

# On-Line and Telephone Surveys: The Impact of Survey Mode on Spending Estimates by Participants in a Major Urban Marathon

by Douglas J. Olberding and Steve Cobb

## Abstract

Survey research has always been an important tool for those interested in the study of sport. Recent advances in technology have made on-line survey administration particularly attractive compared to traditional data gathering methods. This study presents research undertaken as part of an economic impact analysis of the 2002 Flying Pig Marathon in Cincinnati, Ohio, and tests for significant differences in reported spending between data gathered via a telephone survey and data gathered via on-line survey. Tests indicated that while the two survey methods produced largely similar results, significant differences were found in some spending categories. The analysis concluded that group-size bias in the telephone survey was the main source of reported spending difference. After adjusting for this bias, the on-line approach is at least as effective as the telephone approach when there is strong evidence that the population of interest utilizes e-mail.

## *On-Line and Telephone Surveys: The Impact of Survey Mode on Spending Estimates by Participants in a Major Urban Marathon*

Survey research has always been an important tool for those interested in the study of sport. Academics who study sport and professionals who manage sport enterprises have used survey research to collect primary data in economic impact analyses, attitudinal studies, and opinion research. And sport marketers have long used survey research to study consumer satisfaction, conduct fan audits and to perform market research.

Recently, advances in technology and the proliferation of material on the World Wide Web have caused a fundamental change in the way many researchers and sport organizations collect data. At one time, researchers relied primarily on one, or a combination of three methods: the mail survey, the telephone interview, or the face-to-face interview (Dillman, 2001). These methods, while effective when conducted soundly, were nonetheless slow and expensive. Selecting a vendor, designing the instrument, collecting the data, coding, entering data and waiting for a report to be written, could be cost prohibitive and could take anywhere from 3 to 6 months (Merchant, 2006). Now, with increasing frequency, on-line surveys are being used to supplement or replace traditional data gathering methods. New web-based survey hosting sites like *ZAPSurvey.com*, *SurveyMonkey.com*, *SurveySuite.com* and *WebSurveyor.com* have made the world of survey research available to any organization or individual willing to pay the modest subscription fees (Merchant, 2006). In addition, websites such as these offer users the ability to cut the survey 'start to finish time' from six months to as little as two weeks. And sport organizations have added their own twist to on-line data gathering by utilizing computerized kiosks and hand held personal data assistants (PDAs) to gather data on-site at their venues and events (Mullins, Hardy & Sutton, 2000; "Pushing their buttons," 2006). In short, on-line research tools have fundamentally changed the way that many organizations gather data.

Given the potential advantages of on-line surveys, it is critical to understand the degree to which this method impacts the quality of the data. In this paper, we present research done as part of an economic analysis of the 2002 Flying Pig Marathon in Cincinnati. Hence, the focus of this study is on investigating the impact of survey method differences on direct spending estimates. Non-local marathon participants were surveyed using both telephone and on-line methods and their responses were analyzed to test for differences between the two survey approaches.

This research has important implications beyond those which may concern academic researchers. Sport enterprises have long been criticized for lack of investment in research as compared to their counterparts in business (Mullins, Hardy & Sutton, 2000). Part of the lack of investment in research is no doubt attributable to the considerable cost, both human and financial, of mounting a broad-based methodologically sound research effort. On-line surveys offer an enticing alternative to traditional data gathering methods due their lower cost, the ease with which they can be constructed and administered, and because data entry is vastly simplified. However, sport organizations and researchers alike must understand the extent to which on-line data gathering methods potentially impact results.

## Literature Review

All surveys of sample populations are subject to four major sources of error, each of which must be given consideration in order for the researcher to have confidence in the survey's results (Groves, 1989). These sources of error are (a) coverage error which results when all subjects in a population of interest do not have an equal chance of being included in the sample population; (b) sampling error which results when the characteristics of the sample population are different from the population of interest; (c) measurement error which is the result of inaccurate survey responses due to question wording effects, interview bias, the choice of survey method, or some aspect of the respondent's behavior; and (d) non-response error which occurs when the non-respondents to a survey would have provided different answers to questions than those who did respond to the survey.

Reducing all four sources of error contributes to the precision of survey results. In recent years, researchers have begun to examine the relative merits of on-line surveys as compared to traditional surveys like mail, telephone and face-to-face interviews. Part of the recent growth in the use of on-line surveys is related to ease in which these surveys can be constructed and administered. Early studies demonstrated that data gathered electronically greatly facilitated the processing of survey data (Keisler and Sproull, 1986). More recently, it has been shown that on-line surveys significantly reduce survey administration costs (Clayton and Werking, 1998) and that they have the potential to increase overall responses (Dillman and Bowker, 2001).

However, Dillman and Bowker (2001) have cautioned that many on-line survey results may be compromised because researchers

ignore one source of error by being vigilant in protecting against another. For example, a professional sport team could post a poll on their website to seek fans' input regarding a new team logo. While the survey may generate a high number of responses (ostensibly to reduce non-response error), coverage error could result if a large portion of the population (e.g., the team's fan base) does not have access to the Internet. Or, a team may offer incentives through its web-site to entice fans to enter personal information so that they might be surveyed for future market research. If the right incentives are offered, the team could achieve very high response rates and reduce the likelihood of coverage error. However, if the team gathered only the names, postal addresses and e-mail addresses of respondents, sampling error is likely to occur because team marketers would only have limited information from which to estimate the representativeness of the sample.

A further concern is the issue of measurement error, in particular, error resulting from differences in survey methods. Researchers have long understood that differences sometimes exist in the answers that people give in face-to-face interviews, telephone and mail surveys (de Leeuw, 1992; Dillman, Sangster, Tarnai & Rockwood, 1996; Hochstim, 1967; Schwarz, Strack, Hippler & Bishop, 1991; Shuman & Presser, 1981). One of the underlying issues has been the presence of the interviewer. For example, Hochstim (1967) found that survey subjects are more likely to give a socially desirable answer in the presence of an interviewer than when an interviewer is not present. Further, acquiescence, or the tendency to agree rather than disagree, is more likely in the presence of an interviewer especially when the interview is fast-paced (de Leeuw, 1992).

Researchers are now beginning to explore survey response differences produced by on-line and traditional survey methods. One stream of research has focused on the impact of programming techniques in the construction on-line survey (Dillman & Bowker, 2001; Nichols & Sedivi, 1998). There is general agreement that the use of complicated programming language, "fancy" design schemes and lack of browser compatibility can lessen the effectiveness of on-line surveys as compared to other modes.

Another stream of research has focused on question response differences between on-line and other survey modes. For example, Miller and Hogg (1999) found that when survey questions used scaled response forms, respondents to on-line surveys were more likely to choose scale endpoints than those responding to the same question in a telephone survey. This study also found that on-line subjects were more likely than their telephone counterparts to respond to sensitive questions like those dealing with abortion or the death penalty. Another study by the Pew Research Center examined response differences in a national public opinion poll and found that while telephone and on-line responses were largely similar, on-line surveys overstated results on issues of national importance as compared to telephone results ("Online polling offer mixed results," 1999).

### **Study Design and Survey Methodology**

This study used data collected for an economic impact analysis of the 2002 Flying Pig Marathon in Cincinnati, Ohio, to test whether direct spending data collected via an on-line survey are significantly different than the data collected via a telephone

survey.

Data on marathon runners were provided by the Flying Pig Marathon organizers from the 2002 marathon registration database. The database was constructed based on participant responses on the marathon registration form. In order to participate in the marathon, each runner had to complete the form and was required to provide their name, address, and at least one phone number. Runners also had the option of including a second phone number and an e-mail address. They had the option of completing the form online or by writing their responses on a paper form and mailing the completed form to the registration processing firm. In all, 100% of runners listed one phone number and 63% listed a second number. Eighty-seven percent of subjects listed an e-mail address.

Subjects were then grouped by zip code and were divided into (a) local participants, or those residing inside the Cincinnati Consolidated Metropolitan Statistical Area (CMSA), and (b) non-local participants, or those residing outside the Cincinnati CMSA. Since economic impact analyses of sport events typically focus on spending generated from non-local sources (Li, Hofacre & Mahoning, 2001), only responses from runners residing outside the Cincinnati CMSA were analyzed for differences. A total of 6,857 runners participated in the marathon; of these, 3,270 were defined as non-local runners.

Two random independent samples containing 750 names each were drawn from the list of non-local participants. The first group was surveyed via telephone over a two day period and 179 surveys were completed. The second group was surveyed using the on-line approach and 226 completed surveys were received. For the telephone survey, interviewers were told not to leave messages if a recording device was encountered and to call the subject's second number, or if not applicable, to simply move to the next subject. Each interview lasted approximately 90 seconds. The on-line survey of non-local runners was administered using *Survey Suite*, an automated on-line survey administration tool (Intercom, n.d.). A cover letter and link to the survey web-site was e-mailed to subjects on June 1, 2002. No follow-up e-mails were sent after the initial June 1 mailing in order to remain consistent with the procedures used with the telephone survey. The results were downloaded from the web server for analysis on August 1, 2002.

The survey instrument itself was designed to measure direct spending by marathon participants in 12 different categories (see Table 1). Direct spending is the dollar amount spent by non-local visitors in the local economy and is the portion of event-related spending that is used to estimate economic impact. The initial round of spending in the context of sport events like a marathon generally comes from participant spending on such items as lodging, transportation, food, beverages and various retail categories (Li, Hofacre & Mahoning, 2001). Hence, the spending categories examined in this study included lodging, gasoline, rental car, parking, public transportation, food and entertainment restaurants, drinking establishments and entertainment establishments, retail items (grocery/drugstore, souvenir/department stores, and other retail) and other spending.

For the on-line survey, the telephone survey instrument was translated to a web-based format using the *Survey Suite* interface. Both surveys were identical in all respects except for one question.

During the telephone survey, which was conducted a few days prior to the on-line survey, it became apparent that many respondents were reporting exposition spending in response to Question 11 'other marathon-related spending'. The marathon exposition, or "expo" to which it is commonly referred, is a running trade show that is held in conjunction with the marathon. Here, runners can register for the race, purchase shoes, apparel and equipment from vendors, listen to featured speakers and learn about other races happening locally and around the country. In order to get the most accurate estimate of overall direct spending, a question regarding expo spending was added to the telephone survey about halfway through the data gathering process and added to the on-line survey at the outset. Because of the inconsistency in the way that expo spending data was gathered, the analysis of spending differences for this category was excluded.

### **Results**

Descriptive statistics for each spending category grouped by survey method are shown in Table 2. To test for differences in reported spending, independent sample *t*-tests were used on spending categories with sample sizes greater than 30. For those with sample sizes less than 30, Mann-Whitney *U* was used because it is the appropriate non-parametric test when the assumptions underlying the *t*-test are violated (Pagano, 1986). Mann-Whitney *U* tests the statistical difference between two independent groups when the populations are not assumed to be normally distributed (Vogt, 2005).

For three spending categories analyzed with the *t*-test (gasoline, parking and restaurants), there was insufficient statistical evidence to reject the null hypothesis ( $p < .1$ ) (see Table 3). However, results showed that mean spending differed significantly by survey method for lodging ( $t=2.54, p=.012$ ), department stores ( $t=2.26, p=.025$ ) and grocery/drug stores ( $t=2.94, p=.005$ ). In each of the above cases, telephone respondents reported higher spending.

For the spending categories analyzed using Mann-Whitney *U*, there was insufficient evidence to reject the null hypothesis ( $p < .1$ ) for spending on public transportation, rental cars, drinking establishments and entertainment establishments (see Table 4). Although Table 2 shows that there was nearly a two-fold difference in reported spending in drinking establishments, the difference was not significant ( $U=478.5, p=.110$ ) likely due to the low number of respondents. Only spending in other retail stores ( $U=91.5, p=.011$ ) showed a significant difference between survey methods. As with the categories analyzed using the *t*-test, telephone respondents reported higher spending.

The results were further examined to determine an underlying cause for spending differences. Although coverage error has been cited as a major source of error with on-line surveys, it is not likely to have had a significant impact in this study. Recall that coverage error results when all subjects in a population do not have an equal chance of being included in the sample. Overall, 87% of population (in this case, those in the marathon registration database) listed a personal e-mail address and 100% listed at least one telephone number. In other words, it is not likely that the either survey method resulted in a significant exclusion of marathon participants.

Since spending for lodging was about \$70 higher in the telephone group, it was hypothesized that telephone respondents

may have included other spending when reporting outlays for lodging. Within group tests were conducted for significant differences in spending based on the size of the travel party within each survey group. When these tests were conducted, significant differences were found only in the telephone group (see Table 5). In particular, spending for lodging was higher for individuals in large groups who responded to the telephone survey ( $t=2.639, p=.009$ ). When large groups were removed from the analysis, no significant differences were found for lodging or for department stores. However, telephone responses remained slightly higher for grocery/drugstore spending and other retail (see Table 6).

### **Discussion**

The results of this study support the findings in other studies, namely that responses to identical questions asked in a telephone survey and an on-line survey are for the most part similar. However, conflicting responses to certain important questions are cause for further discussion. Here we present possible explanations for the discrepancies between the two methods that we found in this study.

One explanation for the discrepancy in spending for lodging may lie in the wording of the question. The question was intended to capture group spending attributable to a single marathon participant. Hence, if a survey respondent traveled to Cincinnati with her non-running spouse and three kids, spending by the entire group is included as direct marathon-related spending. Conversely, if a subject traveled to Cincinnati with three other marathon participants, then only spending by the subject can be counted as direct marathon-related spending.

The group-size variation in telephone survey data suggests that there was a problem in how the question was interpreted by respondents who were part of a large group of runners. This was not apparent with the on-line approach. The fact that the response differences between survey methods disappears when we throw out the large group respondents suggests that the on-line approach was more likely to be unbiased. Furthermore once the problem was "corrected" with the phone group by dropping the large group respondents, the consistency between the two survey approaches suggests that one could use either method to collect survey data. In other words, these results suggest that the on-line approach was equally effective to a phone-based approach for gathering data in this study.

### **Conclusion**

To conclude, survey method bias was found only in the telephone group and once the bias was removed, there was negligible impact on spending estimates attributable to survey method. This study offers evidence that the on-line approach to data collection is at least as effective as the telephone approach when there is strong evidence that the population of interest utilizes e-mail. This has implications for sport managers because a methodologically sound online survey is significantly more cost effective to administer than a similarly constructed telephone survey.

However, a word of caution is in order. Because of the financial and human resource costs required to mount a full-scale telephone or mail survey campaign, survey research was largely the domain of academics and those professional trained to do such work.

The accessibility and lower relative costs of on-line surveys have opened the world of survey research to almost any organization or individual with access to the World Wide Web. Sport managers are wise to view all survey research with a critical eye; on-line surveys are no exception and perhaps warrant greater scrutiny. Accessibility and ease of use are not substitutes for sound research methodology, proper question structure, and the appropriate application of statistical tests.

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**Table 1. Flying Pig Marathon survey of non-local participants**

- 1.01 Including yourself, how many members were in your group that attended the Flying Pig Marathon on May 5, 2002?
- 1.02 Did you buy any gasoline while in the Cincinnati area? [If YES, answer question 1.3. If NO, skip to question 1.4.]
- 1.03 In total, how much did you spend on gasoline?
- 1.04 Did you pay for parking while in the Cincinnati area? [If YES, please answer question 1.5. If NO, please skip to question 1.6.]
- 1.05 In total, how much did you spend on parking?
- 1.06 Did you use any public transportation while in the Cincinnati area (e.g. taxi, bus)? [If YES, please answer question 1.7. If NO, please skip to question 1.8.]
- 1.07 In total, how much did you spend on public transportation?
- 1.08 Did you rent a car while in the Cincinnati area? [If YES, please answer question 1.9. If NO please skip to question 1.10.]
- 1.09 In total, how much did you spend on car rental?
- 1.1 While you were in the Cincinnati area for the marathon, did you stay over night? [If YES, please answer question 1.11. If NO, please skip to question 1.12.]
- 1.11 In total, how much did you spend on lodging?
- 1.12 While in the Cincinnati area for the marathon, did you or any members of your group go to any restaurants? [If YES, please answer question 1.13. If NO, please skip to question 1.14.]
- 1.13 In total, how much did you spend and/or your party spend at restaurants?
- 1.14 While in the Cincinnati area for the marathon, did you or any members of your group go to any drinking establishments? [If YES, please answer question 1.15. If NO, please skip to question 1.16.]
- 1.15 In total, how much did you spend and/or your party spend at drinking establishments?
- 1.16 While in the Cincinnati area for the marathon, did you or any members of your group go to any entertainment establishments (e.g., the movies, a museum, a concert, the zoo)? [If YES, please answer question 1.17. If NO, please skip to question 1.18.]
- 1.17 In total, how much did you spend at entertainment establishments?
- 1.18 While in Cincinnati for the Flying Pig Marathon, did you make any purchases at the Expo? [If YES, please answer question 1.19. If NO, please skip to question 1.20.]
- 1.19 In total, how much did you spend at the marathon Expo?
- 1.2 While in the Cincinnati area for the marathon, did you or any members of your group purchase any retail merchandise? [If YES, please answer question 1.21, 1.22 and 1.23. If NO, please skip to question 1.24.]
- 1.21 How much did you spend at department stores, variety stores, clothing, or souvenir shops?
- 1.22 How much did you spend at grocery or drug stores?
- 1.23 How much at any other type of store?
- 1.24 Is there any other form of spending that you can recall doing while in the Cincinnati area associated with the Flying Pig Marathon? [If YES, please answer questions 1.25 and 1.26. If NO, please skip to question 1.27.]
- 1.25 Please describe the type of spending?
- 1.26 How much did you spend?

1.27 Please type your E-mail address in the space provided.  
This is to insure that your name is removed from our

survey list and that additional requests for information  
are not forwarded to you.

**Table 2. Descriptive statistics**

Category	Survey method	N	Mean	Std. Deviation	Std. Error Mean
Gasoline	Telephone	87	25.51	16.90	1.81
	On-line	106	22.54	12.01	1.17
Parking	Telephone	118	18.21	14.95	1.38
	On-line	149	16.79	18.03	1.48
Public transportation	Telephone	24	28.60	24.18	4.94
	On-line	29	31.38	19.54	3.63
Rental car	Telephone	11	90.45	40.15	12.11
	On-line	19	124.11	69.82	16.02
Lodging	Telephone	157	233.14	277.37	22.14
	On-line	205	162.19	244.37	17.07
Restaurants	Telephone	156	144.02	185.49	14.85
	On-line	196	138.28	200.44	14.32
Drinking establishments	Telephone	28	123.04	213.63	40.37
	On-line	44	67.65	138.04	20.81
Entertainment establishments	Telephone	25	49.28	35.09	7.02
	On-line	31	34.39	28.01	5.03
Department stores	Telephone	79	129.76	173.35	19.50
	On-line	72	79.74	88.13	10.39
Grocery or drug stores	Telephone	50	40.50	43.80	6.19
	On-line	80	21.33	18.06	2.02
Other retail stores	Telephone	34	108.47	140.61	24.11
	On-line	11	37.73	40.77	12.29

**Table 3. T-test: Spending categories by survey method**

Spending Categories	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Gasoline	1.374	150.951	0.172	2.961	2.156	-1.298	7.220
Parking	0.691	265.000	0.490	1.427	2.063	-2.636	5.489
Lodging	2.538	312.222	0.012	70.953	27.952	15.955	125.951
Restaurants	0.276	350.000	0.783	5.742	20.81	-35.188	46.672
Department stores	2.264	118.084	0.025	50.023	22.096	6.267	93.780
Grocery or drug stores	2.943	59.549	0.005	19.175	6.515	6.140	32.210

**Table 4. Mann-Whitney-U: Spending categories by survey method**

	Public transportation	Rental car	Drinking establishments	Entertainment establishments	Other retail stores
Mann-Whitney <i>U</i>	298.0	74.500	478.500	295.500	91.500
Wilcoxon <i>W</i>	598.0	140.500	1468.500	791.500	157.500
<i>Z</i>	-0.896	-1.294	-1.597	-1.521	-.2542
Asymp. Sig. (2-tailed)	0.370	0.196	0.110	0.128	0.011

**Table 5. T-test: Spending categories by survey method. Cases selected: Small groups**

Spending Categories	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Gasoline	0.244	121.000	0.808	0.437	1.793	-3.112	3.987
Parking	-0.071	156.000	0.943	-0.156	2.196	-4.493	4.181
Lodging	1.569	223.000	0.118	25.728	16.400	-6.592	58.047
Restaurants	-0.398	212.000	0.691	-5.136	12.919	-30.602	20.330
Department stores	0.968	91.000	0.335	18.335	18.936	-19.280	55.950
Grocery or drug stores	2.586	27.421	0.015	14.653	5.666	3.035	26.270

**Table 6. Mann-Whitney-U: Spending categories by survey method. Cases selected: small groups**

	Public transportation	Rental car	Drinking establishments	Entertainment establishments	Other retail stores
Mann-Whitney <i>U</i>	150	33	176	113.5	36.5
Wilcoxon <i>W</i>	340	54	501	191.5	72.5
<i>Z</i>	-0.89	-0.94	-.095	-0.47	-2.43
Asymp. Sig. (2-tailed)	0.37	0.35	0.34	0.64	0.02
Exact Sig. [2*(1-tailed Sig.)	0.39	0.38		0.64	0.01