve for 70 less days on average than Volunteers under the age of 50, and this difference is statistically significant.

For Peace Corps leadership, these findings indicate that they should continue to recruit older Americans that have shown an interest in sharing their experience and expertise as overseas Peace Corps Volunteers. However, the agency should also be prepared for these older Volunteers to not serve as long as their younger colleagues. This will affect progress towards the goals and objectives of each Peace Corps project, and may affect the relationship between Peace Corps and

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the host communities in which these older Volunteers serve, as the community expects each Volunteer to serve a full two years.

It must be stated that this study has limitations. While a low early termination rate may be a good indicator of Volunteers' resiliency, the measure is not a direct indicator of the impact that Volunteers have on their communities. It is possible that ambitious, highly-skilled, productive, and effective older Peace Corps Volunteers may complete significant projects but still leave their service early. On the other hand, younger, less-skilled, less effective Volunteers may provide just adequate value to their communities, yet stay for the full two years of service. This study does not measure the quality of each age groups' contribution to their host community. This is an area that future researchers, particularly at Peace Corps, will want to pursue. Additionally, future studies should research the qualitative reasons why older Volunteers serve less than two years on average, so that Peace Corps leadership may use this information to inform their decisions on ways to better support older Volunteers during their service.

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