

The Impact of Efforts to Increase Response Rates on Survey Estimates

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Introduction

Survey response rates have steadily declined over the last several years, bringing into question the validity of the data collected. Oftentimes, researchers use multiple survey modes in an effort to increase their study's overall response rate, resulting in what is referred to as a mixed-mode data collection. However, research suggests that an increase in nonresponse does not necessarily produce nonresponse bias, typically a top concern when response rates are low (Groves et al., 2006).

Groves et al. (2006) suggested that nonresponse bias is more likely to occur when the survey title, introduction, etc. emphasize the topic of the survey, thus stimulating interest and participation among those interested in the topic and decreasing the likelihood of response by those not interested in the topic. This is especially likely to cause nonresponse bias when the survey variables are correlated with the interests perceived to be covered in the survey; those who are interested in a topic are likely to have different opinions than those who are not interested in the topic. Thus, nonresponse bias may be influenced more so by the title of the survey and the information provided in the introduction than the response rate itself; the more objective the survey title, the more likely the respondent interest in the survey will be mixed, thus decreasing nonresponse bias.

The Pew Research Center has conducted extensive research on the impact of declining response rates on survey estimates and argues that the time and money spent to increase response rates may produce little to no difference in the survey results. Three studies were conducted at the Pew Research Center that compare survey estimates from a 5-day survey using their "standard" methodology with survey estimates using a "rigorous" methodology with a much longer field period producing a significantly higher response rate. Both the 1997 and 2003 studies reveal differences in survey estimates that were small and "statistically indistinguishable," indicating that although the more rigorous methodology resulted in higher response rates, the survey estimates were about the same (Keeter et al., 2006). Specifically, in the 2003 study, estimates for 77 out of 84 comparable items from the standard and rigorous methodology were not statistically different. Thus, using more resources in an attempt to increase response rates did not impact the quality of the data for the majority of the comparable items. However, it is important to note that the rigorous methodology resulted in a response rate of 50 percent, thus the opinions of half of the population were still not observed. In addition, the results of this study were based on a political survey and may not be generalized to surveys on other topics. These authors, similar to Groves et al. (2006), recommend that a rigorous approach be taken when the level of interest in the survey topic may lead to nonresponse by certain groups and thus cause nonresponse bias.

As in the 1997 and 2003 Pew Research Center studies, the 2012 study found few significant differences in estimates between the standard survey (yielding a lower response rate) and the more rigorous survey which employed techniques aimed at increasing response rates (e.g., longer fielding period, monetary incentives) (Kohut, A, 2012). Although the more rigorous survey methodology resulted in a higher response rate (22% v. 9% for the standard survey), 28 of the 40 estimates showed differences of two percentage points or less; there were three point differences on seven items and four point differences on the remaining five items.

Groves and Peytcheva (2008) conducted a meta-analysis of 59 studies that were designed to estimate the magnitude of nonresponse bias on statistics of interest; using these 59 studies, methodological design factors, including features of the survey itself, characteristics of the sample, and survey statistics used to analyze results that produce a relationship between nonresponse rates and nonresponse bias, were identified. Groves and Peytcheva's strongest finding was that, although high response rates can reduce the risk of bias, as previously discussed, high response rates are less likely to reduce the risk of bias when the motivation to participate is highly correlated with the survey variables. Similarly, a secondary finding was that survey estimates most likely to show nonresponse bias are those assessing the cause of survey participation (e.g., Why did you choose to participate in this survey?).

Some nonresponse research has focused on early versus late responders to determine whether these two groups are statistically different, under the assumption that later responders are similar to non-responders (Irani, T. A. et al.,

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2004, Paganini-Hill et al., 1993). Other studies focus on comparing early responders with all respondents to determine whether additional efforts to increase response rates (after early responders submitted their data) led to statistically different results (Groves, R. M., 2006 and Millar, M. M. & Dillman, D. A., 2011). The current study uses this methodology to determine whether additional efforts to increase response rates to a dual-mode Army survey (web and paper) impacted the survey results. Specifically, the current research investigates whether the survey estimates would be statistically different if the survey had been closed earlier, thus not including late responders. The current study expands on the findings from the Pew Research Center's studies by investigating estimates from data collected via web and paper, whereas the Pew Research Center's analyzed data collected via telephone surveys.

As discussed above, the current study uses survey data from a mixed-mode survey, web and paper. There are several advantages of employing a mixed-mode data collection, including a decrease in non-response and the potential bias associated with non-response due to the respondent having more than one choice of mode, and a reduction in cost when a lower cost survey mode is used for a substantial portion of the sample (VanNieuwenhuyze, J. et al., 2010). However, there are disadvantages to using a mixed-mode data collection as well, the most significant being the potential for the introduction of bias, including selection and measurement effects. Selection effects occur when different types of respondents choose different survey modes. However, this same bias of self-selection into one survey mode over another can contribute to increased response rates compared to a single-mode survey. Measurement effects result from a respondent's answer being influenced by the survey mode they are using (i.e., the participant would respond differently if they answered the same survey using a different mode). Given possible selection and measurement effects, the current study analyzes results for the web and paper version of the survey separately. We investigate whether or not estimates from data collected via web and paper modes of survey administration are differentially impacted by a shorter, less rigorous data collection period.

Response Rates and Nonresponse Bias of Web Surveys Compared to Other Survey Modes

Research shows that response rates of web surveys are typically lower than other survey modes. In a meta-analysis of 45 published and unpublished experimental comparisons between web and other survey modes, Manfreda et al. (2008) found that web surveys yield, on average, an 11% lower response rate than other survey methods. Several reasons for this difference were identified, including security and privacy concerns; a lack of new techniques to decrease non-response rates in web surveys (e.g., prepaid monetary incentives do not work for web surveys when the incentive is transferred electronically); limited web literacy among certain segments of internet users (e.g., lack of knowledge of how to access and fill out a web-based survey); low frequency of computer use by some individuals; and technical limitations, such as software incompatibilities and long or irregular loading times. When specifically comparing web surveys to paper surveys, web surveys may yield lower response rates due to 1) the lack of a continuous reminder (e.g., there is no hard copy of the survey sitting on a respondent's desk); 2) an invitation to participate via email is more likely to be overlooked than an invitation via postal mail; and 3) potential respondents are more likely to perceive email invitations as spam and less legitimate than postal mail invitations.

One possible solution to low web survey response rates is to use a multi-mode approach. In a study by Beebe, T. J. et al. (2012), web survey non-respondents were contacted by phone after two mailings for follow-up. Response rates and nonresponse bias were studied to determine the impact of the multi-mode and follow-up approach. Although response rates increased, nonresponse bias did not decrease.

In a study by Shin, E. et al. (2012), overall unit and item response rates were compared for Gallup panel members who were sent web surveys and members who were sent mail surveys. Overall, the web survey yielded significantly lower response rates compared to the mail survey (72.9% v. 67.0%, or 9% lower for the web survey). However, it is important to note that sample members were not randomly assigned to receive the web or the mail survey; instead, they were strategically placed into one group or the other based on their frequency of internet use and whether they provided an e-mail address; one may hypothesize that the difference in response rates may have been more dramatic

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if sample members had been randomly assigned to the two groups. Item nonresponse rates were also investigated; results indicated item nonresponse was significantly lower on the web survey than on the mail survey (an average of 0.3 items on the web survey v. 2.2 on the mail survey). In addition, web respondents were more likely to have no missing items (85% for the web survey v. 63% for the mail survey). Of particular importance was the lower item nonresponse rate to the height (0.6% v. 7.5%) and weight (1.2% v. 8.2%) questions, characteristically perceived as sensitive information, on the web survey compared to the mail survey, indicating respondents may be more willing to provide sensitive information on a web survey. The web survey also elicited more open-ended comments at the end of the survey compared to the mail survey (item/comment response rate of 19.6% web vs. 15.1% mail). These findings suggest that respondents who make the decision to take a survey are more likely to provide complete information on a web survey than on a mail survey. However, future research may investigate the quality of the data provided using each survey mode.

Borkan, B. (2010) also studied mode effects for web versus paper surveys. Again, overall unit response rate was lower for the web survey than for the paper survey. Contrary to Shin et al.'s (2012) findings, item non response rates did not differ by mode, except for a question on respondent age. However, it is important to note that non-respondents were followed up with the opposite survey mode (e.g., those that did not respond to the web survey were sent a paper survey). By gathering additional data in the mode the respondent may have been more comfortable with, a potential item nonresponse effect may have been eliminated. In addition to higher response rates to the mail survey, Borkan, B. (2010) studied how the opposite mode follow-up impacted response rates. The overall response rate increased by 16% when mail survey non-respondents were followed up with web surveys and 87% when web survey non-respondents were followed up with paper surveys. This may have implications for cost savings in multi-mode studies as a researcher can attempt to get a response using a web survey first and only follow up with a paper survey for those who do not respond by web. However, it is important to note that overall response rates were higher when the paper survey was followed up by a web survey than vice versa (51% v. 40%). Borkan, B. (2010) also found no mode effect on the psychometric quality of the items with a rating scale; however, findings support previous studies that participants may respond differently to background questions (e.g., race, gender) on a web-based versus a paper-based survey.

Due to the mode differences identified in previous research, the current study analyzes data collected via web separately from data collected via paper-and-pencil surveys received through postal mail.

Method

The 2012 Army Morale Welfare and Recreation (MWR) Survey was a mixed-mode survey (web and paper) administered in the spring of 2012, and used a stratified random sample by patron group (i.e., active duty Army, spouses, retirees, and civilians) and Army Garrisons (75 Army sites) to ensure data were captured on the groups of interest to the Army Morale, Welfare, and Recreation office.

The web survey was in field for approximately 10 weeks, launching on March 12th and closing on May 24th; the paper survey was in field for about eight weeks, with the first of two Mail Out Packages (MOPs), including a letter about the survey and a copy of the paper survey, being sent between March 23 and April 4, 2012 (see Table 1). In an effort to encourage web participation, email reminders were sent between March 19th and March 23rd; a second set of email reminders were sent between March 29 and April 4. To ensure that all sample members were contacted, USPS reminders were also utilized, with the first USPS reminders being sent between April 9th and April 19th; a second set of USPS reminders were sent between May 2nd and May 11th. Both sets of USPS reminders included the web address and login information to enable online participation; the instructions also included information on how to submit a paper survey (included in the MOPs). In the intervening time (between the first and second USPS reminders), a second set of MOPs were sent to encourage survey participation via paper-and-pencil.

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Table 1.
Survey Administration Schedule

Pre-notification email	February 29-March 6
Email announcement	March 12 – March 16
Email reminder	March 19 – March 23
Mail Out Packages (MOPs) ¹	March 23 – April 4
2 nd email reminder	March 29 – April 4
USPS reminder ²	April 9 – April 19
2 nd Mail Out Packages (MOPs) ¹	April 18 – April 24
2 nd USPS reminder ²	May 2 – May 11
End of survey administration	May 24

¹ Included URL and password and a paper copy of the survey

² Included URL and password

The data collection time periods for analysis were based on the survey schedule to most closely capture which event led to participation. Since the web survey was in the field two weeks longer than the paper survey, the web analysis was broken into three time periods instead of two as in the case of the paper survey (see Table 2).

Web survey data were analyzed by the following time periods:

- Data collected during the first two weeks of the web survey administration (following the pre-notification email, email announcement, and 1st email reminder)
- Data collected during the first four weeks of the web survey administration (following the above notifications, and the 1st Mail Out Package (MOP) and 2nd email reminder)
- Data collected during the first seven weeks of the web survey administration (following the above notifications, and the 1st USPS reminder and 2nd MOPs)
- Data collected during the entire web administration (following the above notifications, and the 2nd USPS reminder)

Paper survey data were analyzed by the following time periods:

- Data collected during the first two weeks of the paper survey administration (following the pre-notification email, email announcement, 1st email reminder, 1st Mail Out Package (MOP), and 2nd email reminder)
- Data collected during the first five weeks of the paper survey administration (following the above notifications, and the 1st USPS reminder and 2nd MOPs)
- Data collected during the entire paper administration (following the above notifications, and the 2nd USPS reminder)

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Table 2.
Count of Eligible Surveys Received by Survey Type and Time Period

Period of data collection	Tools to obtain responses	Web		Paper	
		N	% of web responses	N	% of paper responses
0 to 2 weeks	Email announcement 1 st email reminder	10,765	33%		
2 to 4 weeks	1 st Mail Out Packages 2 nd email reminder	11,039	34%	10,772	45%
4 to 7 weeks	1 st USPS reminder 2 nd Mail Out Packages	7,657	23%	8,406	35%
7 to 10 weeks	2 nd USPS reminder	3,329	10%	4,725	20%
		32,790 ¹		23,903	

¹58% responded using the web survey.

Note: The email announcement with instructions on how to complete the web survey began on March 12, 2012; mailing of the first Mail Out Packages (MOPs) for the paper survey began on March 23, 2012. Thus, data were collected via web ~2 weeks longer than via paper.

One-third of web respondents completed the questionnaire during the first two weeks of the web survey administration, during which a pre-notification, the email announcement, and an email reminder were sent. Two-thirds (67%) of web respondents completed the questionnaire during the first four weeks of the web administration, which included the notifications sent during the first two weeks of the web administration and the first Mail Out Packages (MOPs) and 2nd email reminder. Another quarter of web respondents completed the survey during the next three weeks of the web administration, which included the 1st USPS reminder and the 2nd MOPs; the final 10% of web respondents completed the questionnaire during the last three weeks of the web administration, which included the 2nd and last USPS reminder.

Almost half (45%) of paper respondents completed the questionnaire during the first two weeks of the paper survey becoming available, during which, in addition to electronic notifications (email announcement, 1st email reminder, and 2nd email reminder), the 1st MOPs were sent out. Four-fifths (80%) of paper respondents completed the questionnaire during the first five weeks of the paper survey becoming available which, in addition to the notifications above, included the 1st USPS reminder and the 2nd MOPs. The final 20% of paper respondents completed the survey during the last three weeks of the administration, which included the 2nd USPS reminder.

The current study compares early responders with all respondents to determine whether additional efforts (e.g., email and USPS reminders) to increase response rates to a mixed-mode Army survey (web and paper) impacted survey estimates. Specifically, the current research investigates whether survey estimates would have been statistically different if the survey had been closed earlier with a lower response rate, and some of the notifications, such as the 2nd MOPs, which included a paper copy of the survey, and the two USPS reminders had not been sent. Results may be considered in the future to potentially lower the costs of future survey administration.

Results are analyzed by the four patron groups of interest to the Army: active duty members, spouses of active duty members, retirees, and civilians. Twenty survey items were analyzed to test for differences in survey estimates based on the various data collection cut-off dates.

Analysis

The majority of results of the 2012 Army Morale, Welfare, and Recreation (MWR) Services survey were reported in terms of the percent satisfied or agreement with positive statements regarding MWR programs and services, by patron group (i.e., spouse, active duty, retiree, or civilian). The percent 'satisfied' or 'very satisfied' were combined,

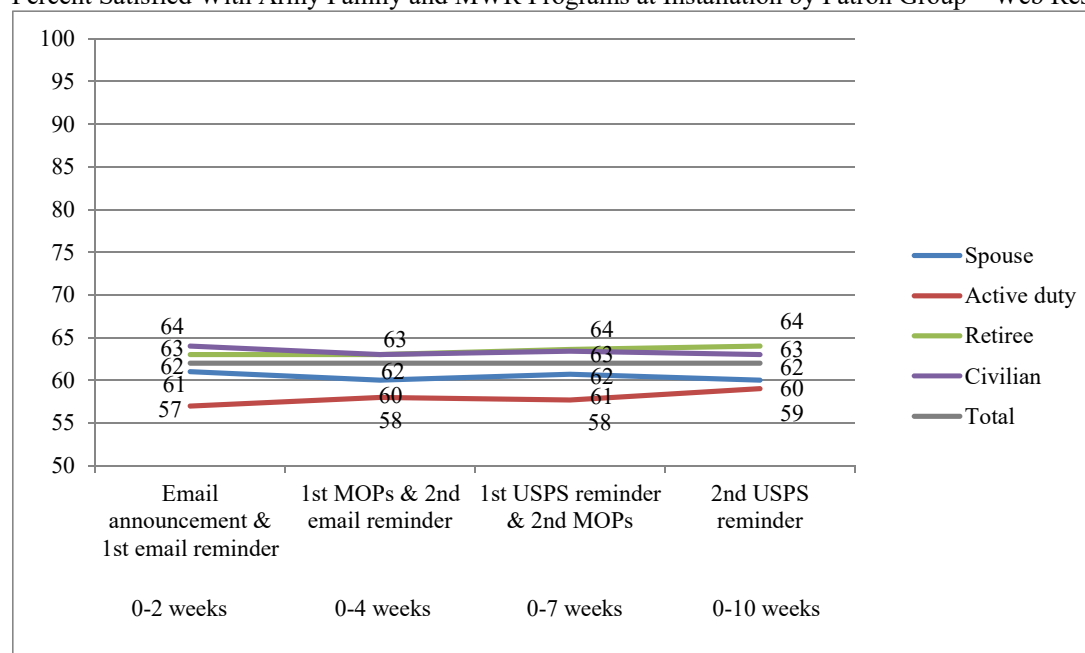
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as were the percent who ‘agreed’ or ‘strongly agreed’ with statements. We selected a set of questions that capture questions that were asked of all respondents and questions that were only asked of a subset of respondents (e.g., some questions were only asked of those who indicated using a specific program or service).

Figures 1 through 3 are provided to visually display changes in the survey estimates over the web survey administration period by patron group. Figure 1 presents the percent of web respondents who indicated they were satisfied with Army Family and MWR programs (item asked of all respondents) by patron group for web respondents as additional data were collected over the survey administration. If the web survey had been closed after just two weeks in the field, survey estimates (for percent satisfied) would have differed by up to two percentage points depending on patron group, whereas if the survey had closed at either the four or seven week mark, survey estimates would have differed by up to just one percentage point (none of these differences were statistically significant). Table 3 presents total differences for 20 measures analyzed for web respondents. Results by patron group are presented in Tables 4-7.

Figure 1.

Percent Satisfied With Army Family and MWR Programs at Installation by Patron Group – Web Respondents



Figures 2 and 3 present the same information as Figure 1 for two additional survey items based on web respondents - satisfaction with Family and MWR Army entertainment (item asked of all respondents) and agreement that Army child, youth, and school age programs are a valuable benefit to them (item asked only of respondents who indicated they have children under 18 that live in their home or stay with them often). If the web survey had been closed after just two weeks in the field, survey estimates for the percent satisfied with Family and MWR Army entertainment would have differed by up to four percentage points depending on patron group (statistically significant difference for spouses, $p < .05$), whereas if the survey had closed at either the four or seven week mark, survey estimates would have differed by up to just one percentage point (none of these differences were statistically significant). Similarly, if the survey had been closed after two weeks in the field, survey estimates for the percent who agreed Army child, youth, and school age programs are a valuable benefit to them would have differed by up to five percentage points depending on patron group (statistically significant difference for spouses, $p < .05$), whereas if the survey had closed at the four week mark, survey estimates would have differed by up to just two percentage points; at the seven week mark, by up to just one percentage point.

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Figure 2.

Percent Satisfied With Family and MWR Army Entertainment by Patron Group – Web Respondents

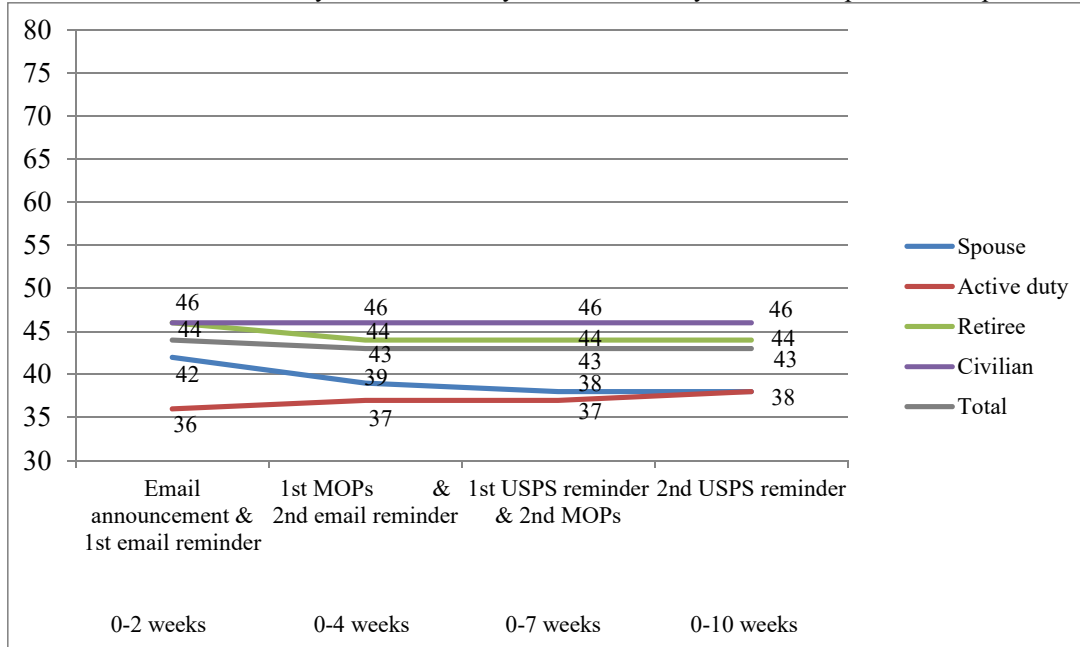
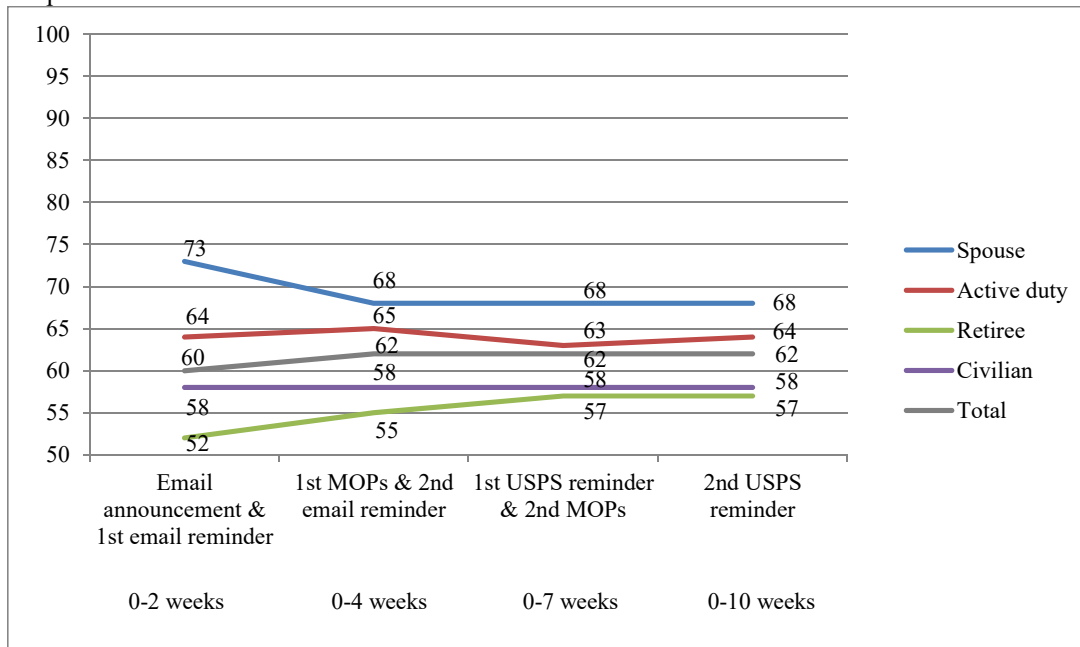


Figure 3.

Percent Agree Army Child, Youth, and School Age Programs are a Valuable Benefit to me by Patron Group – Web Respondents



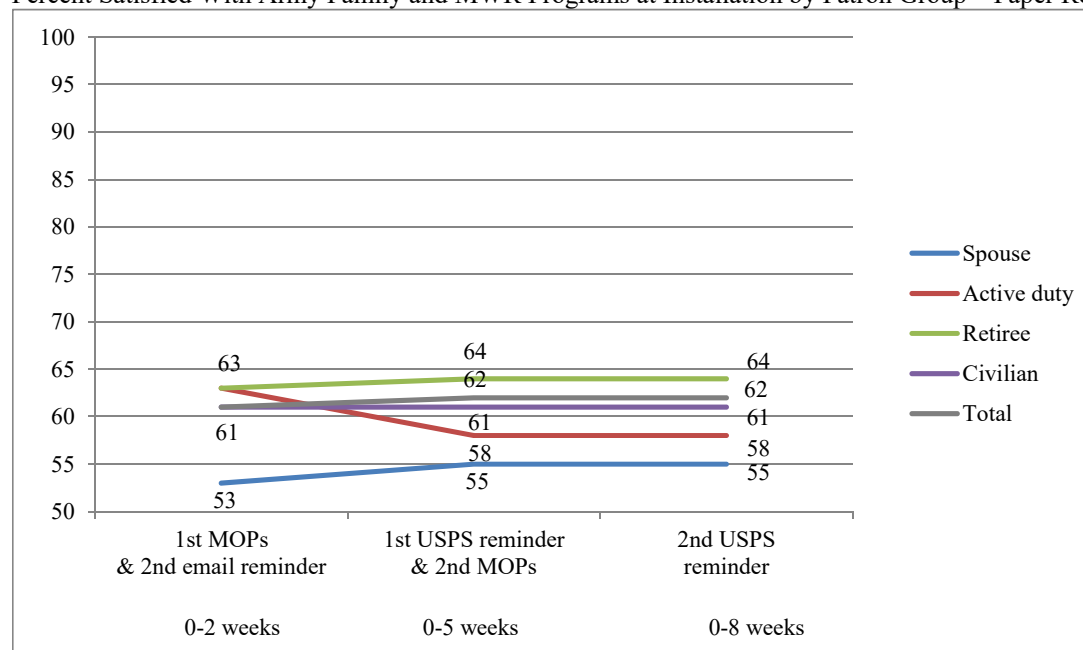
Similar to Figures 1-3, Figures 4-6 presents data for paper respondents for the same three survey items to visually display changes in the survey estimates over the paper survey administration period by patron group. Results indicate a more dramatic change in paper survey estimates over time than in the web survey estimates, with an implication that the paper survey would need to be in the field for at least five weeks before survey estimates stabilize.

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Figure 4 presents the percent of paper respondents who indicated they were satisfied with Army Family and MWR programs (item asked of all respondents) by patron group for paper respondents as additional data were collected over the survey administration. If the paper survey had been closed after just two weeks in the field, survey estimates (for percent satisfied) would have differed by up to five percentage points statistically significant difference for active duty members, $p < .05$) depending on patron group, whereas if the survey had closed at the five week mark, survey estimates would have been the same, regardless of patron group. Table 8 presents total differences for 20 measures analyzed for paper respondents. Results by patron group are presented in Tables 9-12.

Figure 4.

Percent Satisfied With Army Family and MWR Programs at Installation by Patron Group – Paper Respondents



Figures 5 and 6 present the same information as Figure 4 for two additional survey items based on paper respondents - satisfaction with Family and MWR Army entertainment (item asked of all respondents) and agreement that Army child, youth, and school age programs are a valuable benefit to them (item asked only of respondents who indicated they have children under 18 that live in their home or stay with them often). If the paper survey had been closed after just two weeks in the field, survey estimates for the percent satisfied with Family and MWR Army entertainment would have differed by up to eight percentage points depending on patron group (statistically significant difference for civilians, $p < .05$), whereas if the survey had closed at the five week mark, survey estimates would have differed by up to just one percentage point (none of these differences were statistically significant).¹

Similarly, if the survey had been closed after two weeks in the field, survey estimates for the percent who agreed Army child, youth, and school age programs are a valuable benefit to them would have differed by up to twelve percentage points depending on patron group (statistically significant difference for active duty members and civilians, $p < .05$), whereas if the survey had closed at the five week mark, survey estimates would have differed by up to three percentage points (none of these differences were statistically significant). (See Figure 6)

¹ Note that estimates presented in the figure have been rounded, thus some differences appear one percentage point more or less than the information reported in the text.

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Figure 5.

Percent Satisfied With Family and MWR Army Entertainment by Patron Group – Paper Respondents

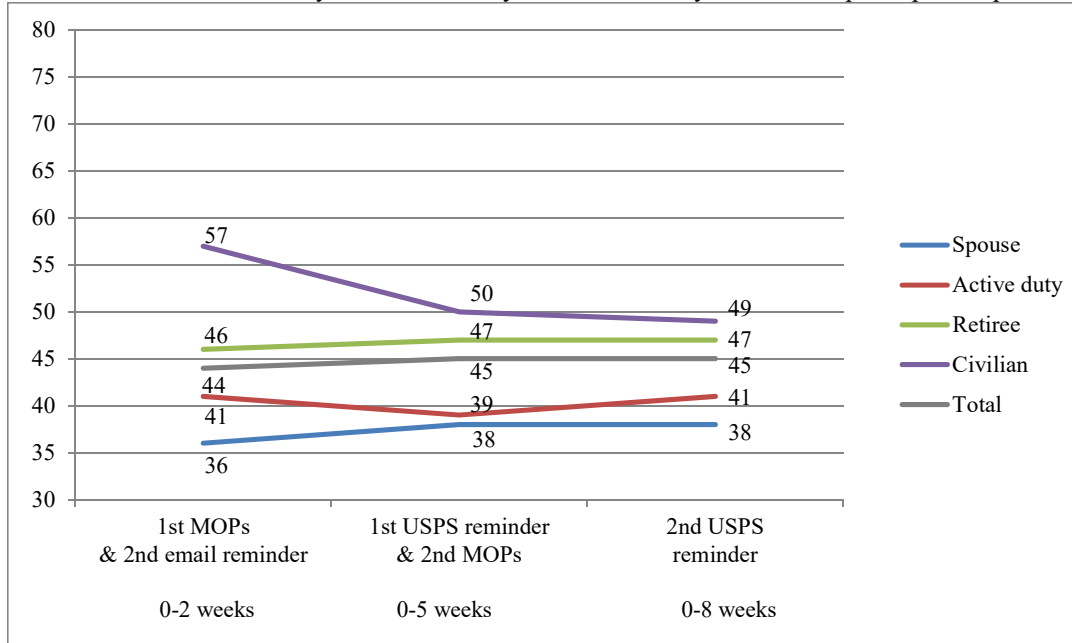
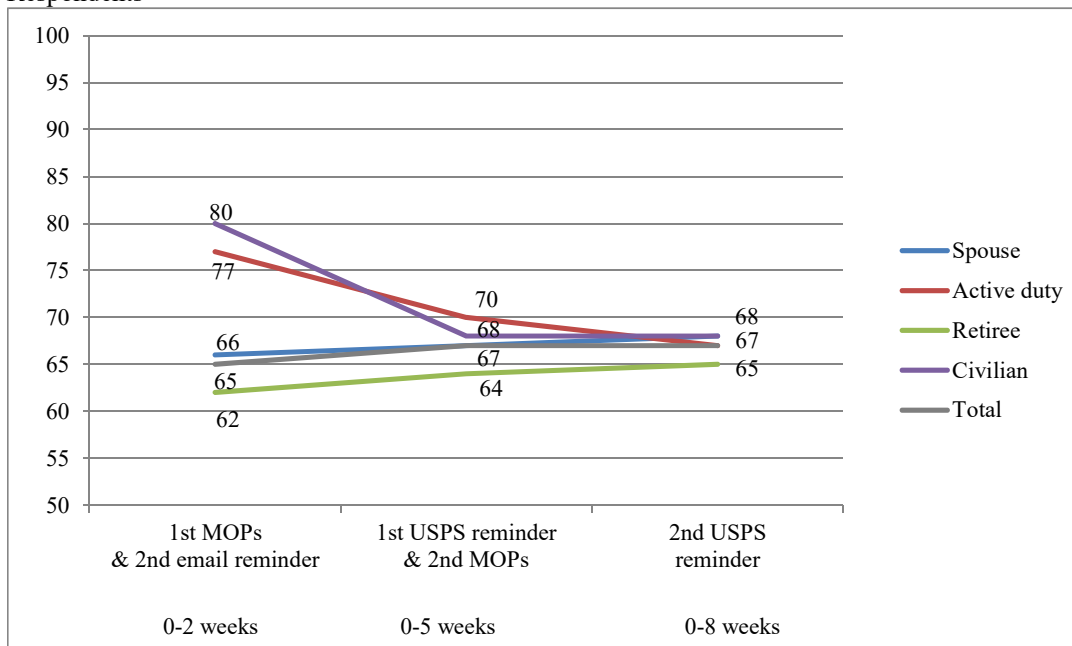


Figure 6.

Percent Agree Army Child, Youth, and School Age Programs are a Valuable Benefit to me by Patron Group – Paper Respondents



Findings and Conclusions

Web

Across the 20 measures analyzed, web survey estimates by patron group differed by 0 to 2 percentage points between estimates from data collected during the first four weeks of data collection and the full administration. However, these differences were not statistically significant ($p < .05$). Differences were between 0 and 1 percentage points between estimates from data collected during the first seven weeks of data collection and the full administration by patron group; none of these differences were statistically significant ($p < .05$). Differences were much larger, up to 13 percentage points, between estimates from data collected during the first two weeks of data collection and the full administration, several of these differences being statistically significant ($p < .05$) (see Tables 3-7). Differences tended to be largest for active duty spouse and retiree respondents for the two week to full administration comparison.

Web survey estimates stabilized after four weeks into the web administration and a 15% response rate. Thus, a web administration of this population that achieves a response rate of at least 15% is necessary (given the same sample design); fewer email and USPS reminders may be used to achieve this. Data collected beyond the first four weeks of the web survey administration had little to no impact on survey results (i.e., differences were not statistically significant), though the collection of additional data could be necessary for minimizing variance.

Paper

Across the 20 measures analyzed, paper survey estimates by patron group differed by 0 to 4 percentage points between estimates from data collected during the first five weeks of data collection and the full administration; five of the 20 estimates were statistically different ($p < .05$) (see Tables 8-12). Differences were much larger, up to 16 percentage points, between estimates from data collected during the first two weeks of data collection and the full administration. Differences tended to be largest for active duty and civilian respondents for the two week to full administration comparison.

Most of the paper survey estimates stabilized after five weeks into the paper administration and a 15% response rate. However, as discussed above, five of the 20 measures analyzed showed statistically significant differences between estimates obtained during the first five weeks of the paper administration and the full paper administration. Thus, evidence suggests that a paper administration of this population would need to achieve a higher response rate (higher than 15% given the same sample design) for survey estimates to stabilize.

Limitations

This study had more power than the typical survey, with a total sample of over 250,000 Army members. The findings of this study may differ with smaller sample sizes. Even after just two weeks into the administration of each mode, approximately 22,000 respondents had submitted a survey in one of the two modes (i.e., about 11,000 respondents in each mode). A survey with a smaller sample would have less power, thus potentially suffering from larger margins of error with lower response rates. Smaller sample sizes can also yield more unstable results. In addition, respondents could choose between modes in the current study, thus there was no way of knowing what motivated their participation (e.g., a mail out package with a paper copy of the survey may have reminded a participant to fill out the survey online).

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Table 3.

Differences in Web Survey Estimates by Survey Close Date – Total Army

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 4 weeks	ME	Estimate - 0 to 7 weeks	ME	Estimate - 0 to 10 weeks	ME
Satisfied with Army Family and MWR programs at installation	99%	62.2	0.9	62.1	0.6	62.2	0.6	62.2	0.5
Rated current installation's Army Family and MWR programs higher compared to other places stationed	83%	42.0	1.0	43.1	0.7	43.5	0.6	43.4	0.6
Satisfied with Family and MWR Army Entertainment	79%	44.0	1.0	43.1	0.7	42.8	0.6	42.9	0.6
Agreement that Army child, youth, and school age programs are a valuable benefit	27%	60.3	1.8	61.6	1.3	62.1	1.1	62.4	1.0
Use Army Child Care services	39%	20.0	1.2	20.4	0.9	21.1	0.8	21.2	0.7
Agree that participating in MWR programs and services provides a healthy way to relieve stress	85%	71.9	0.9	70.9	0.7	70.7	0.6	70.8	0.5
Satisfied with military life	30%	81.1	1.5	80.9	1.0	80.5	0.8	80.2	0.8
Plan to stay in the Army beyond my present obligation or longer	15%	88.3	1.4	87.3	1.2	86.7	1.0	86.2	1.0
Increase in use of Family and MWR programs and services during a deployment	18%	46.7	2.6	42.2	1.7	42.3	1.4	42.4	1.3
Used on post outdoor recreation center in the past 12 months	97%	39.6	0.9	36.9	0.6	36.4	0.6	36.7	0.5
Participated in activities at the on post bowling center in the past 12 months	96%	37.9	0.9	35.4	0.6	35.1	0.6	35.3	0.5
Interested in golf	96%	38.9	0.9	38.9	0.7	38.9	0.6	38.9	0.5
Interested in weight/strength training	95%	72.2	0.9	70.0	0.6	70.1	0.5	70.6	0.5
Interested in cardiovascular training	96%	83.5	0.7	82.1	0.5	82.2	0.4	82.4	0.4
Satisfied with on post fitness facilities	56%	87.5	0.8	88.3	0.6	88.6	0.5	88.6	0.5
Interested in going to the movies	95%	78.4	0.8	78.0	0.6	78.4	0.5	78.9	0.5
Satisfied with the on post Leisure Travel/Ticket Office	29%	81.1	1.3	81.7	1.0	82.0	0.8	81.6	0.8
Children interested in bowling	38%	64.5	1.5	64.5	1.0	64.4	0.9	64.3	0.8
Satisfied with food and beverage service	39%	50.6	1.5	50.2	1.1	50.3	0.9	50.4	0.9
Eat out for dinner off post at least once per month	93%	72.7	0.9	73.3	0.6	72.8	0.5	72.8	0.5

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

Bolded estimates indicate a statistically significant difference from the estimate obtained from the full web survey administration at $p < .05$.

¹ Difference in survey estimates between 1st two weeks of data collection and full administration

² Difference in survey estimates between 1st four weeks of data collection and full administration

³ Difference in survey estimates between 1st seven weeks of data collection and full administration

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Table 4.

Differences in Web Survey Estimates by Survey Close Date – Active Duty Army Spouses

	Percent Responding	Estimate - 0 to 2 weeks ME		Estimate - 0 to 4 weeks ME		Estimate - 0 to 7 weeks ME		Estimate - 0 to 10 weeks ME	
Satisfied with Army Family and MWR programs at installation	99%	61	5.2	60	2.0	61	1.5	60	1.4
Rated current installation's Army Family and MWR programs higher compared to other places stationed	83%	33	5.2	36	2.1	37	1.6	37	1.5
Satisfied with Family and MWR Army Entertainment	82%	42	5.6	39	2.2	38	1.7	38	1.5
Agreement that Army child, youth, and school age programs are a valuable benefit	52%	73	6.4	68	2.6	68	2.0	68	1.8
Use Army Child Care services	67%	45	6.6	32	2.3	33	1.8	33	1.6
Agree that participating in MWR programs and services provides a healthy way to relieve stress	90%	71	5.1	67	2.0	67	1.5	67	1.4
Satisfied with military life	99%	81	4.1	80	1.6	80	1.2	80	1.2
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	66%	30	5.8	32	2.3	34	1.8	34	1.7
Used on post outdoor recreation center in the past 12 months	98%	48	5.3	39	2.0	40	1.5	40	1.4
Participated in activities at the on post bowling center in the past 12 months	97%	61	5.3	50	2.0	51	1.6	50	1.5
Interested in golf	97%	36	5.2	30	1.9	30	1.4	30	1.3
Interested in weight/strength training	97%	82	4.2	77	1.7	77	1.3	78	1.2
Interested in cardiovascular training	97%	93	2.8	90	1.2	91	0.9	91	0.8
Satisfied with on post fitness facilities	62%	88	4.1	88	1.6	89	1.2	89	1.2
Interested in going to the movies	97%	91	3.1	92	1.1	92	0.9	92	0.8
Satisfied with the on post Leisure Travel/Ticket Office	32%	70	7.3	78	2.9	78	2.3	77	2.1
Children interested in bowling	66%	69	6.3	63	2.4	64	1.8	65	1.7
Satisfied with food and beverage service	32%	45	8.0	47	3.5	46	2.7	47	2.5
Eat out for dinner off post at least once per month	95%	83	4.2	79	1.7	78	1.3	78	1.2

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

Bolded estimates indicate a statistically significant difference from the estimate obtained from the full web survey administration at $p < .05$.

¹ Difference in survey estimates between 1st two weeks of data collection and full administration

² Difference in survey estimates between 1st four weeks of data collection and full administration

³ Difference in survey estimates between 1st seven weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 5.

Differences in Web Survey Estimates by Survey Close Date – Active Duty Army

	Percent Responding	Estimate - 0 to 2 weeks ME		Estimate - 0 to 4 weeks ME		Estimate - 0 to 7 weeks ME		Estimate - 0 to 10 weeks ME	
Satisfied with Army Family and MWR programs at installation	99%	57	2.1	58	1.7	58	1.4	59	1.3
Rated current installation's Army Family and MWR programs higher compared to other places stationed	92%	36	2.1	36	1.7	36	1.5	37	1.4
Satisfied with Family and MWR Army Entertainment	80%	36	2.3	37	1.8	37	1.6	38	1.5
Agreement that Army child, youth, and school age programs are a valuable benefit	43%	64	3.1	65	2.4	63	2.1	64	2.0
Use Army Child Care services	53%	26	2.5	28	2.0	28	1.8	28	1.7
Agree that participating in MWR programs and services provides a healthy way to relieve stress	90%	76	1.9	78	1.5	76	1.3	76	1.2
Satisfied with military life	99%	81	1.7	81	1.3	81	1.2	80	1.1
Plan to stay in the Army beyond my present obligation or longer	92%	88	1.4	87	1.2	87	1.0	86	1.0
Increase in use of Family and MWR programs and services during a deployment	54%	50	2.9	51	2.3	52	2.0	52	1.8
Used on post outdoor recreation center in the past 12 months	97%	47	2.2	46	1.7	45	1.5	45	1.4
Participated in activities at the on post bowling center in the past 12 months	94%	53	2.2	53	1.7	51	1.5	51	1.4
Interested in golf	95%	45	2.2	45	1.7	45	1.5	45	1.4
Interested in weight/strength training	95%	85	1.5	86	1.2	85	1.1	85	1.0
Interested in cardiovascular training	95%	90	1.3	90	1.0	90	0.9	90	0.8
Satisfied with on post fitness facilities	78%	88	1.6	88	1.2	88	1.1	88	1.0
Interested in going to the movies	94%	85	1.6	86	1.2	86	1.0	86	0.9
Satisfied with the on post Leisure Travel/Ticket Office	29%	79	3.2	79	2.5	79	2.2	79	2.0
Children interested in bowling	53%	65	2.7	66	2.2	65	1.9	65	1.8
Satisfied with food and beverage service	41%	51	3.4	50	2.7	50	2.3	51	2.1
Eat out for dinner off post at least once per month	91%	76	1.9	75	1.5	74	1.3	74	1.2

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

Bolded estimates indicate a statistically significant difference from the estimate obtained from the full web survey administration at $p < .05$.

¹ Difference in survey estimates between 1st two weeks of data collection and full administration

² Difference in survey estimates between 1st four weeks of data collection and full administration

³ Difference in survey estimates between 1st seven weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 6.

Differences in Web Survey Estimates by Survey Close Date – Army Retirees

	Percent Responding	Estimate - 0 to 2 weeks ME		Estimate - 0 to 4 weeks ME		Estimate - 0 to 7 weeks ME		Estimate - 0 to 10 weeks ME	
Satisfied with Army Family and MWR programs at installation	99%	63	2.1	63	1.1	64	1.0	64	0.9
Rated current installation's Army Family and MWR programs higher compared to other places stationed	89%	41	2.2	47	1.3	48	1.1	48	1.0
Satisfied with Family and MWR Army Entertainment	79%	46	2.4	44	1.3	44	1.1	44	1.1
Agreement that Army child, youth, and school age programs are a valuable benefit	13%	52	5.3	55	3.3	57	2.8	57	2.6
Use Army Child Care services	24%	9	2.2	7	1.2	7	1.1	7	1.0
Agree that participating in MWR programs and services provides a healthy way to relieve stress	82%	73	2.0	70	1.2	71	1.0	71	1.0
Satisfied with military life	0%	N/A		N/A		N/A		N/A	
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	0%	N/A		N/A		N/A		N/A	
Used on post outdoor recreation center in the past 12 months	98%	43	2.2	33	1.1	32	0.9	33	0.9
Participated in activities at the on post bowling center in the past 12 months	97%	41	2.2	28	1.1	27	0.9	28	0.9
Interested in golf	97%	43	2.2	43	1.2	43	1.0	43	1.0
Interested in weight/strength training	96%	69	2.1	62	1.2	62	1.0	62	1.0
Interested in cardiovascular training	97%	82	1.7	76	1.0	77	0.9	77	0.8
Satisfied with on post fitness facilities	47%	86	2.0	89	1.1	90	0.9	90	0.8
Interested in going to the movies	97%	76	1.9	72	1.1	72	0.9	72	0.9
Satisfied with the on post Leisure Travel/Ticket Office	27%	81	2.8	83	1.7	84	1.4	84	1.4
Children interested in bowling	23%	65	3.9	65	2.4	65	2.0	64	1.9
Satisfied with food and beverage service	35%	48	3.4	49	2.0	50	1.7	49	1.6
Eat out for dinner off post at least once per month	95%	74	2.0	74	1.1	73	0.9	73	0.9

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

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² Difference in survey estimates between 1st four weeks of data collection and full administration

³ Difference in survey estimates between 1st seven weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 7.

Differences in Web Survey Estimates by Survey Close Date – Army Civilians

	Percent Responding	Estimate - 0 to 2 weeks ME		Estimate - 0 to 4 weeks ME		Estimate - 0 to 7 weeks ME		Estimate - 0 to 10 weeks ME	
Satisfied with Army Family and MWR programs at installation	98%	64	1.2	63	1.0	63	0.9	63	0.9
Rated current installation's Army Family and MWR programs higher compared to other places stationed	73%	46	1.4	45	1.2	45	1.1	45	1.0
Satisfied with Family and MWR Army Entertainment	77%	46	1.4	46	1.2	46	1.0	46	1.0
Agreement that Army child, youth, and school age programs are a valuable benefit	22%	58	2.6	58	2.2	58	2.0	58	1.9
Use Army Child Care services	35%	17	1.6	17	1.3	17	1.2	16	1.1
Agree that participating in MWR programs and services provides a healthy way to relieve stress	83%	70	1.2	70	1.0	69	0.9	69	0.9
Satisfied with military life	0%	N/A		N/A		N/A		N/A	
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	0%	N/A		N/A		N/A		N/A	
Used on post outdoor recreation center in the past 12 months	97%	36	1.2	36	1.0	35	0.9	35	0.9
Participated in activities at the on post bowling center in the past 12 months	95%	31	1.2	31	1.0	30	0.9	29	0.8
Interested in golf	95%	36	1.2	36	1.0	36	0.9	36	0.9
Interested in weight/strength training	94%	68	1.2	68	1.0	68	0.9	69	0.8
Interested in cardiovascular training	95%	81	1.0	81	0.8	81	0.7	81	0.7
Satisfied with on post fitness facilities	52%	88	1.1	88	0.9	88	0.8	88	0.8
Interested in going to the movies	94%	76	1.1	76	0.9	76	0.8	76	0.8
Satisfied with the on post Leisure Travel/Ticket Office	28%	83	1.7	83	1.4	83	1.3	83	1.2
Children interested in bowling	34%	64	2.1	64	1.7	64	1.5	63	1.4
Satisfied with food and beverage service	43%	51	1.9	52	1.5	52	1.4	52	1.3
Eat out for dinner off post at least once per month	91%	71	1.2	71	1.0	70	0.9	70	0.8

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

Bolded estimates indicate a statistically significant difference from the estimate obtained from the full web survey administration at $p < .05$.

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² Difference in survey estimates between 1st four weeks of data collection and full administration

³ Difference in survey estimates between 1st seven weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 8.

Differences in Paper Survey Estimates by Survey Close Date – Total Army

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 5 weeks	ME	Estimate - 0 to 8 weeks	ME
Satisfied with Army Family and MWR programs at installation	96%	61	0.9	62	0.7	62	0.6
Rated current installation's Army Family and MWR programs higher compared to other places stationed	76%	51	1.1	50	0.8	49	0.7
Satisfied with Family and MWR Army Entertainment	70%	44	1.1	45	0.8	45	0.8
Agreement that Army child, youth, and school age programs are a valuable benefit	18%	65	2.4	67	1.6	67	1.4
Use Army Child Care services	30%	17	1.4	18	1.0	19	0.9
Agree that participating in MWR programs and services provides a healthy way to relieve stress	72%	71	1.0	72	0.8	72	0.7
Satisfied with military life	22%	75	2.0	76	1.3	76	1.2
Plan to stay in the Army beyond my present obligation or longer	5%	87	7.3	82	3.5	82	2.3
Increase in use of Family and MWR programs and services during a deployment	14%	36	2.7	37	1.9	38	1.6
Used on post outdoor recreation center in the past 12 months	97%	19	0.7	21	0.6	22	0.5
Participated in activities at the on post bowling center in the past 12 months	97%	18	0.7	21	0.6	22	0.5
Interested in golf	95%	34	0.9	35	0.7	35	0.6
Interested in weight/strength training	94%	53	1.0	57	0.7	59	0.6
Interested in cardiovascular training	96%	69	0.9	72	0.6	74	0.6
Satisfied with on post fitness facilities	38%	93	0.9	92	0.6	92	0.6
Interested in going to the movies	95%	70	0.9	72	0.7	74	0.6
Satisfied with the on post Leisure Travel/Ticket Office	0%	N/A		N/A		N/A	
Children interested in bowling	29%	59	1.9	60	1.3	60	1.2
Satisfied with food and beverage service	32%	57	1.7	58	1.3	57	1.1
Eat out for dinner off post at least once per month	92%	68	0.9	68	0.7	68	0.6

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

Bolded estimates indicate a statistically significant difference from the estimate obtained from the full paper survey administration at $p < .05$.

¹ Difference in survey estimates between 1st two weeks of data collection and full administration

² Difference in survey estimates between 1st five weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 9.

Differences in Paper Survey Estimates by Survey Close Date –Active Duty Army Spouses

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 5 weeks	ME	Estimate - 0 to 8 weeks	ME
Satisfied with Army Family and MWR programs at installation	99%	53	2.2	55	1.6	55	1.4
Rated current installation's Army Family and MWR programs higher compared to other places stationed	78%	32	2.3	33	1.7	33	1.5
Satisfied with Family and MWR Army Entertainment	82%	36	2.3	38	1.7	38	1.5
Agreement that Army child, youth, and school age programs are a valuable benefit	53%	66	2.9	67	2.0	68	1.8
Use Army Child Care services	74%	24	2.1	26	1.6	27	1.5
Agree that participating in MWR programs and services provides a healthy way to relieve stress	88%	64	2.2	66	1.6	67	1.4
Satisfied with military life	86%	74	2.0	75	1.4	75	1.3
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	57%	37	2.8	36	2.0	37	1.8
Used on post outdoor recreation center in the past 12 months	99%	29	2.0	31	1.4	32	1.3
Participated in activities at the on post bowling center in the past 12 months	99%	42	2.2	45	1.6	46	1.4
Interested in golf	98%	29	2.0	30	1.4	30	1.3
Interested in weight/strength training	99%	74	1.9	75	1.4	75	1.2
Interested in cardiovascular training	99%	89	1.4	90	0.9	90	0.9
Satisfied with on post fitness facilities	58%	90	1.8	90	1.2	91	1.1
Interested in going to the movies	99%	92	1.2	93	0.8	92	0.8
Satisfied with the on post Leisure Travel/Ticket Office	0%	N/A		N/A		N/A	
Children interested in bowling	72%	58	2.5	59	1.8	59	1.7
Satisfied with food and beverage service	33%	42	3.8	46	2.7	45	2.5
Eat out for dinner off post at least once per month	97%	80	1.8	78	1.3	78	1.2

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

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² Difference in survey estimates between 1st five weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 10.

Differences in Paper Survey Estimates by Survey Close Date – Active Duty Army

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 5 weeks	ME	Estimate - 0 to 8 weeks	ME
Satisfied with Army Family and MWR programs at installation	98%	63	9.4	58	4.2	58	2.7
Rated current installation's Army Family and MWR programs higher compared to other places stationed	83%	39	10.2	36	4.5	36	2.9
Satisfied with Family and MWR Army Entertainment	82%	41	10.4	39	4.6	41	2.9
Agreement that Army child, youth, and school age programs are a valuable benefit	44%	77	12.0	70	5.7	67	3.9
Use Army Child Care services	59%	45	12.2	29	4.8	28	3.2
Agree that participating in MWR programs and services provides a healthy way to relieve stress	92%	79	8.3	75	3.9	73	2.5
Satisfied with military life	94%	85	7.5	78	3.7	77	2.4
Plan to stay in the Army beyond my present obligation or longer	87%	87	7.3	82	3.5	82	2.3
Increase in use of Family and MWR programs and services during a deployment	51%	33	12.9	43	5.7	42	3.8
Used on post outdoor recreation center in the past 12 months	99%	32	9.2	31	4.0	34	2.6
Participated in activities at the on post bowling center in the past 12 months	99%	31	9.2	38	4.2	40	2.7
Interested in golf	97%	43	10.0	43	4.3	43	2.7
Interested in weight/strength training	99%	70	9.1	78	3.6	82	2.1
Interested in cardiovascular training	99%	79	8.0	88	2.8	88	1.8
Satisfied with on post fitness facilities	77%	95	5.2	92	2.7	90	1.9
Interested in going to the movies	98%	85	7.2	87	2.9	88	1.8
Satisfied with the on post Leisure Travel/Ticket Office	0%	N/A		N/A		N/A	
Children interested in bowling	57%	54	12.2	55	5.3	57	3.6
Satisfied with food and beverage service	44%	68	14.4	51	6.6	53	4.1
Eat out for dinner off post at least once per month	96%	72	9.1	76	3.7	76	2.4

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

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² Difference in survey estimates between 1st five weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 11.

Differences in Paper Survey Estimates by Survey Close Date – Army Retirees

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 5 weeks	ME	Estimate - 0 to 8 weeks	ME
Satisfied with Army Family and MWR programs at installation	94%	63	1.1	64	0.8	64	0.8
Rated current installation's Army Family and MWR programs higher compared to other places stationed	78%	56	1.2	56	0.9	55	0.9
Satisfied with Family and MWR Army Entertainment	65%	46	1.3	47	1.0	47	1.0
Agreement that Army child, youth, and school age programs are a valuable benefit	6%	62	4.6	64	3.4	65	3.1
Use Army Child Care services	14%	4	1.2	5	1.1	6	1.0
Agree that participating in MWR programs and services provides a healthy way to relieve stress	65%	73	1.2	74	0.9	74	0.9
Satisfied with military life	0%	N/A		N/A		N/A	
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	0%	N/A		N/A		N/A	
Used on post outdoor recreation center in the past 12 months	96%	16	0.8	17	0.6	18	0.6
Participated in activities at the on post bowling center in the past 12 months	96%	12	0.7	13	0.6	14	0.6
Interested in golf	94%	35	1.0	36	0.8	36	0.8
Interested in weight/strength training	92%	47	1.1	50	0.9	51	0.8
Interested in cardiovascular training	95%	64	1.0	66	0.8	67	0.8
Satisfied with on post fitness facilities	28%	94	1.1	93	0.8	93	0.8
Interested in going to the movies	93%	64	1.1	65	0.8	66	0.8
Satisfied with the on post Leisure Travel/Ticket Office	0%	N/A		N/A		N/A	
Children interested in bowling	13%	62	3.1	64	2.3	63	2.2
Satisfied with food and beverage service	29%	61	2.0	62	1.5	62	1.4
Eat out for dinner off post at least once per month	90%	65	1.1	64	0.8	64	0.8

Note: Some item response rates are low due to skip patterns (i.e., not all respondents eligible for the survey item).

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The Impact of Efforts to Increase Response Rates on Survey Estimates

Table 12.

Differences in Paper Survey Estimates by Survey Close Date – Army Civilians

	Percent Responding	Estimate - 0 to 2 weeks	ME	Estimate - 0 to 5 weeks	ME	Estimate - 0 to 8 weeks	ME
Satisfied with Army Family and MWR programs at installation	97%	61	9.5	61	2.9	61	1.8
Rated current installation's Army Family and MWR programs higher compared to other places stationed	64%	44	10.1	45	3.6	46	2.3
Satisfied with Family and MWR Army Entertainment	73%	57	10.9	50	3.4	49	2.1
Agreement that Army child, youth, and school age programs are a valuable benefit	15%	80	21.0	68	7.3	68	4.4
Use Army Child Care services	30%	19	14.1	10	3.3	13	2.2
Agree that participating in MWR programs and services provides a healthy way to relieve stress	76%	72	9.6	72	3.1	71	1.9
Satisfied with military life	0%	N/A		N/A		N/A	
Plan to stay in the Army beyond my present obligation or longer	0%	N/A		N/A		N/A	
Increase in use of Family and MWR programs and services during a deployment	0%	N/A		N/A		N/A	
Used on post outdoor recreation center in the past 12 months	98%	20	7.8	23	2.5	23	1.6
Participated in activities at the on post bowling center in the past 12 months	97%	21	7.9	20	2.4	19	1.4
Interested in golf	95%	38	9.6	35	2.9	35	1.8
Interested in weight/strength training	96%	66	9.4	63	2.9	63	1.8
Interested in cardiovascular training	97%	78	8.0	75	2.6	75	1.6
Satisfied with on post fitness facilities	43%	92	7.6	92	2.4	90	1.6
Interested in going to the movies	95%	70	9.0	74	2.6	75	1.6
Satisfied with the on post Leisure Travel/Ticket Office	0%	N/A		N/A		N/A	
Children interested in bowling	29%	47	18.2	58	5.5	60	3.3
Satisfied with food and beverage service	41%	74	13.2	61	4.6	60	2.8
Eat out for dinner off post at least once per month	93%	66	9.6	62	3.0	64	1.8

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² Difference in survey estimates between 1st five weeks of data collection and full administration

The Impact of Efforts to Increase Response Rates on Survey Estimates

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