

St. Anthony Hospitals



EVALUATION OF THE 48-96 SHIFT *FOR WEST METRO FIRE RESCUE*

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Executive Summary

The following study was undertaken to assist West Metro Fire Rescue with evaluating its shift change to 48-96 (48 hours on, 96 hours off), which was instituted January 1, 2006. The purpose of the information gathered was two-fold: 1) to assist West Metro Fire Rescue with the decision whether to continue the shift; and 2) to conduct research and provide information to the general EMS community on the effects of the 48-96.

Surveys, sleep diaries, and focus groups were used in the assessment.

Key findings pertaining to on-line personnel are as follows:

- The members slept more on average post change.
- The increased sleep was distributed throughout both ON and OFF shifts.
- Members slept fewer hours the night before a shift began in anticipation of getting up to go on shift and the new rotation minimizes this.
- At baseline, the majority of respondents were satisfied with their job, and this did not change appreciably with the 48-96; instead views regarding job satisfaction (and in some cases dissatisfaction) became stronger.
- On average, the respondents reported a low degree of dissatisfaction with patient care; this dissatisfaction did not increase on the 48-96, and in fact, showed a trend toward being less.
- Members felt that when compared to the old shift, the 48-96 shift interfered significantly less with leisure activities, household activities, and non-household activities like going to the bank.
- Over half (52%) of the members thought that the overall advantages of the old schedule outweighed its disadvantages, however, a significantly greater proportion of members (68%) felt that the overall advantages of the 48-96 outweighed its disadvantages.
- Use of caffeinated beverages and alcohol remained the same after the change.
- The majority of families liked the 48-96. They noted that the shift made it much easier to do special projects around the home, participate in leisure time activities, take personal time for themselves, and spend time together as a family.

- The majority of families felt that the 48-96 shift did not adversely affect their time together as a family or as a couple, nor did it put a strain on their relationship or their children.
- Very few families reported being adversely affected by the shift change with regard to changing to less satisfactory child care arrangements, elder care arrangements or visitation rights.
- Not all the members like the 48-96 shift and it has made accomplishing household tasks and taking care of children more difficult for some families.

Background

The following study was undertaken to assist West Metro Fire Rescue with evaluating its shift change to 48-96 (48 hours on, 96 hours off), which was instituted January 1, 2006. The purpose of the information gathered was two-fold: 1) to assist West Metro Fire Rescue with the decision whether to continue the shift; and 2) to conduct research and provide information to the general EMS community on the effects of the 48-96. Only the professional aspects of the members' lives were included in the formal research and members were required to provide consent. The St. Anthony Hospitals Institutional Review Board reviewed and approved the research proposal.

Methods

The methods are briefly outlined in Table 1 below; more of the technical details can be found in Appendix A. Surveys (Appendices B and C), sleep diaries, and focus groups (separate report) were used in the assessment. All of the on-line personnel employed as of December 1, 2005 were given three opportunities between April 1 and August 31, 2006 to comment on the shift change. The baseline survey and sleep diary were mailed to 314 uniform employees in December 2005. These uniform employees were identified by West Metro Fire Rescue and included on-line personnel as well as employees in administrative positions. Subsequent surveys and diaries were only mailed to on-line personnel and any other employee in an administrative position who desired to be in the study.

Since the response to the first work-related questionnaire was less than optimal, the decision was made to allow members to respond anonymously.

Table 1. Evaluation methods

Aspect of member's life assessed	Work-related questionnaire administered to on-line personnel (Dec '05, April '06, July '06).	Sleep diary for one week (Dec '05, April '06, July '06)	Family Survey (July 2006)	Focus Groups (August 2006)
Job Satisfaction	✓			
Burn-out	✓			
Number of hours of sleep		✓		
Daytime sleepiness	✓			
Ability to accomplish activities outside of work	✓		✓	
Quality of family life			✓	✓

Results

RESPONSE RATES

A detailed description of the response rates can be found in Table 2 located in Appendix D. The total response rate for the work-related questionnaires submitted anonymously plus those who consented from on-line personnel was as follows: 59.5% in December 2005, 40.9% in April 2006, and 57.9% in July 2006. A total of 79 members submitted completed questionnaires for all three time periods (29.3%)

The sleep diaries were returned at a rate of 40.5% in December 2005, 36.4% in April 2006, and 48.0% in July 2006. Approximately 25% of on-line members submitted sleep diaries for all three time periods.

The family survey had the best response with 65.1% of the families replying.

FINDINGS ABOUT SLEEP

Number of hours of sleep pre and post shift change for on-line personnel

Data were analyzed for 69 on-line members who submitted a completed sleep diary in December 2005 and July 2006¹ (see Appendix A for more of the methodological details). The average total hours slept per week during July 2006 was greater (49.7) than in December (46.1), and this difference was statistically significant (Figure 1).^{2,3} The increase in July was not due solely to members getting more sleep on their "off" times; the members also reported longer hours of sleep during the times they were "on" shift (Figure 2). On average, members reported getting 5.9 hours of sleep/night during a shift in December compared to 6.4 hours/night during July 2006 ($p < 0.01$). During off times, members reported an average of 7.1 hours/night in December and 7.4 hours in July ($p < 0.01$).

The reason for the increased number of sleep hours on shift is not clear. When the number of times awakened during the night was examined, members reported statistically significantly less awakenings during July (Figure 3). Unfortunately we did not include the reason(s) for the awakenings on the sleep diary, e.g., was the member awakened because of a call or awakened because he needed to void, nor did we ask which station the member was located in so it was not possible to correlate the number of awakenings with call volume, and this is a source of potential bias. In speaking with Gary Armstrong, Chief of Operations, the call volumes in December (2175) and July (2173) were almost identical. Figure 4 shows the average number of hours slept per night for all members who submitted a diary in July 2006. For the group, there is very little fluctuation in the number of hours slept per night during the off times with the exception of the night preceding the onset of a shift. The members reported an average of 6.9 hours of sleep compared to 7.4 to 7.6 hours on other off nights. According to Dr. Lange (the sleep medicine specialist), this pattern represents

the anticipatory effect of having to get up for the shift the next day and is an expected reaction.

Number of hours of sleep pre and post shift change for administrative personnel

Very few administrative personnel elected to take part in the study. Ten administrators submitted a sleep diary in December 2005, and the average (mean⁴) total hours slept during this time period was 44.4 hours (median⁴ 44.25). Four administrators submitted a sleep diary for July 2006, and the average (mean) total hours slept was 46.7 (median 46.25).

It is not possible to compare the average total hours slept between the on-line personnel and the administrators because so few administrators took part in the study, and because of the difference in the methods of comparison (one group was matched, the other was not).

Daytime sleepiness in on-line personnel

Excessive daytime sleepiness was assessed by the Epworth sleepiness⁵ scale that was included in the work-related questionnaires. A score greater than or equal to 10 is considered excessive daytime sleepiness from any cause. To assess this condition, we used paired data from 107 individuals who completed the questions in December and July. In this group, 43 individuals (40.2%) had excessive daytime sleepiness as measured by the Epworth sleepiness scale in December and this decreased to 39 (36.4%) in July (Figure 5). Although this difference is not statistically significant,⁶ it is in the right direction of fewer individuals reporting a score of 10 or higher.

Daytime sleepiness in administrative personnel

The proportion of administrative personnel who scored 10 or higher on the Epworth sleepiness scale in December was 50% (5/10), and this value did not change in July: the individuals who scored 10 or higher in December also scored 10 or higher in July.

GENERAL JOB SATISFACTION, SATISFACTION WORKING WITH PATIENTS, AND SATISFACTION WITH SHIFT

The work-related questionnaire asked the on-line personnel for their opinions and feelings on the following items:

- Their satisfaction with the job in general, and their observations about their co-worker's job satisfaction;^{7,8}
- The satisfaction they get from working with patients;⁹

- How much the shift they're currently working interferes with leisure time, household and non-household activities;^{7,8}
- Whether the advantages of the current shift system outweigh the disadvantages;^{7,8}
- How their spouse/partner feels about the current shift.^{7,8}

The demographics of the respondents who answered the work-related questionnaire were similar across the three time periods with the exception of the proportion of paramedic technicians in each group. In general, the consenters had a greater representation of paramedic technicians than the anonymous group. This difference in distribution of paramedic technicians was controlled for in the analysis of dissatisfaction with patient care ("burn-out") by examining the responses of paramedic technicians separately from those of non-paramedic technicians.

Table 3. Demographics of on-line members who responded to questionnaires, by time period, and by consent status

	December 2005		April 2006		July 2006	
	Consented (n=122)	Anonymous (n=29)*	Consented (n=70)*	Anonymous (n=26)*	Consented (n=113)	Anonymous (n=42)
Age, median	38.0	36.0	39	41	38.0	38.0
Gender, % male	98%	100%	97%	100%	98%	100%
Paramedic Technician (%)	45.1%	37.9%	50.0 %	20.0 %	45.1%	32.6%
Roundtrip commute, median (in minutes)	The data from this survey was not used because the question was unclear as to whether it referred to roundtrip or one-way.		50 min	40 min	45 min	45 min
Years working current shift, mean	11.6 years	11.9 years	This question was not asked on follow-up surveys because of the shift change.			

* These values do not match the values in Table 2 because surveys that were received after the cut-off date were excluded from these analyses so that the time periods would be clearly delineated. For example, December questionnaires returned in February or March 2006 were not used in the December analysis because the responses may have been influenced by the 48-96 schedule.

Overall Job Satisfaction

Overall job satisfaction was determined by a series of five statements that members were asked to respond to using a 7 point scale ranging from Disagree Strongly to Agree Strongly.

At baseline in December 2005, the majority of respondents indicated that they were satisfied with the job (Figure 6, Table 4), the kind of the work they do in this job (Figure 7, Table 4) , and did not frequently think of quitting (Figure 8, Table 4).

Members also indicated that they thought others were also satisfied with the job (Figure 9, Table 4), who did not often think of quitting (Figure 10, Table 4).

When assessed six months later in July, the results were not substantially different or statistically significant, however, there was movement towards stronger views. The proportion of people who strongly agreed or agreed with a statement increased, and the proportion who strongly disagreed or disagreed also increased, but remained less than 3%. Overall, however, the majority of individuals still said they were satisfied with their job and the work they do and were not thinking of quitting (Table 4).

Table 4. Job satisfaction, December 2005 vs. July 2006

	December 2005 (n=152)		July 2006 (n=156)	
	Percent who indicated:		Percent who indicated:	
Statement	Strong agreement or agreement with statement	Strong disagreement or disagreement with statement	Strong agreement or agreement with statement	Strong disagreement or disagreement with statement
Generally speaking, I am very satisfied with this job	86.9%	0.7%	91.0%	1.9%
I frequently think of quitting this job	2.0%	83.4%	2.6%	86.4%
I am generally satisfied with the kind of work I do in this job	88.2%	0.7%	92.4%	1.2%
Most people on this job are very satisfied with the job	78.3%	0.8%	80.7%	2.6%
People on this job often think of quitting	0.7%	78.3%	0%	81.4%

Satisfaction of working with patients

Similar to assessing job satisfaction, satisfaction of working with patients was assessed by presenting members with a series of questions that they were asked to react to on

a 5 point scale. Since patient contact differs between paramedic technicians and non paramedic technicians, the responses were calculated separately for these two groups.

In general, the trend showed that for both groups the difficulty of working with patients (Figure 11), the amount of energy required to work with patients (Figure 12), and just being tired of working with patients (Figures 13 – 15) decreased over time indicating a tendency towards less burn-out, however, none of the changes were statistically significant.¹⁰ The Copenhagen Burnout Inventory⁹ defines client burnout as “a state of prolonged physical and psychological exhaustion, which is perceived as related to the person’s work with clients;” in this case, the clients are patients. The average score measuring dissatisfaction with caring for patients also decreased from December to July (Figure 16), thus supporting a tendency to less “burn-out”. The one score that did not change for paramedic technicians was the degree of frustration of working with patients (Figure 17).

Overall satisfaction with shift

Members were asked how much the current shift system they were experiencing at the time interfered with leisure, household (going to grocery, etc.) and non-household activities (going to physician, bank, etc.). On a scale of 1 (not at all) to 5 (very much), members reported an average score of 2.3 for leisure time and household activities and 1.9 for non-household activities at baseline in December. All of these scores showed a statistically significant decrease⁹ from December to July thus indicating less interference of these activities by the 48-96 shift system (Figure 18).

Figure 19 shows the results for members’ feelings about whether the advantages of the shift system they were experiencing at the time outweighed the disadvantages. In December, 52% of the respondents indicated that the advantages of the old shift system definitely outweighed the disadvantages. In April and then in July, at least 68% of the respondents said the advantages of the 48-96 definitely outweighed the disadvantages. The proportion of respondents who said that the advantages of the old shift system definitely outweighed its advantages was small (0.7%), but this proportion increased to 5.8% when considering the advantages and disadvantages of the 48-96. This pattern of change was statistically significant with $p=0.01$.

Spouse/partner support

Members were asked how their spouse/partner felt about them working the current shift they were experiencing. In contrast to the results suggested by the family survey (presented in next section), the members reported decreased spousal support with the 48-96.

In December, 88.9% of the respondents indicated that their spouse/partner was extremely or fairly supportive of the shift they working; in July, this proportion was 83.1% (Figure 21). In contrast, the proportion of respondents citing that their spouse was fairly or extremely unsupportive increased from 3.7% to 11.9%. The pattern of change over time approached statistical significance with $p=0.06$.

USE OF CAFFEINATED BEVERAGES, CIGARETTES, ALCOHOL

Consumption of caffeinated beverages by respondents did not increase during the time under study (Table 5). Median reported alcohol use did increase from 2 drinks to 3 drinks per week, but this was not statistically significant.¹⁰ It was not possible to compare cigarette smoking between time periods because so few respondents reported smoking.

The reason caffeinated beverage intake was assessed was to evaluate if members were “medicating” themselves with caffeine to decrease the effects of possible sleep deprivation on the 48-96 and this does not appear to be the case (the effect of the 48-96 schedule on sleep was not known prior to this study). Alcohol use was assessed for a similar reason. The effect(s) of the 48-96 schedule were not known, and it was unknown whether members might increase their alcohol intake to relax off shift (either to deal with increased stress, decreased sleep, etc.).

Table 5. Use of caffeinated beverages, cigarettes and alcohol, December 2005, vs. July 2006

	December 2006	July 2006
Cups of caffeinated drinks/day, median	2	2
Number of cigarettes/week, median	Very few respondents reported smoking cigarettes so this value is not statistically valid	
Number of alcoholic drinks/week, median	2	3

MEMBER COMMENTS ABOUT 48-96

Members were presented with opportunities to submit comments on the April and July work-related questionnaires. These comments can be found at the end of report, in Figures 51a and 51b. In general, the comments were positive during both time periods. The two most common comments during both time periods were more time with family, and more sleep/rest.

IMPACT ON FAMILY

Focus Groups

The focus groups were facilitated by JVA Consulting at the request of St. Anthony Central Hospital, and the findings are being submitted in a separate report. St. Anthony Central staff did not attend the focus groups.

Family Survey

Demographics of respondents

The family survey was completed by 175 families, 70% (123) of which reported having at least one child under the age of 19, the median number of children being 2. Slightly more than half of the families had young children less than eleven years of age. Approximately 25% of the families did not have any children and the other 5% had grown children.

The majority of the families that responded (86%) had two or more adults in the household; 6.9% indicated one adult.

The average (median) commuting time for West Metro members who responded to the family survey was 40 minutes.

Ability to accomplish activities at home and with children since institution of shift change

Families were asked to rate how much easier or difficult it was for them to accomplish a variety of household activities since the shift change. These activities included the following:

-
- | | |
|---|--|
| • Getting daily household tasks done. | • Ensuring children do schoolwork. |
| • West Metro Member: Working at paid job(s) | • Supervising children's behavior and activities at home. |
| • Spouse/Partner - Working at paid job(s) | • Having children take part in after-school activities. |
| • Shopping for necessities. | • Participating in activities at your child (ren)'s school (school events, PTA, parent-teacher conferences). |
| • Handling financial matters. | • Participating in child(ren)'s extra-curricular activities like Boy Scouts or Girl Scouts. |
| • Maintaining safety/security of your home. | |
| • Taking personal time for yourselves (getting a hair cut etc.) | |
| • Maintaining automobile | |
| • Taking care of member's health. | |
| • Taking care of spouse/partner's health. | |
| • Taking care of elder's health. | |
| • Taking care of pets. | |
| • "Having a social life." Visiting with friends, etc. | |
| • Doing volunteer work. | |
| • Doing special projects around the home. | |
| • Participating in leisure time activities. | |
| • Spending time together as a family. | |
| • Taking care of elder at home. | |
| • Arranging for child care. | |
| • Taking care of children at home. | |
| • Taking care of child(ren)'s health. | |

The results are shown in Figures 21-50. For all the tasks, there were a greater number of families who indicated that it was “about the same,” “somewhat easier,” or “much easier” to accomplish the activity with the 48-96 shift than it had been during the previous six months. On average, there were 20 or fewer families per task that found it “somewhat more difficult” or “much more difficult” to accomplish the task with the 48-96 shift.

There were some activities that the majority of families indicated were either somewhat or much easier to accomplish with the 48-96 and these included: doing special projects around the home (Figure 34), participating in leisure time activities (Figure 35), taking personal time for themselves (Figure 36), and spending time together as a family (Figure 37).

Child care arrangements

Families were asked if they had to change who provided child care for their children with the onset of the 48-96. Five (5) families responded “Yes.” Two of the five families said that the new arrangements were as satisfactory to them as the previous ones. Three families said they were not; the arrangements were less satisfactory because they resulted in less time for the child and member to be together, child care had to be added when none was needed previously or another day(s) of child care had to be added.

Elder care arrangements

Only 1 family indicated that they had to change who provided care for their parent or older adult with the onset of the 48-96, and the arrangement was as satisfactory to them as the prior arrangement had been.

Visitation rights

Thirty-seven families answered the question about amending visitation rights since the onset of the 48-96. Six of the 37 families (16.2%) said that they did have to amend their visitation rights, and all but one of these families said that the arrangements were as satisfactory, or in the case of one family, better than the ones they had previously. The arrangement that was not as satisfactory resulted in the member being able to spend less time with the child.

Combining work and family

The final aspect of family life that members and their families were asked to comment on was whether the 48-96 schedule affected their time together as a family. Families were presented with the following five statements and asked to indicate whether the statement was “Completely Untrue,” “Mostly Untrue,” “Equally True and Untrue,” “Mostly True,” or “Completely True”:

- The 48/96 schedule creates a strain for our (my) children;
- Because of the 48/96 schedule, our (my) family time is less enjoyable;
- The 48/96 schedule leaves us (me) with too little time to be the kind of parent we (I) want to be;
- The 48/96 schedule leaves us (me) with too little energy to be the kind of parent we (I) want to be;
- The 48/96 schedule creates a strain on our marital (partner) relationship.

The most common response to all of these statements was, "Completely Untrue," (Figures 46-50).

FAMILY COMMENTS

The majority of the comments submitted on the family survey were positive in regard to how the 48-96 shift has affected members' families. See Figures 52a and 52b.

Discussion including Limitations

Although the response to the work-related surveys was not as high as hoped, the results from these surveys, sleep diaries, the family survey, and the comments are relatively consistent, thus contributing to the overall validity of the findings. There are two major statistically significant findings that emerged from the evaluation: 1) The on-line members slept more on average post change; 2) the majority of on-line members who responded reported significantly less interference of the 48-96 schedule with their personal lives and were able to spend more time with their families/friends, etc. In addition, the findings do not suggest that the 48-96 schedule lead to increased job dissatisfaction or "burn-out" from working with patients. It was not possible to evaluate how the 48-96 schedule affected administrative personnel because of the low participation rate and the difficulty of interpreting their answers on the questionnaires because most of the respondents did not change shifts.

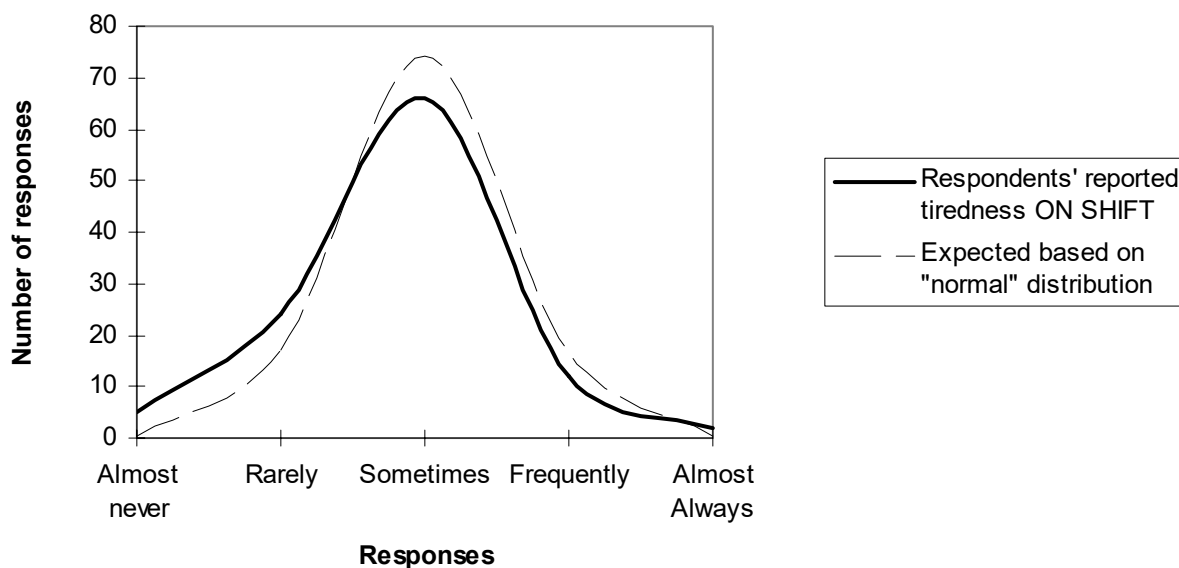
It is important to note that there may have been other changes at West Metro Fire Rescue that could account for the results, e.g., the bond issue. However, study data were collected in April before the bond issue was resolved, and differences (from December) were noted at that time, and these differences persisted into July.

One of the concerns voiced by some members was that some on-line personnel might try to skew or exaggerate the results to meet their personal agendas. It is unlikely that the observed findings are due to a group of members exaggerating their answers to make the results appear stronger or larger than they actually are. When the distribution of change was analyzed, the vast majority of respondents (90%), only changed their answers one or two categories, which would be expected. For example, if someone selected a "2" in December regarding how much

the then current shift system interfered with their leisure time, they were more likely to select a "1," "2," or "3" on repeat surveys, not a 5.

In addition, two survey questions were included to assess how honestly respondents were approaching the questions. These questions included "Do you ever feel tired ON SHIFT?", and "Do you feel tired on YOUR TIME OFF?" Realistically, everyone feels tired sometimes, and very few individuals chose the extreme answers of "almost never" or "almost always." This is consistent with a normal distribution or "bell curve." Shown below are the respondents' answers compared with what would be expected with a normal distribution. As can be seen, the two curves are very similar. This general pattern was seen in the pre assessment of both questions, and the April assessment of both questions. These two questions were not asked in the July survey.

Frequency of Answers to APRIL question: "Do you ever feel tired ON SHIFT?" compared with the expected frequency of responses in a "normal" distribution.



Finally, the statistical methods used (nonparametric tests) depend less on extreme answers and make it more difficult to find statistically significant differences so that if a statistically significant difference is found (like in this study), one can be fairly certain that it is a true difference and not just due to chance.

There are limitations to the study. As mentioned above, the study did not specifically assess the effects of the 48-96 on the administrative personnel, nor was the effect on crew interaction specifically examined, and several members made comments about this. Presumably, however, members took this aspect into account when they answered the question about the relative advantages vs. disadvantages of the 48-96, and when they voted. It is also possible that the effects of the 48-96 may change over time as may people's opinions. We did not formally

collect information in September, but the members voted to retain the 48-96, thus adding to the total experience (9 months).

Another limitation is that the results regarding the number of awakenings on the sleep data may be biased because we did not ascertain the source of the awakening (i.e., was it call related) and therefore we can not control for the number of awakenings in comparing data from two time periods.

Approximately 40% of the on-line membership did not respond to a questionnaire, and 50% to 60% did not turn in a sleep diary. With this kind of a response, one always wonders if the experience of the non-responders is similar to the responders, however, given the membership's 86% vote to retain the schedule, this is less of a concern with this group.

Finally, the purpose of this study was to evaluate the effect of the 48-96 on a population of firefighter/paramedics, and the results are presented for the group as a whole. It is clear that for some members the schedule change was difficult both personally and professionally, and the results as presented are not intended to minimize or dismiss these difficulties.

CONCLUSIONS

- The members slept more on average post change.
- The increased sleep was distributed throughout both ON and OFF shifts.
- Members slept fewer hours the night before a shift began in anticipation of getting up to go on shift and the new rotation minimizes this.
- At baseline, the majority of respondents were satisfied with their job, and this did not change appreciably with the 48-96; instead views regarding job satisfaction (and in some cases dissatisfaction) became stronger.
- On average, the respondents reported a low degree of dissatisfaction with patient care; this dissatisfaction did not increase on the 48-96, and in fact, showed a trend toward being less.
- Members felt that when compared to the old shift, the 48-96 shift interfered significantly less with leisure activities, household activities, and non-household activities like going to the bank.
- Over half (52%) of the members thought that the overall advantages of the old schedule outweighed its disadvantages, however, a significantly greater proportion of members (68%) felt that the overall advantages of the 48-96 outweighed its disadvantages.
- Use of caffeinated beverages and alcohol remained the same after the change.
- The majority of families liked the 48-96. They noted that the shift made it much easier to do special projects around the home, participate in leisure time activities, take personal time for themselves, and spend time together as a family.
- The majority of families felt that the 48-96 shift did not adversely affect their time together as a family or as a couple, nor did it put a strain on their relationship or their children.
- Very few families reported being adversely affected by the shift change with regard to changing to less satisfactory child care arrangements, elder care arrangements or visitation rights.
- Not all the members like the 48-96 shift and it has made accomplishing household tasks and taking care of children more difficult for some families.

Figures

Figure 1. Total hours sleep per week, on-line personnel, December '05 vs. July '06 (n=69)

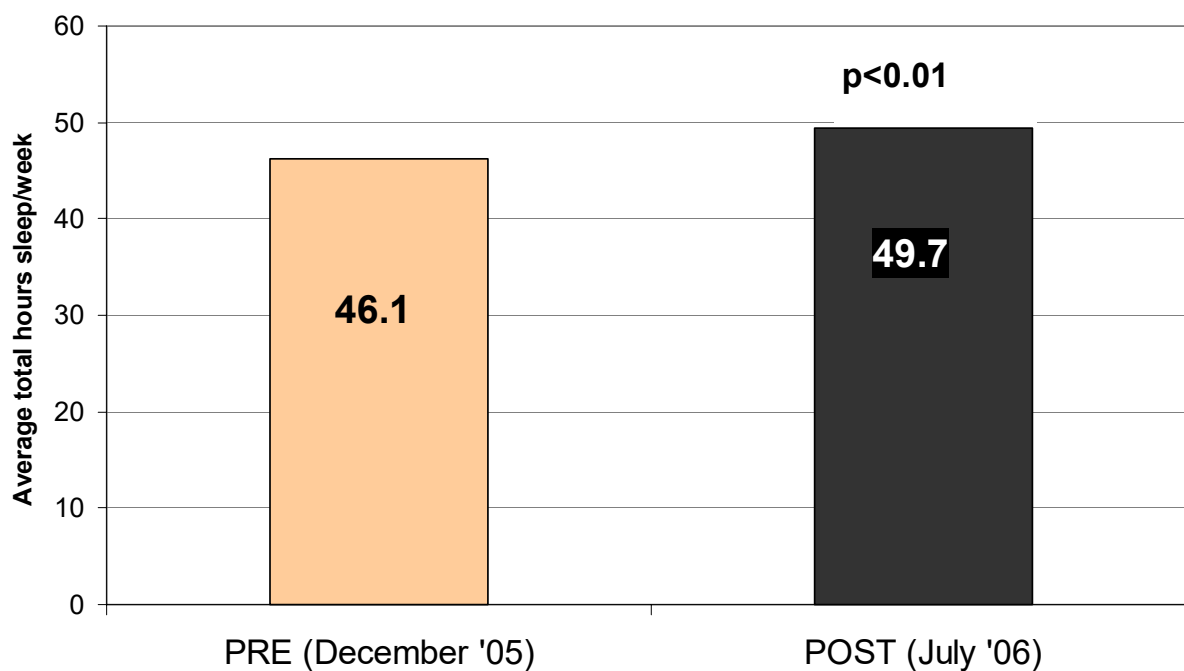


Figure 2. Average number of hours sleep per night, on-line personnel, on and off shift, December '05 vs. July '06 (n=69*)

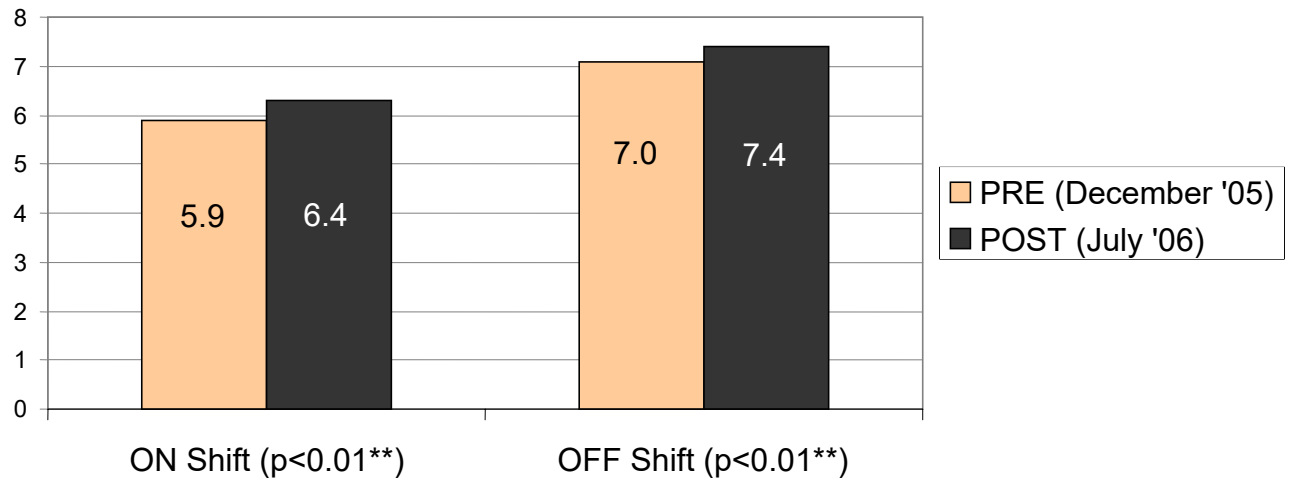


Figure 3. Average (mean) number of times awakened during night, on-line personnel, December '05 vs July '06

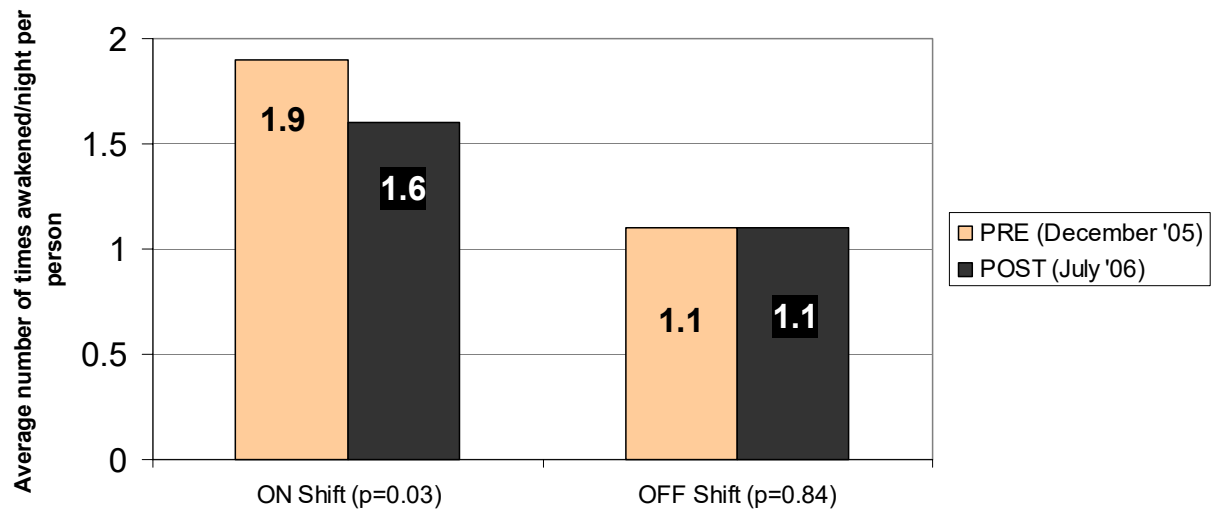


Figure 4. PATTERN of sleep: Average (mean) number of hours slept, on-line personnel, by shift status, July 2006 (n=129)

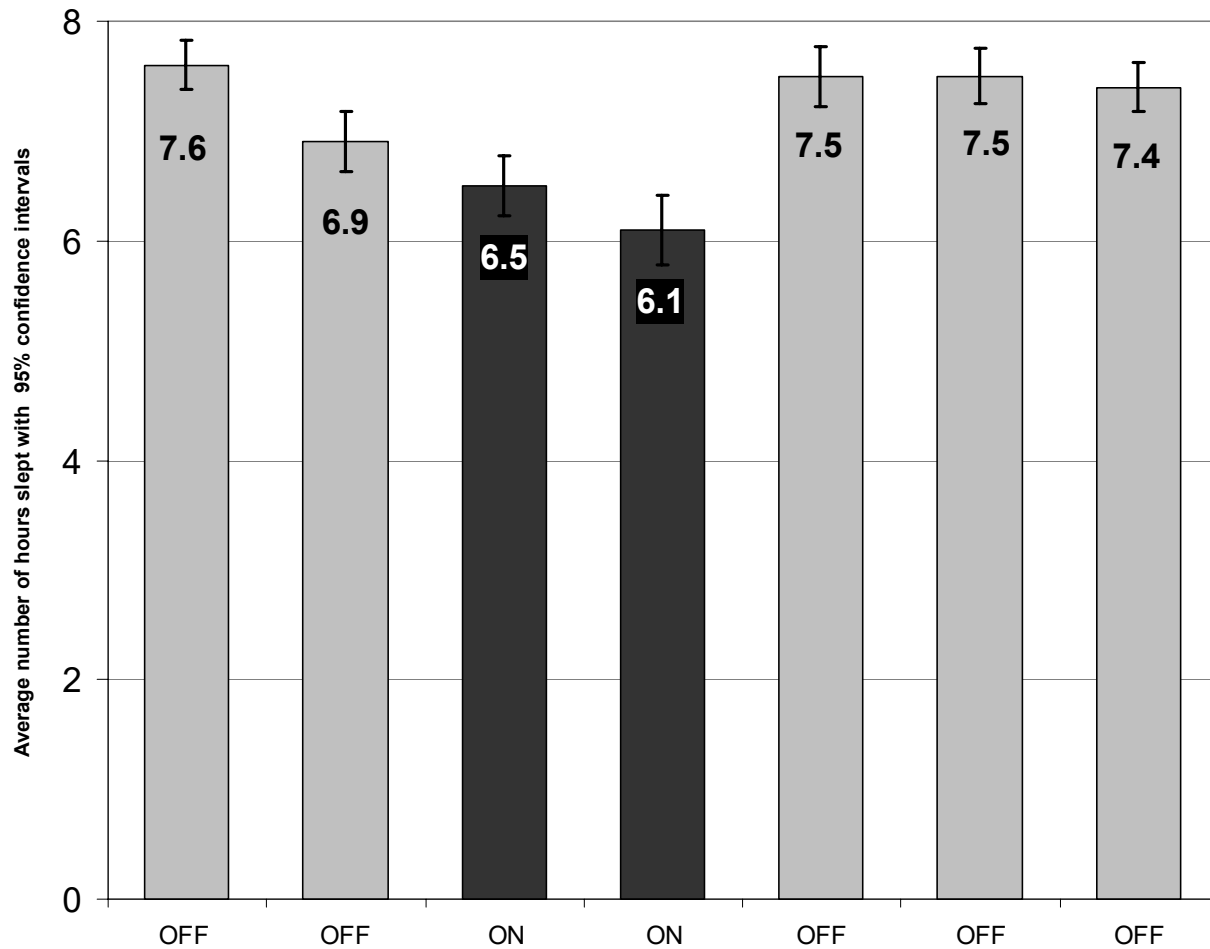


Figure 5. Epworth sleepiness scores, on-line personnel who submitted data in December '05 and July '06

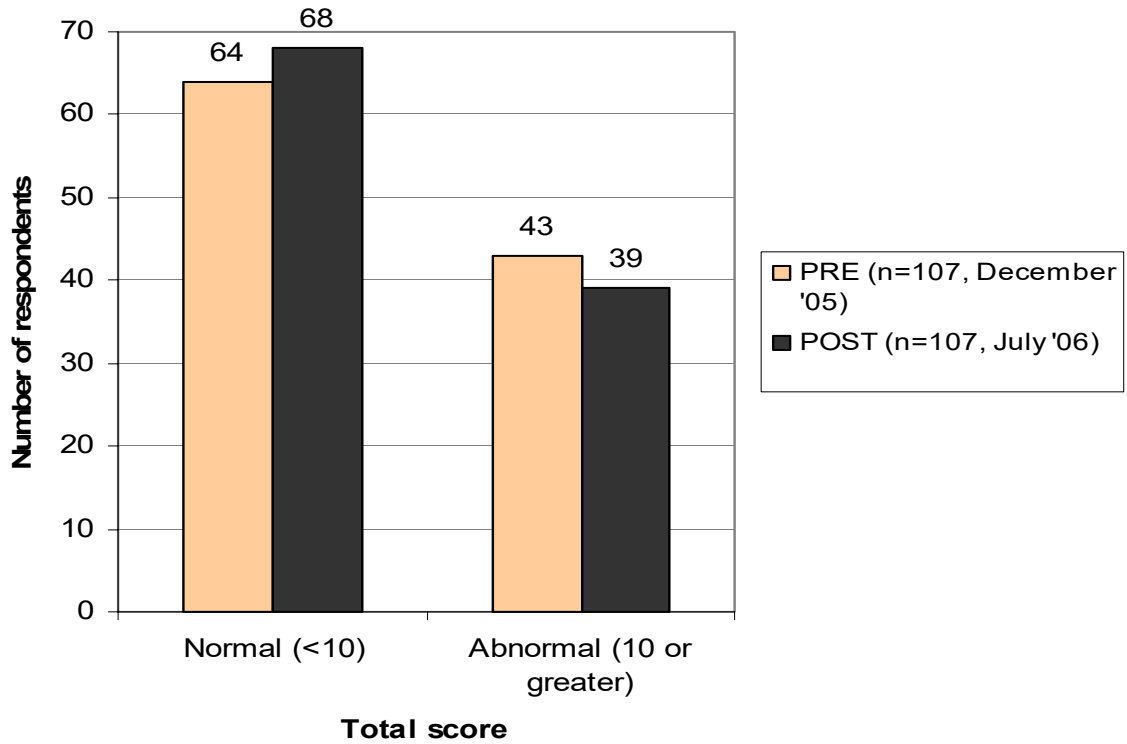
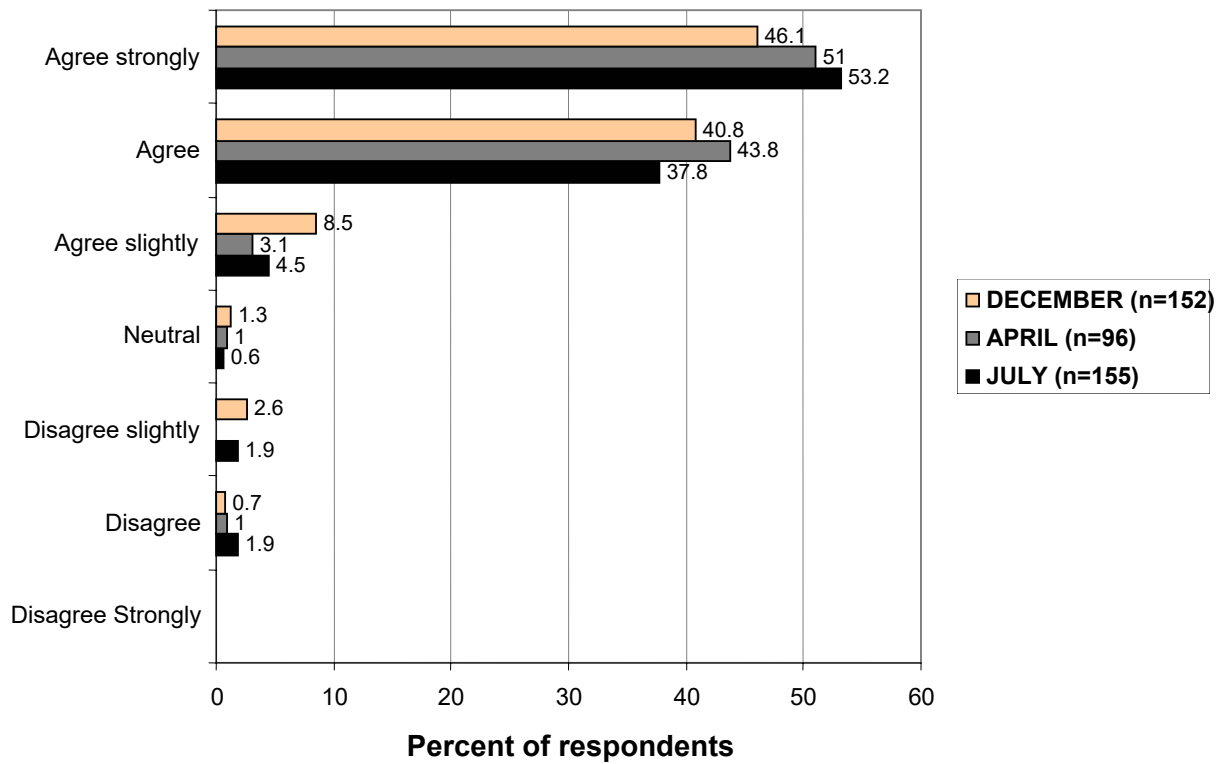
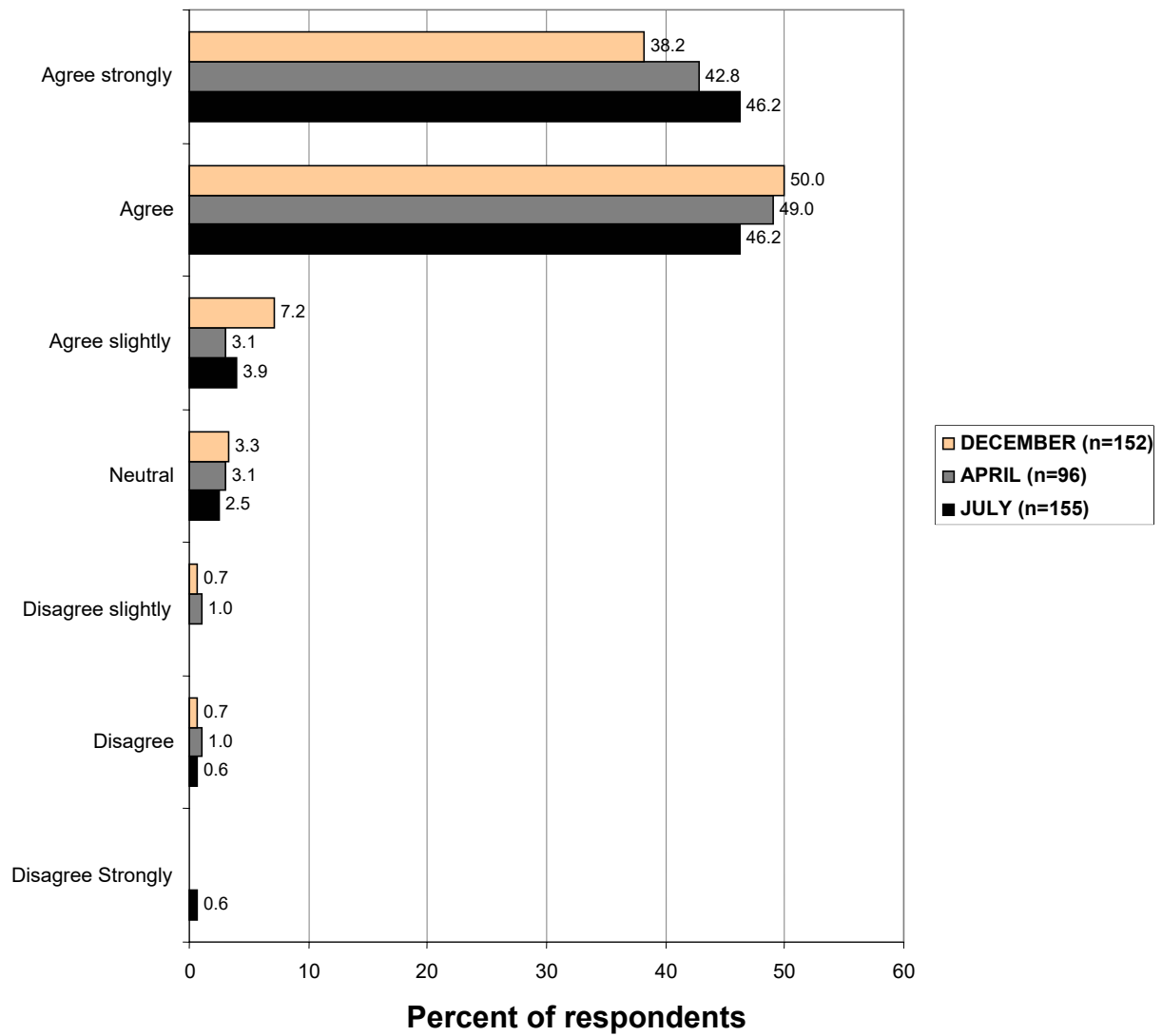


Figure 6. JOB SATISFACTION: “I am very satisfied with this job.”



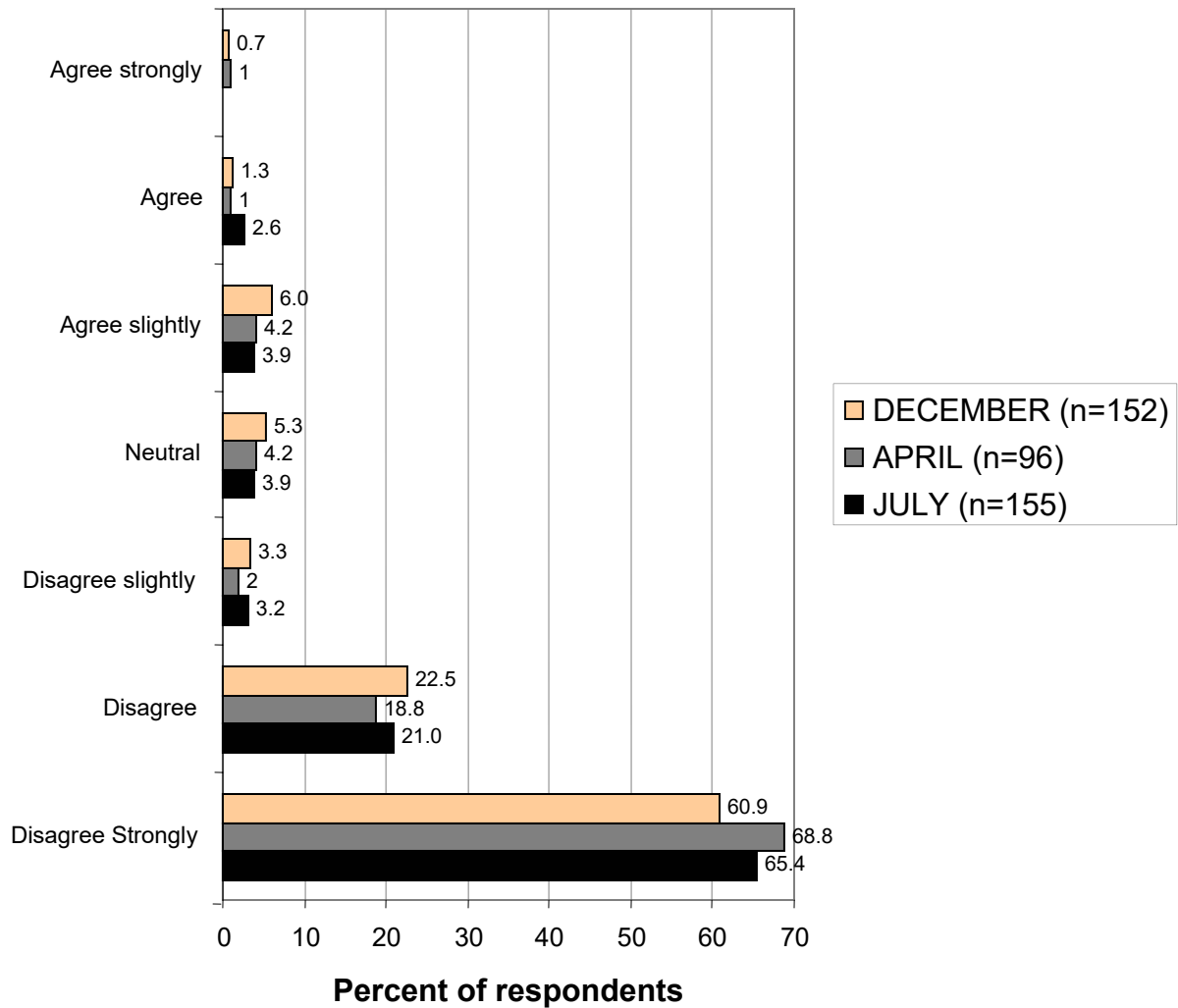
Statistical significance of differences between time periods: $p=0.29$

Figure 7. JOB SATISFACTION: “I am generally satisfied with the kind of work I do in this job.”



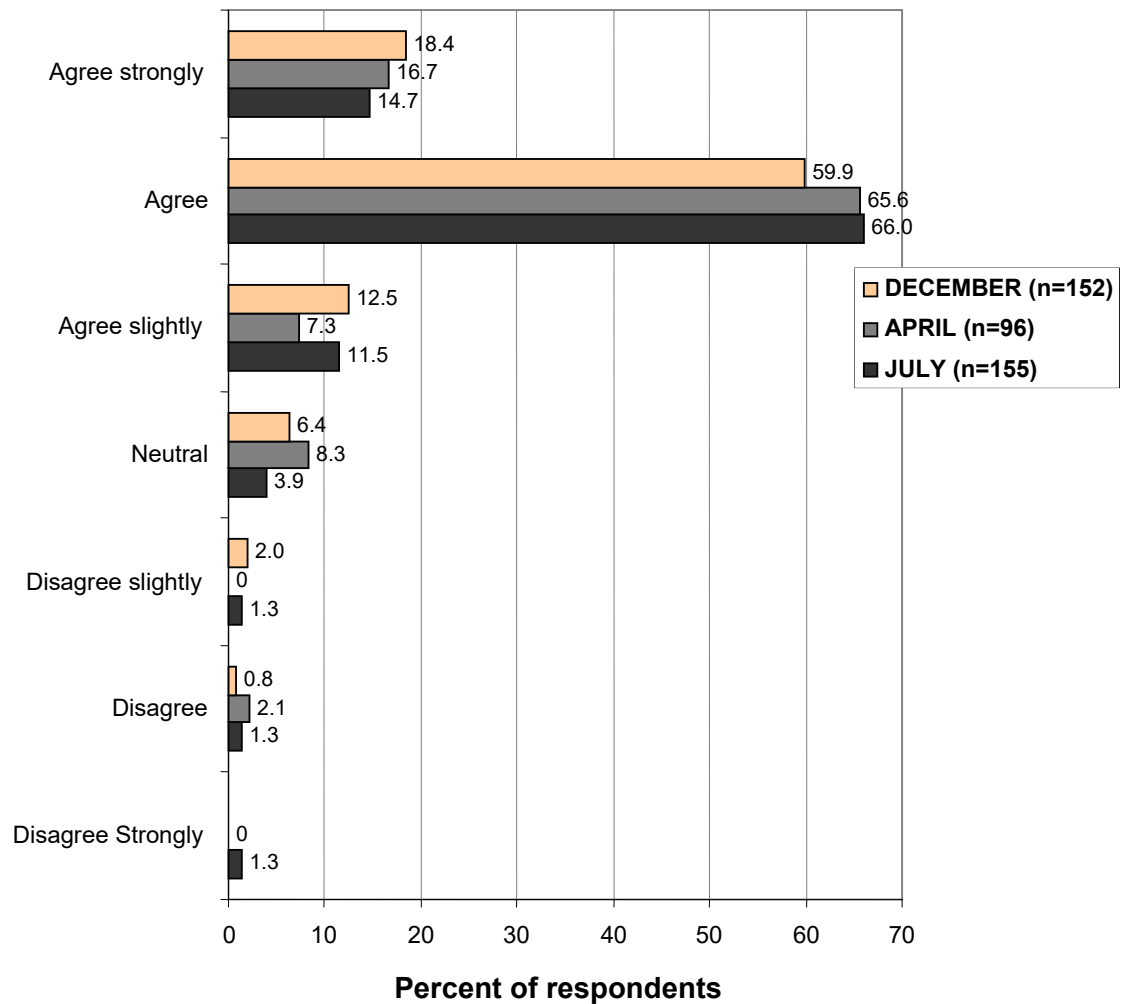
Statistical significance of differences between time periods: $p=0.27$

Figure 8. JOB SATISFACTION: “I frequently think of quitting this job.”



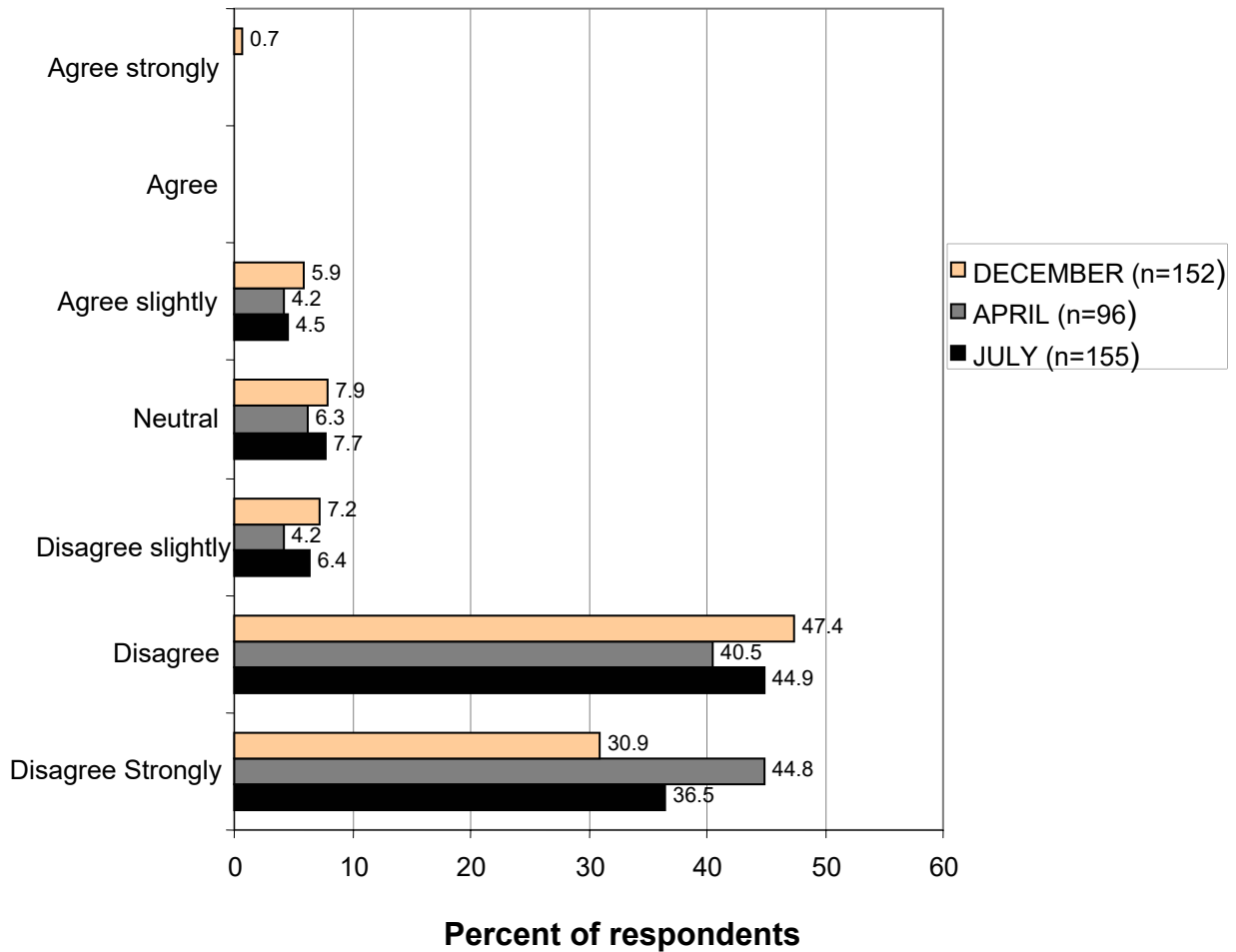
Statistical significance of differences between time periods: $p=0.43$

Figure 9. JOB SATISFACTION: “Most people on this job are very satisfied with the job.”



Statistical significance of differences between time periods: $p=0.27$

Figure 10. JOB SATISFACTION : “People on this job frequently think of quitting.”



Statistical significance for differences between time periods: $p=0.08$

Figure 11. PATIENT WORK SATISFACTION: “Do you find it hard to work with patients?”

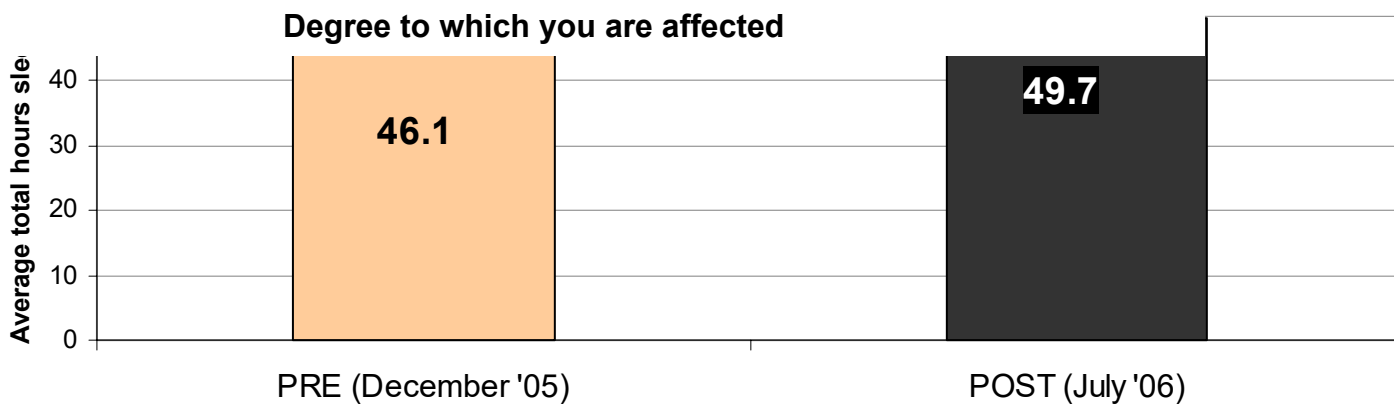
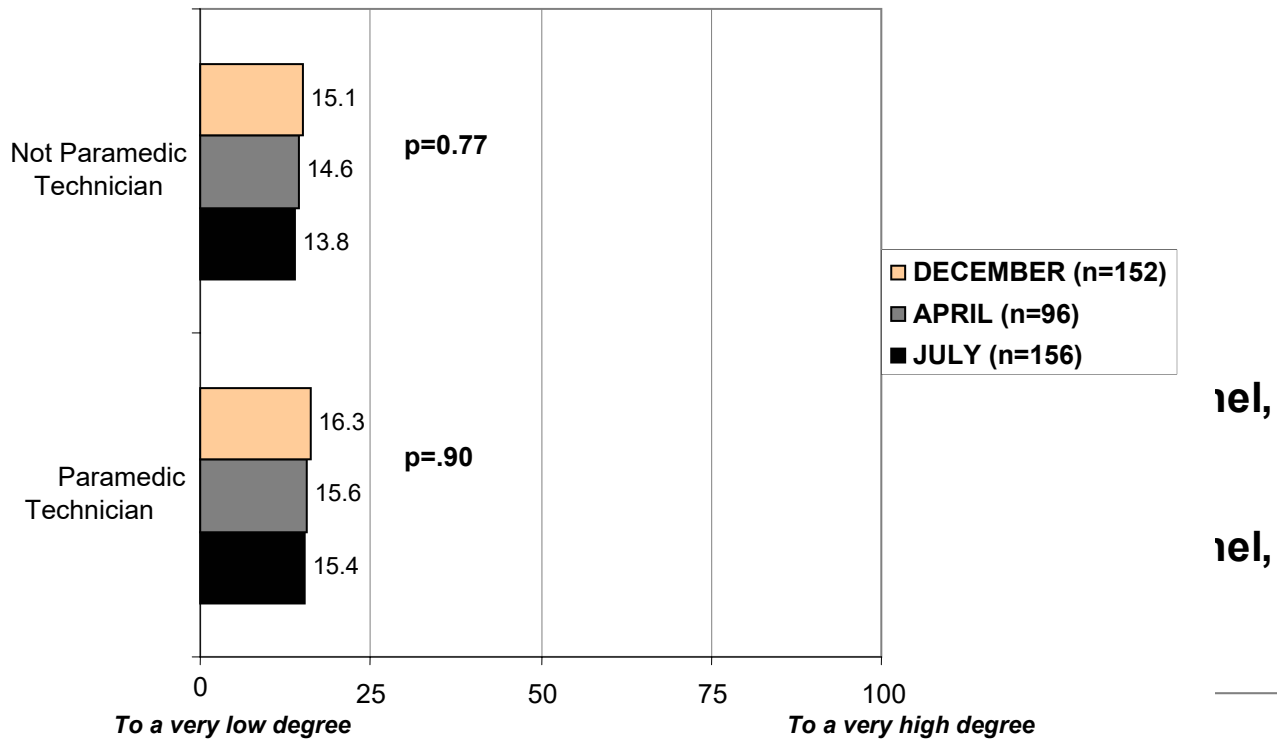


Figure 12. PATIENT WORK SATISFACTION: “Does it drain your energy to work with patients?”

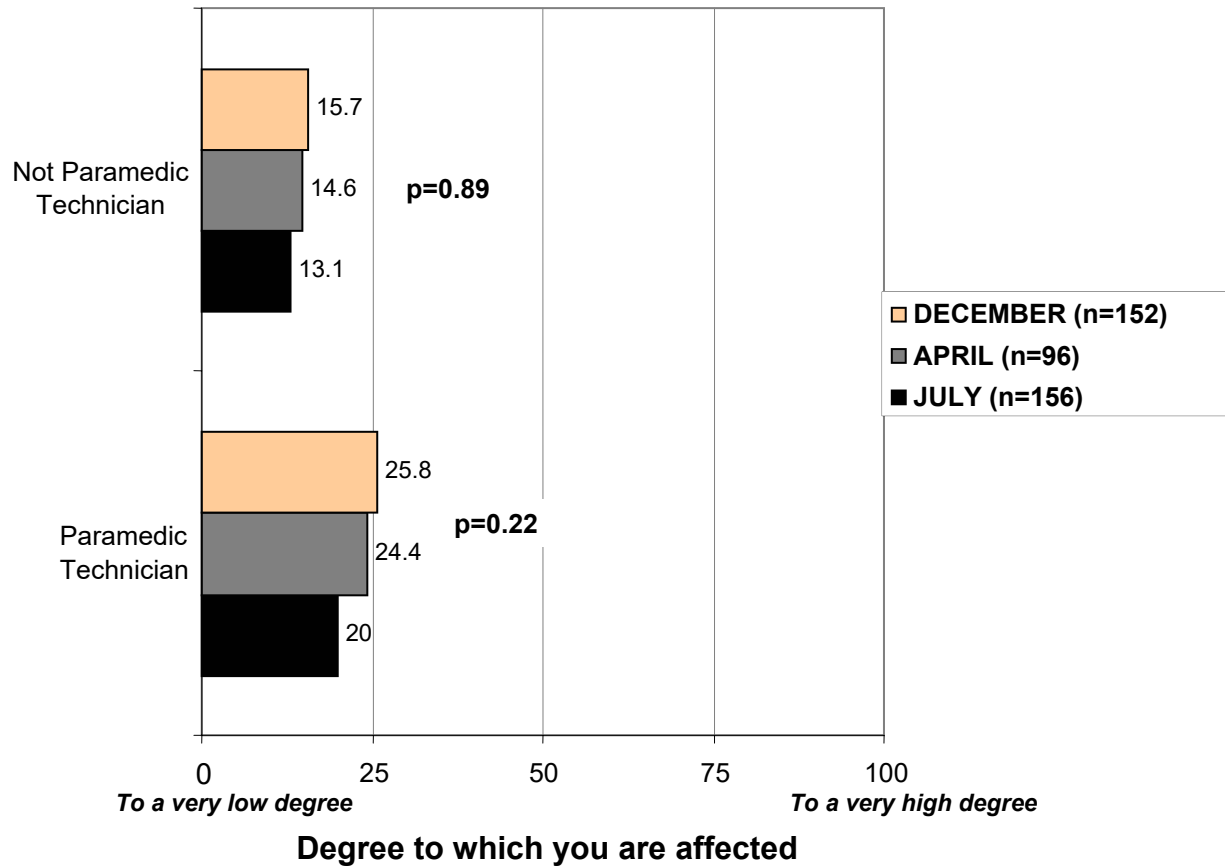


Figure 13. PATIENT WORK SATISFACTION: “Are you tired of working with patients?”

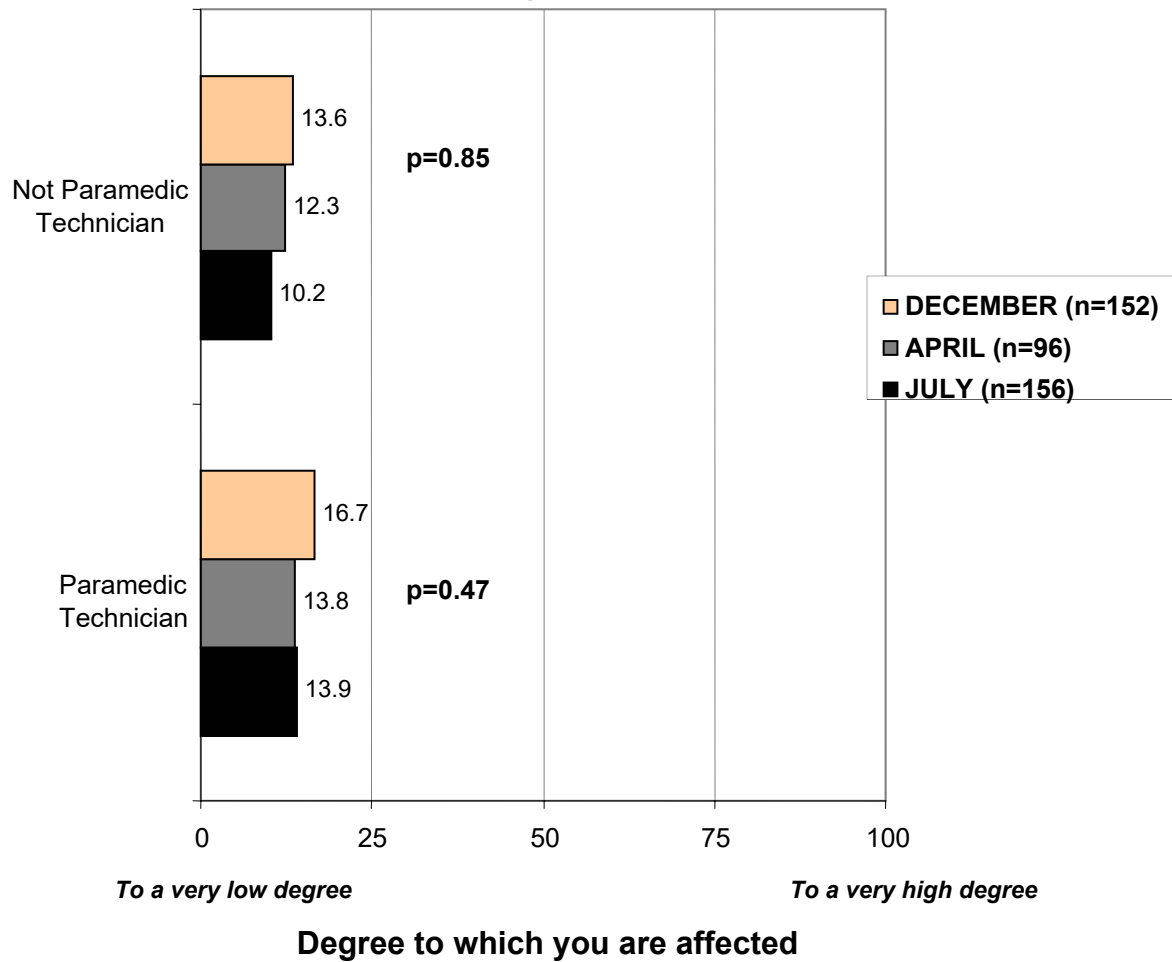
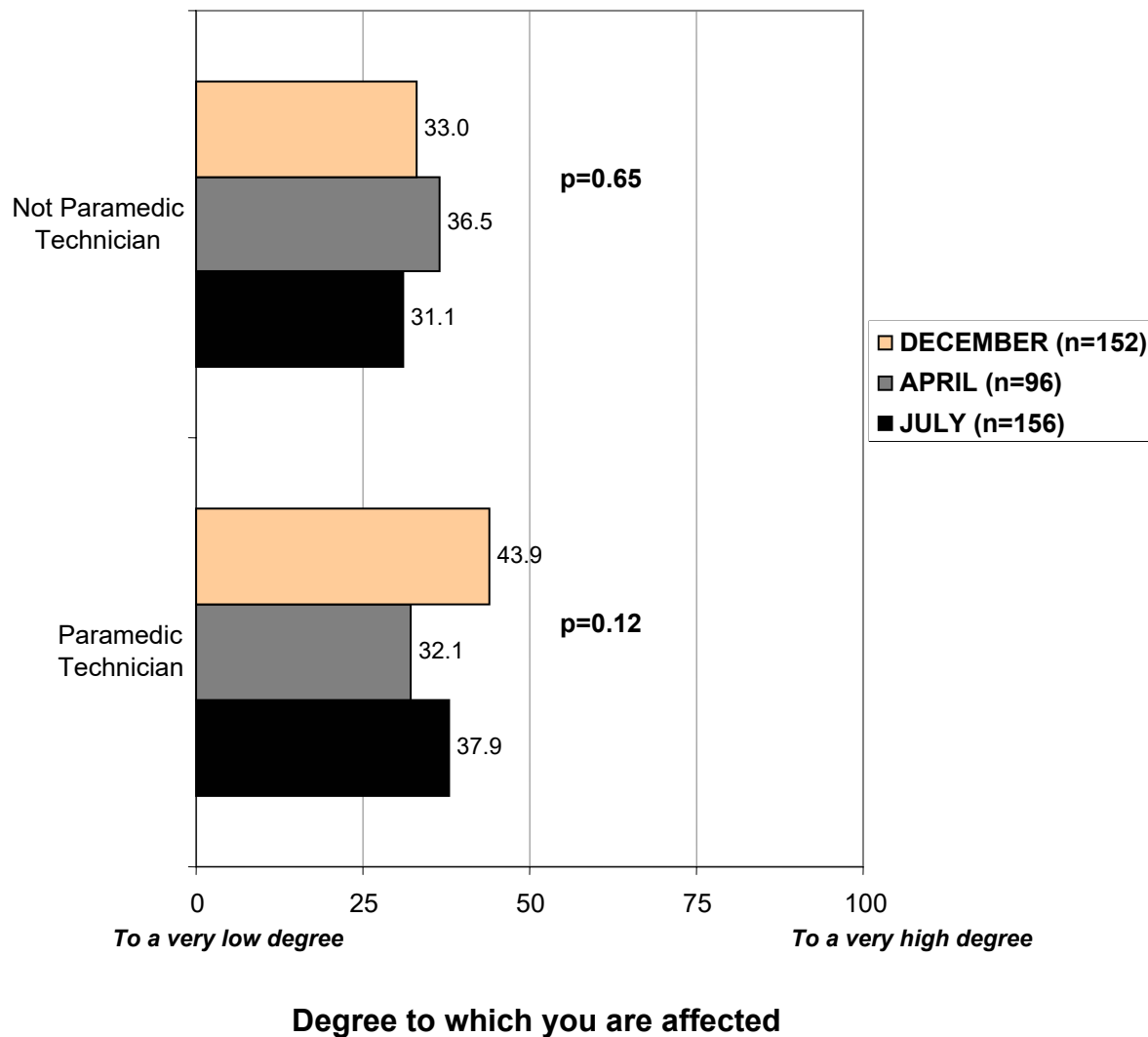


Figure 14. PATIENT WORK SATISFACTION: “Do you feel that you give more than you get back when you work with patients?”



Some people commented on this question that it was expected to give more than receive in their positions because of the nature of their work, e.g., they are actually administering a service. Therefore, this question may not be measuring what it was intended to measure with this population, i.e., emotional giving vs. job satisfaction. It's unclear.

Figure 15. PATIENT WORK SATISFACTION: “Do you sometimes wonder how long you will be able to continue working with patients?”

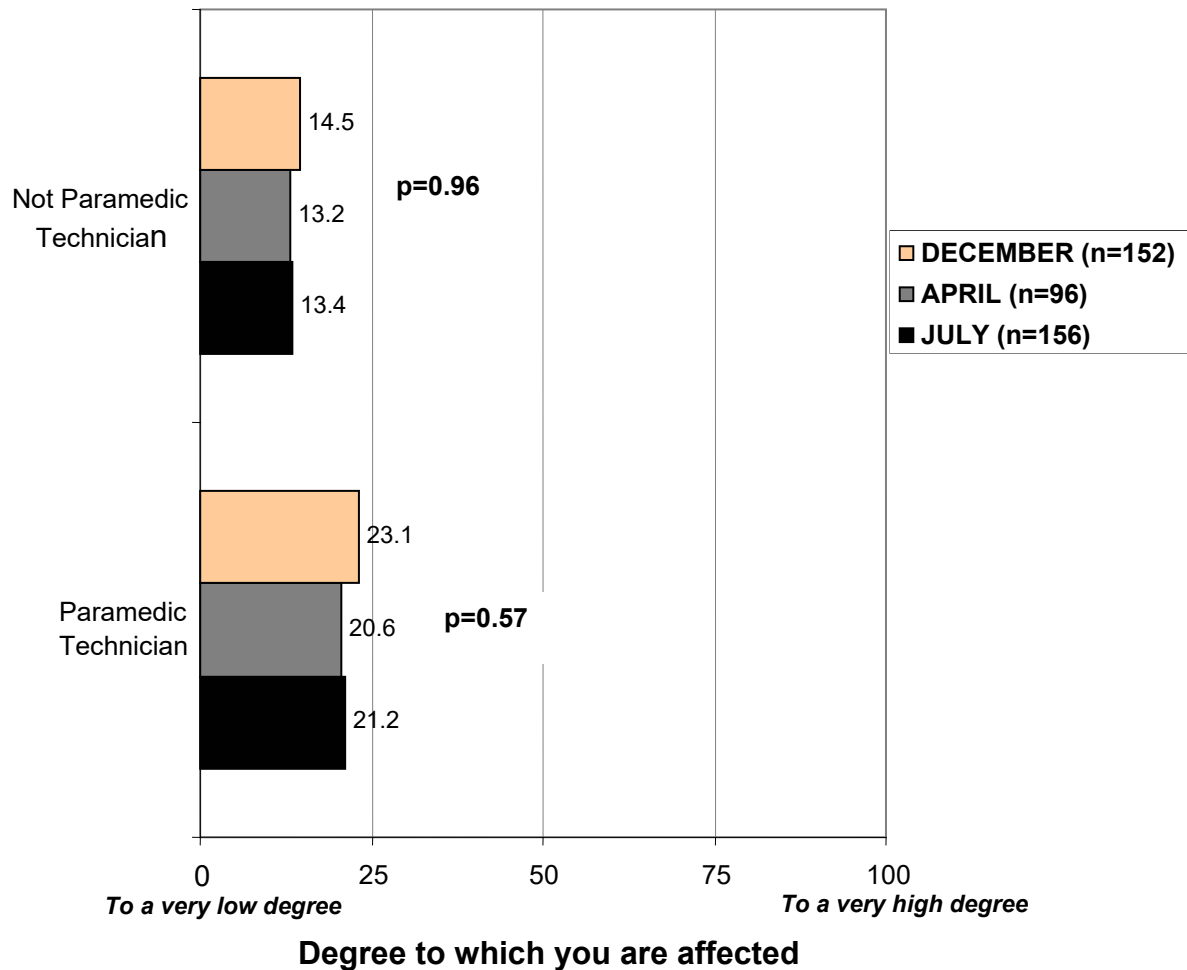
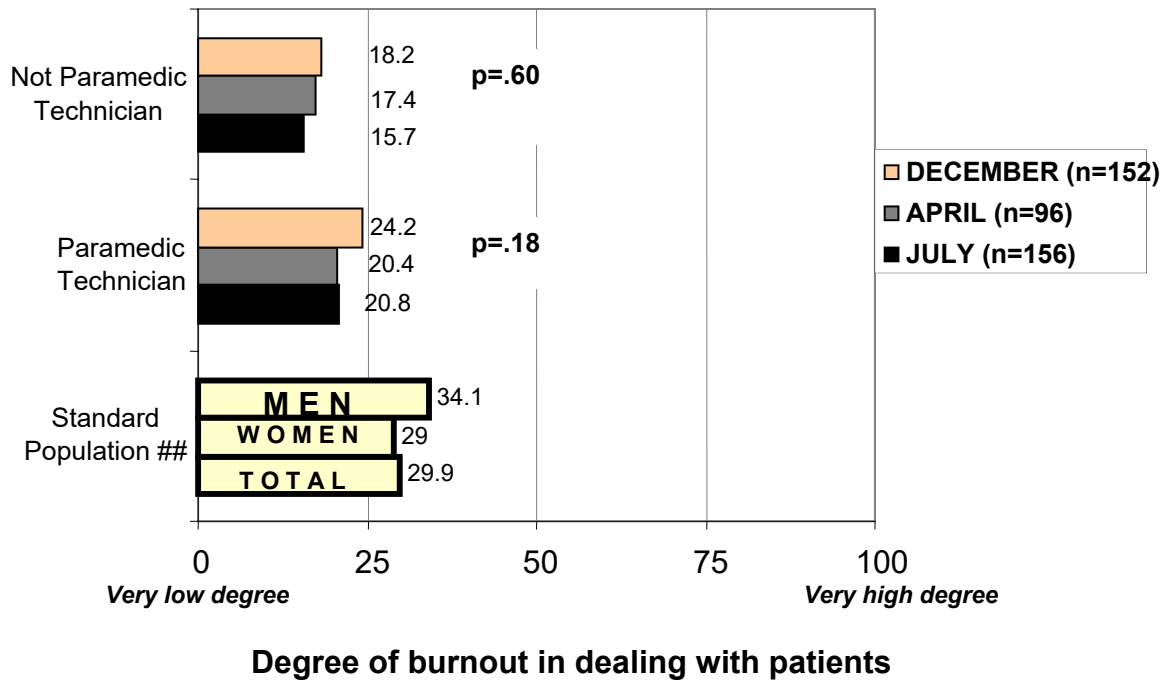
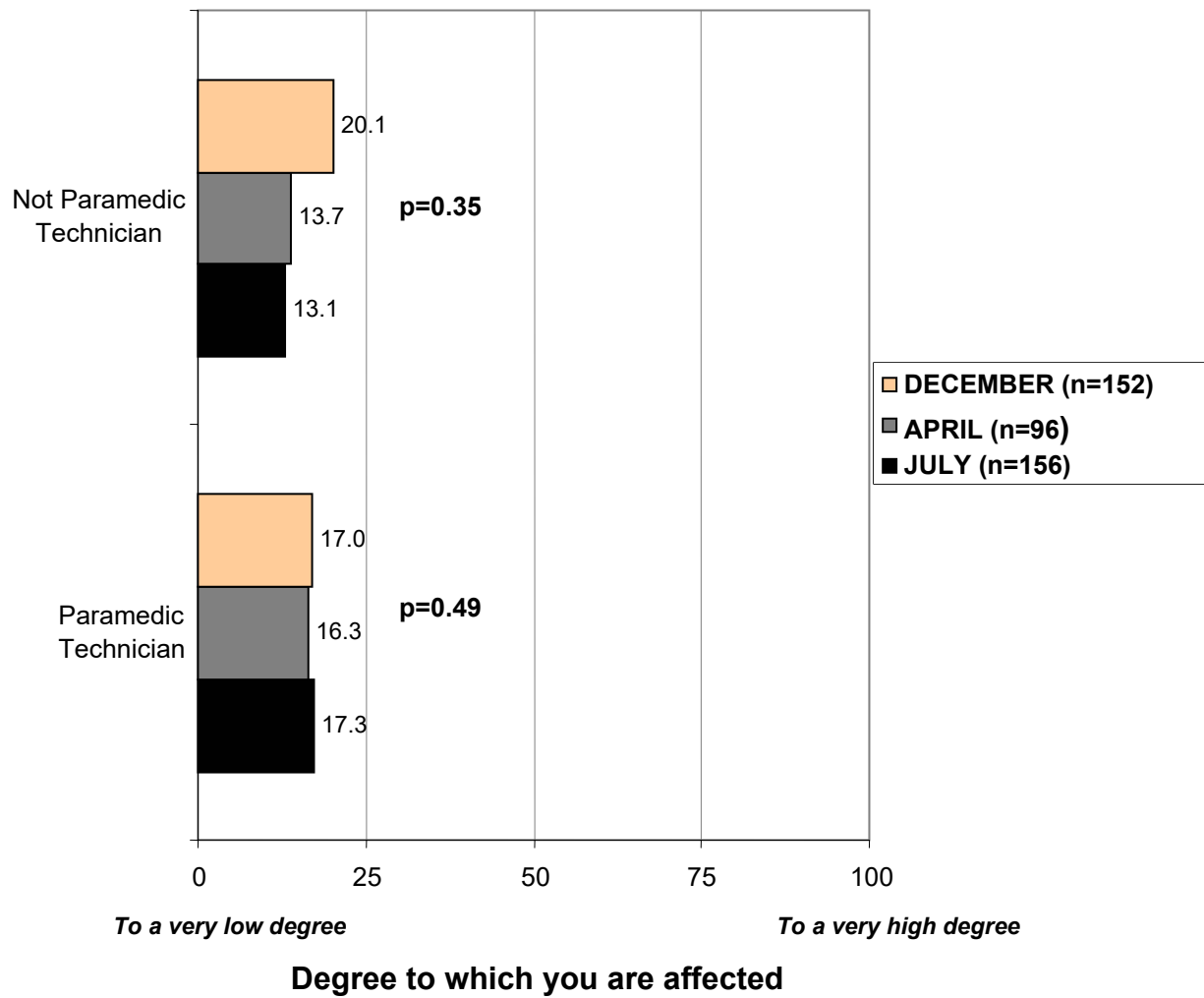


Figure 16. Average (mean) score of six questions pertaining to "burn-out" in taking care of patients



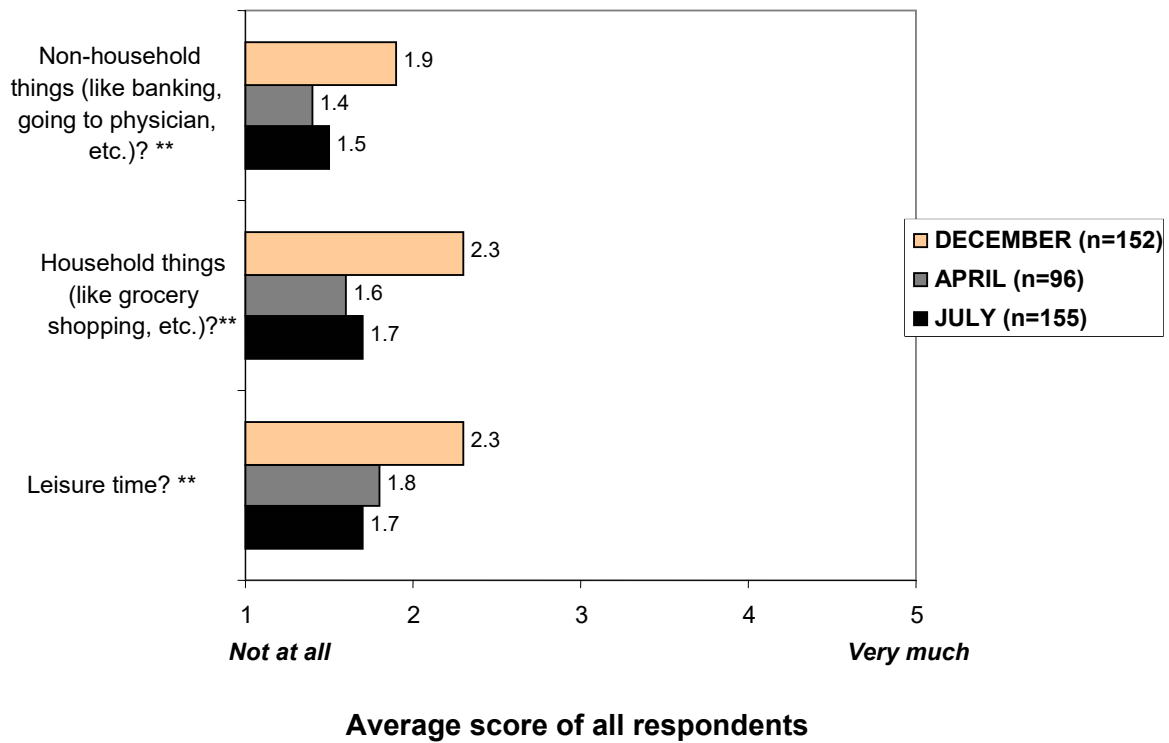
service ## Standard population consisted of 1,917 Danish persons working in human professions (social workers, hospital staff, prisons, home helpers, etc.)

Figure 17. PATIENT WORK SATISFACTION: “Do you find it frustrating to work with patients?”



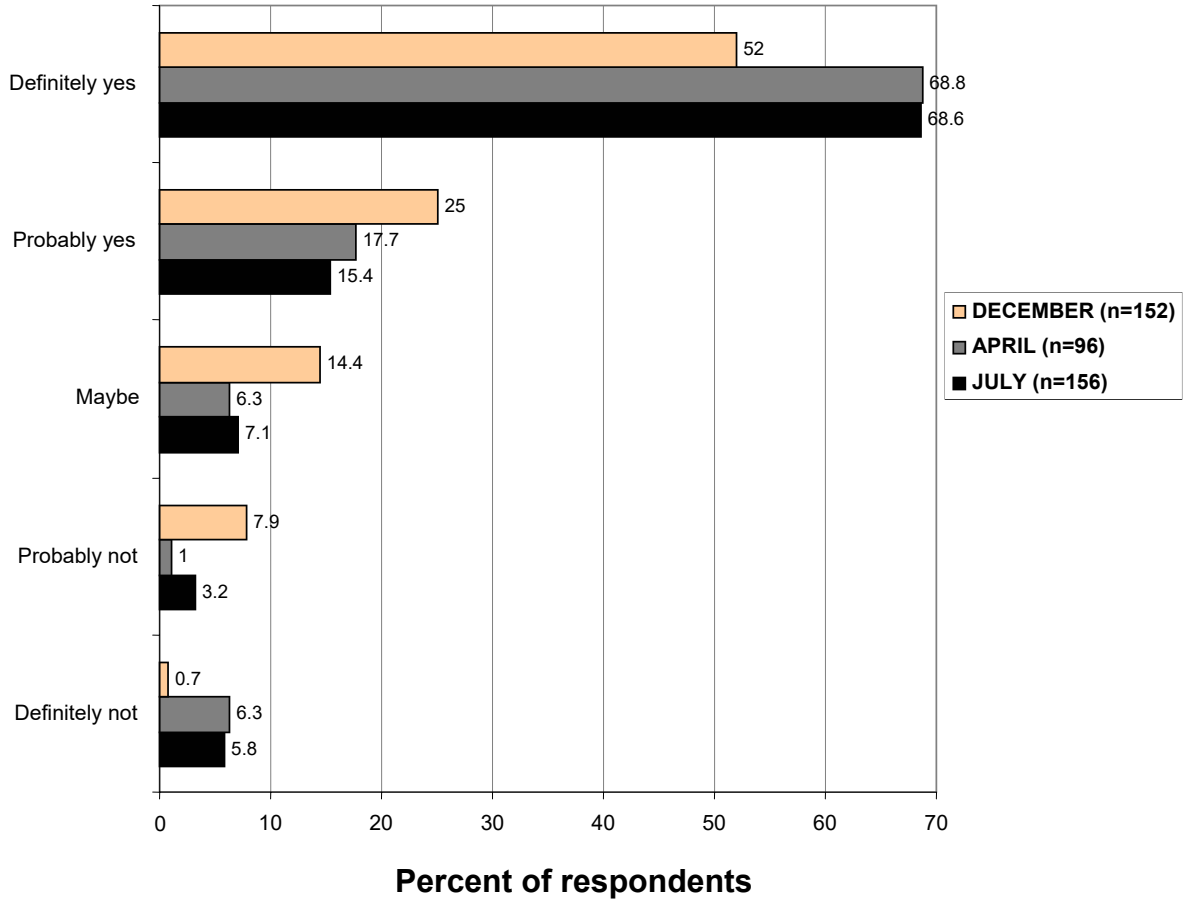
On the comments, several people noted that it was frustrating to take care of patients who abuse the system, but not frustrating to take care of people with true emergencies.

Figure 18. Answer to questions about: “How much does your CURRENT SHIFT interfere with...”



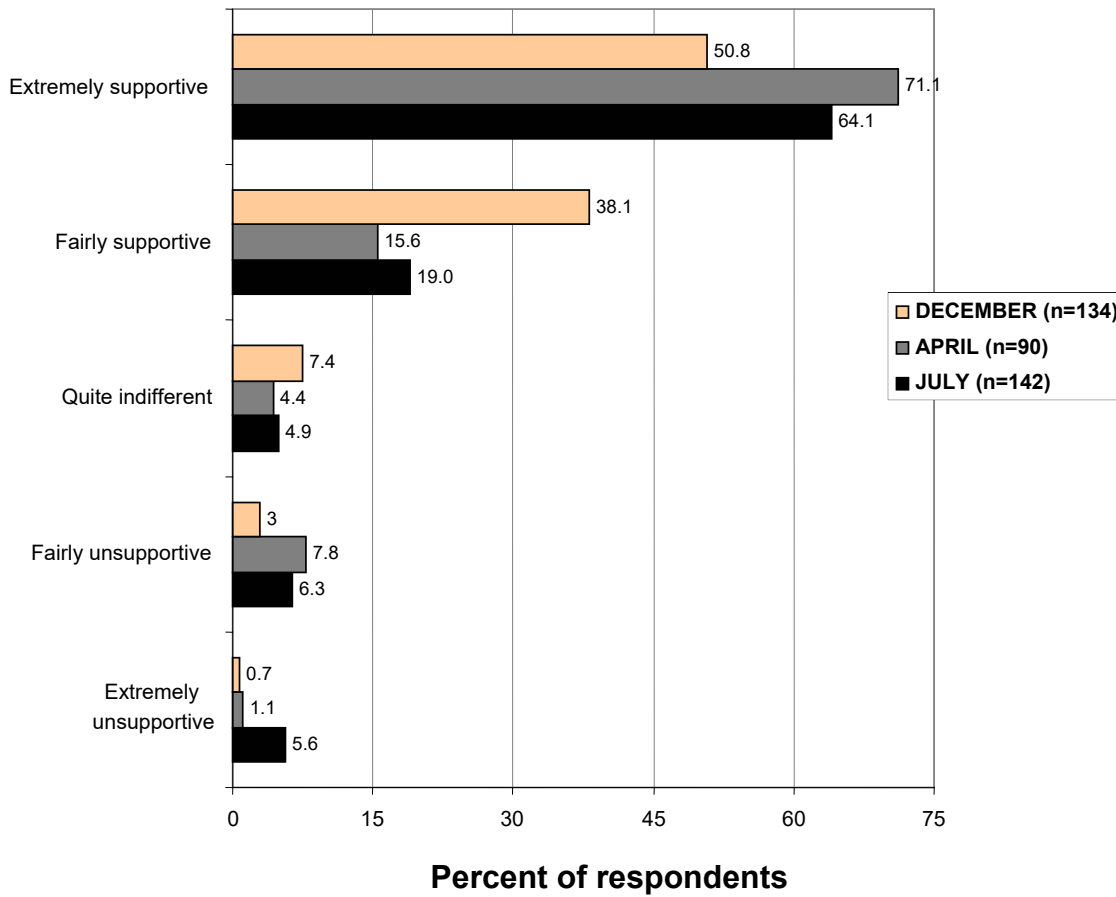
**Statistical significance for difference in time periods: $p < 0.01$

Figure 19. Answers to question: “Do you feel that overall the advantages of your CURRENT system outweigh the disadvantages?”



* Statistical significance of difference in time periods: $p=0.01$

Figure 20. Answers to question: “How does your spouse/partner feel about you working your CURRENT shift?”



Statistical significance for difference between time periods: $p=0.06$

See results of family survey to see in more detail how families have found the 48-96 schedule (Figures 21 – 45).

Figure 21. Getting daily household tasks done (n=175)

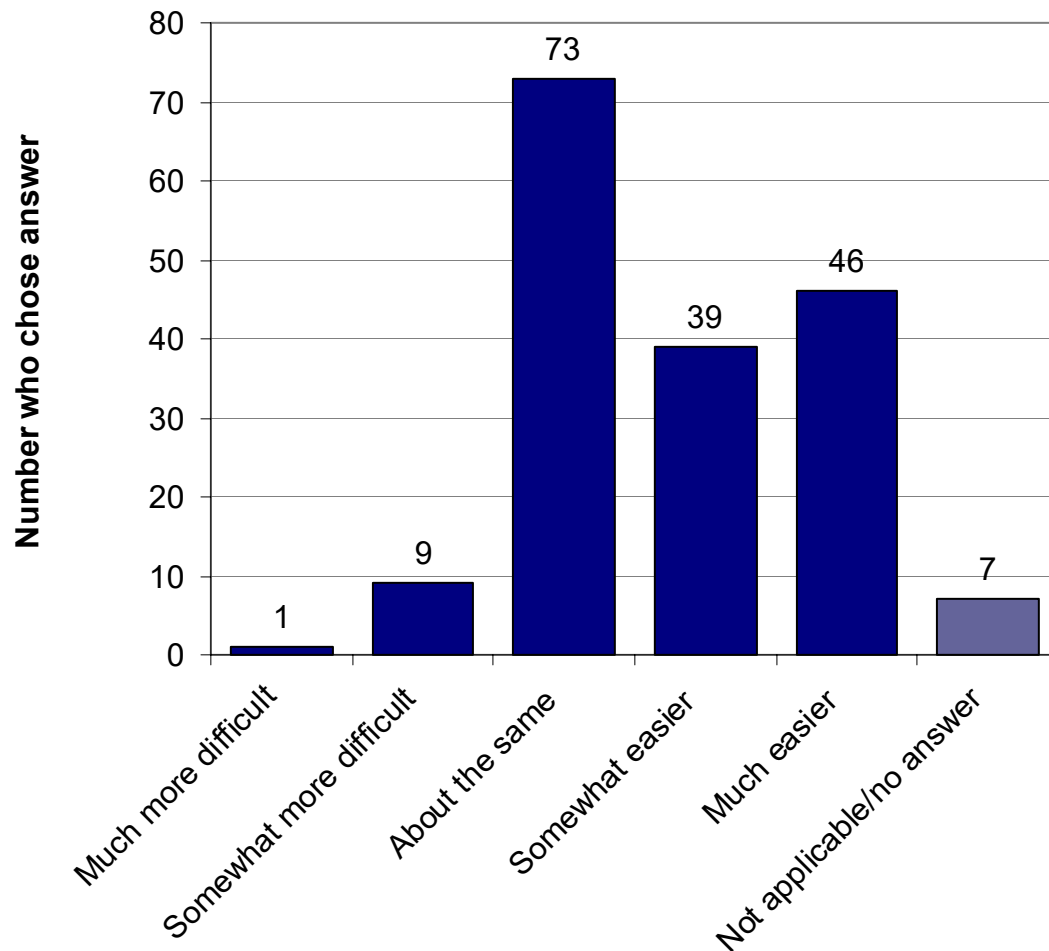
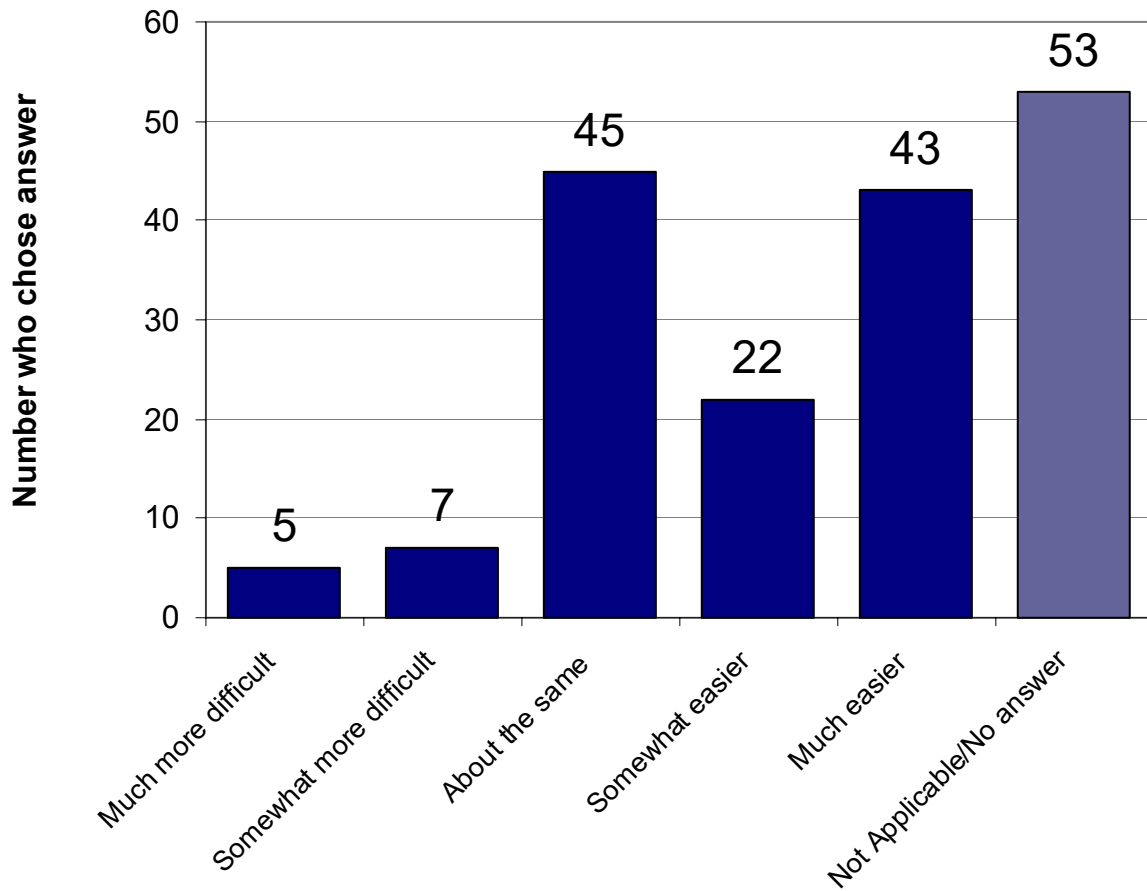
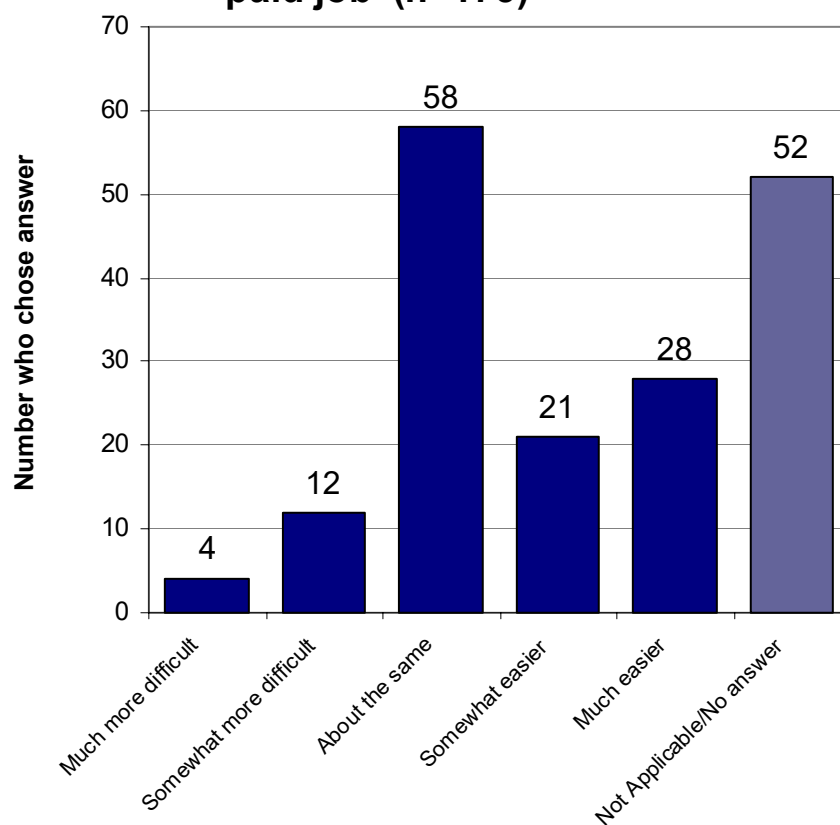


Figure 22. West Metro member working at paid job (n=175)



The answer to this question is somewhat perplexing since it pertained directly to the West Metro member, however, it may have been interpreted as working at a second paid job.

Figure 23. Spouse/Partner working at paid job (n=175)



**Figure 24. Shopping for necessities
(n=175)**

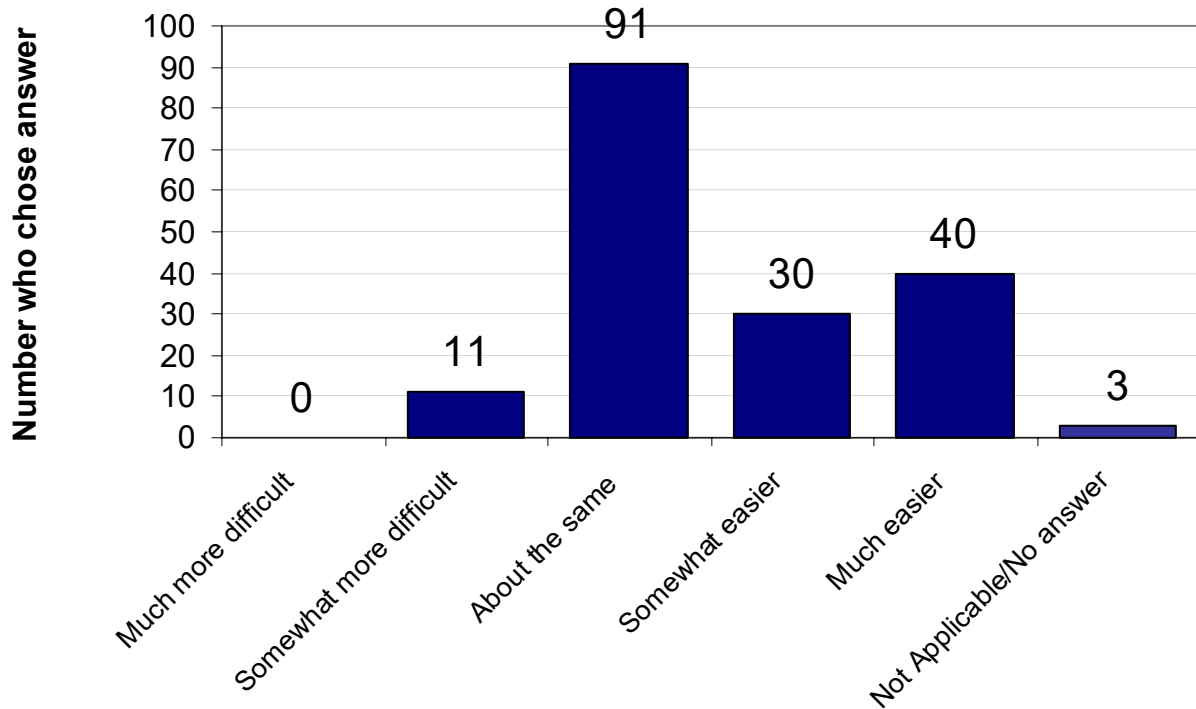


Figure 25. Handling financial matters (n=175)

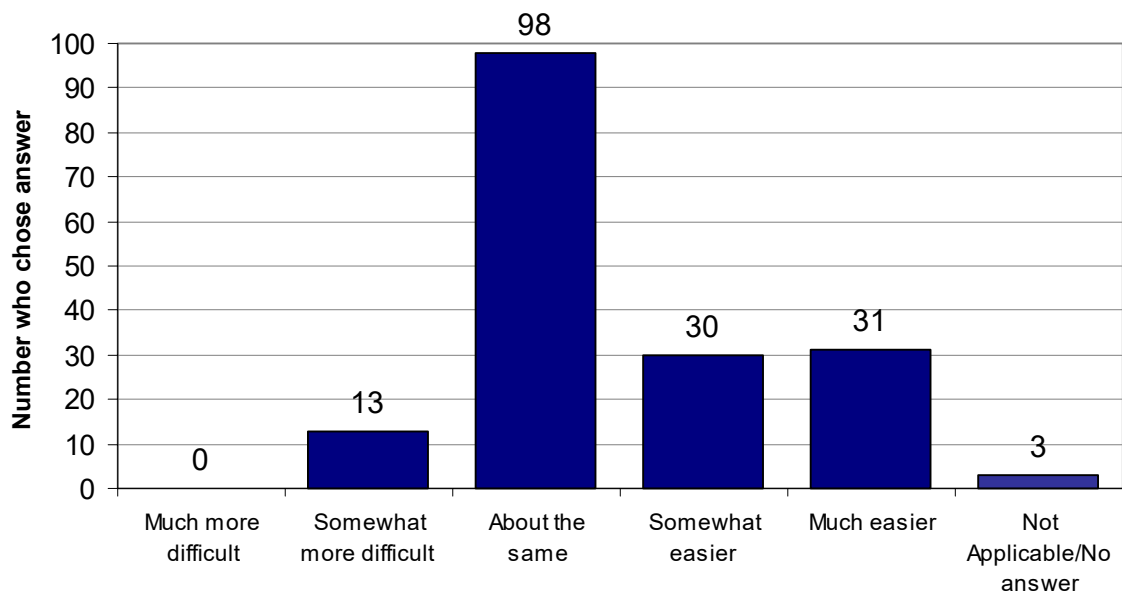


Figure 26 Maintaining safety/security of your home (n=175)

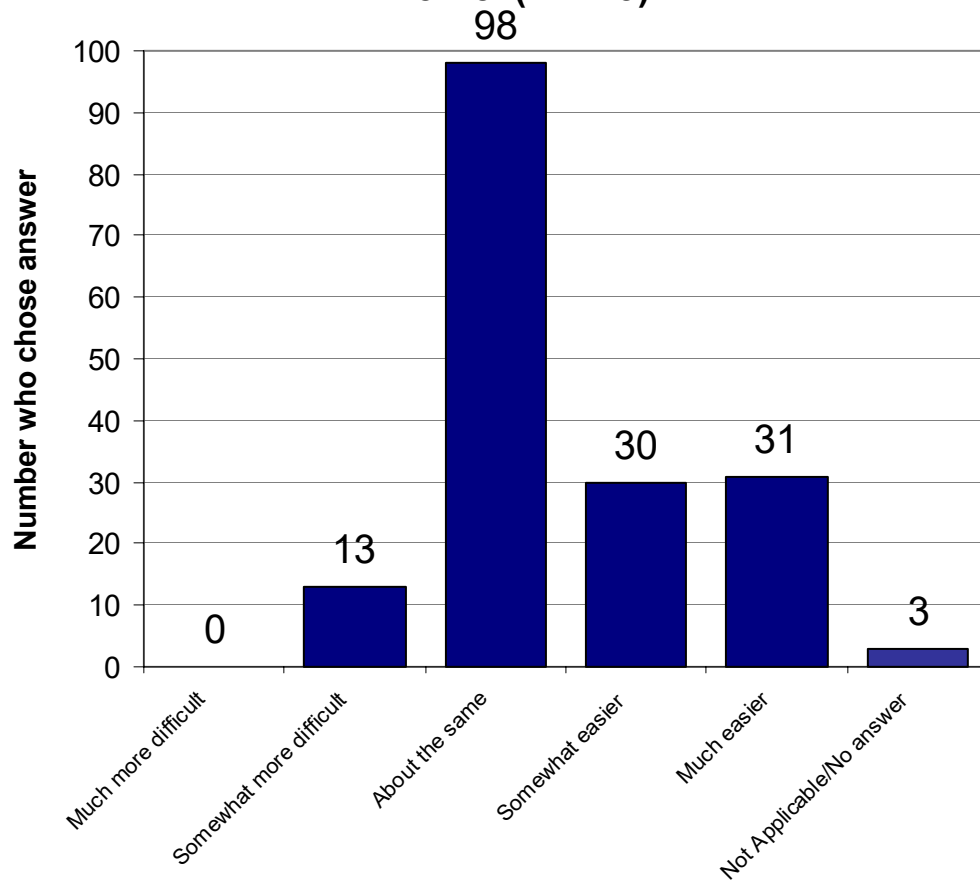


Figure 27. Maintaining automobile (n=175)

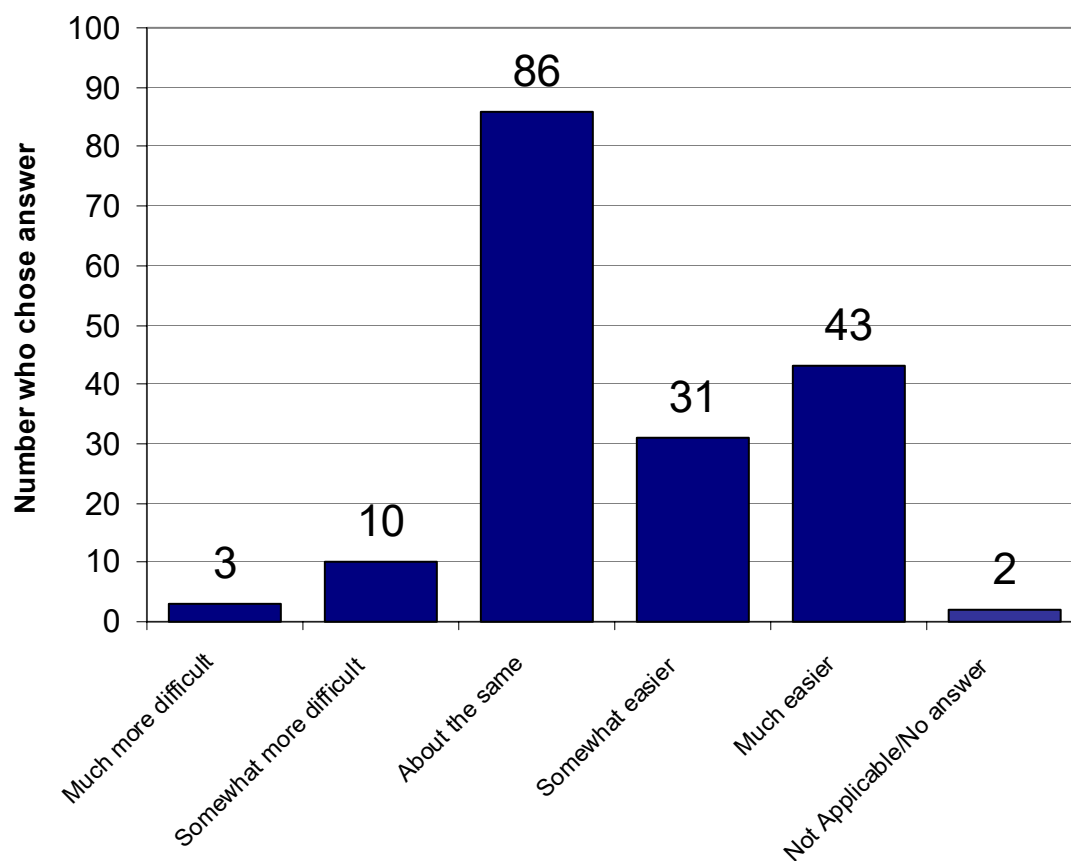
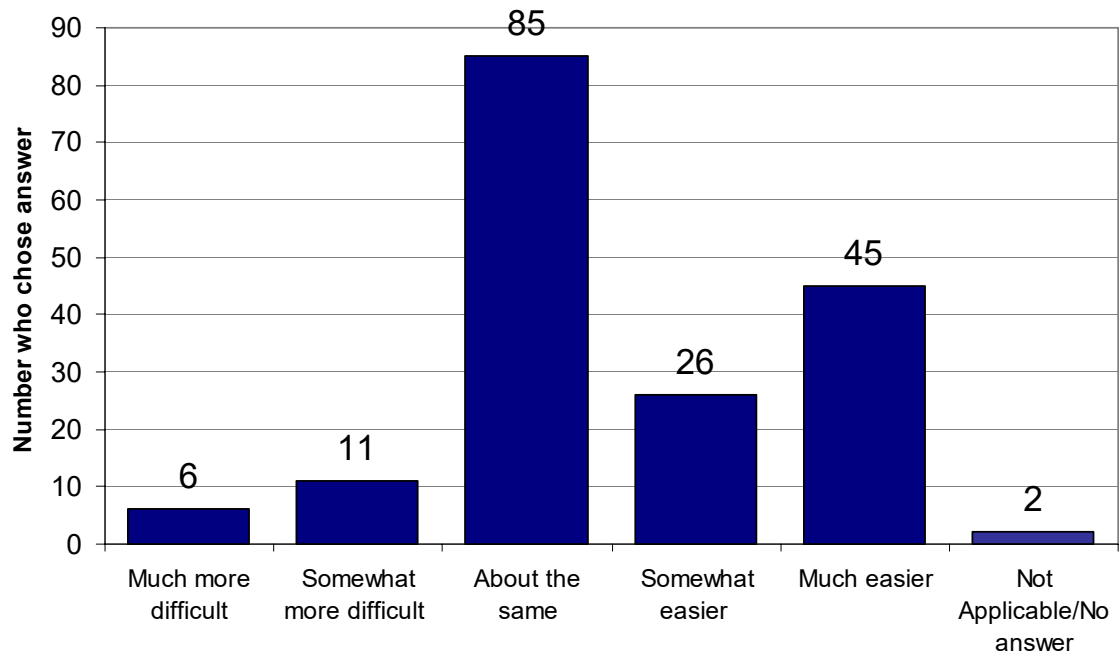


Figure 28. Taking care of member's health (n=175)



**Figure 29. Taking care of spouse/partner's health
(n=175)**

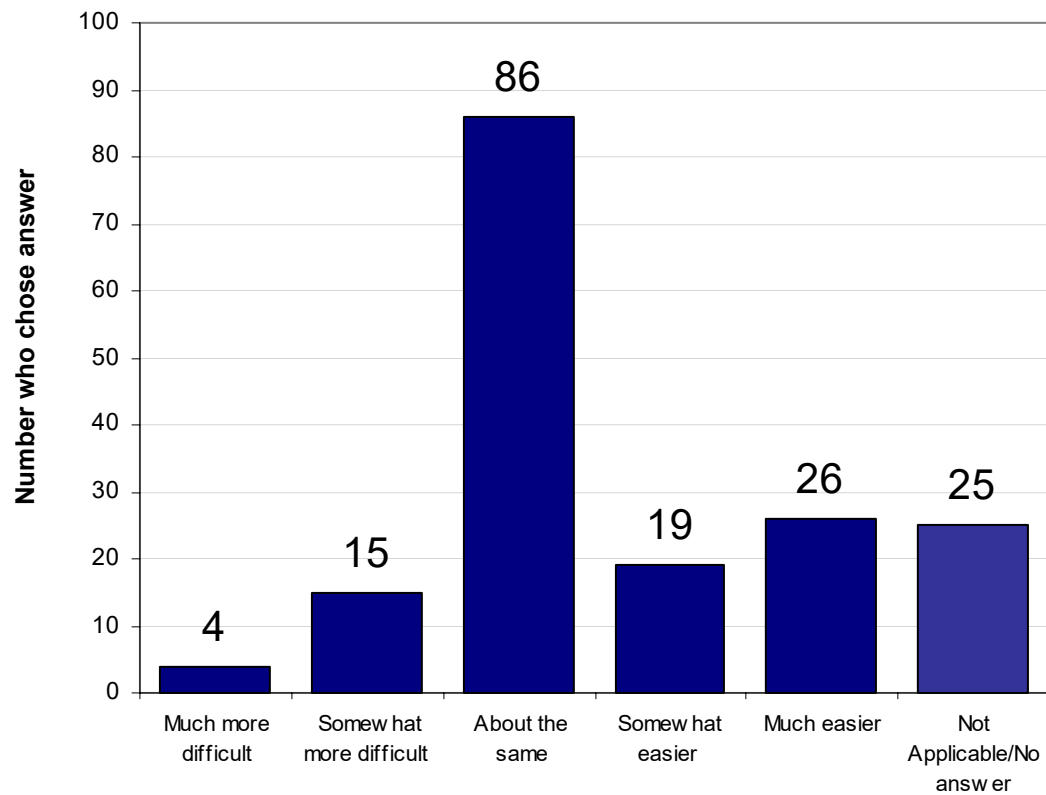


Figure 30. Taking care of elder's health (n=175)

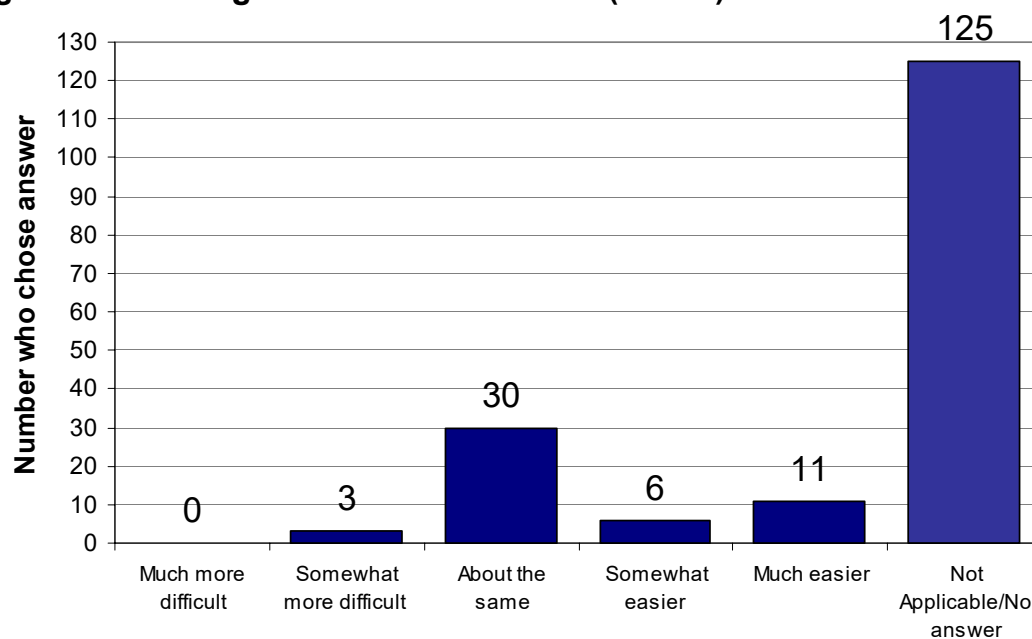


Figure 31. Taking care of pets (n=175)

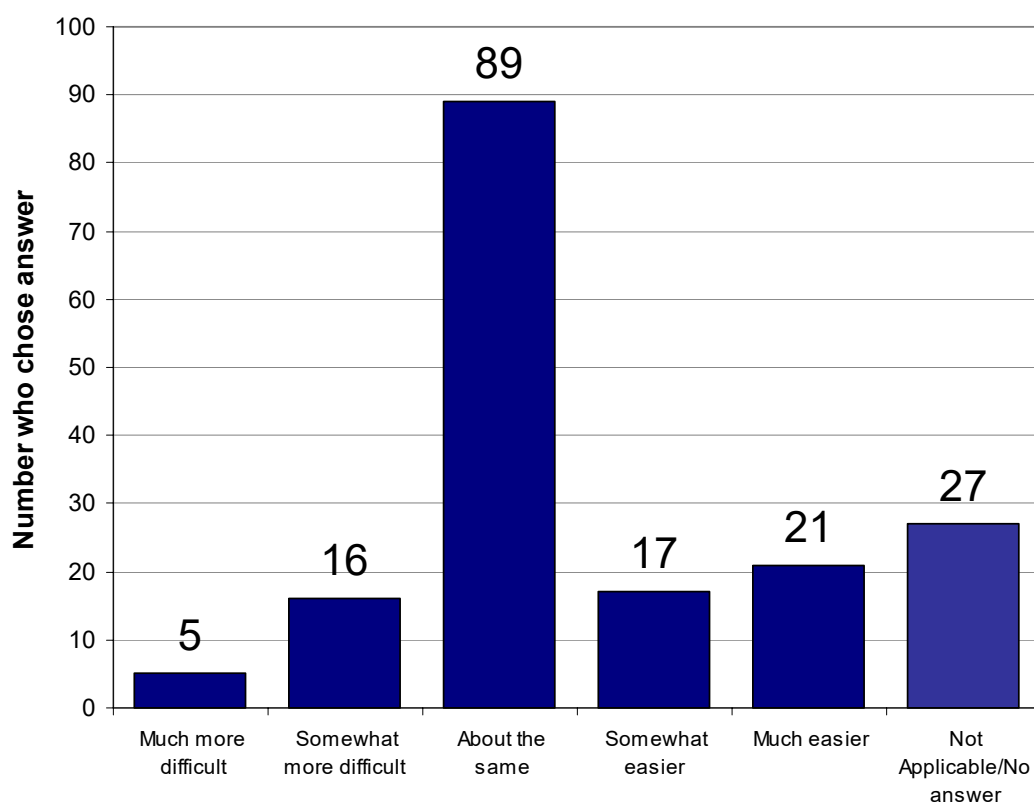


Figure 32. Having a social life (n=175)

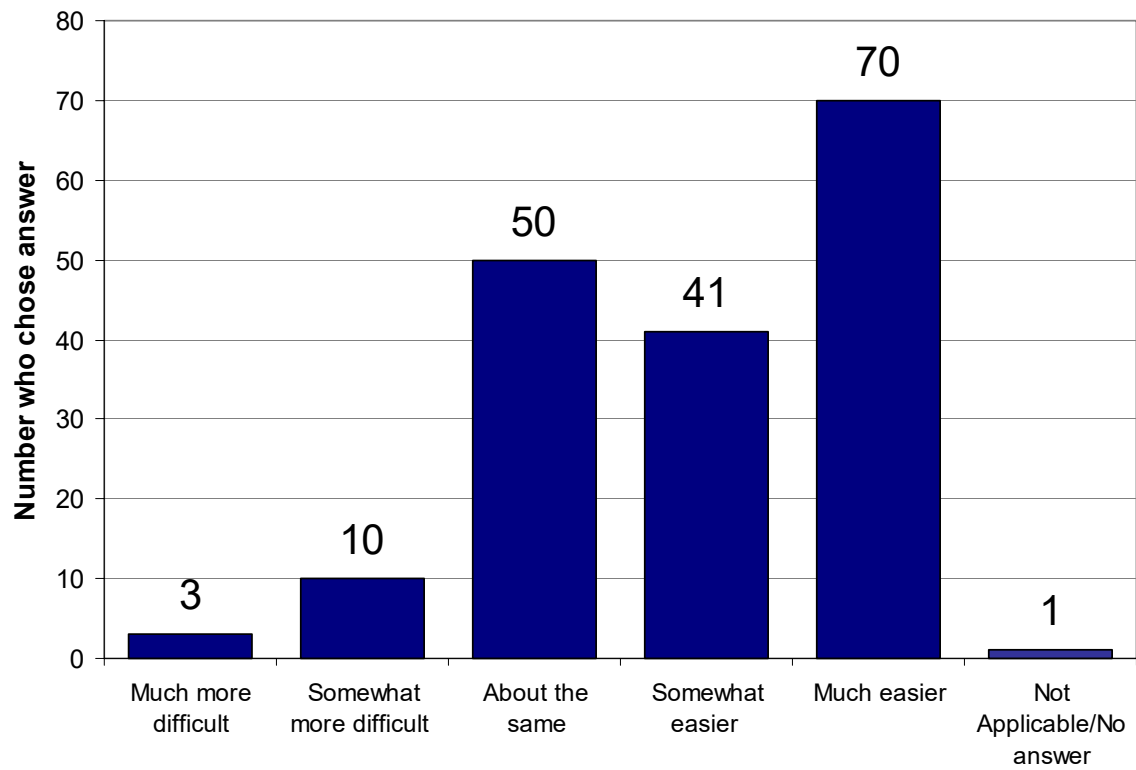


Figure 33. Doing volunteer work (n=175)

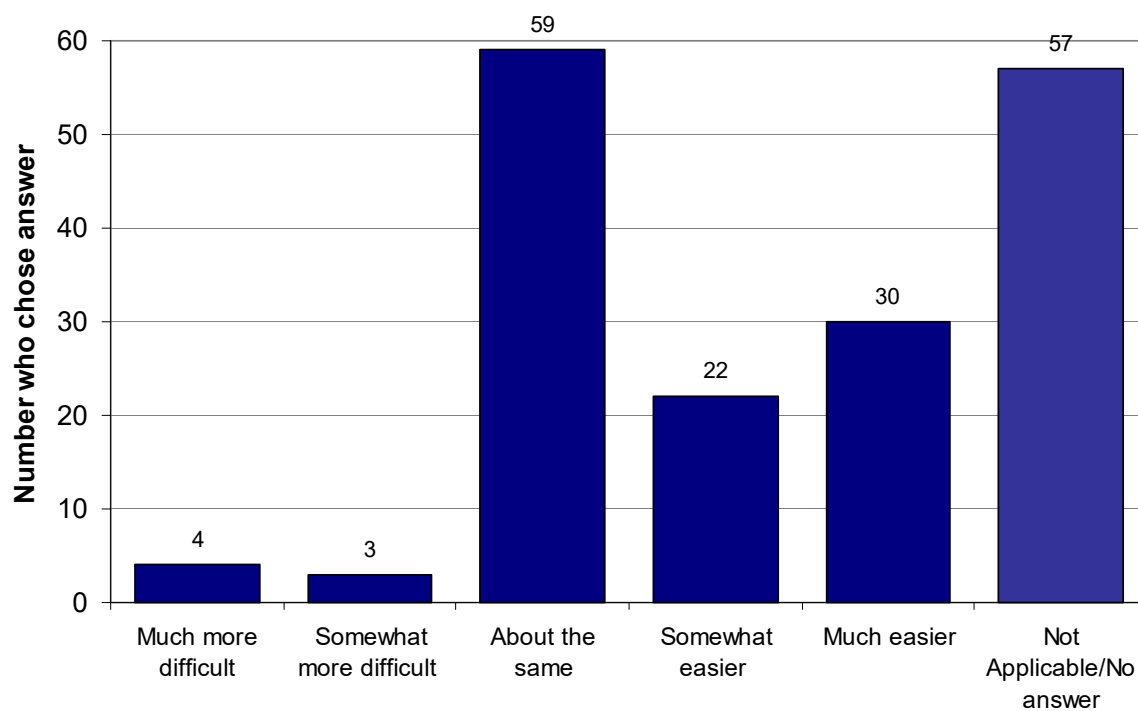


Figure 34 Doing special projects around the home (n=175)

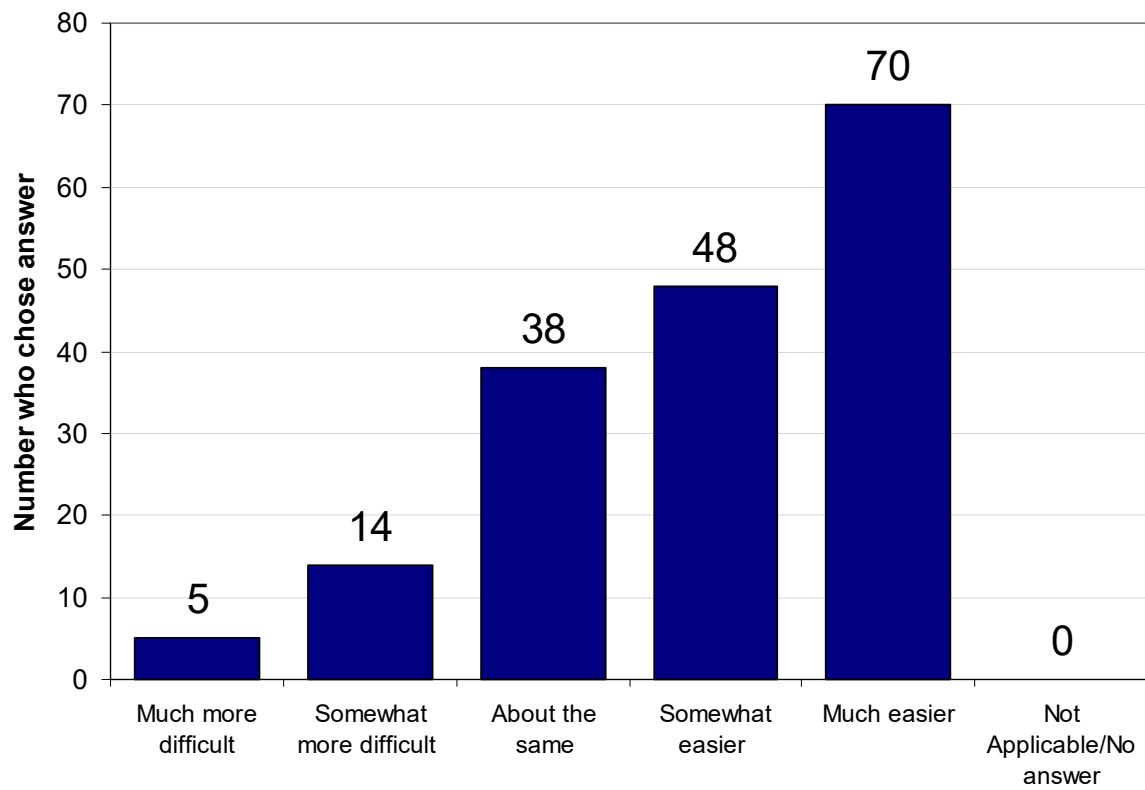


Figure 35. Participating in leisure time activities (n=175)

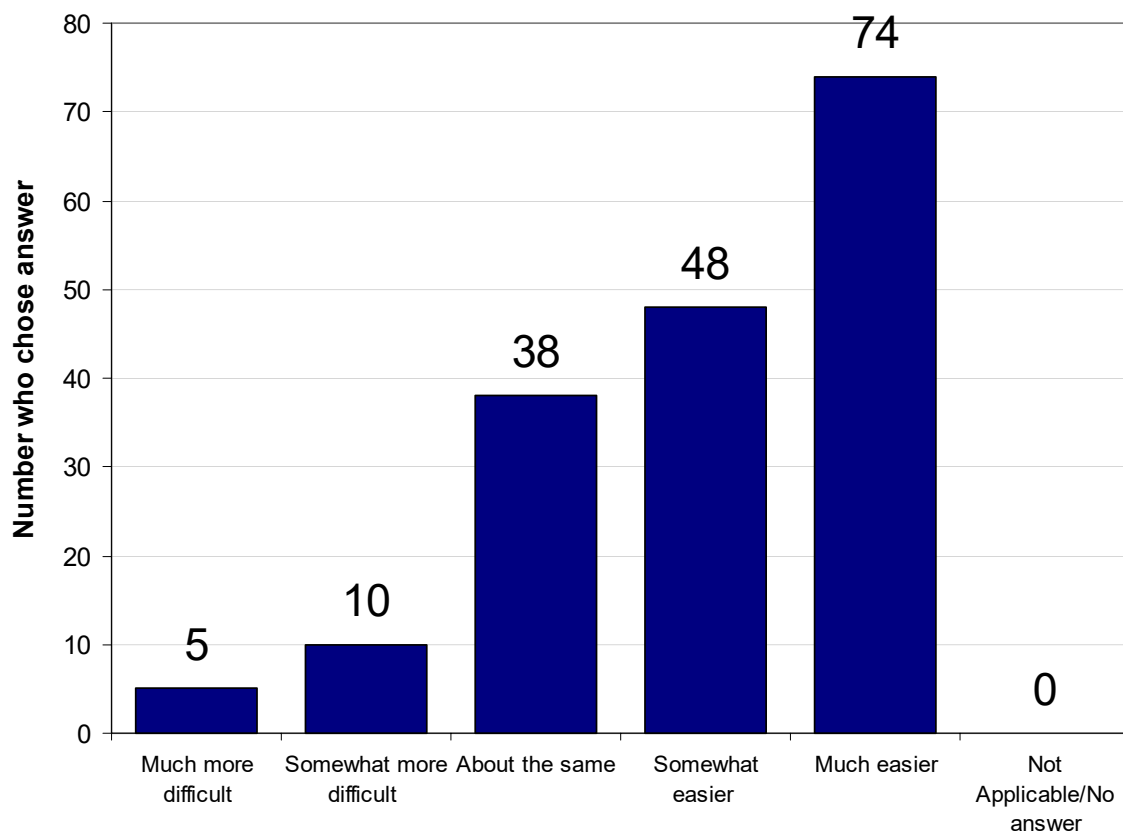


Figure 36. Taking personal for yourself (n=175)

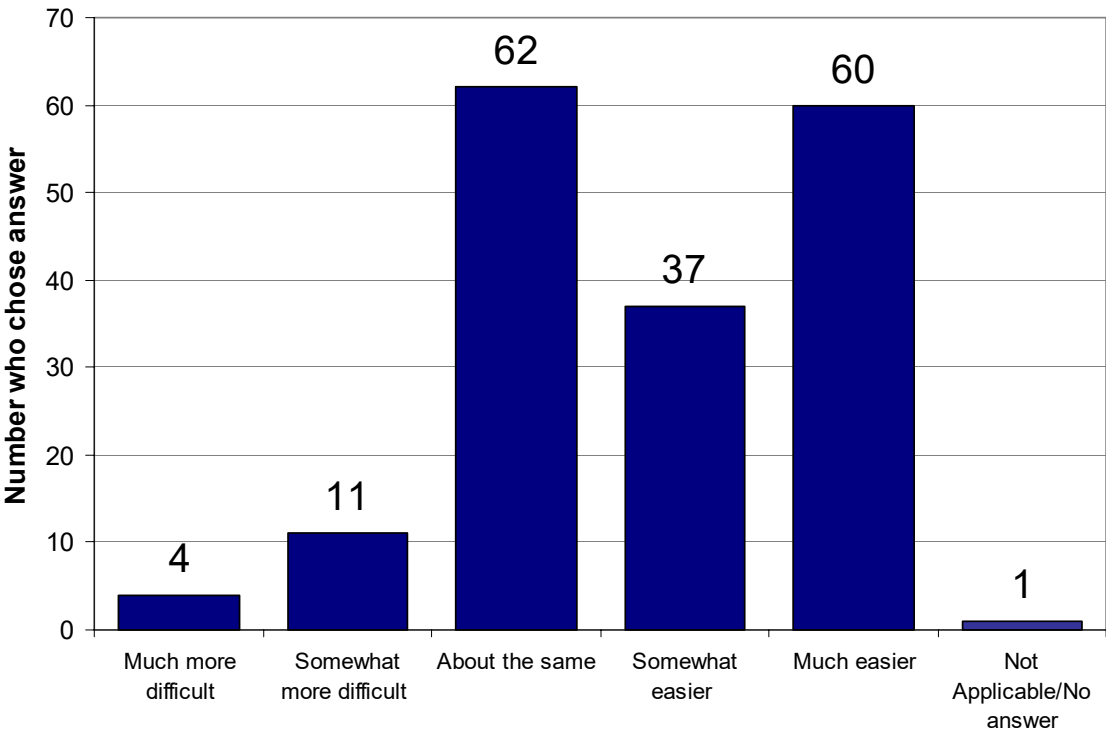
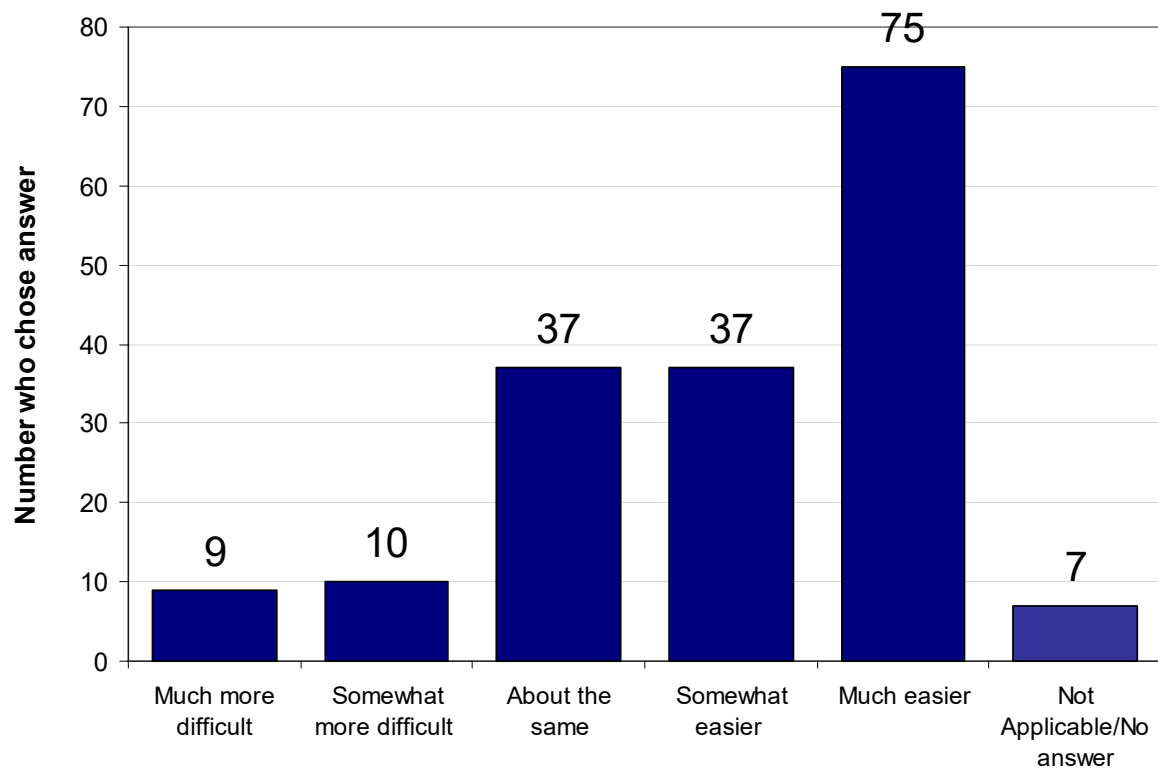


Figure 37. Spending time together as a family (n=175)



Answer to question: Since the shift change, how has your family found it to accomplish the following activities?

Figure 38. Taking care of elder at home (n=175)

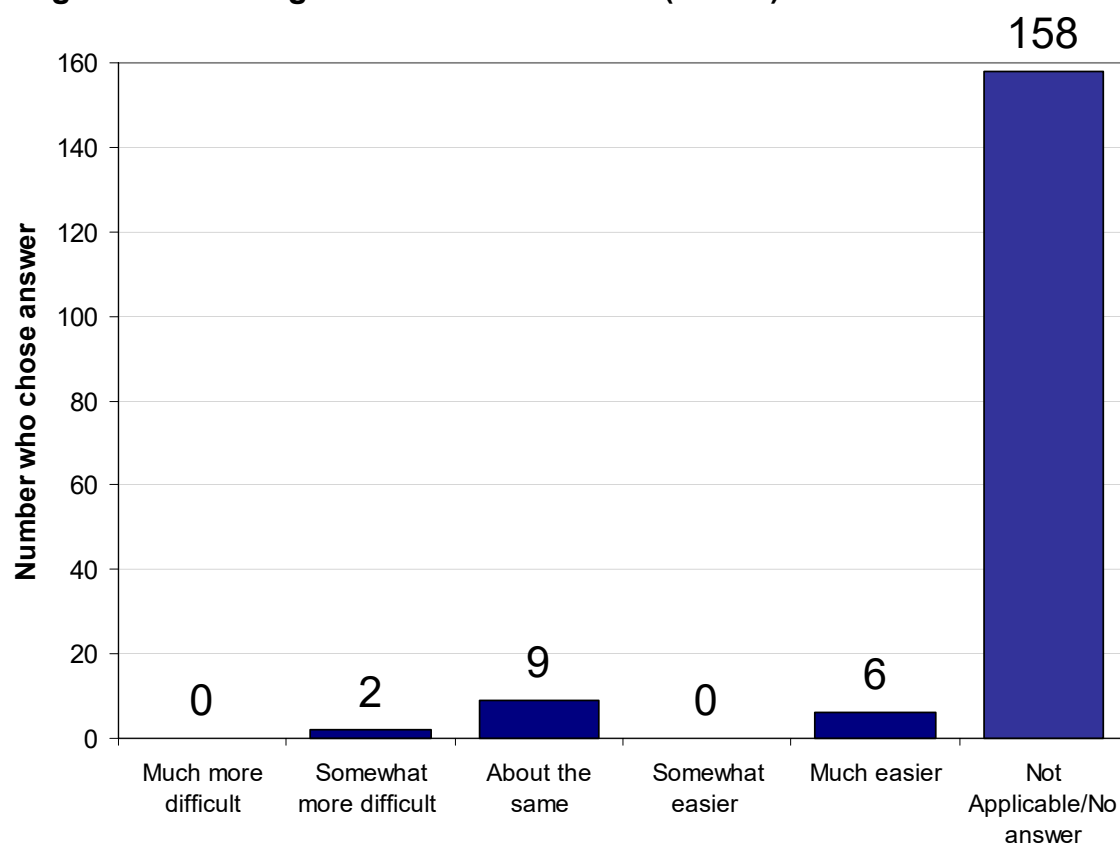


Figure 39. Arranging for child care (n=175)

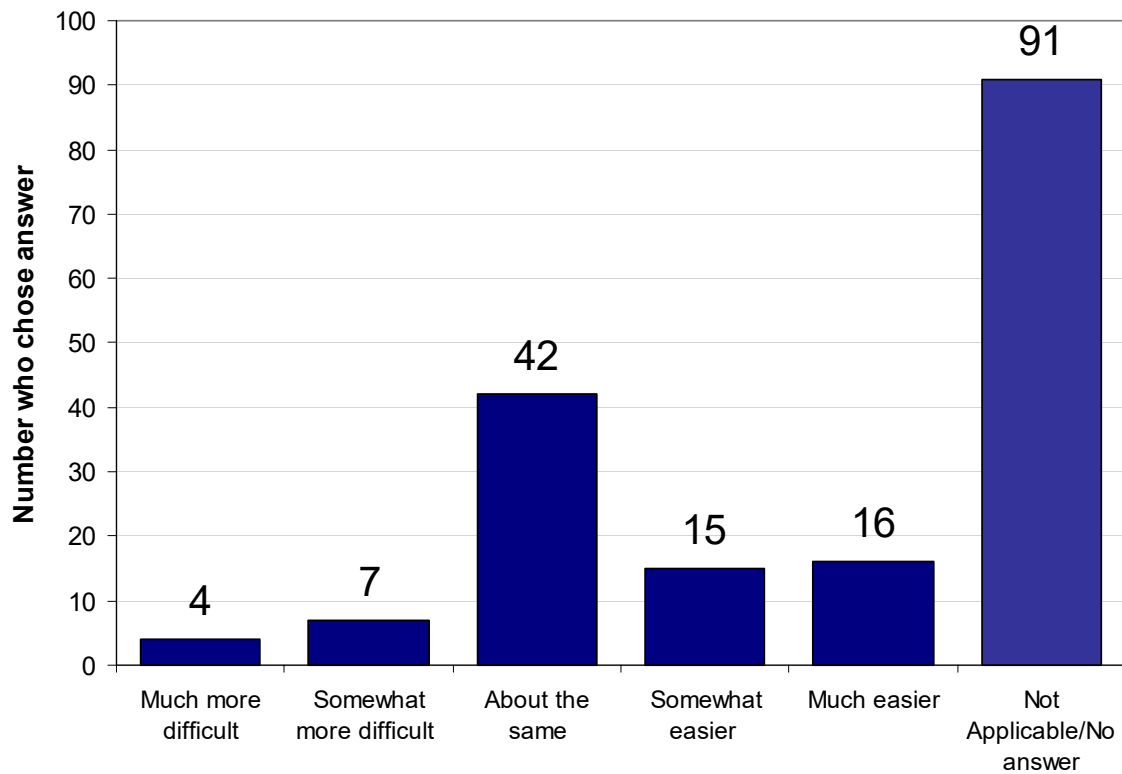


Figure 40. Taking care of children at home (n=175)

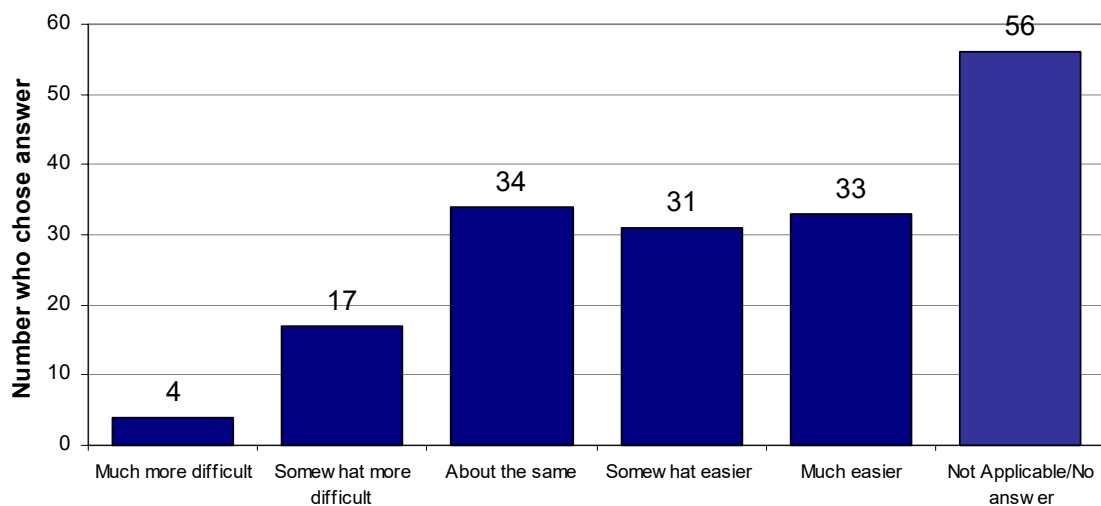


Figure 41. Taking care of children's health (n=175)

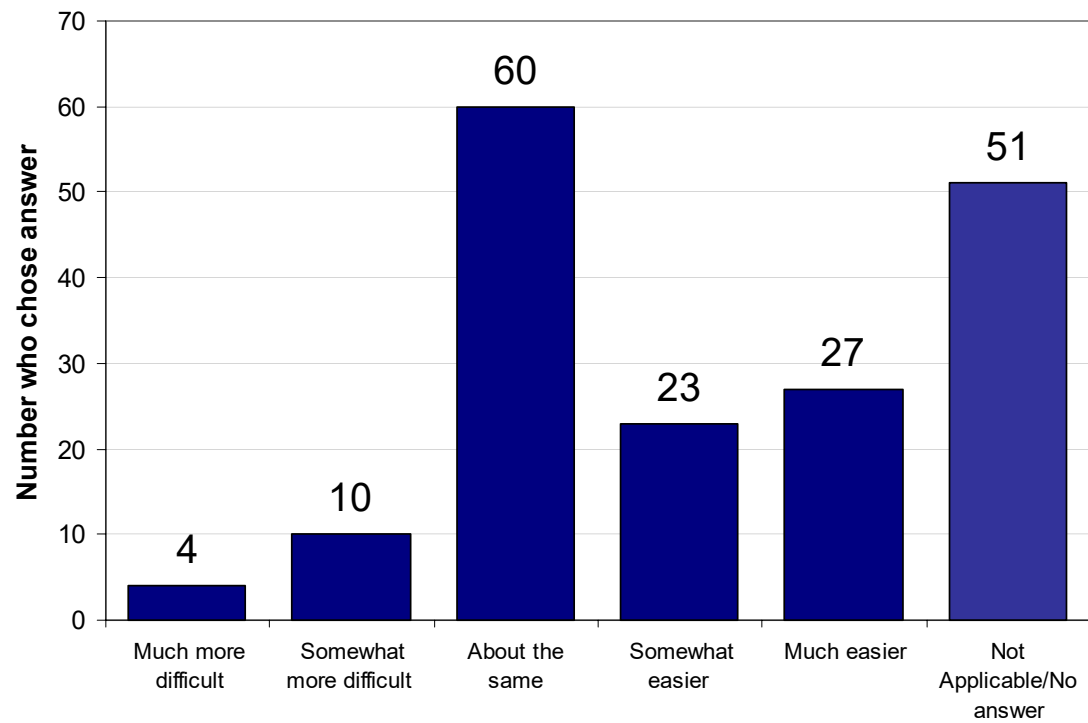


Figure 42. Ensuring children do schoolwork (n=175)

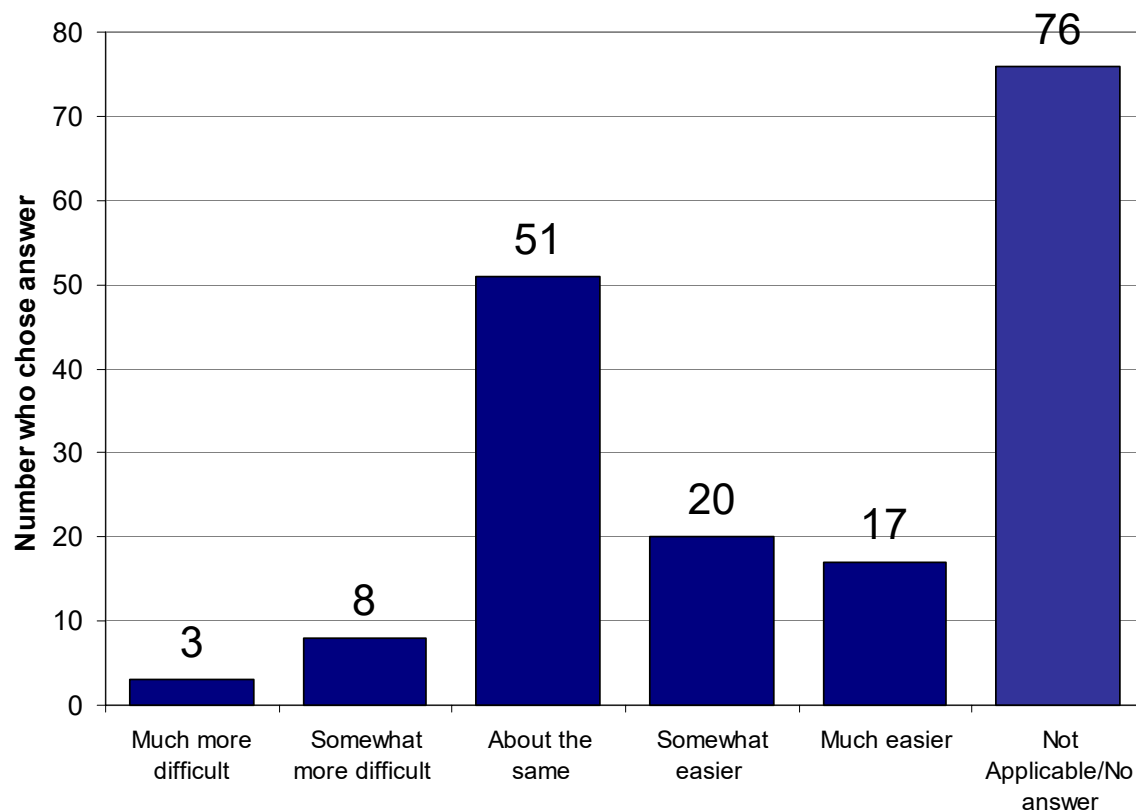
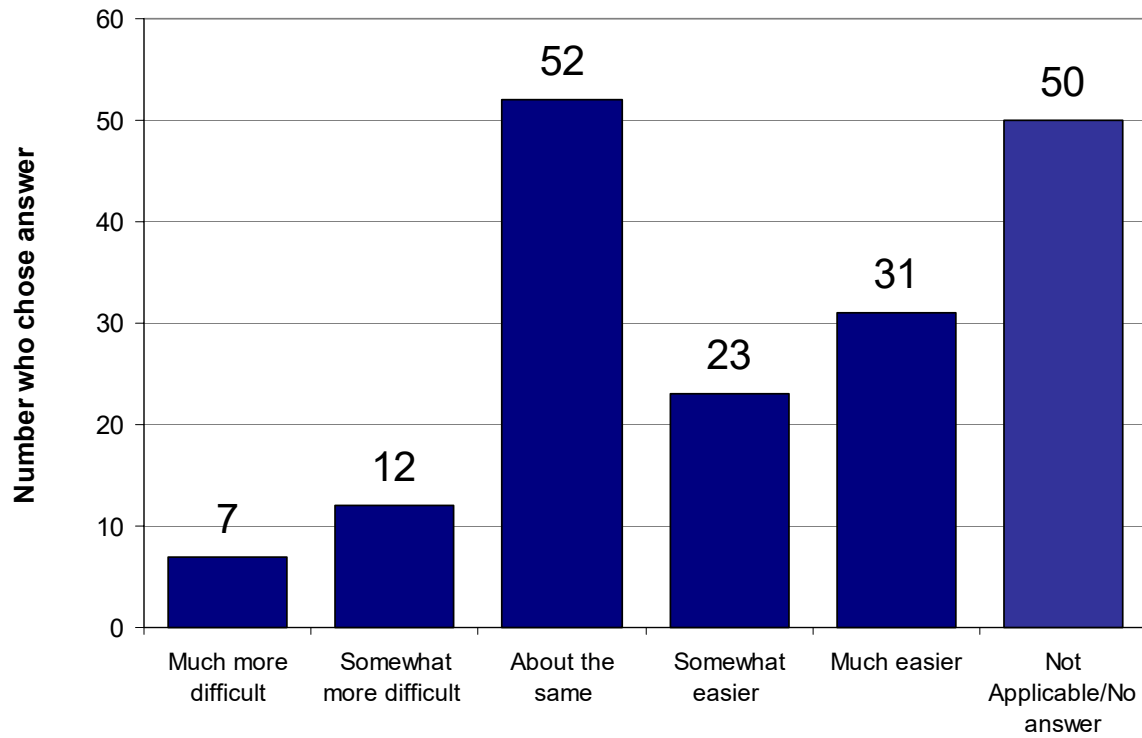


Figure 43. Supervising children's behavior and activities at home (n=175)



**Figure 44. Having children take part in after school activities
(n=175)**

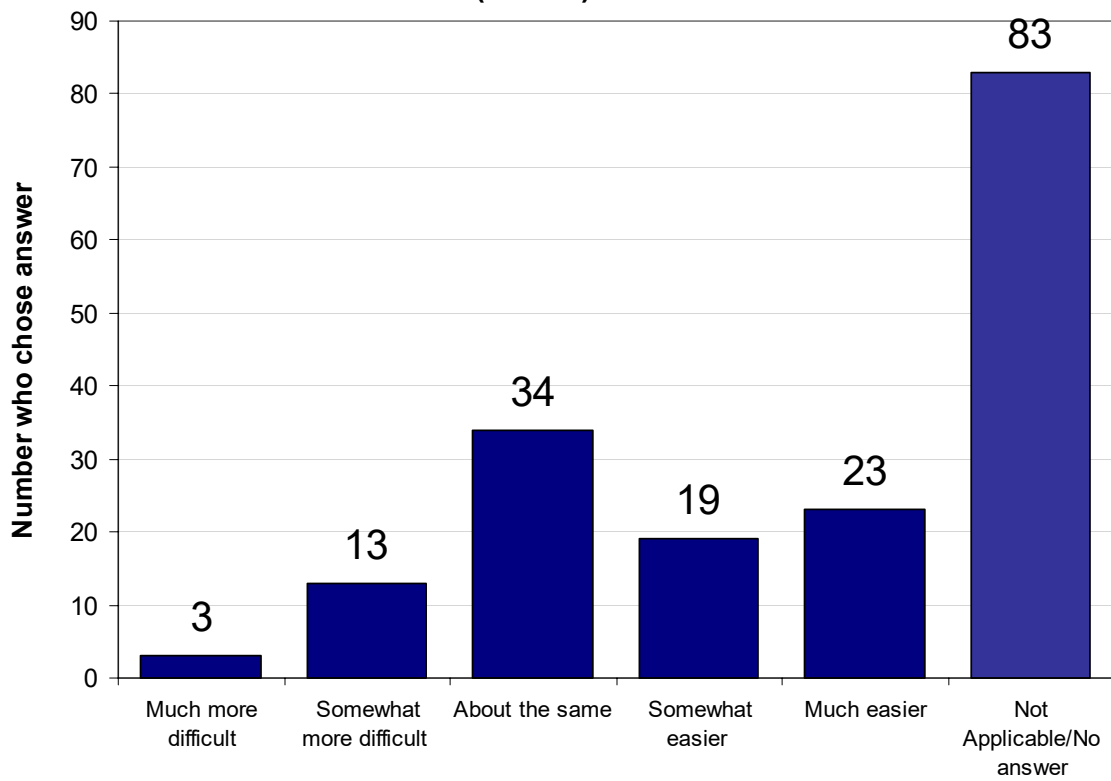


Figure 45. Participating in activities at your child(ren)'s school (n=175)

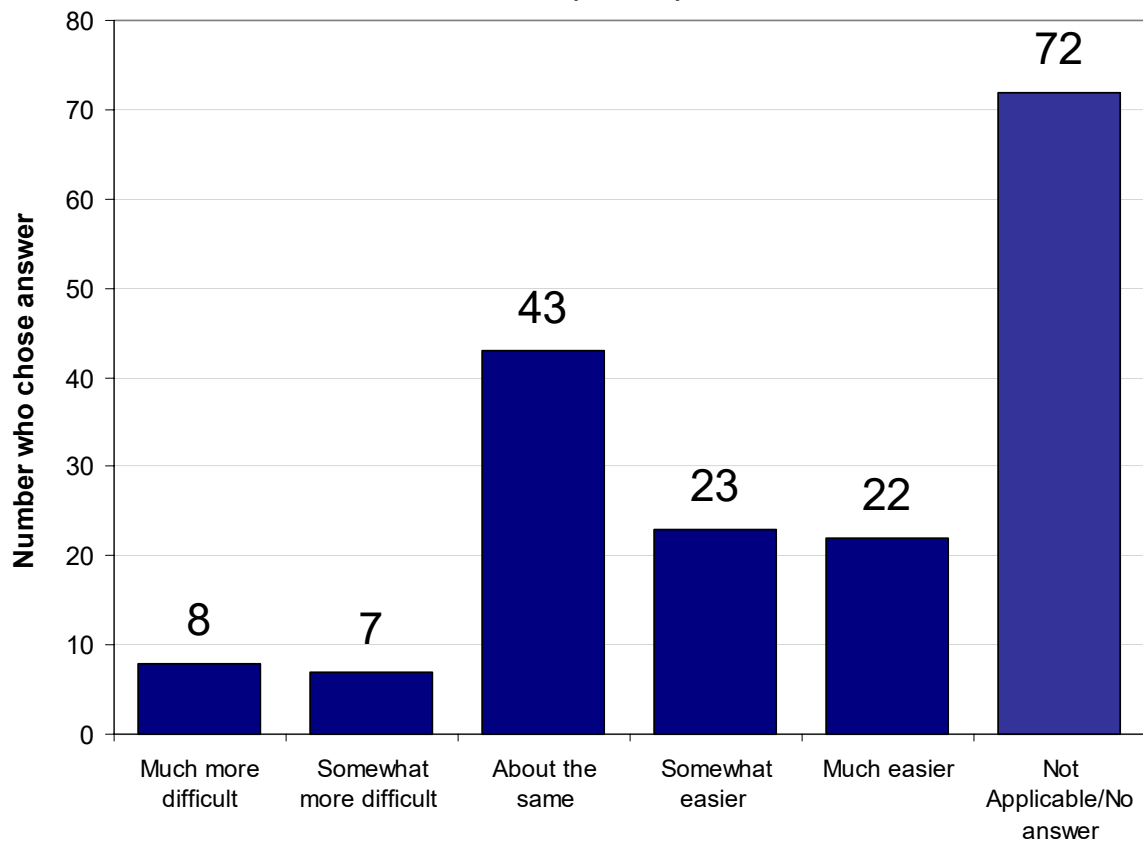


Figure 46. The 48/96 schedule creates a strain for our(my) child(ren) (n=175)

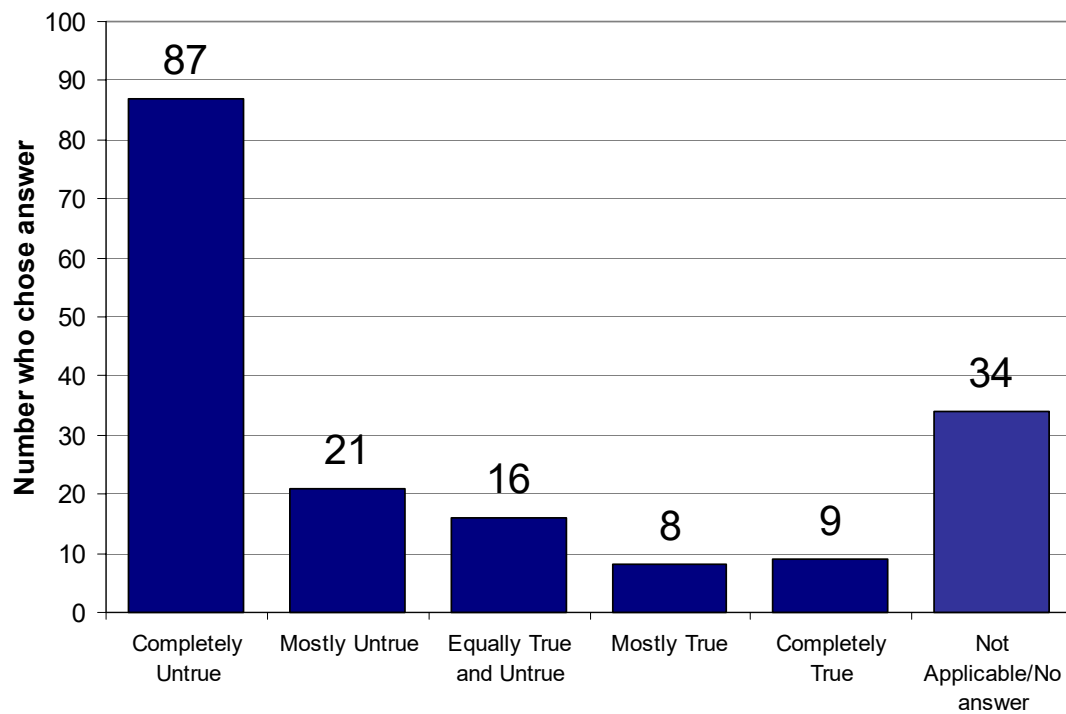


Figure 47. The 48/96 schedule leaves us (me) with too little TIME to be the kind of parent we (I) want to be (n=175)

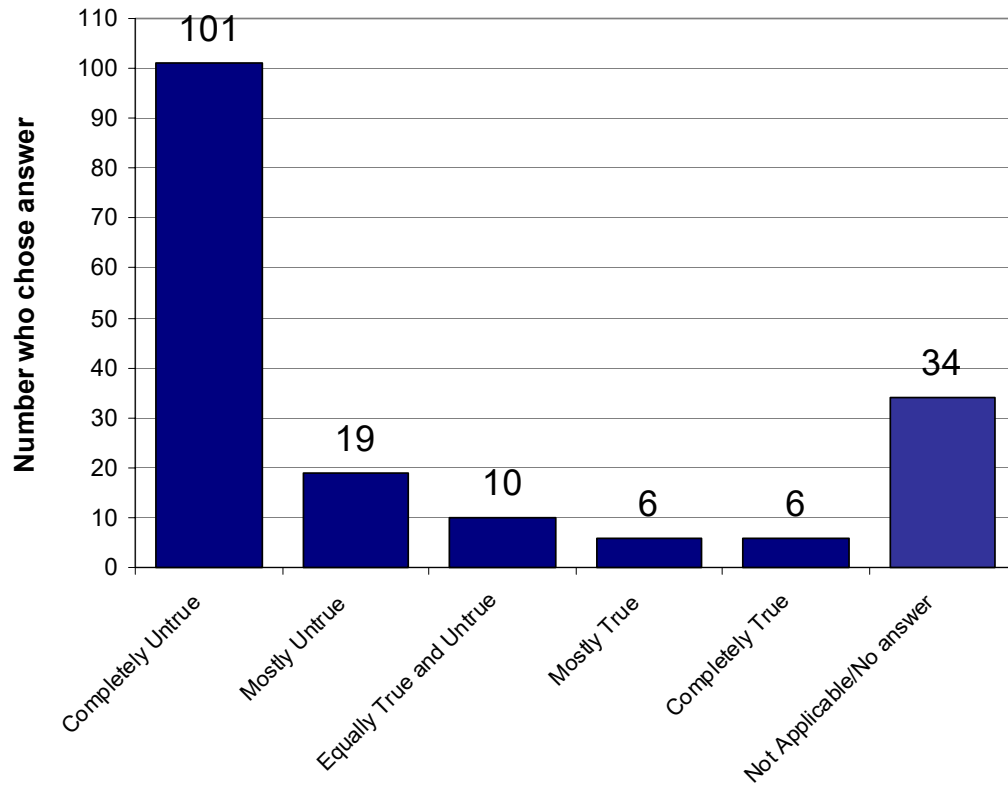


Figure 48. The 48/96 schedule leaves us (me) with too little ENERGY to be the kind of parent we (I) want to be (n=175)

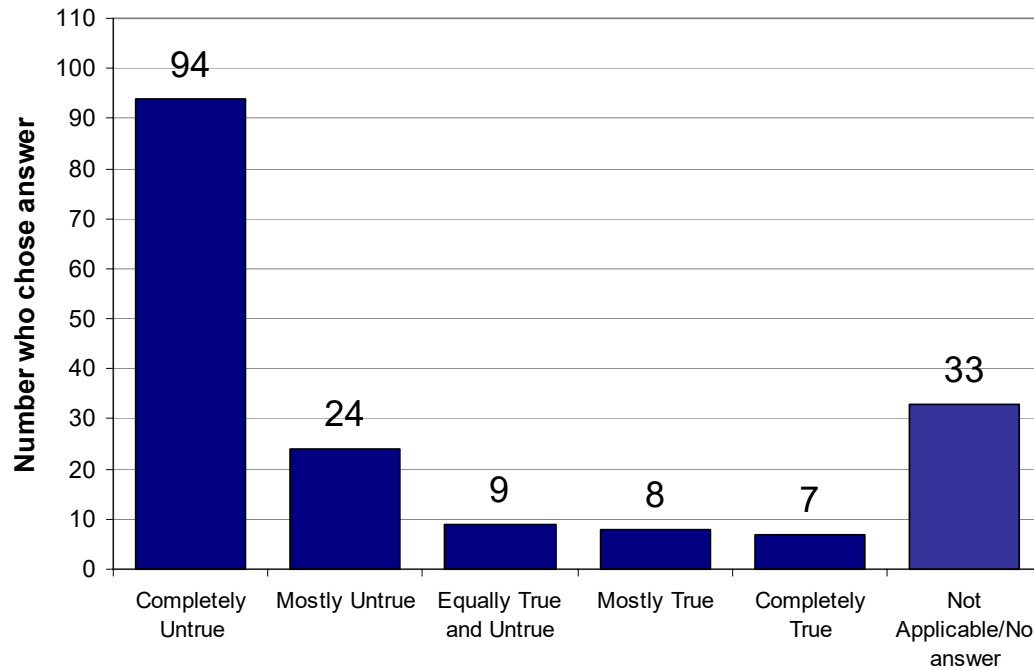


Figure 49. The 48/96 schedule creates a strain on our marital (partner) relationship (n=175)

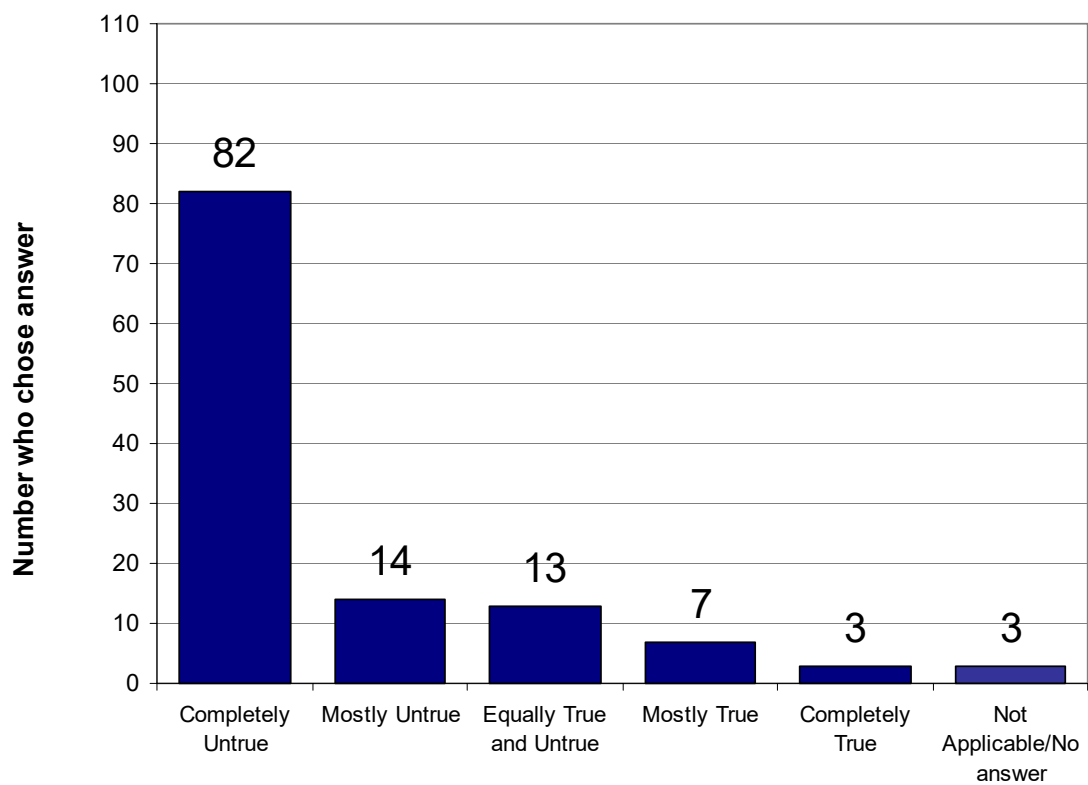


Figure 50. Because of the 48/96 schedule, our (my) family time is less enjoyable (n=175)

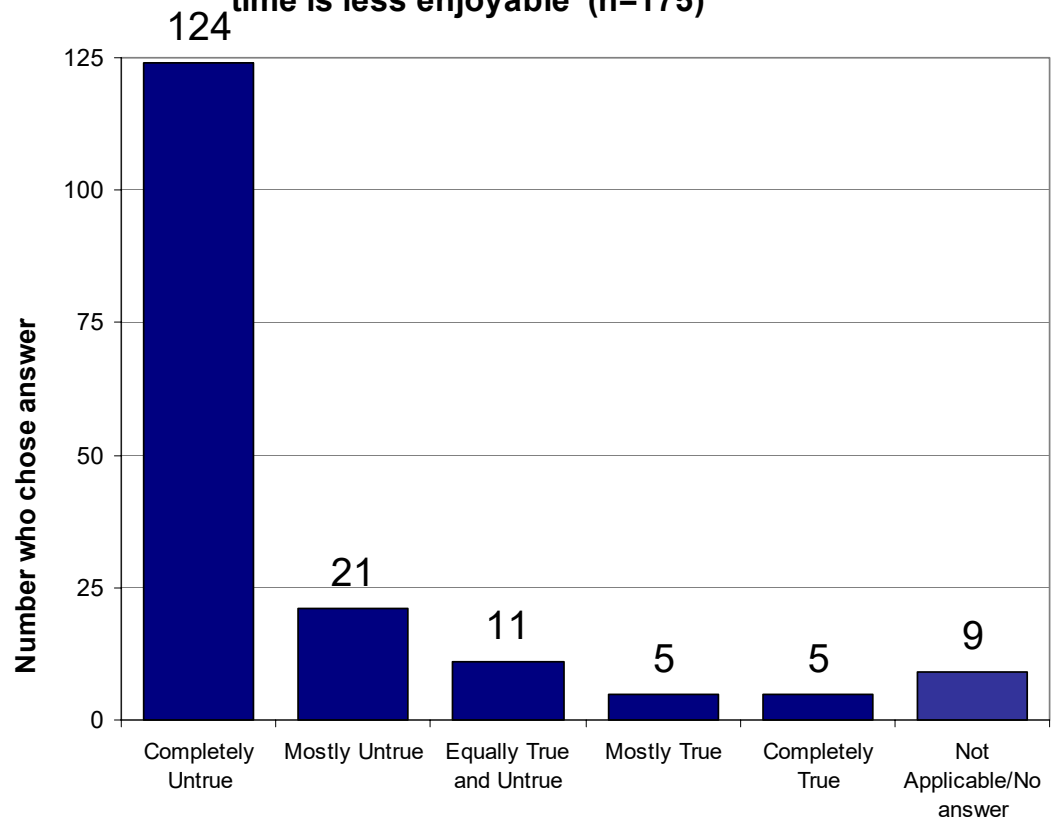
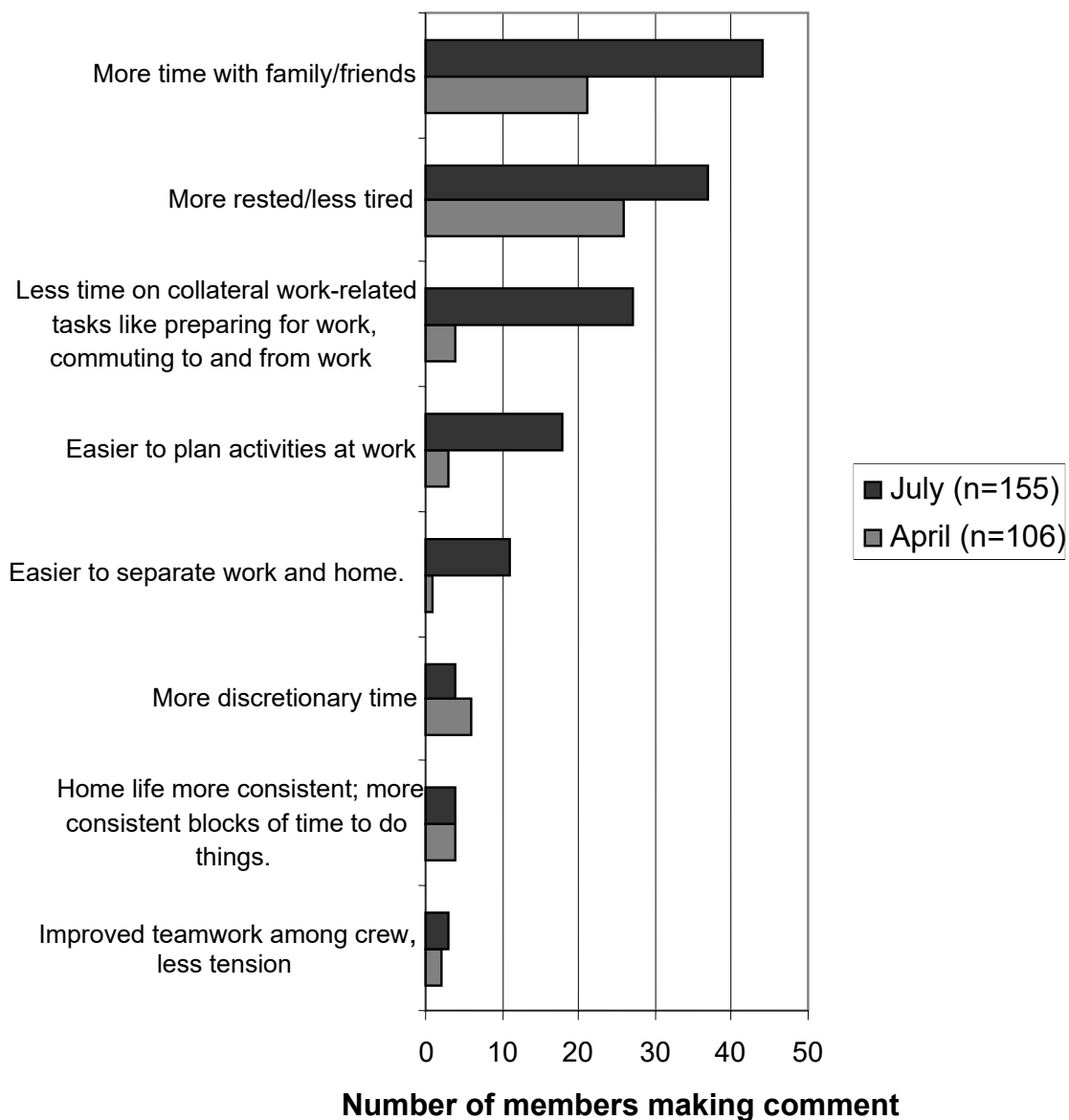
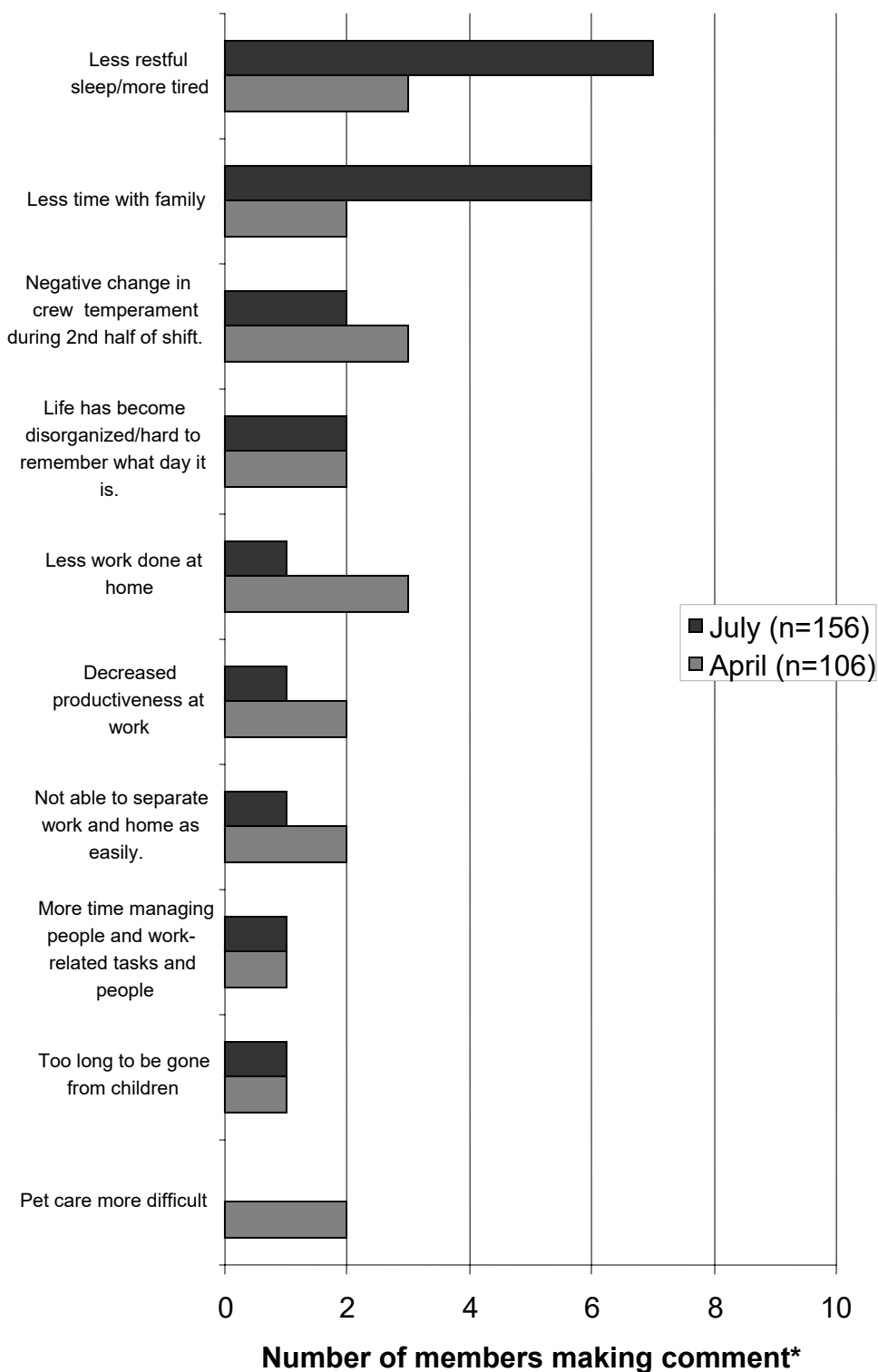


Figure 51 a. MEMBER SURVEYS: Positive comments about 48-96, April and July 2006



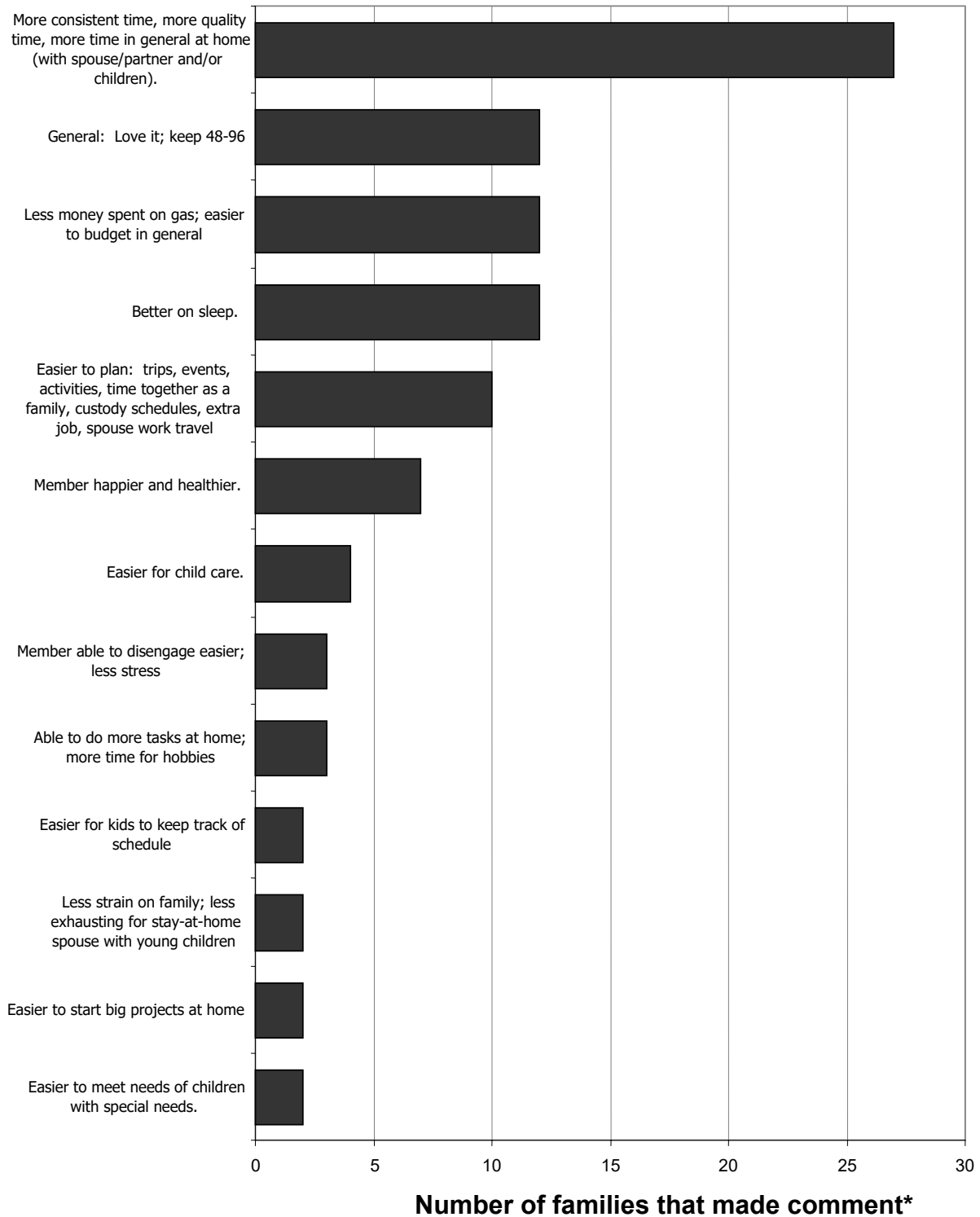
*Members could make more than one comment for each time period. Also, members who answered in April and July could make the same comment twice.

Figure 51 b. MEMBER SURVEYS: Negative comments about 48-96, April and July 2006



*Members could make more than one comment for each time period. Also, members who answered in April and July could make the same comment twice.

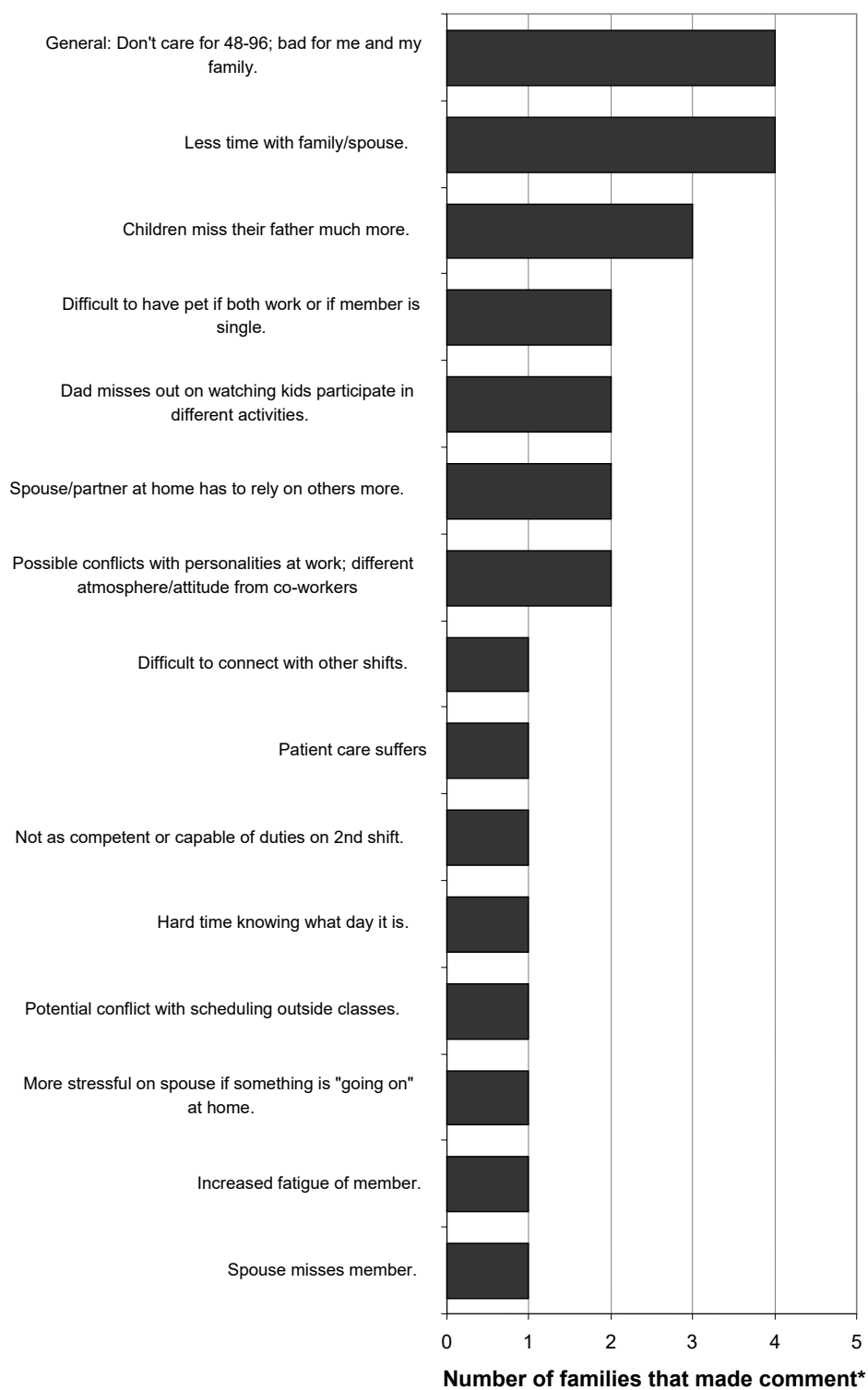
Figure 52 a. FAMILY SURVEY COMMENTS: Positive comments about 48-96 shift, August 2006



* Families could make more than comment

KEY to symbols: < = less than
 ≤ = less than or equal to

Figure 52 b. FAMILY SURVEY COMMENTS: Negative comments about 48-96 shift, August 2006



* Families could make more than comment

APPENDIX A

Statistical Methods and Notes

1. In order for the sleep diary to be in the analysis, the member had to include observations from two or three "ON-SHIFTS" and five or four "OFF-SHIFTS."
2. Statistical significance for paired data was assessed using the Wilcoxon Matched-Pairs Signed-Ranks Test. Accessed 10/1/2006 from http://www.fon.hum.uva.nl/Service/Statistics/Signed_Rank_Test.html.
3. p value is a measure of statistical significance. Significance levels show you how likely a result is due to chance. The p value tells you how likely something is to be not true. Thus, a p value less than ($<$) 0.01 says that there is a less than 1% chance that the results are not true; or in other words, there is 99% chance the results are true. (Adapted from Statistical Significance, accessed 10/18/2006 from <http://www.surveysystem.com/signif.htm>.)
4. Median is the middle number of the observed range. Mean is the average (sum of all observations/total number of observations). for the group of numbers 2,4,7,8, 9,10,15, the median is 8, and the mean is 7.86.
5. Johns KW. 1991. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep 14(6) 540-5.
6. Statistical significance assessed by Chi-square test, Web Chi Square Calculator, Accessed from http://schnoodles.com/cgi-bin/web_chi.cgi.
7. Standard Shiftwork Index. Accessed November 18, 2005 from <http://www.workingtime.org/images/5/5b/SSIQUES.doc>
8. Barton J, Folkard S, Smith LR, Spelten ER, Totterdell PA. Standard Shiftwork Index Manual. Accessed November 18, 2005 from <http://www.workingtime.org/images/3/31/SSIMAN.doc>
9. Kristensen TS, Borritz M, Villadesen E, Christensen KB. The Copenhagen burnout inventory: A new tool for the assessment of burnout. Work & Stress, July – September 2005; 19 (3): 192-207.
10. Statistical significance assessed with the Kruskal-Wallis test using computing program Minitab, Release 14.

APPENDIX B (Member Questionnaire)

1. How long have you worked in your present shift system? (Can be with other EMS crews as well)

_____ Years _____ Months

2. How long altogether have you been working shifts? (Include all work, not just EMS work).

_____ Years _____ Months

3. On average how many hours do you work each week, excluding overtime? _____ Hours

4. Are you currently a paramedic technician? ☐ No ☐ Yes

5. On average, how long does it take you to travel to and from work? _____ Minutes

For questions 5-7, please answer each question on a scale of 1-5, where 1 indicates the shift system does not interfere at all and 5 indicates that it interferes very much.

6. In general, how much does your shift system interfere with the sorts of things that you would like to do in your leisure time (e.g., sports activities, hobbies, etc.)?

Not at all 1 2 3 4 5 Very much

7. In general, how much does your shift system interfere with the household things you have to do in your time off work (e.g., grocery shopping, looking after children, etc.)?

Not at all 1 2 3 4 5 Very much

8. In general, how much does your shift system interfere with the non-household things you have to do in your time off work (e.g., going to doctor, going to the bank, etc.)?

Not at all 1 2 3 4 5 Very much

9. Do you feel that overall the advantages of your current shift system outweigh the disadvantages?

☐ Definitely not ☐ Probably not ☐ Maybe ☐ Probably yes ☐ Definitely yes

10. How does your spouse/partner feel about you working your current shift?

☐ Extremely unsupportive ☐ Fairly unsupportive ☐ Quite indifferent ☐ Fairly supportive ☐ Extremely supportive ☐ Not applicable

The following questions relate to general job satisfaction and not to your satisfaction with your shift system. Please choose the appropriate answer for each question.

11. Generally speaking, I am very satisfied with this job.

☐ Disagree strongly ☐ Disagree ☐ Disagree slightly ☐ Neutral ☐ Agree slightly ☐ Agree ☐ Agree strongly

12. I frequently think of quitting this job.

13. ☐ Disagree strongly ☐ Disagree ☐ Disagree slightly ☐ Neutral ☐ Agree slightly ☐ Agree ☐ Agree strongly

14. I am generally satisfied with the kind of work I do in this job.
- ☐ Disagree strongly ☐ Disagree ☐ Disagree slightly ☐ Neutral ☐ Agree slightly ☐ Agree ☐ Agree strongly
15. Most people on this job are very satisfied with the job.
- ☐ Disagree strongly ☐ Disagree ☐ Disagree slightly ☐ Neutral ☐ Agree slightly ☐ Agree ☐ Agree strongly
16. People on this job often think of quitting.
- ☐ Disagree strongly ☐ Disagree ☐ Disagree slightly ☐ Neutral ☐ Agree slightly ☐ Agree ☐ Agree strongly

The following questions relate to your work with patients and how satisfying it is for you. Please choose the appropriate answer for each question.

17. Do you find it hard to work with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree
18. Does it drain your energy to work with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree
19. Do you find it frustrating to work with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree
20. Do you feel that you give more than you get back when you work with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree
21. Are you tired of working with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree
22. Do you sometimes wonder how long you will be able to continue working with patients?
- ☐ Yes, to a very high degree ☐ Yes, to a high degree ☐ Somewhat ☐ To a low degree ☐ To a very low degree

EPWORTH SLEEPINESS SCALE: The next set of questions asks about your sleep. For questions 21 – 28, use the following scale to indicate how likely you are to doze off or fall asleep in the following situations in contrast to just feeling tired. This refers to your usual way of life in recent times. Even if you have not done some of these things recently, try to work out how they would have affected you.

0 = Would never doze; 1 = slight chance of dozing; 2 = Moderate chance of dozing; 3=High chance of dozing.

SITUATION	CHANCE OF DOZING
23. Sitting and reading	
24. Watching TV	
25. Sitting inactive in a public place (for example a theater or a meeting)	
26. As a passenger in a car for an hour without a break	
27. Lying down to rest in the afternoon when circumstances permit	
28. Sitting and talking to someone	
29. Sitting quietly after a lunch without alcohol	
30. In a car, while stopped for a few minutes in traffic	

31. Do you ever feel tired on YOUR TIME OFF?

☐ Almost never ☐ Rarely ☐ Sometimes ☐ Frequently ☐ Almost always

32. Do you ever feel tired ON SHIFT?

☐ Almost never ☐ Rarely ☐ Sometimes ☐ Frequently ☐ Almost always

33. When you or other crew members feel tired on shift, are you/other crew members more likely to do any of the following activities as compared to when you are not feeling tired? Put a check mark next to each activity that you are more likely to engage in when tired.

Yes, more likely to do when tired.

- a. Not take a patient to requested destination. ☐
- b. Not chart completely. ☐
- c. Others (describe) _____
- _____

The following questions pertain your health habits.

34. On average, how many cigarettes do you smoke per week? _____

35. On average, how many alcoholic drinks do you drink per week? _____

(One alcoholic drink is 1 beer, 6 ounces of wine, or 1 shot/1 ounce liquor)

36. On average, how many cups of caffeinated coffee/tea/cola do you drink each day? _____ cups/day

37. Your current age _____ years

38. Gender ☐ Male ☐ Female

APPENDIX C (Family Survey)

INSTRUCTIONS

This survey is meant for all families of West Metro Fire Rescue members. **Families can take many shapes and sizes.**

If you are:

Currently single without dependent children, and are not living with a partner, please answer these questions as they pertain to you.

Married or live with a partner, and do not have children, answer these questions with your spouse or partner. Your “family” is you and your spouse/partner.

Married or live with a partner and have children, answer these questions with your spouse or partner. Your “family” is you and your spouse/partner and your dependent children. *Dependent children* are children that depend on you for financial and/or emotional support, regardless of whether they live with you or whether they are biologically related to you.

If you are single and have children, your “family” is you and your dependent (child)ren. Dependent children are children that depend on you for financial and/or emotional support, regardless of whether they live with you or whether they are biologically related to you.

Activities At Home

Since the SHIFT CHANGE, how has your family found it to accomplish the following activities?

January through June 2006 -- COMPARED TO -- July through December 2005						
	Much more difficult to accomplish	Somewhat more difficult to accomplish	About the same	Somewhat easier to accomplish	Much easier to accomplish	Not Applicable
EXAMPLE: Taking care of yardwork.	☐	☐	☐	☒	☐	☐
1. Getting daily household tasks done.	☐	☐	☐	☐	☐	☐
2. West Metro Member: Working at paid job(s)	☐	☐	☐	☐	☐	☐
3. Spouse/Partner - Working at paid job(s)	☐	☐	☐	☐	☐	☐
4. Shopping for necessities.	☐	☐	☐	☐	☐	☐
5. Handling financial matters.	☐	☐	☐	☐	☐	☐
6. Maintaining safety/security of your home.	☐	☐	☐	☐	☐	☐
7. Maintaining automobile.	☐	☐	☐	☐	☐	☐
8. Taking care of member's health.	☐	☐	☐	☐	☐	☐
9. Taking care of spouse/partner's health.	☐	☐	☐	☐	☐	☐
10. Taking care of elder's health.	☐	☐	☐	☐	☐	☐
11. Taking care of pets.	☐	☐	☐	☐	☐	☐
12. "Having a social life." Visiting with friends, etc.	☐	☐	☐	☐	☐	☐
13. Doing volunteer work.	☐	☐	☐	☐	☐	☐
14. Doing special projects around the home.	☐	☐	☐	☐	☐	☐
15. Participating in leisure time activities.	☐	☐	☐	☐	☐	☐
16. Taking personal time for yourselves (getting a hair cut etc.)	☐	☐	☐	☐	☐	☐
17. Spending time together as a family.	☐	☐	☐	☐	☐	☐
18. Taking care of elder at home.	☐	☐	☐	☐	☐	☐
The next 8 questions pertain to families with children.						
19. Arranging for child care.	☐	☐	☐	☐	☐	☐
20. Taking care of children at home.	☐	☐	☐	☐	☐	☐
21. Taking care of child(ren)'s health.	☐	☐	☐	☐	☐	☐
22. Ensuring children do schoolwork.	☐	☐	☐	☐	☐	☐
23. Supervising children's behavior and activities at home.	☐	☐	☐	☐	☐	☐
24. Having children take part in after-school activities.	☐	☐	☐	☐	☐	☐
25. Participating in activities at your child (ren)'s school (school events, PTA, parent-teacher conferences).	☐	☐	☐	☐	☐	☐
26. Participating in child(ren)'s extra-curricular activities like Boy Scouts or Girl Scouts.	☐	☐	☐	☐	☐	☐

27. With the onset of the 48/96 schedule, did you have to change who provides care for your child/children?

- ☐ YES
☐ NO (SKIP to Question #29)
☐ Not Applicable (SKIP to Question #29)

28. Are your current child care arrangements as satisfactory to you as the child care arrangements you had before January 2006?

- ☐ YES
☐ NO. Please briefly explain why they are not: _____

29. With the onset of the 48/96 schedule, did you have to change who provides care for your parent or elder adult?

- ☐ YES
☐ NO (SKIP to Question #31)
☐ Not Applicable (SKIP to Question #31)

30. Are your current arrangements as satisfactory to you as the arrangements you had before January 2006?

- ☐ YES
☐ NO Please briefly explain why they are not: _____

31. With the onset of the 48/96 schedule, did you have to amend your visitation rights?

- ☐ YES
☐ NO (SKIP to Question #33)
☐ Not applicable (SKIP to Question #33)

32. Are your current arrangements as satisfactory to you as the arrangements you had before January 2006?

- ☐ YES
☐ NO Please briefly explain why they are not: _____

Combining Work and Family

To what extent, if at all, is each of the following items true for your family?

	Completely Untrue	Mostly Untrue	Equally True and Untrue	Mostly True	Completely True	Not Applicable
33. The 48/96 schedule creates a strain for our (my) child(ren).	☐	☐	☐	☐	☐	☐
34. Because of the 48/96 schedule, our (my) family time is less enjoyable.	☐	☐	☐	☐	☐	☐
35. The 48/96 schedule leaves us (me) with too little time to be the kind of parent we (I) want to be.	☐	☐	☐	☐	☐	☐
36. The 48/96 schedule leaves us (me) with too little energy to be the kind of parent we (I) want to be.	☐	☐	☐	☐	☐	☐
37. The 48/96 schedule creates a strain on our marital (partner) relationship.	☐	☐	☐	☐	☐	☐

Information About Your Household

1. How long is the West Metro member's round trip commute to work?	_____ Minutes
2. Are you (the West Metro member) a single parent with sole custody of a child (ren)?	☐ Yes ☐ No
3. Total number of adults living in household (including member).	_____ Adults
4. Would your family be willing to participate in a focus group to discuss these important issues in a more in-depth way? (Separate focus groups will be held for members and for spouses/partners).	☐ Yes ☐ No ☐ Maybe

About Your Children

☐ I/WE DO NOT HAVE CHILDREN.

YOUR DEPENDENT CHILDREN: AGE, AND SCHOOL GRADE EACH CHILD WILL BE IN, AS OF SEPTEMBER 2006

(IF CHILD WILL BE CARED FOR AT HOME, WRITE "HOME").

	Current Age	School Grade as of September 2006 (if child will be cared for at home, write "HOME")
EXAMPLE:	6	First Grade
First Child		
Second Child		
Third Child		
Fourth Child		
Fifth Child		
Sixth Child		
Seventh Child		
Eighth Child		

Please use space below to make additional comments.

Appendix D

Table 2. Response rates, by method and time of assessment

Method of assessment	TOTAL Response Rate ON-LINE members (n=269)	Number of uniform employees in administrative positions that responded
December 2005		
TOTAL questionnaires returned	160 (59.5%)	12
Consented	122	12
Anonymous*	38	
TOTAL sleep diaries returned	109 (40.5%)	10
Consented	102	
Anonymous*	7	
April 2006		
TOTAL questionnaires returned	106 (40.9%)	3
Consented	78	3
Anonymous*	28	
TOTAL sleep diaries returned	98 (36.4%)	3
Consented	74	3
Anonymous*	24	
July 2006		
TOTAL questionnaires returned	156 (57.9%)	7
Consented	113	7
Anonymous*	43	
TOTAL sleep diaries returned	129 (48.0%)	4
Consented	97	4
Anonymous	32	
Family Survey**	175 (65.1%)	NA
Focus Groups	See attached report	See attached report

* The response rate to the first survey and sleep diary was less than optimal, so the protocol was changed to allow members to respond anonymously.

** The Family Survey was not included in the research and the questionnaire was administered anonymously.