

**THE INTRAHOUSEHOLD COMMUNICATIONS STUDY:  
ESTIMATING THE ACCURACY OF PROXY RESPONSES AT THE DYADIC LEVEL**

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**KEY WORDS:** Proxy Reports, Consumer Expenditures  
Family Communication

What do people living in the same household know about each other? Do they, for example, know the employment status, work and vacation hours, and wages of other household members? Similarly, do they know what other household members spend money on and how much they spend? Although there is a growing body of literature on what household members serving as proxy reporters actually know about other household members, and on the factors that might account for any observed differences between self and proxy reports, the results are rather inconclusive (e.g., Moore, 1988). In brief, observed differences between self and proxy reports seem to be, at least in part, related to factors such as the relationship between the proxy and the self, the information being asked about, the importance of the information to the proxy, the characteristics of the proxy, whether the proxy participated in the event, and the method of survey administration (see for example Blair, Menon, & Bickart, 1990; Cash & Moss, 1974; Groves, 1989; Mathiowetz & Groves, 1985; Moore, 1988; Rodgers & Herzog, 1987; Rodgers, Herzog, & Andrews, 1988). Nevertheless, many surveys continue to accept one individual's report about all other household members because it is neither reasonable to expect nor practical to seek individual reports from each person in every household (e.g., Blair, Menon, & Bickart, 1990; Dippo, 1989).

We had two specific goals in this research. Our first goal was to examine the accuracy of proxy reports involving household members' expenditures. We employed survey questions similar to those for which the Bureau of Labor Statistics (BLS) frequently accepts proxy reports. Our second goal was to identify factors that would be systematically related to the accuracy of these proxy reports and that could subsequently lead to more efficient and effective selection of adequate proxy respondents.

*Proxy Accuracy*

Although self-reporters are fallible human beings who may forget some of their expenditures or may include expenditures made outside of the reference period, they are probably the best criteria that can be reasonably obtained for studying everyday expenditures, and they also represent the best

alternative to proxy reports for survey researchers. In the present investigation we compared proxy reports to self reports and utilized their degree of agreement (or disagreement) as our criteria for examining potential predictors of proxy accuracy.

*Predictors of Proxy Accuracy*

A variety of factors may be related to how much one person knows about another household member. There are likely to be some *individual characteristics* that distinguish some people, who by virtue of their role or status in the household, are likely to be well informed about the expenditures of other household members. Some people may also have a great deal of knowledge about particular household members or may learn information about other household members as a result of the type or amount of direct or indirect *interaction* they have with other household members. Furthermore, some people may know quite a bit about a particular household member because of their *relationship* or their *interest and involvement* in the activities of that particular household member. At yet another level of analysis, there may also be *household or family characteristics* that distinguish households where all members are well-informed about each other from households where each person can only be relied upon to accurately report about themselves.

In this paper, we focus on the dyad, looking at the direct and indirect interaction of the self and proxy or the *source or mode* by which the proxy learns about other household members (through direct participation, communication, or observation). We also look at the *relationship* between the proxy and the other household members they report on.

*Mode or source of learning.* At the most basic level, what one person knows about another must be learned through some kind of direct or indirect interaction. This interaction could be very informative and direct, such as participating in the same activity together, or discussing a purchase or work schedule. For example, Mary may tell John how busy her work schedule will be next week, or she may go with him to buy groceries. This interaction could also be indirect, such as John noticing that Mary is wearing a new blazer or that she has come home late from work a couple of nights in a row. Of course, one person may learn about another by interacting with a third person who had a more direct interaction with the second person. Julie may, for example, ask her father about

her mother's work schedule in order to find out when she might be likely to get the car. Or, Julie may find out from her sister, Jane, that her parents bought a new sofa. People may also learn about other household members' expenditures and labor force activities in a variety of other ways, such as by seeing bills, receipts, or checks.

Clearly, a person may obtain knowledge about any given expenditure made by another household member through one or several of these modes. However, some of these sources should be better than others for fostering more complete information about an expenditure. The more information the source provides, the more we would expect the proxy might know about the expenditure.

*Relationship of the proxy to other household members.* The amount of information that one household member has about another household member is also likely to be a function of the kind of relationship between the two people. For example, parents may choose not to share some information about their income or expenditures with their children. Likewise, siblings or friends may know more about the specific expenditures of teenage household members than their parents do.

#### *The Present Study*

The present study is an examination of data from an initial investigation that is part of a larger program of research conducted by BLS to examine the factors that might influence the accuracy of proxy reports particularly regarding labor force status and expenditures. The data we present in this paper are restricted to dyadic level analyses of expenditures. Previous papers have discussed proxy reporting of labor force status and family-level analyses of proxy reports of expenditures (Miller & Tucker, 1993; Mullin & Tonn, 1993; Tucker & Miller, 1993).

We anticipated that the way in which a proxy learned about a target's expenditure would be related to their agreement or disagreement with the target. Although a person could obtain valid information about another's expenditures through a variety of means or sources, we believed that some of these sources would be more consistently reliable or more memorable than others. Specifically, we expected that participation with the target, i.e., being with them when they made the purchase, would be related to less self-proxy disagreement. In a similar manner, we expected that direct communication from the target to the proxy about the expenditure, most likely through a conversation, would also be related to less self-proxy disagreement to. To a lesser extent, we hypothesized a negative relation among first and second hand observations and self-proxy disagreement.

We also anticipated that the nature of the relationship between the self and proxy would be systematically related to how closely they agreed about each others expenditures. Specifically, we hypothesized that spouses would show the least amount of disagreement when reporting about each other's expenditures than any other dyad, i.e., parent-child, and child-parent. We also expected parents might demonstrate less disagreement with their children's expenditures than their children would with their parent's expenditures. Although we planned to directly compare how much husbands and wives disagreed when reporting about each others expenditures, we made no predictions regarding the outcome of this analysis.

## **Method**

### *Overview of Design*

Seventy-one households completed a computerized self-administered questionnaire that included modified expenditure questions from four sections of the Consumer Expenditure Interview Survey (CEIS) covering their expenditures for groceries, food and drinks away from home, clothing, and medical expenses. Household members were interviewed simultaneously on individual computer terminals, reporting information for themselves and one or two other members of their household. Only household members who were at least 16 years old, who would have been acceptable as a proxy respondent for the CEIS, participated in the study. For each proxy report about another household member, respondents answered questions concerning how they learned about that person's expenditures.

### *Measures of Proxy Accuracy*

In conceptualizing and measuring the agreement between self and proxy, we considered a variety of methods for measuring the level of accuracy between self and proxy reports of expenditures. For example, a proxy may know that another household member shopped for clothing in the past month, but may not know how many items they bought or how much they spent. By examining several variables with different criteria for agreement we could give the proxy reporters credit for what they did know, but also measure how much they did not know.

Consequently, we developed three measures of self and proxy agreement: 1) whether or not the self and proxy agreed that an expenditure took place in each of the four categories of expenditures (i.e., clothing, groceries, food away from home, medical, and home furnishings); 2) how well the self and proxy agreed in terms of the number of expenditures (within and across the four categories); and 3) how well the self and proxy

agreed in terms of the cost of the expenditures, (within and across the four categories).

*Creation of Disagreement Indices.* For each of the indicators of self-proxy agreement that we just described, i.e., the categorical level, number of expenditures and cost of expenditures, we created an index of *disagreement* by taking the absolute value of the difference between the report of the proxy and the self for each category and then summing across expenditure categories. We then divided the total of these differences by the respective total reported by the self to scale the discrepancies in terms of their relative proportion of the self report. This scaling was employed to make the self-proxy disagreement also reflect the variability in number and cost of expenditures reported by different targets. For example, a proxy who missed one of the ten expenditures reported by the self would show much less disagreement (.10) than a proxy who missed one of two expenditures reported by the self (.5) with this scaling. These two proxies would have been treated exactly the same without the rescaling because in each case only one expenditure was missed.

*Measures of Source or Mode of Learning*

We measured the source of information for different categories of expenditures from the proxy's point of view by asking them how they learned about the expenditures made by another household member within different categories of expenditures. For each expenditure category (with the exception of food and drinks) proxies were presented with a list of possible ways they could have learned about the target person's expenditure, and they were to select as many of them as applied. We grouped the list of items into four sets that reflected participation with the target, conversation with the target, first hand observations of the expenditure, such as noticing a new outfit, and finally second hand observations which included hearing about the expenditure from others. Unfortunately, if the proxy reporters did not believe or did not report that the target person made an expenditure in a category during the past week (or month for clothing and medical expenditures), they may not have provided their typical information source for those kinds of expenditures. Thus, our measures of source or mode of learning may be limited in this study.

*Measures of Relationships*

In this study the only information collected about the nature of relationships among household members was the *type* of relationship, for example, spousal, parent-child, and child-parent. An inadequate number of unrelated individuals and other kinds of relatives

precluded us from exploring additional relationship types.

**Results**

*Overview of Data Analyses*

The results of our research are presented in three sections. In the first section, we examine three kinds of self and proxy agreement on the four different categories of expenditures, and from these, we create three indices that reflect the amount of disagreement between the self and proxy reports. The second and third sections show whether the mode of learning, and the type of relationship between the self and proxy are related to each of these three disagreement indices.

*Self-Proxy Agreement*

Table 1 shows the percentage of cases where the self and proxy agreed that an expenditure had or had not been made within each expenditure category. The last row shows the average agreement across all four categories. As shown, the highest agreement was in the grocery category, where self and proxy agreed almost 80% of the time that groceries had or had not been purchased in the last week. The lowest agreement was in the food and drinks away from home category, where self and proxy agreed about half of the time that food and drinks had or had not been purchased away from home in the last week. The overall average agreement was 62.5% using this minimal criteria for a match.

**Table 1. Self and Proxy Agreement on Expenditures in a Category.**

	Agreement	Proxy Misses	Proxy Overreports
Clothing	65.80%	44.20%	12.10%
Food & Drink	49.40%	52.60%	12.30%
Groceries	79.70%	18.00%	11.70%
Medical	55.10%	54.00%	27.00%
<b>Average</b>	<b>62.50%</b>	<b>42.20%</b>	<b>15.76%</b>

For this measure, we also determined the percentages of mismatches according to whether the self or proxy omitted an expenditure report when the other person reported an expenditure or category. As can be seen in column three of Table 1, an average of 42% of the categories in which expenditures were reported by the self were missed by the proxy reporters. On the other hand, the self failed to report an expenditure at an average of almost 16% of the different categories for which proxy reporters reported an expenditure, as shown in the last column of Table 1.

A closer examination of the total number of expenditures reported in each category indicated that self and proxy reporters differed significantly in the number of expenditures within each category that they reported, as can be seen in Table 2. The mean number of expenditures for the self exceeded that of the proxy for the three categories of clothing, food and drinks, and medical, as well as overall,  $F(1,157) = 28.23 - 92.13$ , all  $p$ 's  $< .01$ . The difference between self and proxy reports for the number of grocery store trips was not significant,  $F(1,157) = 2.01$ ,  $p > .10$ .

**Table 2. Mean Number and Cost of Expenditures Reported by Self and Proxy Reporters.**

	Self	Proxy
<b>Number of Expenditures</b>		
Clothing	1.39 <sub>a</sub>	.65 <sub>b</sub>
Food & Drink	3.29 <sub>a</sub>	1.43 <sub>b</sub>
Groceries	.70 <sub>a</sub>	.65 <sub>a</sub>
Medical	2.18 <sub>a</sub>	.90 <sub>b</sub>
Total	8.20 <sub>a</sub>	4.02 <sub>b</sub>
<b>Cost of Expenditures</b>		
Clothing	\$59.04 <sub>a</sub>	\$24.44 <sub>b</sub>
Food & Drink	\$22.16 <sub>a</sub>	\$8.01 <sub>b</sub>
Groceries	\$44.54 <sub>a</sub>	\$23.43 <sub>b</sub>
Medical	\$251.15 <sub>a</sub>	\$81.16 <sub>b</sub>
Total	\$376.89 <sub>a</sub>	\$137.04 <sub>b</sub>

Note: Means with different subscripts are significantly different at  $p < .05$ .

It is possible for the self and the proxy to disagree markedly within dyads and still show agreement across dyads in the relative number of expenditures. Indeed, this appeared to be the case with the number of expenditures reported by self and proxy reporters correlating significantly for clothing, groceries, and medical expenses,  $r$ 's = .26 to .54,  $p$ 's  $< .01$ . There was no significant correlation between self and proxy reports of number of expenditures for food and drinks purchased away from home or overall across these four categories of expenditures,  $r$ 's = .06 and .09, respectively,  $p$ 's  $> .10$ . This lack of an overall correlation appears to be due chiefly to the relatively large number of food and drink purchases reported by the self that were often missed by many proxy reporters.

An examination of how well the self and proxy agreed in terms of the cost of the expenditures indicated that the cost reported for expenditures within and across categories of expenditures differed significantly between the self and proxy reporters. Table 2 above also shows the total cost of all the expenditures within a category and overall as reported by both the self and proxy. Specifically, self reporters described spending more money than proxy reporters for Clothing, Food and Drinks, Groceries, Medical Expenses, and overall,  $F(1,157) = 5.09 - 56.77$ , all  $p$ 's  $< .05$ .

Once again, despite these significant within-dyad differences, there was significant agreement across dyads in the relative cost of expenditures for clothing and groceries,  $r$ 's = .43 and .41, respectively,  $p$ 's  $< .01$ , but there were no significant relations between the self and proxy reports for the cost of food and drinks away from home or medical expenditures,  $r$ 's = .12 and -.02, respectively,  $p$ 's  $> .10$ . As clearly shown in Table 2, the cost of medical expenditures dominates the others. There were several outliers with very large medical expenses that considerably distort this average. The median medical expenditures were only \$151.00 and \$53.00 for self and proxy reporters, respectively. Because several people who reported rather extreme medical expenditures, some of whom it seems likely may have accidentally misreported these expenditures, we restricted further analyses concerning the cost of expenditures to Clothing, Food & Drinks, and Groceries categories. The overall correlation between self and proxy reporters excluding medical expenditures was significant,  $r = .39$ ,  $p < .01$ .

#### *Source or Mode of Learning*

To examine the relation of source or mode of learning with self-proxy disagreement, we calculated Pearson product-moment correlations among the three disagreement indices and the four different sources. As can be seen in Table 3, there were some significant relations demonstrated between mode of learning and self-proxy agreement, although they were not exactly in line with our expectations. Specifically, more first and second hand observations were associated with lower levels of disagreement between the self and the proxy reporter on the category of expenditures,  $r$ 's = -.23 and -.22, respectively,  $p$ 's  $< .01$ . The relations among participation and conversations with self-proxy disagreement for the category of expenditures were marginally significant,  $r$ 's = -.16 and -.14, respectively,  $p$ 's  $< .10$ . Conversations were also significantly related to lower levels of self-proxy disagreement in the total cost of expenditures,  $r = -.18$ ,  $p < .05$ . There were no other significant associations among source of proxy

information and self-proxy disagreement,  $r$ 's =  $-.05$  to  $-.14$ , all  $p$ 's  $> .10$ .

**Table 3. Sources of Proxy Information and Self-Proxy Disagreement**

Source of Proxy Information	Type of Disagreement		
	Category of Expenditure	Number of Expenditures	Cost of Expenditure
Participation	-.16+	-.11	-.08
Conversation	-.14+	-.13	-.18*
First Hand			
Observation	-.23**	-.11	-.14
Second Hand			
Observation	-.22**	-.11	-.05

+  $p < .10$  \*  $p < .05$  \*\*  $p < .01$

#### *Relationship Between Self and Proxy*

To examine the differences between self and proxy reporters in different relationships, we conducted analyses of variance of the self-proxy disagreement indices of categories of expenditures, number of expenditures, and cost of expenditures by the type of relationship between the self and proxy with follow-up tests using Tukey's HSD procedure. As illustrated in Table 4, there were some significant differences in self-proxy disagreement for different types of relationships for the total number of expenditures reported and the category of expenditures with some of the differences coinciding with our expectations. Specifically, parents reporting as proxies for their children's expenditures had significantly greater disagreement about the number expenditures and category of expenditures than husbands made reporting about their wives, wives reporting about husbands, or than children reporting about their parents. However, there were no other significant differences between these relationship types. There were no relationship type differences for disagreement on the cost of expenditures.

#### **Conclusions**

In the present study, we examined the agreement of self and proxy reports about common expenditures, and we explored some dyadic influences on their agreement. In general, the self and proxy agreed that an expenditure had occurred within a specific category from 40 to 80 percent of the time, but proxy reporters missed over 40% of the different categories in which the self reported expenditures. Further, proxy reports were significantly lower than the self reports in total

number of expenditures and in the total cost of the expenditures. Despite the significant differences within dyads, the proxy reports were still related to the self reports across dyads for number and cost of expenditures in several categories of expenditures. Thus, although the proxy reporters in this study were likely to underreport the expenditures when compared to the self, there was still significant relative agreement between the self and proxy reports. It is important to note here that we have no objective data as to what really occurred, but we believe that it is safe to assume that there are errors in reporting by both self and proxy, and that neither are infallible.

**Table 4. Relationship Type and Disagreement about Expenditures.**

Relationship Type	Type of Disagreement		
	Category of Expenditure	Number of Expenditures	Cost of Expenditure
Husband	0.533 <sub>a</sub>	0.795 <sub>a</sub>	0.799
Wife	0.547 <sub>a</sub>	0.818 <sub>a</sub>	0.866
Child-Parent	0.404 <sub>a</sub>	0.732 <sub>a</sub>	0.823
Parent-Child	0.934 <sub>b</sub>	1.301 <sub>b</sub>	1.04

Note: Means with different subscripts are significantly different at  $p < .05$ .

Using three indices that reflected the discrepancies between self and proxy reports, we were able to account for some of the variability in self-proxy disagreement by taking into account the mode of learning and the type of relationship between the self and proxy. Specifically, all four modes of learning were associated with lower levels of disagreement between the self and the proxy reporter for the category of expenditure. Conversation was also related to less disagreement about the total cost of expenditures. These results were not as strong as we had hoped. In addition, the modes of learning that we had considered to be the weakest (observations) performed adequately, while participation, which we had considered the strongest mode of learning, was only marginally significant in predicting one kind of disagreement. It is worth noting that the rates for conversation and participation in the present study were very high which may have contributed to a ceiling effect on the observed correlations.

In our analyses of relationship type, parents proved to be relatively quite inferior reporters about the category and about the total number of expenditures made by their children. Parents demonstrated significantly greater disagreement than children reporting about them, or husbands and wives reporting about each other. These results differed slightly when we did not rescale the disagreement indices by the number of categories and expenditures, which reflects the fact that children were making fewer expenditures and parents were missing a small number of them, but a relatively large percentage.

In conclusion, accurate proxy reporting can be quite difficult to obtain for consumer expenditures. In this research, we have begun to identify some of the factors that are related to how well proxy and self reports agree about expenditures. In the near future, we hope to learn more about the factors that mediate self-proxy convergence so that we can gain a greater understanding of proxy reporting and so that we can develop respondent rules that will improve the quality of proxy data.

#### References

- Bickart, B.A., Blair, J., Menon, G., & Sudman, S. (1990). Cognitive aspects of proxy reporting of behavior. In M. Goldberg, G. Gorn, & R. Pollay (Eds.) *Advances in Consumer Research*, vol 17, pp 198-206. Provo, UT: Assoc. for Consumer Research.
- Cash, W.S. & Moss, A.J. (1972). Optimum recall period for reporting persons injured in motor vehicle accidents. *Vital and Health Statistics*, National Center for Health Statistics, Series 2, No. 50
- Dippo, C.S. (1989). The use of cognitive laboratory techniques for investigating memory retrieval errors in retrospective surveys. *Proceedings of the International Statistical Institute*. Paris, France.
- Groves, R.M. (1989). *Survey Errors and Survey Costs*. New York: Wiley.
- Kuiper, N.A., & Rogers, T.B., (1979). Encoding or personal information: Self-other differences. *Journal of Personality and Social Psychology*, 37, 499-514.
- Mathiowetz, N.A. & Groves, R. M. (1985). The effects of respondent rules on health survey reports. *American Journal of Public Health*, 75, pp. 639-633.
- Miller, L., & Tucker, C., (1993, January). *The Intrahousehold Communications Study: A typology of family Cohesion*. Paper presented at the 1993 winter meetings of the American Statistical Association, Ft. Lauderdale, FL.
- Mullin, P. A. & Tonn, B. E. (1993, January). *Factors associated with proxy knowledge of employment-related information*. Paper presented at the 1993 winter meetings of the American Statistical Association, Ft. Lauderdale, FL.
- Moore, J.C., (1988). Self-proxy response status and survey response quality: A review of literature. *Journal of Official Statistics*, 4( 2), pp. 155-172.
- Rodgers, W.L., & Herzog, R. (1987). Interviewing older adults: The accuracy of factual information. *Journal of Gerontology*, 42, (4). pp. 387-394.
- Rodgers, W.L., Herzog, R., & Andrews, F. M. (1988). Interviewing older adults: Validity of self-reports of satisfaction. *Psychology and Aging*, 3(3). pp. 264-272.
- Tucker, C. & Miller, L. A. (1993, January). *The Intrahousehold Communications Study: Family Cohesion and the level of knowledge about expenses*. Paper presented at the 1993 winter meetings of the American Statistical Association, Ft. Lauderdale, FL