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Heath McDonald, Stewart Adam

Institutions: Deakin University

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A comparison of online and postal data collection methods in marketing research

Heath McDonald, *Deakin University, Melbourne, Australia*

Stewart Adam, *Deakin University, Melbourne, Australia*

Abstract

The widespread acceptance of the use of online techniques in market research necessitates appreciation of the relative advantages and disadvantages of these techniques over more traditional research methods. This paper reports on a study which directly compares online and postal data collection methods using the same survey instrument on two samples drawn from the same population of football club subscribers. The results confirm that the online and postal respondents are demographically different. Online data collection is shown to be less expensive per respondent and that data collection is faster, however, an overall lower response level is achieved relative to the postal data collection method. Of greater importance, though, are the findings that respondents seem to answer questions differently online than they do via postal methods. The conclusion here is that online data collection should not be treated as a direct substitute for postal data collection in every instance.

Introduction

Use of the Internet (Net) as a medium, and the World Wide Web (Web) as an evolving technology has made it less costly and allowed marketers to get information – both of low quality and high quality – more quickly and easily than ever before. Couper (2000, p. 466) notes, however, that the Net offers “a wide array of approaches representing varying levels of quality and cost”. This is but one of a number of commentaries concerning the quality and cost of Internet marketing research by a long list of researchers such as Dommeyer and Moriarty (2000), Weible and Wallace (1998) and Comely (1996).

A number of problematic issues exist in the undertaking of marketing research in general, and in online marketing research in particular, including declining response levels and the resulting representativeness of those responding. Past research into online research has often produced conflicting results on such crucial issues as response levels and data quality. Some of these conflicting results can be attributed to the variety in research designs used, however, the broader issues remain unresolved. This paper continues the discussion on the quality issues in online marketing research by comparing the outcomes of a survey involving both postal and online delivery of the same questionnaire (in terms of items) delivered to two sample frames from the same population of football club members. The focus of the paper is on the response patterns and the demographic profiles of the two groups of respondents using the two data collection methods employed. The main objective of the research presented here is to clarify the exact nature of the advantages and disadvantages online market research offers in comparison to postal delivery. It is hoped the results will help guide researchers who are contemplating the use of one, or both, of these data collection methods.

Online technologies in marketing research

Most marketing scientists and practitioners have used one or all of the possible research approaches – observational research, survey research and experimental research – at one point in time. Moreover, they have in all likelihood used one or more of the four survey contact methods – mail, telephone, personal interviews and electronic networks. With the convergence of telecommunications, media and TCP/IP (Transmission Control Protocol/Internet Protocol) technology, collectively called TMT, we might extend this list to include interactive television, cellphones, and even touch-screen responses to 3D simulations in store situations.

Recognising the ever expanding list of options open to market researchers seeking to collect data, it becomes increasingly important to understand the unique characteristics of each method. A detailed understanding of these unique characteristics ensures that the problems inherent in using these research methods, such as non-response bias, can be controlled or overcome. To date, much of what we know of these emerging methods of data collection has mostly been learnt from small-scale academic studies.

This study replicates and extends relevant past work, using the same research instrument delivered via online and postal methods to two separate samples randomly drawn from the same population of subscription based customers. Online data collection, the most widely used of the emerging data collection methods previously listed, is compared directly with postal data collection.

Antecedent studies and issues

Traditional marketing research is suffering from falling participation rates, rising costs, respondent fears concerning misuse of personal information and managerial issues resulting from the time taken to conduct postal surveys (Jarvis, 2002). In contrast, a number of claimed advantages are put forward for using online data collection methods in survey research, in particular: lower costs; faster turnaround; higher response levels; lower respondent error; broader stimuli potential through the inclusion of colour, graphics and sound; flexibility in the form of adaptive questioning; and even greater enjoyment (Forrest, 1999; Kehoe and Pitkow, 1996). Most of these advantages relate to what has been called the efficiency of online as a data collection method (Weible and Wallace, 1998).

There is some concern though, that given time, as novelty wears off, online data collection will suffer from the same disadvantages as the traditional methods. For instance, we can already see that the issue of the fear of misuse of respondent information does not disappear, but rather is exacerbated in the online environment (Cho and LaRose, 1999), and that this has contributed to falling confidence in online marketing and research (Australian Privacy Commissioner, 2001).

It is instructive to examine each of the claimed benefits, albeit briefly in the context of survey research. In doing so, we acknowledge that there are other forms of online research that present opportunities, such as moderated e-mail groups (Eke and Comley, 1999), however, this paper is restricted to online surveys given the increasing prevalence of this particular methodology.

The costs of online surveys are frequently claimed to be lower, provided it is not necessary to continually develop specialised software so that one can treat such development costs as sunk costs (Weible and Wallace, 1998; Zadeh *et al.*, 2000). The need for printing, stuffing, two-

way postage, data entry, handling and tracking is removed in the case of online surveys, making them less costly.

Turnaround times are frequently reported to be much faster for online surveys. Adam and Deans (2000) conducted a probabilistic e-mail and HTML form survey with 2,976 online businesses and gained 40 per cent of their overall 500 responses within seven days. In the case of the mixed mode e-mail invitation and HTML form study we later report on, 40 per cent of responses (334) were received in the first 24 hours, and over 85 per cent of responses were received within seven days. E-mail surveys, in particular, offer higher response speed than postal surveys (Comely, 1996; Cho and LaRose, 1999; Dommeyer and Moriarty, 2000; Schaefer and Dillman, 1998), however, the choice of a “technologically sophisticated population” (Weible and Wallace, 1998, p. 22) may bring about higher response speed than might be achieved when surveying the general population.

Higher response levels are often claimed for online marketing research involving either e-mail or HTML forms or a combination of the two, over postal surveys (Bachmann *et al.*, 1996, 2000; Jackson and DeCormier, 1999). Table I suggests that the situation is not clear-cut, however, and it is difficult to state with statistical certainty that there has been a decline in response levels for both postal and online surveys over time. It has been previously suggested that early novelty seeking behaviour in regards to Internet based surveys may have artificially increased online response levels initially (Zadeh *et al.*, 2000). The evidence would suggest that any “novelty” effect is now wearing off.

Another benefit of online surveys is a claimed lower respondent error as determined by such measures as the completeness of response and quality of the response to open text box questions (Weible and Wallace, 1998). One issue in this regard is that HTML form based questionnaires may become too complex for human use simply because the technology permits more intricate rank and rate matrices to be presented than hard copy surveys allow (Zadeh *et al.*, 2000). Analysis of response quality, a vital issue, has been limited to date and thus claims of the superiority of online collection seem premature.

As a final advantage, there is the opportunity to use a broader range of stimuli in the case of HTML forms (Web pages), and with those whose e-mail clients are known to be set to read HTML (Rae and Brennan, 1998). However, little research appears to have been published on this matter to date, although experimentation is underway (Couper *et al.*, 2001). There is also the ability to use filtering processes to increase the flexibility of online surveys by employing adaptive questioning. This approach appears to be used only in a small number of commercial surveys, and little has been reported thus far.

A comparative subscriber study

Many of the previous studies in this field have examined the claimed advantages of online surveys. However, there are a number of issues that may affect the validity of such studies (Couper, 2000). Such issues include the use of small samples, low response levels, non-probability sampling and other matters such as the use of reminders and in some cases the application of incentives, which do not allow for ease of direct comparisons. The need for a comparative study that avoided these shortcomings was clear.

The study reported in this paper includes most of the areas of interest within the one investigation, and involves methodology that enables a sound comparison of online and postal data collection techniques.

Hypotheses

A number of hypotheses were developed from the studies discussed earlier and outlined in Table I, and are grouped under the areas of interest in this section of the paper. These hypotheses concern not only managerial issues such as the speed and efficiency of the contrasted data collection methods but also concern research quality issues such as the incidence of missing data and the levels of variation amongst the responses received.

Response level and speed

H1a: Online data collection manifests a higher response level than the postal data collection method.

H1b: Online data collection manifests a higher level of undelivered questionnaires than the postal data collection method.

H1c: Online data collection is less expensive than is the case with the postal data collection method.

H1d: Online data collection manifests a higher response speed than the postal data collection method.

Data quality

H2a: Online data collection manifests less item-missing non-demographic data than the postal data collection method.

H2b: Online data collection manifests a lower omission of personal demographic data than the postal data collection method.

H2c: Online data collection manifests a lesser use of end and mid points in the case of scale items than the postal data collection method.

Comparability of resulting data and respondents

H3a: Online data collection manifests different mean responses to scale items than the postal data collection method.

H3b: Online data collection attracts respondents with different demographic profiles than the postal data collection method.

Methodology

The study we report involved use of a 70-item, seven page (postal version) questionnaire entitled "Club name (withheld) member satisfaction survey". As the title suggests, the questionnaire dealt with the satisfaction of members of a professional Australian Rules

Football (AFL) club, which we hereafter refer to as AFC to maintain the club's anonymity. In the main, Likert scale items were used, with an 11-point (0-10) "poor" to "excellent" scale.

In the year of the study (2001), the AFC claimed over 21,000 paid-up members. The AFC also maintains an "opt-in" e-mail list for those members who wish to interact with the club via this medium. There were 3,900 members on this e-mail list at the time of the study. The club sent an e-mail to the members on this list inviting them to complete an online questionnaire (HTML form), and advising them of a username and password to gain access to the questionnaire. On completing the questionnaire, they were presented with a "success" Web page. The online responses were automatically parsed to a flat file database. Additionally, 1,026 members were randomly selected, and sent a questionnaire through the post to their home address, together with a reply-paid return envelope.

The attempt was made to have the online questionnaire appear as close as possible to the printed version, with minimal use of colour (for instructions and the like), except for the arguably preferred use of radio buttons (Couper *et al.*, 2001) presented in a "scrollable" HTML form (Dillman 2000) that disclosed all questions to respondents.

The combined responses were then assessed for their representativeness. Both online and postal survey responses were compared with the overall profile of the full list of AFC members. No meaningful differences were found between those who returned the survey and the full membership list, suggesting the sampling process was not biased toward a particular demographic or membership type.

Findings

The hypotheses set out in the preceding section are directly tested and reported next.

Speed and efficiency

Response details for the two data collection methods are shown in Table II. The postal survey response level is similar to the response achieved by Bachmann *et al.* (2000). Moreover, the online response level is similar to the levels achieved in the Adam and Deans (2000) and Bachmann *et al.* (2000) studies. The questionnaire was more easily completed than the Adam and Deans (2000) online questionnaire; taking around eight minutes on average (from dump files and pre-testing), compared with 20 minutes noted by Adam and Deans.

The response levels might have been expected to be higher, given that this is a subscriber survey dealing with what is an emotive matter for AFL fans. Dillman (1978) observed that interest in a topic can lead to higher response levels. A number of respondents commented on how they appreciated the opportunity to have "their say" in the running of the club, which they had expressed strong attachment to.

The postal data collection method resulted in a response level more than twice that of the online data collection method. Although findings on this matter reported in antecedent studies were mixed, there is a clear rejection of *H1a* in this study. This finding is in line with Dommeyer and Moriarty's (1999) argument that online data collection methods do not result in higher response levels.

findings support past research, which has typically found e-mail non-delivery rates of 35 per cent) ... and as high as 67 per cent

We employed Webalizer software <mrunix.net/webalizer> on the host server to analyse the server log files and are able to report that for the response level of 826, the questionnaire page was visited 1,298 times. Due to the weakness of “hits” as a measure, it is not possible to report whether or not the additional 473 questionnaire hits represent individuals who examined the questionnaire and then left the site, or a few people returning many times, or many people returning a few times to the questionnaire page. It is, however, known that they did not submit the questionnaire. We acknowledge that there are commercial survey programs that do provide this information, however, they were not employed here.

The level of non-delivered online questionnaires was found to be unexpectedly high, particularly given the fact that these addresses had been collected in the ten months prior to this study, and were volunteered by participants. These findings support past research, which has typically found e-mail non-delivery rates of 35 per cent (Comely 1996), and as high as 67 per cent in one early study (Weible and Wallace, 1998). The mailing list in the present study was, however, more accurate in this regard and we accept *H1b*, acknowledging the superior reliability of mailing address lists, while also acknowledging that it is not possible to accurately measure the true undelivered rate in the case of postal surveys.

A cost comparison is presented in Table III. In this study, costs were minimised by using an existing Linux server running Apache Web server software configured to run a PERL script that parsed HTML (hypertext markup language) form responses to a pipe (|) delimited flat text file. Thus, no fixed costs relating to the host Web server nor Net access costs were involved, as these were treated as sunk costs.

The costs involved in setting up for online data collection include the costs of HTML coding the questionnaire, and setting up a secure area using the Apache Web hosting software. Postal distribution costs are much higher given they include envelope stuffing and two-way postage costs. By comparison, the online costs relate solely to computer administrator maintenance costs. Collation costs are negligible in the case of online data collection, and data entry costs are non-existent.

In line with the findings of earlier studies (Mehta and Sivadas, 1995; Weible and Wallace, 1998), we conclude that the cost of postal data collection is higher than where online methods are used, supporting *H1c*. In particular, there are substantially higher costs incurred upon the return of postal surveys, in terms of both collation and data entry. Correctly designed online surveys employing the Net avoid these costs, making them a far cheaper option per usable response returned. Since mainly semi-fixed costs are involved in online data collection, the unit costs shown would be much lower in a survey involving a larger number of respondents.

Antecedent studies indicate that online data collection provides a higher response speed than postal surveys. The findings in this study support the earlier studies in that 75 per cent of the online questionnaires were completed within four days following the e-mail invitation to participate, and 40 per cent were received within the first 24 hours. Questionnaires delivered by post, whilst starting more slowly, were mostly returned in the second week of collection. Over 40 per cent of postal responses were received on one day in the second week, as shown in Table IV.

The early response speed in online data collection is notable. However, when examining response speed it is usual to present average response times when examining postal surveys, and to include weekends and other days when post is not delivered. On this basis we find that *H1d* is supported, since postal data collection took an average 10.8 days compared to 3.9 days in the case of online data collection ($t = 58.9, p = 0.00$).

Data quality

Comparisons concerning the quality of data obtained using online and postal data collection methods are often reported at a basic level. Typically, judgements on data quality are restricted to analysis of item-missing data, the number of responses to open text boxes, and item-missing responses for personal demographic questions. It is assumed here that respondents are less likely to provide personal data in online surveys because of a perceived lack of security.

In the present study, item-missing data have been analysed in a more complete manner, and analysis of response variance was undertaken to increase the richness of the comparison. Scale items in this study included a “don’t know” or “refused” option. Where respondents who completed the HTML form questionnaire did not select a response of their own, the default response was “don’t know”. Those who completed the postal survey questionnaire could either answer “don’t know” or leave the question unanswered.

A comparison was made of the combined item-missing and “don’t know” responses in the postal survey and the number of “don’t know” responses in the case of the online survey. On the basis of an analysis that excludes responses to demographic questions, *H2a* is rejected. On average there was a 23 per cent item-missing data/don’t know in the case of the online survey and 19 per cent in the case of the postal survey; which is not a statistically significant difference. Item-missing data levels are high in both cases, as respondents were not required to comment on aspects of the AFC they may not have directly experienced (e.g. the club Web site and/or family days). Prevention of question skipping in an online questionnaire changes this outcome (Couper *et al.*, 2001).

The analysis of responses to personal demographic questions is presented in Table V.

Numerically, there was more item-missing data in the postal surveys in four out of the five demographic questions. However, the level of item-missing data is significantly different in only two of the five cases, viz occupation and life cycle stage. These results suggest that we should accept *H2b*, in that there is a higher incidence of item-missing data on personal demographic questions in the case of the postal survey. This finding supports Basi (1999), who suggested that those who complete online questionnaires complete more questions than those completing postal surveys.

In order to assess the differences in response quality in more depth, analysis of variation in the responses was undertaken. Because of the ease with which questions can be answered online, it was felt that there might be less discrimination on scale items by online participants. This would present itself as a lower variation in responses, with individuals not using extreme points of the scales.

An analysis of both the way individuals answered the questionnaires and of the way the sample as a whole answered specific questions indicates that, in general, those responding

online are less likely to use the full scale and are using end and mid-points less than mail respondents. Analyses of responses to two questions that illustrate this general trend are presented in Figures 1 and 2, for illustrative purposes.

The scale item responses highlighted in Figures 1 and 2 are significantly different between the online and postal surveys. These findings suggest that *H2c* should be accepted, and highlight a possible weakness of online data collection.

Comparability of data from online and postal methods

The third group of hypotheses relates to whether or not respondents involved in the two data collection methods differ in the way they responded to the questionnaire, and in terms of their demographic profiles. *H3a* proposes that the means on each of the questions for the two groups would be the same. Analysis of the responses shows that for the non-demographic questions, the groups are statistically different on 26 of the 65 questions (40 per cent of cases). Even when the online survey was matched against a more demographically equivalent group of postal surveys ($n = 182$), the groups still differed on 22 of the 65 questions (34 per cent). We reject *H3a* in that the two groups of respondents do not respond to the questions in the same way using the two data collection methods employed.

The two groups of respondents also differ in their demographic profile. Income, age, years as a member, occupation and lifestyle category are significantly different between the two groups of respondents ($p < 0.01$). There are also marked differences within the demographic measures. The online respondents are clearly younger as Figure 3 illustrates. Only the under-19 age group is statistically the same for both collection methods. The online respondents are more likely to be professionals, and report higher incomes, as shown in Figure 4. In terms of income, all categories were significantly different at the $p = 0.05$ level. We therefore reject *H3b* as the two data collection methods clearly involve respondents with different demographic profiles.

Managerial and academic implications

As Couper (2000, p. 466) points out, “survey quality is not an absolute but should be evaluated relative to other features of the design (such as accuracy, cost, timeliness, etc)”. While most marketing professionals – managers and academics alike – can easily see the efficiencies involved in online data collections methods, the sources of error are not always quite as obvious. Survey errors arise involving such matters as sampling, coverage, non-response, and measurement.

The AFC study reported in this paper illustrates that the responses and demographic profile of the two groups of subscribers are statistically different between the data collection methods employed. This difference could be a coverage error (those without an e-mail address or Web access), and/or a sampling error that arose because not all members of the postal sampling frame were measured due to undelivered mail.

Even in this study, where respondents were drawn from the same membership base, there are clear differences between the two groups. Non-response remains an issue, even where an emotive topic such as football fans’ perceptions of their experiences with the club are involved. As antecedent studies show, the issue is not going away with the advent of a new interactive medium, and may become a greater issue as more people become aware that they

are paying for their Internet service and therefore for the privilege of being over-surveyed. When and if TMT convergence extends to the point where almost all televisions are interactive devices, then both these issues may be overcome in consumer research. Until that far off day, the issues remain.

In this context, it must be remembered that Net access costs are not uniform across all countries, and that the penetration of the technology can in part be explained by differences in broadband availability and access costs (Park and Jun, 2002). Such differences would only exacerbate the inequities found in this research project.

There is a need for further research into measurement error where online data collection methods are employed, and particularly where HTML forms are used. The clear message for managers and practitioners from this research is that online surveys should not be expected to produce equivalent results to the more established methods of data collection.

Conclusion

In this paper, we have acknowledged that an exciting new interactive, and multi-faceted medium and related technology has spurred innovation in marketing science and practice, and that this innovation includes the field of marketing research. While there are many aspects of online marketing research that require scientific investigation, we have restricted our commentary to the comparative use of the online and postal survey data methods. The study we report is a probabilistic survey of known subscribers, where the same questionnaire was employed. In some ways, the methodology employed might be considered an ideal approach relative to an end-user study that employs non-probability sampling of large numbers of volunteer Net users (e.g. Kehoe and Pitkow, 1996).

We conclude that online data collection does offer some advantages over postal collection from an efficiency viewpoint. Although not uniform, there is also evidence to suggest a lower incidence of item-missing data in online surveys on more sensitive personal demographics questions.

There are, however, a number of unfavourable differences between online and postal methods which should be taken into consideration by researchers employing online methods. The online survey in this study is characterised by a large number of non-delivered questionnaires, and a response level less than half that of the postal data collection method, thus heightening concerns over representativeness. Moreover, clear differences are evident between the two data collection methods in terms of both demographic data and the responses given. The two groups of respondents appear to think differently about the topics presented to them in this study. While those differences in thinking may be a function of the demographic differences, it remains clear that online data collection cannot be used as a direct substitute to the postal data collection method with this population.

The findings in this study are all the more interesting given the nature of the population sampled. The database used to compile the online sample was current, and populated by involved subscribers. It might be said that use of the particular list in this study is an optimal situation, from a marketing research viewpoint.

Nevertheless, even in this subscriber survey situation, the significant differences between the two data collection methods suggests that further research on the application of self-

administered online questionnaires is warranted. The study we report shows that researchers need to ensure that the practical benefits of using the technology are not outweighed by any survey errors. Better use of the interactive medium used in this study can be made in the longer term, by reducing the likelihood of the errors mentioned in the paper, and reducing non-response in particular.

Table I

Response levels for surveys employing online and traditional data collection methods (percentages)

Author(s) and year	Online survey	Traditional survey	Population
AFC (present study)	21w	46p	AFC members
Couper <i>et al.</i> (2001)	41w		Random sample of 1,602 University of Michigan students
Adam and Deans (2000)	17w		Australian and NZ online business directors and managers
Bachmann <i>et al.</i> (2000)	19e	46p	Business school deans and chairs
Weible and Wallace (1998)	30e 34h	36p 31f	MIS faculty, mainly North American
Schaefer and Dillman (1998)	54e	58p	Washington State University faculty
Tse (1998)	7e	52p	Chinese University of Hong Kong teaching and admin staff
Noh (1998)^b	31e		Public e-mail directory ^b
Zelwetro (1998)^b	38e	36p	na ^b
Besser (1997)^c	20e	16p	Former members of the Rural Sociological Society
Couper <i>et al.</i> (1997)^c	43e	71p	Employees of US government statistics agencies
Smith (1997)^c	8e 13e		Members of Web consultants association
Williams <i>et al.</i> (1997)^c	27e	75p	Iowa State University students
Bachmann <i>et al.</i> (1996)^c	53e	66p	Business school deans in the USA
Comely (1996)	14e 17o	15p	Purchased list of UK Internet magazine subscribers
Hertz <i>et al.</i> (1996)^a	69e	96t	Health care workers using CDC Wonder
Parks and Floyd (1996)^a	33e		USENET newsgroups
Mehta and Sivadas (1995)^c	40e	64p	Users of electronic bulletin board
Opperman (1995)^c	49e	26p 33p	American Association of Geographers
Mehta and Sivadas (1995)^c	40e	64p	Users of an electronic bulletin board
Kittleson (1995)^c	28e	77p	International Directory for Health Educators
Tse (1995)^c	6e	27p	Chinese University of Hong Kong teaching and admin staff
Schult and Totten (1994)^c	19e		Marketing and MIS faculty at US universities
Parker (1992)^c	68e	38p	AT&T employees
Walsh <i>et al.</i> (1992)^c	76e		Subscribers to online user group
Kiesler and Sproull (1986)^b	67e	75p	<i>Fortune</i> 500 company department
Sproull (1986)^c	73e	87t	<i>Fortune</i> 500 company department

Notes: e = e-mail; h = HTML form; w = e-mail plus HTML form; o = postal plus HTML form; p = post; t = telephone; f = fax

Sources: ^a Cho and LaRose (1999); ^b Dommeyer and Moriarty (2000); ^c Schaefer and Dillman (1998)

Table I Response levels for surveys employing online and traditional data collection methods (percentages)

Table II

Response levels for online and postal data collection methods

	Online	Postal
Sent	3,900	1,026
Undelivered (invalid address)	700 (18%)	6 (< 0.5%)
Completed	826	471
Response level (%)	21	46

Table II Response levels for online and postal data collection methods

Table III

Unit cost comparison for online and postal data collection methods

	Online (\$)	Postal (\$)
Set-up (e.g. Linus server administrator setup v. printing)	0.91	0.82
Distribution (includes reply costs)	0.20	1.40
Collation (e.g. extraction of data file)	0.05	0.76
Data entry	0.0	1.86
Total per usable response	1.16	4.84

Table III Unit cost comparison for online and postal data collection methods

Table IV

Cumulative response for online and postal data collection

Days from invitation	Online cumulative response (%)	Postal^a cumulative response (%)
1	39.1	0.0
2	52.0	0.0
3	60.2	0.0
4	75.5	2.3
5	81.9	2.7
6	84.5	9.0
7	86.7	9.0
8	88.8	9.86
9	89.9	10.2
10	90.9	52.6
11	92.0	76.4
12	93.1	85.2
13	94.1	95.1
14	95.3	95.8
15	96.2	97.5
16	96.7	97.5
17	97.0	98.4
18	98.3	98.6
19	99.6	98.6
Cutt-off date	100.0	100.0

Note: ^a Weekends and non-postal delivery days not included

Table IV Cumulative response for online and postal data collection

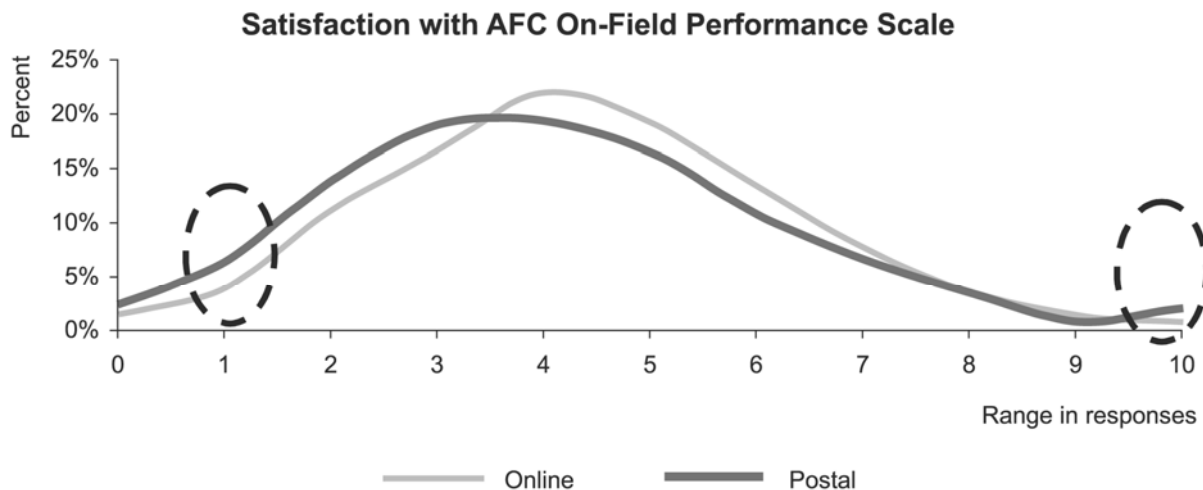
Table V

Analysis of item-missing data: personal demographic items

Demographic variable	Item-missing data (%)	
	Online	Postal
Age	1.9	1.6
Income	16.5	19.1
Occupation	3.4	6.4
Life stage	1.2	6.2
Years as member	6.1	7.6

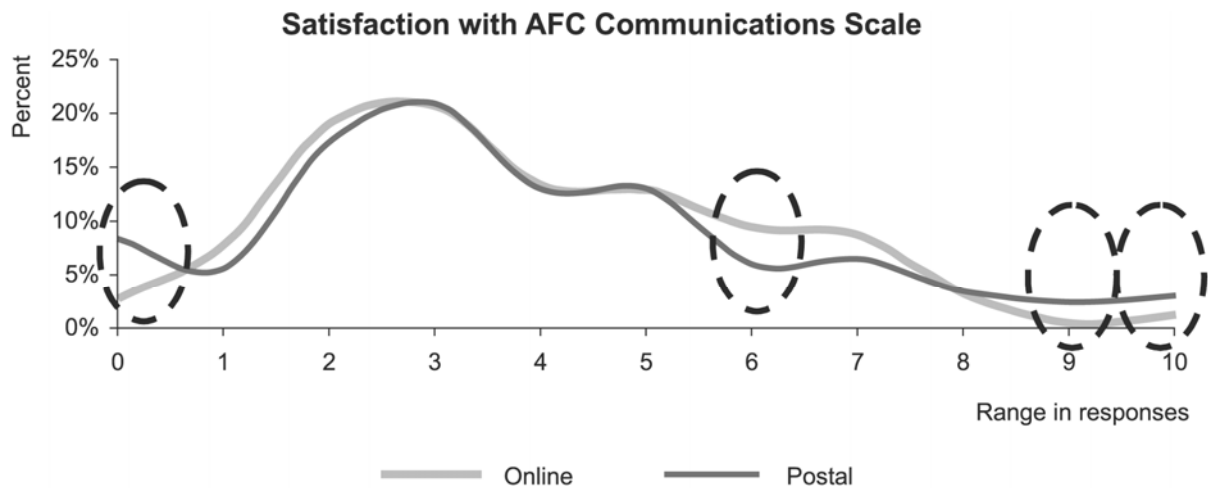
Note: Figures shown in bold are significantly different ($p < 0.05$)

Table V Analysis of item-missing data: personal demographic items



Note: Response points circled are significantly different ($p < 0.05$)

Figure 1 On-field performance scale item response pattern for online and postal data collection methods



Note: Response points circled are significantly different ($p < 0.05$)

Figure 2 AFC communication performance scale item response pattern for online and postal data collection methods

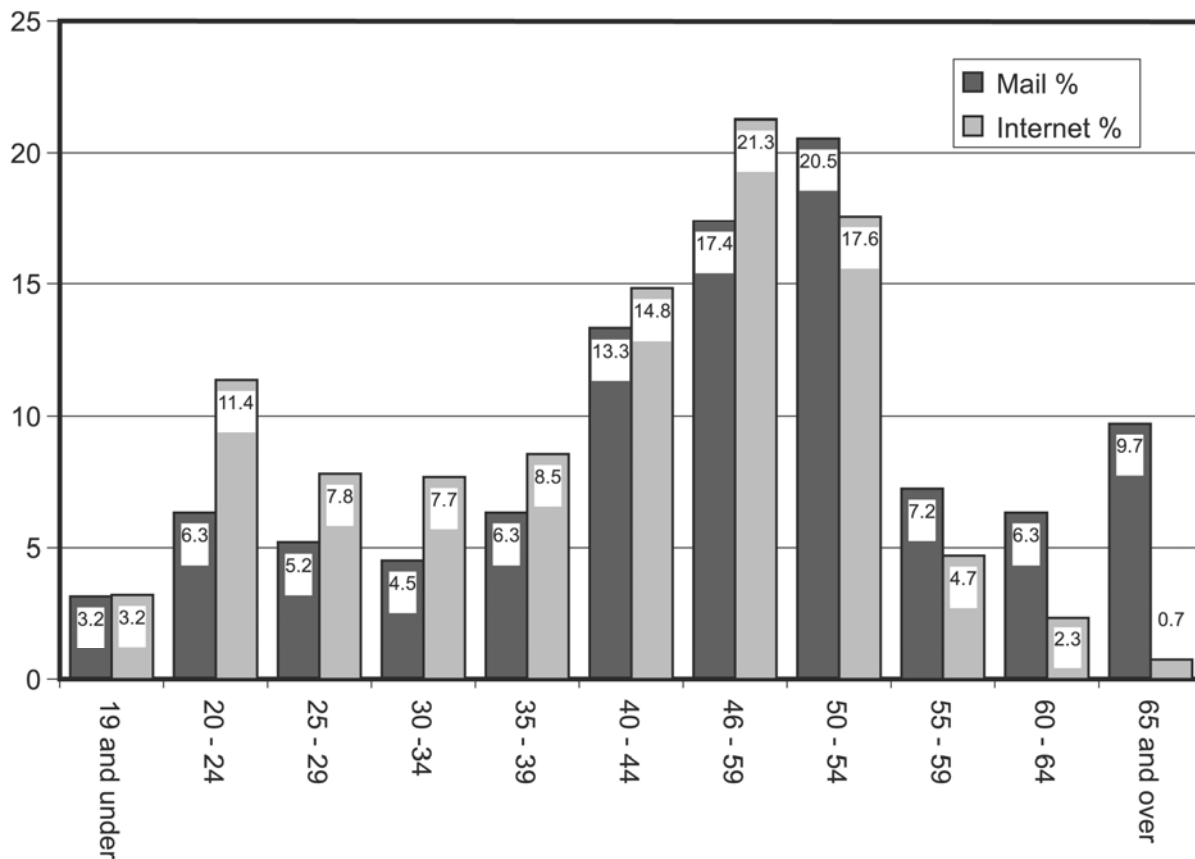


Figure 3 Comparison of age groups for online and postal data collection methods

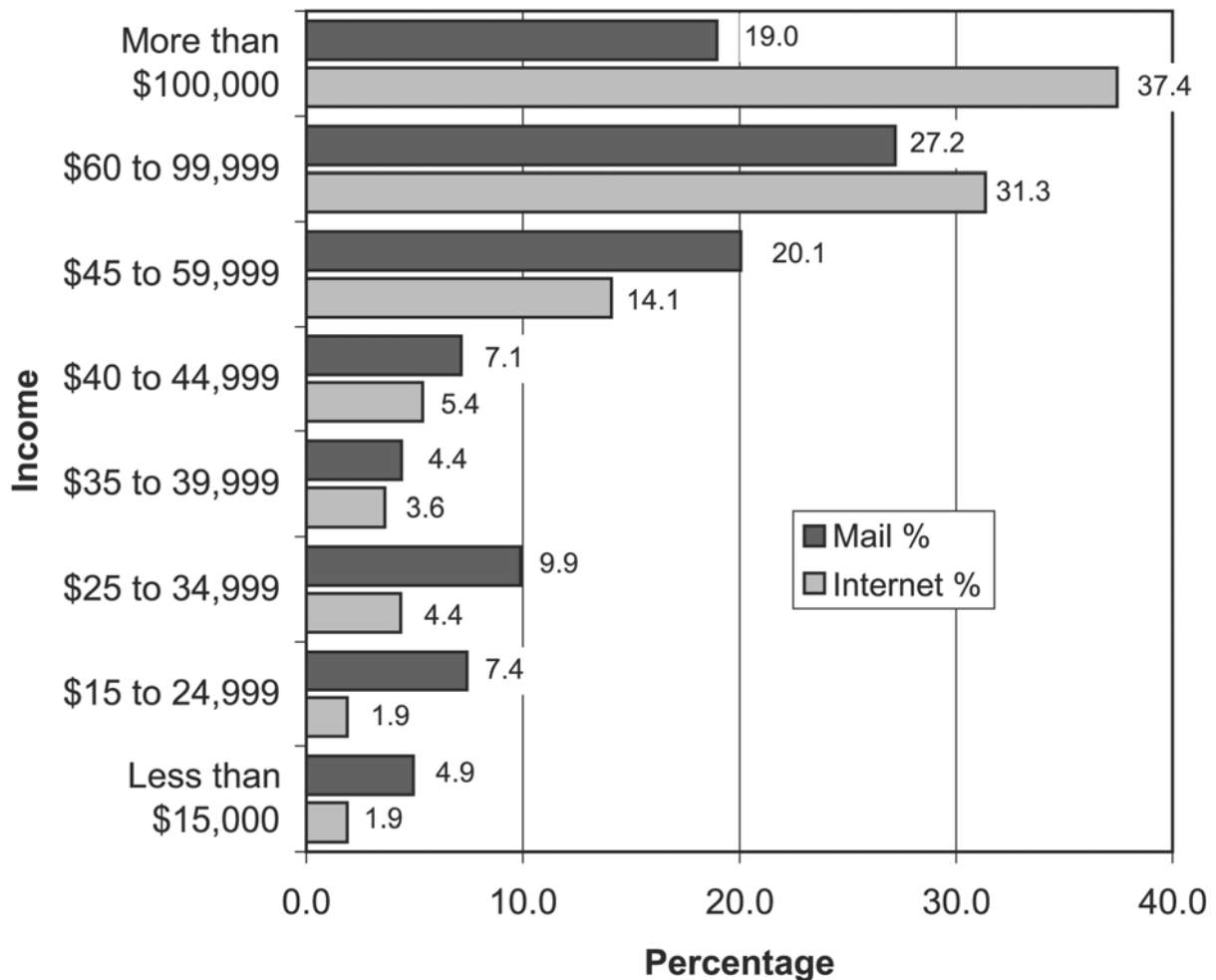


Figure 4 Comparison of income groups for online and postal data collection methods

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