THE UNIVERSITY OF NEW SOUTH WALES

NSW
INJURY RISK MANAGEMENT
RESEARCH CENTRE

IRMRC

Final report of stimulant use by long distance road transport drivers project

Study 1

Predictors of the use of stimulants by drivers in long distance road transport

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Study 2

A survey of stimulant drug use in long distance truck drivers in NSW

Ann Williamson

TABLE OF CONTENTS

EXECUTIVE SUMMARY …….3

Study 1: Predictors of the use of stimulants by drivers in long distance road transport ……...6

Study 2: A survey of stimulant drug use in long distance truck drivers in NSW ……...53

EXECUTIVE SUMMARY

Background and aim of the project

Stimulant use has been an acknowledged issue in the long distance road transport industry in Australia for many years. Crash studies suggest that truck drivers are over-represented in fatal crashes involving stimulant use compared to other drivers. Surveys of long distance truck drivers indicate that between 20 and 30 percent of drivers use stimulants while driving. Further evidence on the importance of stimulant use in this industry is seen from studies that show that among long haul truck drivers who use them, stimulants are rated as one of the most effective strategies for managing fatigue.

While it is argued that stimulants may be an effective strategy for long distance truck drivers as they overcome the effects of fatigue there are a number of arguments against permitting their use in this industry. First, while stimulants have demonstrated benefits for some aspects of driving performance like improved reaction speed and monitoring, their use may have adverse effects on safe driving by increasing risky behaviour. Second, there are concerns that the effects of withdrawal from stimulants may have adverse effects on safe driving. Third, evidence from crash studies shows that drivers who took stimulants are more likely to be the culpable driver. Lastly, studies have identified a number of adverse health effects from long term stimulant use.

Unfortunately, reducing the use of stimulants in the long distance road transport industry is not a simple matter. Stimulant use while driving is illegal; but clearly this strategy is not sufficient to deter a significant minority of drivers. Rather attempts to reduce stimulant use in the long distance road transport industry should focus on the reasons drivers use stimulants and find them helpful for managing fatigue. This was the aim of this project; to identify the predictors of stimulant drug use by long distance truck drivers.

The project involved two studies. The aim of the first study was to identify the factors that predicted drug use by reanalysis of two national surveys of long distance truck drivers conducted in 1991 and 1998 which included driver reports of their use of stay awake drugs. The aim of the second study was to update and extend information on the prevalence, nature and effects of stimulant drug use by long haul truck drivers by conducting an in-depth survey of long distance truck drivers.

Study 1

The two national surveys analysed in the first study were similar in size (survey 1 = 960 respondents, survey 2 = 1007 respondents), were anonymous, largely identical in content and were self-administered or conducted by interview (survey 1 was 70:30 and survey 2 was 50:50). Information was collected on driver demographics, experience of fatigue and fatigue management, including stay awake drug use, and details of recent work experiences. Multivariate logistic regression analysis was used independently for each survey to identify the predictors of reported drug use by drivers. The results of both surveys showed that drivers who reported fatigue as a substantial or major personal problem were around twice as likely to take drugs as drivers who reported less problem with fatigue. In both surveys, again, drivers who were paid on a payment by results or piece-rate form of payment (e.g., by trip or load) were two to three times more likely to report taking stimulants while driving as

drivers paid on a time basis. Younger, less experienced drivers were slightly more likely to take drugs, but this effect was very small. The first survey also identified low pay and working for small or medium companies as significant predictors of stimulant use.

These analyses demonstrate the involvement of external factors, especially productivity-based payment systems in fatigue and stimulant drug use by truck drivers. Importantly, the findings were confirmed in two separate surveys conducted seven years apart. The results clearly highlight the important role of economic and organisational factors in determining drivers need for and choice of fatigue management strategies.

Study 2

The second study involved a survey of 196 long distance truck drivers using an anonymous questionnaire distributed at nine truck stops within 200kms of Sydney in late 2005. The results showed that stimulant use is still a common experience for long distance truck drivers. Just as shown in the 1998 national survey, one in five respondents in the current survey reported using stay awake drugs at least sometimes to help them manage fatigue and just over half of the drivers who used them felt that stay awake drugs were a most helpful approach to fatigue management. In addition, more than half of the respondents in the current study reported using stimulants at some stage in their driving career. The stimulants reported most commonly tended to be in illicit forms like speed or amphetamine-related substances that were obtained mainly through informal channels such as through friends or at truck stops. This differs from a Western Australian survey of long distance truck drivers conducted in 1997 where appetite suppressants obtained on prescription were the most commonly used stay awake drugs. The greater use of illicit stimulants by truck drivers in the current study may reflect easier general access to these types of drugs that has also been shown in recent studies of drug use in the community.

While the self-rated health status of stimulant users was good, they were significantly less likely to rate their health as excellent compared to age and gender matched population data on self-rated health. Where drivers reported any health effects of stimulants, they were consistent with the known effects of amphetamines, such as mood swings and dental problems.

Most notably, the survey results were consistent with those of the first study regarding the factors that best predicted stimulant drug use. Long distance drivers who used stimulants experienced fatigue more often and earlier in the trip and rated their ability to manage fatigue lower than drivers who never use stimulants. Drivers who used stimulants also did longer hours work per week and were more likely to be remunerated on a productivity basis than never users.

Conclusions

In conclusion, the results of this project highlight stimulant use as a continuing characteristic of long distance truck driving and show that the factors that promote stimulant use have remained largely the same over the last fifteen years. Consistent with the overall aim of the project, the results have identified external pressures to do more work through linking payments with productivity and problems with managing fatigue as the two main factors that increase the likelihood of stimulant use by long distance truck drivers. The strength of this conclusion is evident; three separate surveys conducted over fourteen years show the same findings. The implications for prevention are clearly that efforts to decrease the need for stimulants in this industry must focus on reducing fatigue for long distance truck drivers but they also show that this will only be achieved if the external pressures of productivity-based payments are also removed from the industry. While drivers continue to be encouraged to do more trips on the basis that they can earn more money, fatigue will continue to be a natural consequence. Stimulant drugs will continue to be used in lieu of sleep as they are one of the few effective strategies available for drivers to stave off fatigue under these circumstances.

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Predictors of the use of stimulants by drivers in long distance road transport.

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TABLE OF CONTENTS

SUMMARY 8
INTRODUCTION 9
METHOD 10
Survey 1 10
Participants 10
Materials 10
Procedure 11
Survey 2 11
Participants 11
Materials 12
Procedure 12
RESULTS 13
Description of survey participants 13
Perceived helpfulness of psychostimulant drugs while driving 13
Characteristics of drug users 14
Personal characteristics 14
Driving characteristics 15
Perceptions of fatigue 22
Experiences of fatigue 29
Rule compliance 40
Multivariate Analysis 46
DISCUSSION 48
REFERENCES 52

SUMMARY

Two national surveys of fatigue and its effects in the long distance road transport industry in Australia showed that stimulant use was a common feature of this industry. A survey conducted in 1991 showed that nearly one-third of drivers reported using stimulants at least sometimes while driving. A survey in 1998 showed that the number of drivers reporting using drugs at least sometimes had decreased to around one in five, but in both surveys, a significant proportion of these drivers reported stimulant use as one of the most helpful strategies for fatigue management. The current study is a reanalysis of the two surveys with the aim of identifying the factors that predict stimulant drug use by drivers. The surveys were conducted by interview (one-third of respondents in survey 1 (total n=960) and half of respondents in survey2 (total n=1007)) or were self-administered. They were almost identical in content and collected information on the driver demographics, experience of fatigue and fatigue management and details of their work experiences on their last trip and over the last week. Multivariate logistic regression analysis was used independently for each survey to identify the predictors of reported drug use by drivers. The results showed in both surveys that drivers who reported fatigue as a substantial or major personal problem were around twice as likely to take drugs. In both surveys, again, drivers who were paid on a payment by results or piece-rate form of payment were two to three times more likely to report taking stimulants while driving. Younger, less experienced drivers were slightly more likely to take drugs, but this effect was very small. The first survey also identified low pay and working for small or medium companies as significant predictors of stimulant use. This analysis demonstrates the involvement of external factors, especially productivity-based payment systems in fatigue and stimulant drug use by truck drivers; findings that were confirmed in two separate surveys conducted seven years apart. The results clearly highlight the important role of economic and organisational factors in occupational health and safety problems.

INTRODUCTION

It has been recognised for some time that stimulant use is a factor in road safety in Australia. A case-control study by Drummer et al (2003), using road traffic fatality data from three Australian states, demonstrated that stimulant use was associated with a higher risk of fatal crashes and that drivers who took stimulants were more likely to be the culpable driver. A study of truck drivers in the USA suggested potential mechanisms for the effects of stimulants on crash risk. Logan and Schwilke (1996) suggested that the increased crash risk for truck drivers that they showed was associated with use of amphetamines was due to either higher levels of on-road risk-taking behaviour or to the increased sleepiness resulting from the after-effects of the amphetamines.

In Australia, stimulant drug use appears to be a significant feature of the long distance road transport industry in particular. A survey of long distance road transport drivers in Western Australia indicated that just over one-quarter (27%) used stimulant drugs to overcome driver fatigue (Mabbott and Hartley, 1999). A more recent survey of long distance drivers across most Australian states indicated that around one in five drivers used stimulants at least sometimes (Williamson, Feyer, Friswell and Finlay-Brown, 2001). Most strikingly, this survey showed that around one-third of the drivers who reported using drugs also reported that drugs were one of the most helpful approaches to managing driver fatigue. A similar percentage of drivers reported that sleep was one of the most helpful methods for managing driver fatigue, suggesting that drug-use is a fatigue-management solution that is seen as effective by a significant minority of drivers. This is clearly of concern for health and safety of drivers and for the traveling public.

There is some evidence, however, that use of stay-awake drugs has reduced in the Australian long distance road transport industry. An earlier national survey of the long distance road transport industry by Williamson, Feyer, Coumarelos and Jenkins (1992) showed that around one-third of drivers reported using stay-awake drugs at least sometimes and that around half of them reported that it was one of the most effective methods for managing driver fatigue. Compared to the twenty percent usage shown in the later study (Williamson et al, 2001), this suggests that there has been a decline in the use of drugs to manage fatigue.

There is some evidence that the reported lower levels of drug use were related to overall lower levels of work and lower reporting of fatigue in the industry which were also seen between the two surveys. As fewer drivers reported experiencing fatigue while driving in the second survey, it is likely that fewer needed stay awake drugs to manage their trips. There is also some evidence from the second survey however that some parts of the long distance road transport industry were still doing very high work levels and that drivers in these sectors may still be motivated to use stimulants as a way of managing driver fatigue. It is likely that the use of stimulants by long distance drivers is promoted by some of the characteristics of their work. The aim of this study, therefore, is to investigate the predictors of stimulant drug use in the long distance road transport industry.

METHOD

The results of two earlier surveys of the long distance road transport industry were analysed further with particular emphasis on a number of questions regarding the use of psycho stimulant drugs to stay awake while driving. The first survey was conducted in 1991 and was distributed to drivers in all states of Australia except Tasmania. The second survey was conducted in 1998 and included drivers from all states except Western Australia and Tasmania. The characteristics of each of the surveys are described below.

Survey 1

Participants

Nine hundred and sixty drivers participated in the survey. Almost all were male (n=950). Approximately two-thirds (68.5%) completed a self-administered form and the remainder were interviewed.

Materials

The survey contained nine sections as follows:

1. Driver and vehicle information including demographic details about the driver (age, gender, marital status, number of dependents, location of home base) and details about the drivers' employment (owner or employee driver, size of company, heavy vehicle driving experience, type of freight, type of payment received and type of vehicle driven).
2. Fatigue including information about drivers experience of and attitudes towards fatigue and to potential fatigue countermeasures (extent that fatigue is a problem, latency and timing of fatigue in trips, perceived effects of fatigue on driving, perceived contributors to fatigue, strategies used to combat fatigue and most effective strategies)
3. Details of the last trip including work and rest time (trip length and timing, freight carried, type of driving, breaks taken, rest and sleep patterns, when fatigue experienced)
4. Comparison of the last trip with usual trips
5. Details of work/rest schedule in last week including number of long distance trips taken, duration and timing of trips.
6. Comparison of trip payment rates including the effect of type of payment on average on-road speed, number and length of rest breaks.
7. Breaking the rules including the extent that drivers report breaking road rules and working hours rules and the reasons for rule breaking.
8. Reported experience of and attitudes to two-up driving.
9. Reported experience of and attitudes to staged or relay driving.

The survey was anonymous and no questions were asked about the company identity.

The specific questions relating to psychostimulant use included:

1. Questions on the use of drugs and their perceived effectiveness:
   "Please indicate how often you use the strategies listed below in an attempt to deal with your driver fatigue during trips". Taking stay awake drugs was one of the 15 options listed following the statement. Respondents were asked to indicate which

of the options, Often, Sometimes, Rarely or Never applied to them and then to indicate which of the strategy options they found most helpful

2. Questions on the drivers' opinion of strategies that could be used to deal with driver fatigue in the long distance road transport industry.

"Please rate how HELPFUL you would find each strategy in dealing with your driver fatigue by ticking one of the options next to each strategy". The drug-use options were, "Strict policing to prevent the use of stay-awake drugs" and "Permitting the use of stay-awake drubs by prescription only". Respondents were asked to indicate whether they would find these strategies Not helpful, Somewhat helpful or Very helpful and then to indicate which strategy option they found most helpful.

Procedure

The survey was administered in two forms: a self-administered form (4086 distributed) and a structured interview (371 invitations). Long distance drivers, doing trips of at least 300 km, were recruited in all states and territories except Tasmania and the Australian Capital Territory. The self-administered form of the survey was distributed by handing it directly to drivers in truck stops or truck terminals (15.9% of self-administered surveys) or was distributed to drivers through trucking companies (83.4% of self-administered surveys).

A postage paid envelope was attached to each survey so that each driver could return the completed survey directly to the survey team. Almost all interviews were conducted at truck stops or terminals (3% conducted at a company in Western Australia). For the surveys conducted in truck stops/terminals, permission was obtained from the manager to approach drivers at the site to invite them to participate in the survey. Each driver who agreed to participate was told about the purpose of the survey and the fact that it was anonymous and was either interviewed on the spot or was handed a survey and reply-paid envelope to mail back when completed. For the surveys distributed through companies, meetings were arranged with the company management to explain the purpose of the study and the method of administration. If the company agreed to participate, sufficient self-administered surveys with reply-paid envelopes were provided and were then distributed by the company management. For these surveys an additional information sheet was provided explaining the purpose of the study and its anonymous nature.

The overall response rate for self-administered surveys distributed through truckstops was 18.7 percent and through companies was 15.6 percent. For interviews, the participation rate was high with 81.4 percent of drivers who were approached participating.

Survey 2

Participants

In total, 1007 drivers participated in the survey with 48.2 percent completing a self-administered survey form and the remainder completing an interview.

Materials

The survey content was basically the same as for the first survey. The main changes were the addition of questions including: the Epworth Sleepiness scale (Johns, 1991), two questions on the drivers' views about whether awareness of fatigue had changed over the last seven years in the industry or for them, two questions on reported experience of fatigue-related dangers. In addition, the section on the drivers' last trip was modified to make it easier to complete.

The questions relating to psychostimulant use were the same as for the first survey.

Procedure

As for the first study, data was collected by self-administered survey and interview. For the self-administered questionnaire, 1,449 questionnaires were handed out and for the interviews, 565 drivers were invited to participate in the study. Long distance drivers, doing trips of at least 300 km, were recruited at truck stops in all states and territories except Western Australia, Tasmania and the Australian Capital Territory. Drivers were approached by interviewers and invited to participate in a face-to-face interview or a self-administered version of the questionnaire. Drivers were approached during the day and night. There were no apparent systematic differences in the selection process for interviewees or self-administered drivers.

Overall 485 self-administered questionnaires were returned so giving a response rate of 34% and 522 interviews were conducted giving a 92% response rate of those invited to participate in the survey.

RESULTS

Description of survey participants

In the 1991 driver survey more than half of the drivers reported never taking stay-awake drugs. For those drivers who did report taking stay-awake drugs, the majority reported taking them sometimes, with similar numbers of drivers reporting taking stay-awake drugs often or rarely (Figure 1a). Of the 1007 drivers who took part in the 1998 driver survey, 60-70% of drivers again reported never taking stay-awake drugs. Roughly equal numbers of the remaining drivers reported taking stay-awake drugs often, sometimes or rarely. This information is shown in Figure 1b.

Figure 1a: Frequency of drug use within total sample of drivers (1991)

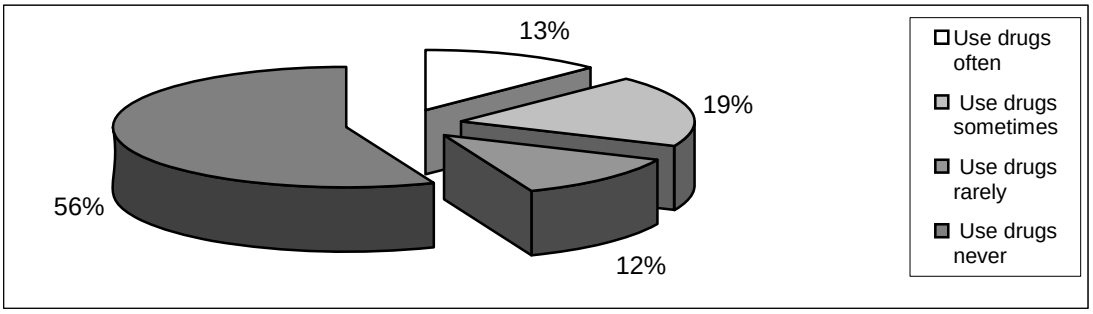
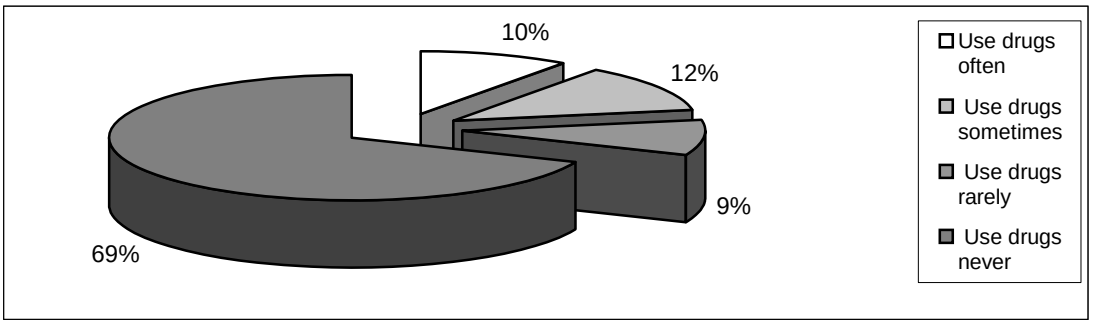


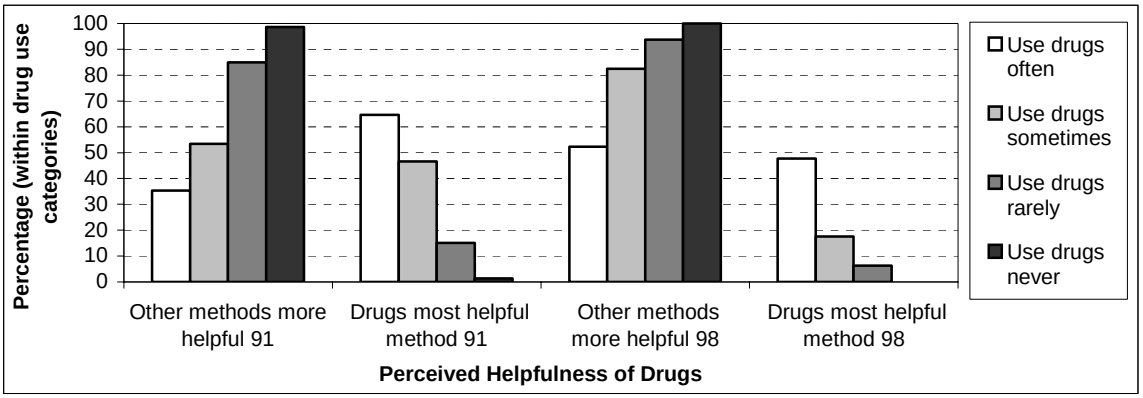
Figure 1b: Frequency of drug use within total sample of drivers (1998)



Perceived helpfulness of psychostimulant drugs while driving

Figure 2 represents the relationship between the perceived helpfulness of drugs as a method of managing fatigue and the frequency of drug use for the 1991 and 1998 surveys. The frequency of drug use in both 1991 and 1998 was directly proportional to the perceived helpfulness of drugs, with drivers who perceived drugs to be the most helpful method of managing fatigue being the most likely to use drugs often or sometimes. In contrast, drivers who perceived other methods of managing fatigue to be more helpful reporting using drugs rarely or never. As a result, the relationship between the perceived helpfulness of taking stay-awake drugs and the other variables was not examined, as it was expected that the results would be the same as those obtained for the frequency of drug use.

Figure 2: Perceived helpfulness of drugs as a method of managing fatigue and reported frequency of drug use in 1991 and 1998.



Characteristics of drug users

Personal characteristics

Table 1 represents the mean age of drivers in each of the drug use categories. Analysis of variance indicated a significant difference for age between drug use categories, ($F_{(3,749)}$ = 15.49, p<0.001). Further investigation using Scheffe post hoc comparisons indicated that drivers who never took stay-awake drugs were significantly older than those drivers who took stay-awake drugs. The age of those drivers at different levels of use of stay-awake drugs did not differ significantly. This same pattern of results occurred in the 1998 data, ($F_{(3,868)}$ = 21.04, p<0.001).

Table 1: Mean age and reported frequency of drug use in 1991 and 1998

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Mean Age 1991 (SD)	33.88 (6.67)	36.75 (7.88)	34.85 (7.06)	38.74 (8.92)
Mean Age 1998 (SD)	35.54 (35.54)	36.13 (7.81)	34.88 (8.34)	40.94 (9.74)

Figure 3a and 3b show the marital status of drivers for the 1991 and 1998 surveys. In 1991, drivers who used drugs often were more likely to be in defacto relationships than drivers who never took drugs, and drivers who never took drugs were more likely to be married ($\chi^2_{(35)}$ = 55.82, p = 0.01).

Figure 3a: Marital status and reported frequency of drug use in 1991.

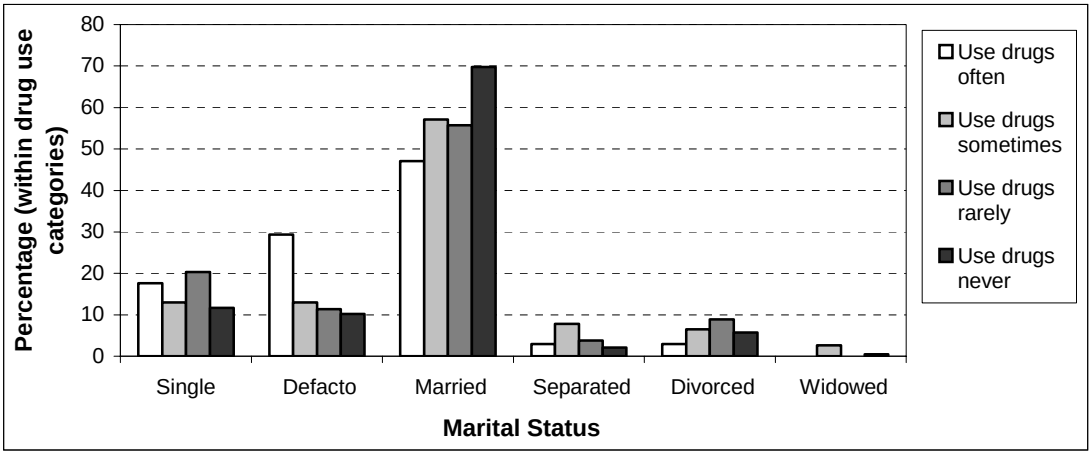
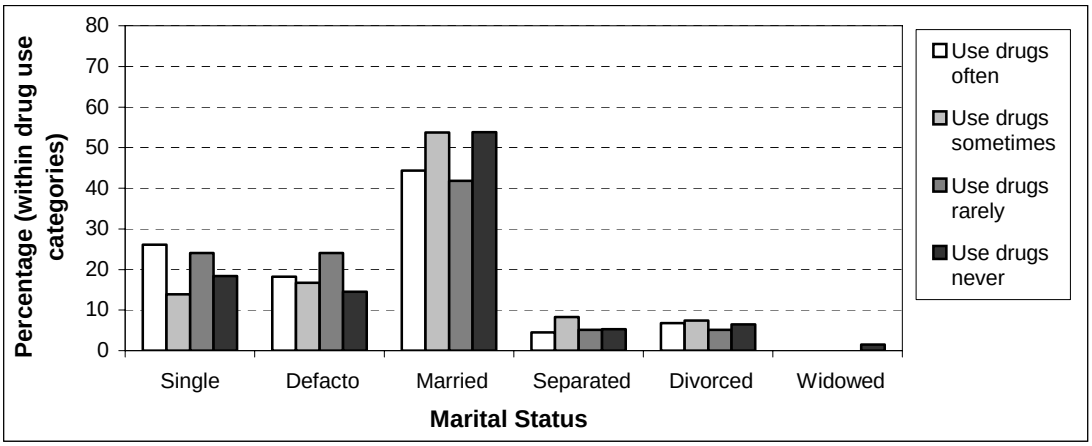


Figure 3b: Marital status and reported frequency of drug use in 1998.



Analysis of 1991 and 1998 data showed that there was no significant difference in the reported frequency of drug use of drivers who did or did not have children.

Driving characteristics

Table 2 shows the years of driving experience for drivers in the 1991 and 1998 driver surveys. Analysis of variance of the 1991 survey data showed a significant difference for years of experience between drug use categories, ($F_{(3,754)} = 5.45$, $p = 0.001$). The data was then further analysed using Scheffe post hoc tests. This identified that the years of driving experience for those drivers who took drugs rarely was significantly lower than the years of experience of drivers who never took drugs. The drivers who took drugs often and sometimes did not differ significantly in years of experience from those drivers who did not take drugs. In contrast, drivers in the 1998 study who took drugs often, sometimes or rarely, all had significantly less years of driving experience than those drivers who never took drugs ($F_{(1,991)} = 5.994$, $p = 0.015$).

Table 2: Mean number of years of driving experience and reported frequency of drug use in 1991 and 1998.

	Categories of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Mean years driving experience (1991)	13.51 (SD=6.19)	14.02 (SD=8.17)	12.9 (SD=7.52)	15.98 (SD=8.89)
Mean years driving experience (1998)	14.39 (SD=8.18)	14.92 (SD=8.01)	12.24 (SD=7.57)	18.6 (SD=10.14)

Drivers in the 1991 survey who took drugs often or sometimes were most likely to work for smaller companies with less than 50 trucks. In comparison, drivers who never took drugs were more likely to work in larger companies with 50 or more trucks ($\chi^2_{(9)} = 23.48$, $p = 0.005$). Although the pattern of results in 1998 also showed that frequent drug users were more likely to work in smaller companies, drivers who used drugs rarely or never also tended to work for smaller companies. However, they were more likely than frequent drug users to work for companies with greater than 50 trucks. These results are demonstrated in Figure 4a and 4b.

Figure 4a: Company size/owner status and reported frequency of drug use in 1991.

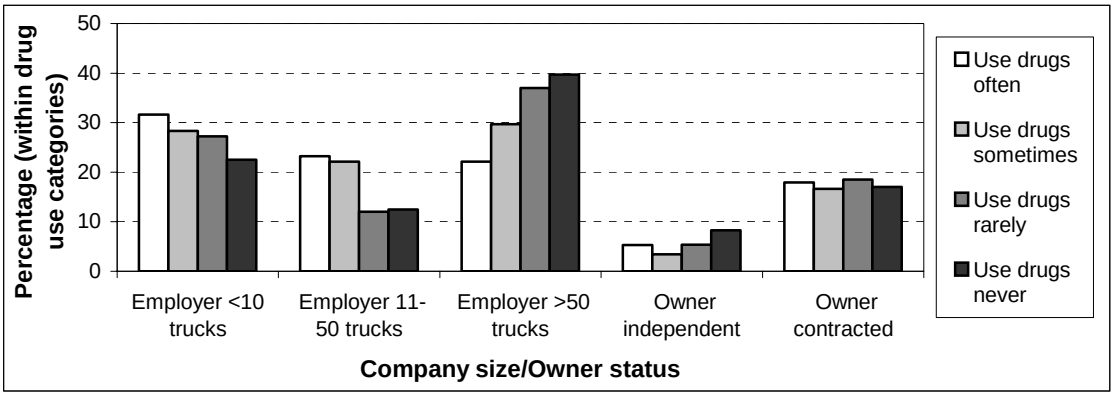


Figure 4b: Company size/owner status and reported frequency of drug use in 1998.

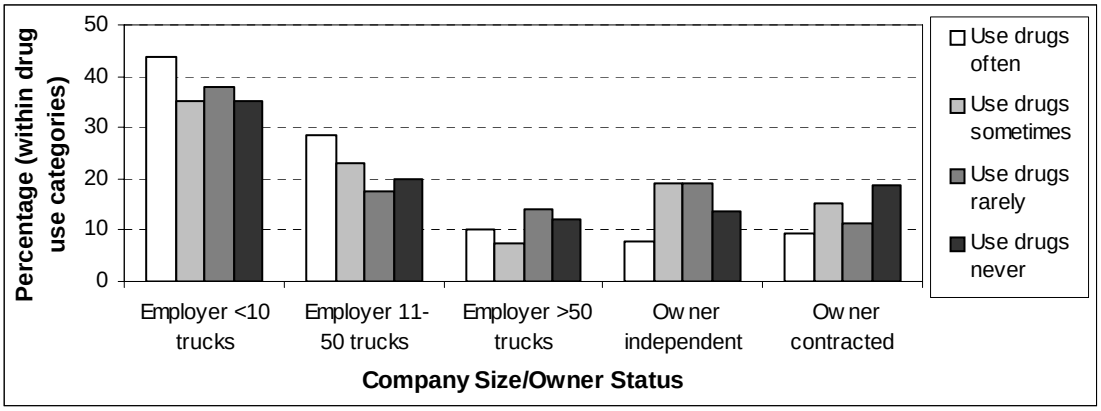


Figure 5a and 5b represent the type of freight usually carried by drivers. Figure 5a shows that, in 1991, drivers who took drugs often or sometimes were most likely to be transporting refrigerated loads, farm produce, groceries and mixed goods. In 1998 drivers who took drugs often or sometimes again reported transporting refrigerated goods, farm produce and groceries. In addition, drivers in the 1998 survey who reported using drugs often or sometimes were also more likely to report transporting express goods. This option was not included in the 1991 survey.

Figure 5a: Type of freight usually carried and reported frequency of drug use in 1991.

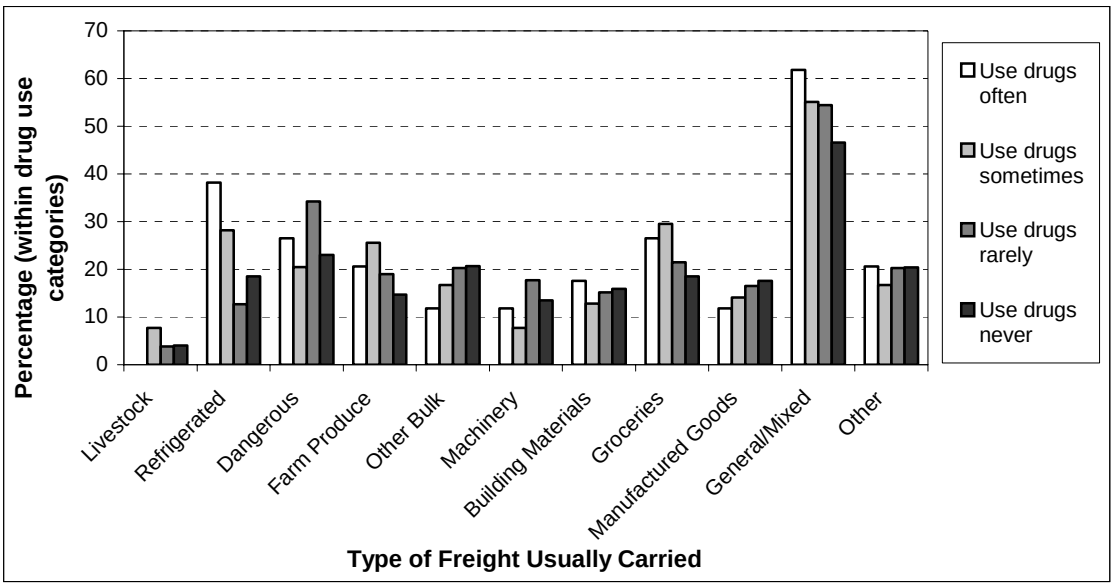


Figure 5b: Type of freight usually carried and reported frequency of drug use in 1998.

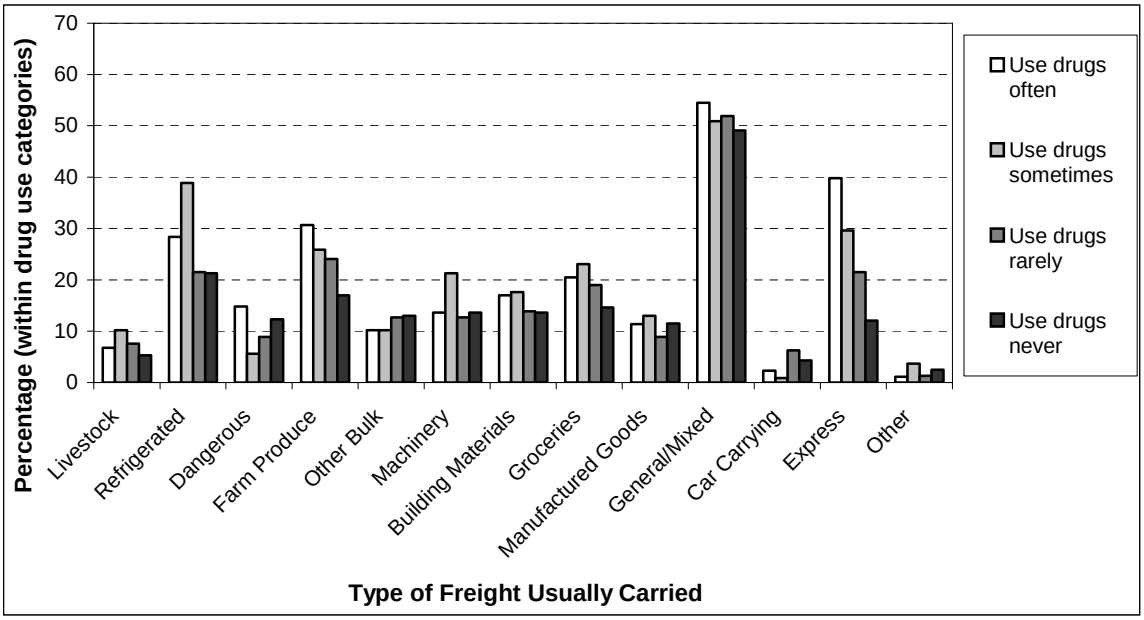


Figure 6 illustrates the party that schedules the drivers' start time in 1991 and includes only those drivers who indicated that they did have a scheduled start time (74.5% of drivers). This figure demonstrates that, while most drivers start times were scheduled by themselves or their employer, drivers who used drugs often or sometimes were more likely to schedule their own trips than drivers who rarely used drugs. They were also less likely to have their trips scheduled by their employer, $\chi^2_{(15)} = 30.15$, p=0.01. Data for the scheduler of start time was unavailable for 1998.

Figure 6: Party responsible for scheduling the drivers' start time and reported frequency of drug use in 1991.

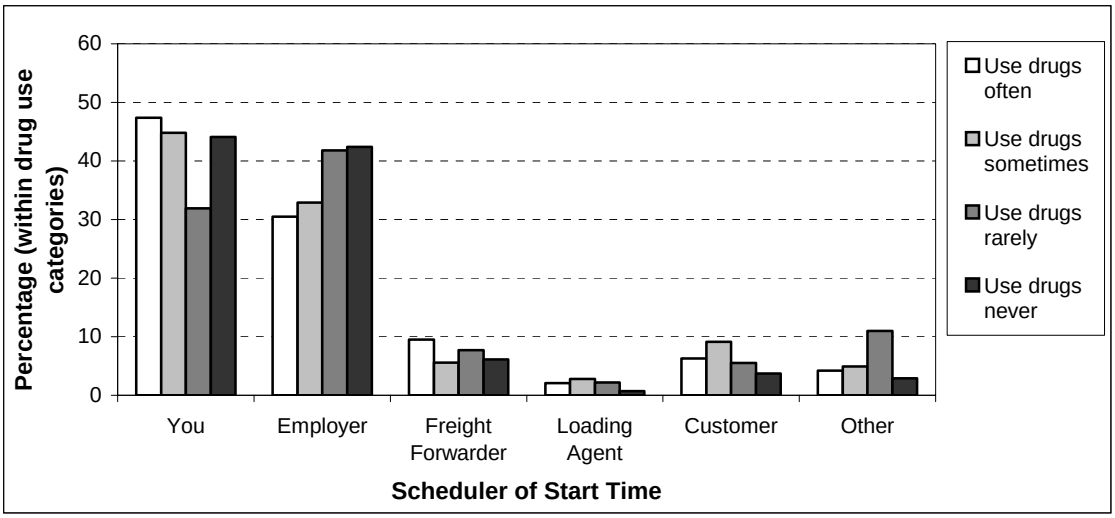


Figure 7 shows the party who schedules the drivers' estimated time of arrival and again includes only those drivers who reported having an estimated time of arrival (74.4% of drivers). This figure shows that drivers who take drugs often are more likely to have an estimated time of arrival that is scheduled by a freight forwarder than drivers who never take drugs. In contrast, drivers who never take drugs are more likely to have their ETA scheduled by their employer than drivers in any of the drug taking categories ($\chi^2_{(15)} = 35.68$, p=0.002).

Figure 7: Party responsible for scheduling the drivers' estimated time of arrival (ETA) and reported frequency of drug use in 1991.

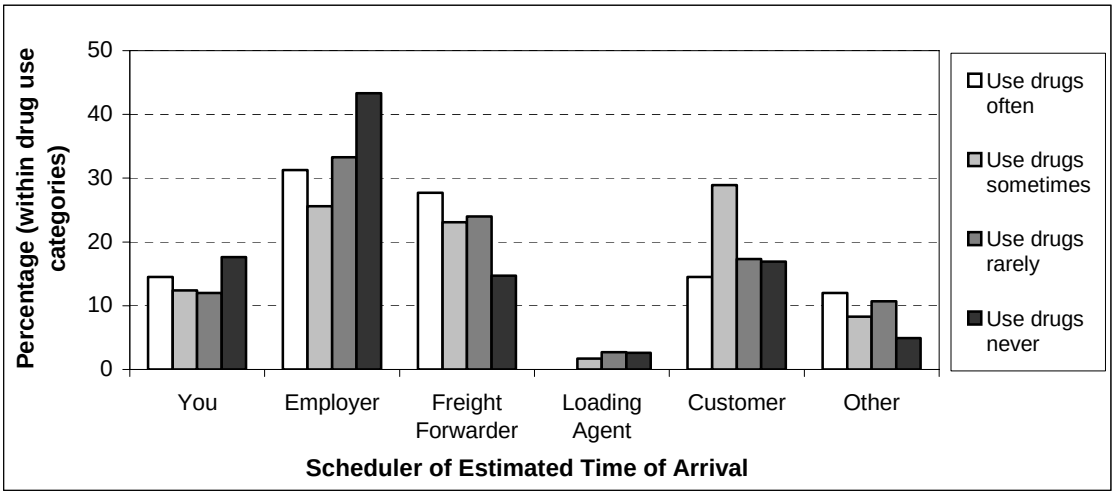
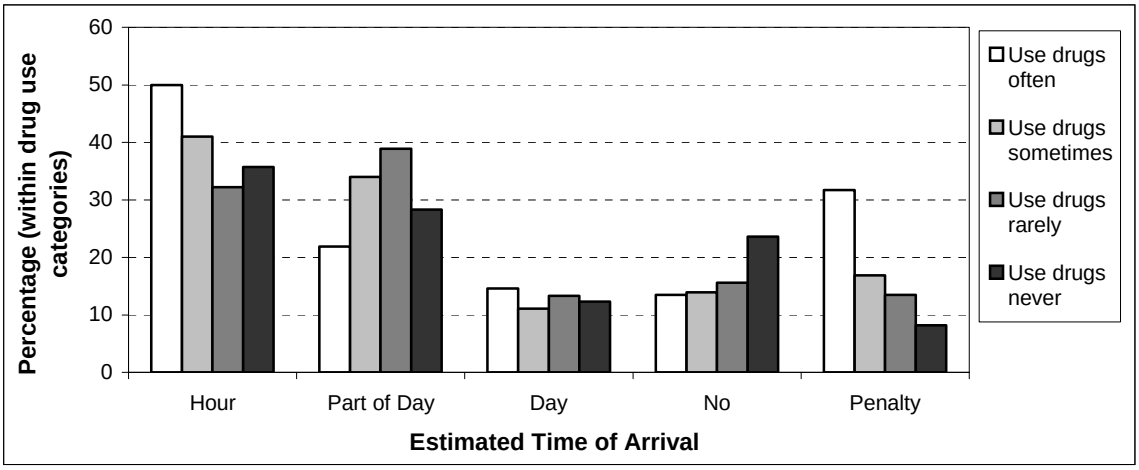


Figure 8 shows the level of specificity of the arrival time for drivers in 1991. This figure indicates that, for drivers who used drugs often, the majority had an arrival time within a specified hour. Drivers who never took drugs were more likely to have an estimated time of arrival within part of a day or no specified arrival time. The level of drug use did not differ for drivers who had an estimated time of arrival of a specific day ($\chi^2_{(9)}$ = 19.96, p=0.02). Analysis of 1991 survey data showed that drivers who used drugs and those who did not were equally likely to obtain a reward for keeping their ETA. In contrast, those drivers who took drugs often were more likely to have a penalty imposed for not keeping their ETA ($\chi^2_{(3)}$ = 30.77, p<0.001). This result is also shown in Figure 8. Data for the estimated time of arrival was unavailable for 1998.

Figure 8: Level of specificity of drivers' ETA and penalty for late arrival, and reported frequency of drug use in 1991.



In the 1991 survey, drivers who used drugs rarely or never were three to four times more likely to report that the need for sleep was an important influence on their need to arrive at their destination by a certain time ($\chi^2_{(18)}$ = 28.49, p = 0.05). This is shown in Table 3.

Table 3: Percentage of drivers who indicate that sleep is a factor in influencing arrival time and reported frequency of drug use in 1991.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Need for sleep important in determining arrival time (%)	3.8	2.8	12	8.4

Table 4 shows the number of hours sleep or rest that drivers reported having in the 10 hours before their last trip for 1991 and 1998. Analysis of 1991 data indicated a significant difference for hours of sleep between the drug use groups, ($F(3) = 14.249$, $p<0.001$). Further analysis using Scheffe post hoc comparisons showed that the number of hours sleep for drivers who did not take drugs was significantly higher than the number of hours sleep for any of the drug taking categories. The mean number of

hours sleep did not vary significantly between those groups who reported taking drugs. 1998 data also showed a significant difference of hours of sleep between drug use groups, ($F_{(3,\ 832)} = 9.21$, $p<0.001$). Post hoc comparisons identified that those drivers who took drugs often had significantly less sleep than drivers who never took drugs but did not differ significantly from drivers who took drugs sometimes or rarely.

Table 4: Number of hours slept in the past 10 hours and reported frequency of drug use in 1991 and 1998.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Mean hours sleep in the past ten hours in 1991 (SD)	6.43 (3.67)	6.77 (3.38)	6.97 (3.46)	8.19 (2.66)
Mean hours sleep in the past ten hours in 1998 (SD)	4.38 (3.33)	5.32 (3.38)	5.75 (3.55)	6.17 (2.93)

Figure 9a and 9b demonstrate the payment type of drivers in 1991 and 1998. In 1991 drivers who used drugs often or sometimes were more likely than drivers who did not take drugs to be paid on per trip basis or at a flat rate per load. Drivers who reported never taking drugs were more likely to be paid by hourly rate, daily rate including overtime or weekly rate including overtime ($\chi^2_{(21)} = 49.58$, p 0.01). In 1998 drivers who took drugs often or sometimes were again more likely to be paid on a per trip rate. In contrast to the 1991 data, drivers in 1998 who never took drugs were slightly more likely to be paid on a per load basis than those drivers who took drugs often or sometimes ($\chi^2_{(3)} = 11.0$, $p = 0.04$).

Figure 9a: Payment type and reported frequency of drug use in 1991.

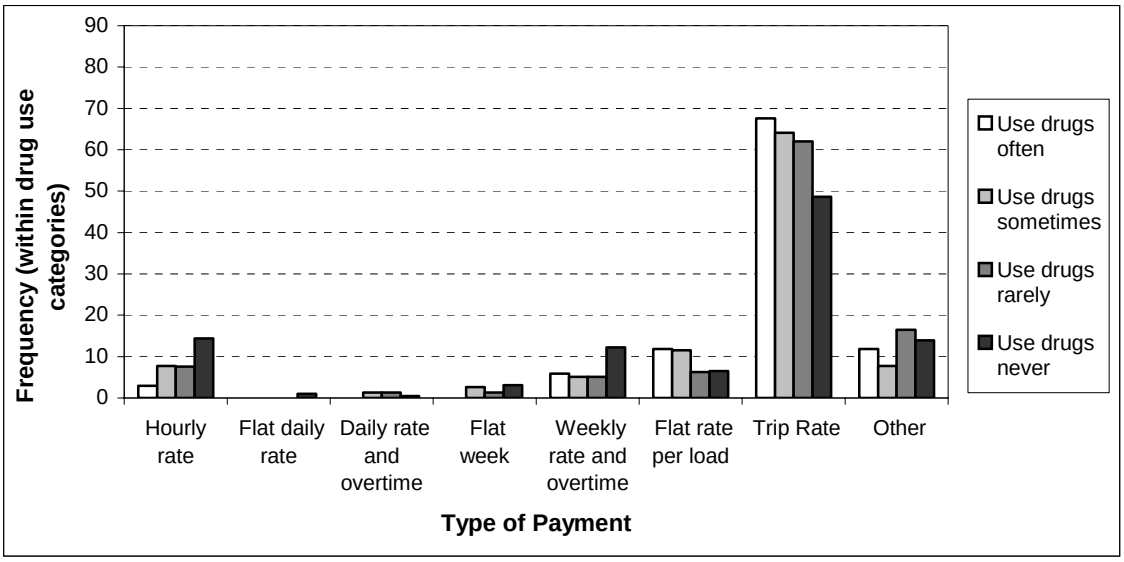
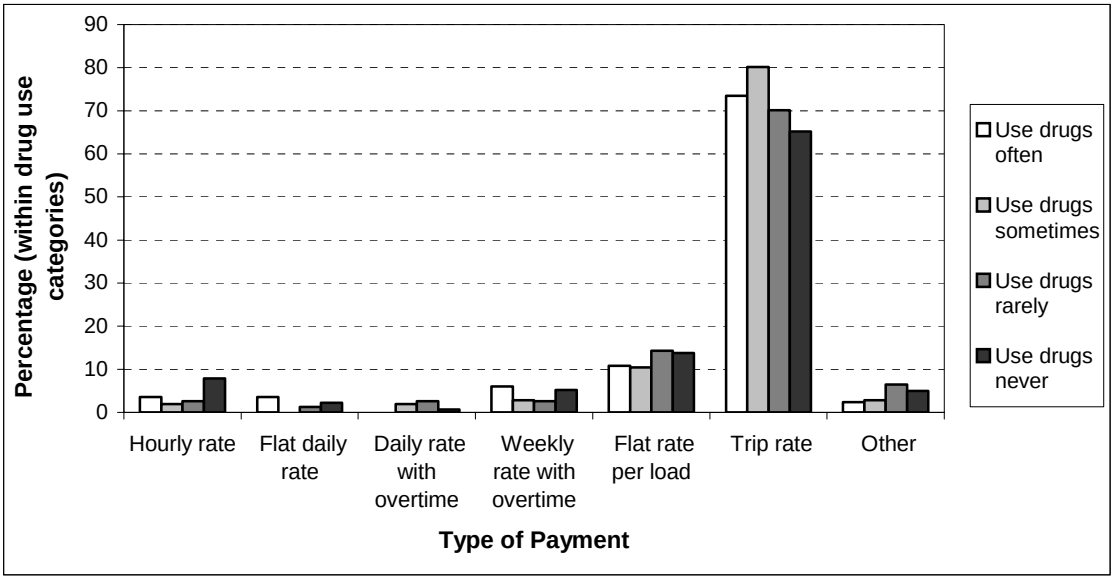


Figure 9b: Payment type and reported frequency of drug use in 1998.



Data on the payment rate of drivers indicates that, in 1991, drivers who took drugs often were more likely to be paid under the award rate than drivers in any of the other drug use categories ($\chi^2_{(9)}$ = 31.92, p = 0.01). In 1998, there was no significant relationship between payment rate and level of drug taking. These results are illustrated in Figure 10a and 10b.

Figure 10a: Payment rate and reported frequency of drug use in 1991.

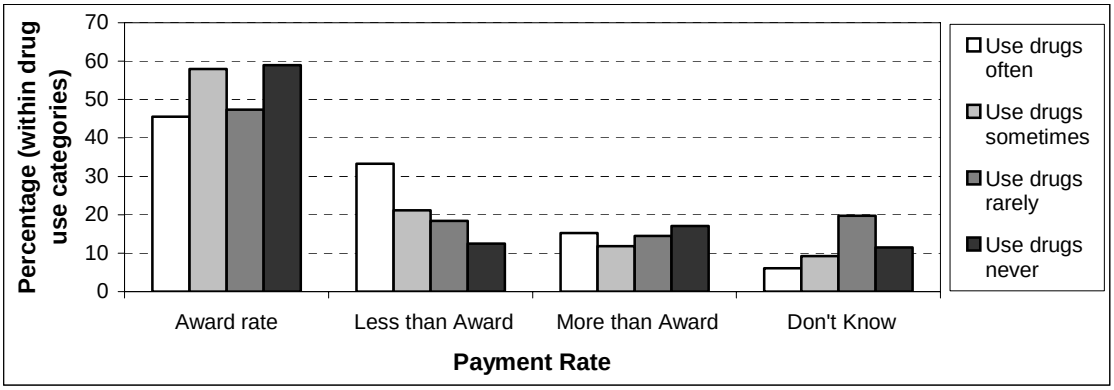


Figure 10b: Payment rate and reported frequency of drug use in 1998.

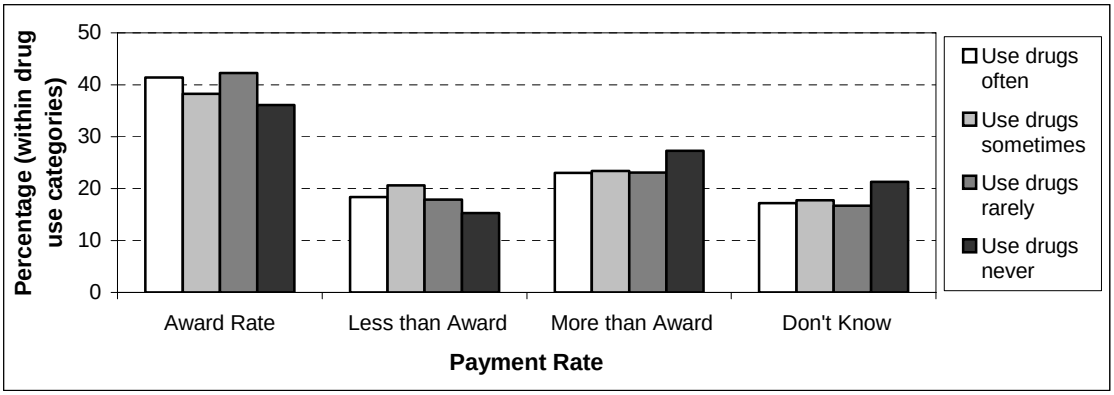


Table 5 shows the number of hours worked by drivers in the week prior to completing the survey. Analysis of variance indicated a significant difference for hours of work between drug use groups in 1991 ($F_{(3,452)} = 3.32$, $p = 0.02$). Further analysis using Scheffe post hoc comparisons indicates that the number of hours worked by drivers who took drugs often was significantly higher than the number of hours work completed by drivers in the other drug use categories. The same pattern of results was found in 1998 ($F_{(3,422)} = 4.0$, $p = 0.008$).

Table 5: Frequency of drug use and hours worked in the past week in 1991 and 1998.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Hours worked in last week in 1991 (SD)	75.1 (32.8)	65.0 (30.2)	67.2 (35.2)	61.4 (32.4)
Hours worked in last week in 1998 (SD)	55.0 (30.0)	51.9 (28.7)	42.6 (25.3)	43.0 (22.4)

The relationship between frequency of drug use and type of truck driver and type of driving (single, two-up, staged) were also examined but no significant differences were found.

Perceptions of fatigue

Figure 11a and 11b represent drivers' perceptions of fatigue problems in the long distance road transport industry. Figure 11a shows the results for 1991 and indicates that those drivers who took drugs often were more likely than drivers in the other drug use categories to think that fatigue was a major problem in the long distance road transport industry. There was little difference between the other drug use groups in their perceptions of the extent of fatigue in the industry ($\chi^2_{(9)} = 25.288$, $p=0.003$). This same pattern of results occurred in 1998 but was not significant ($\chi^2_{(9)} = 8.781$, $p = 0.458$).

Figure 11a: Opinions about the extent of fatigue problem in the long distance transport industry and reported frequency of drug use in 1991.

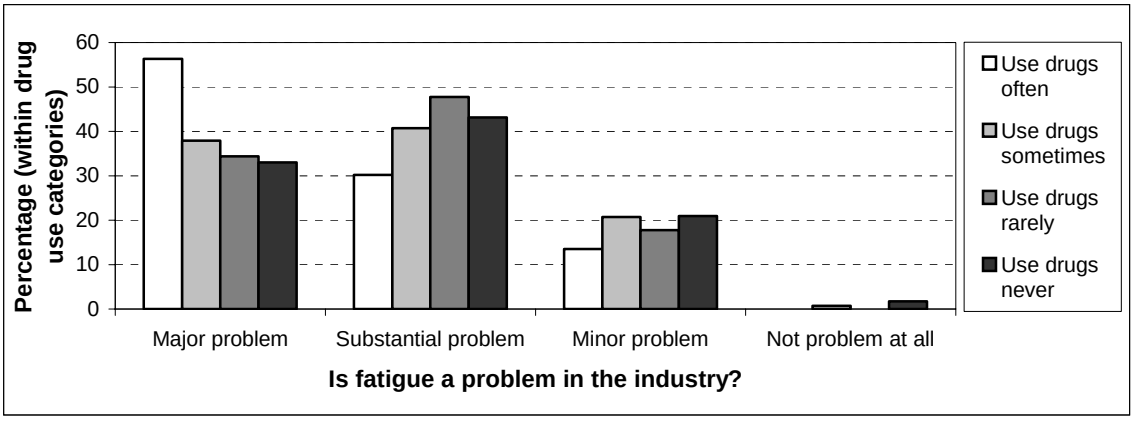


Figure 11b: Opinions about the extent of fatigue problem in the long distance transport industry and reported frequency of drug use in 1998.

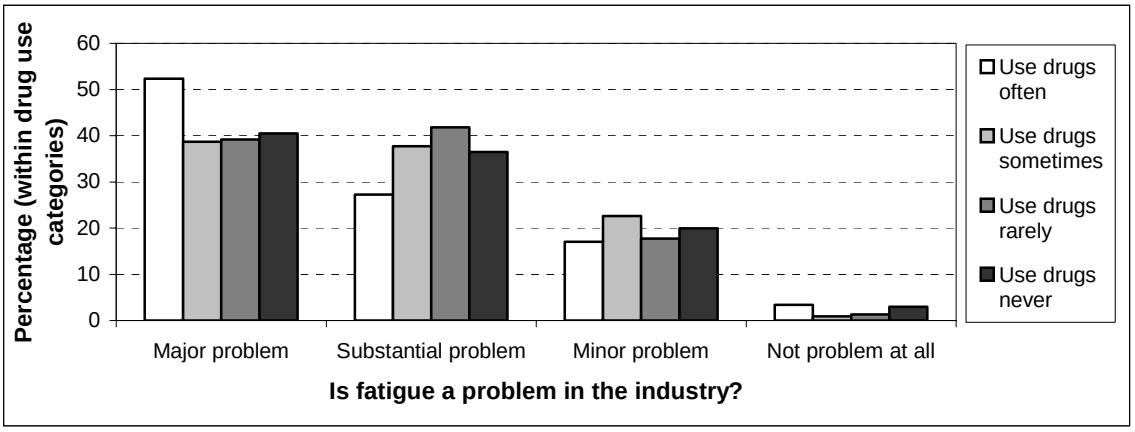


Figure 12 shows the beliefs of the drivers in the 1998 survey regarding how the awareness of driver fatigue has changed within the industry over the past 5 years. This figure shows that, although the greatest percentage of drivers indicated that they believed that awareness of fatigue had increased, drivers who used drugs often were less likely to indicate an increase in awareness compared to the other drug use groups. The majority of drivers who took drugs often reported that there was no change in awareness of fatigue in the industry ($\chi^2_{(12)} = 34.12$, p=0.001).

Figure 12: Change in awareness of driver fatigue in the industry and reported frequency of drug use in 1998.

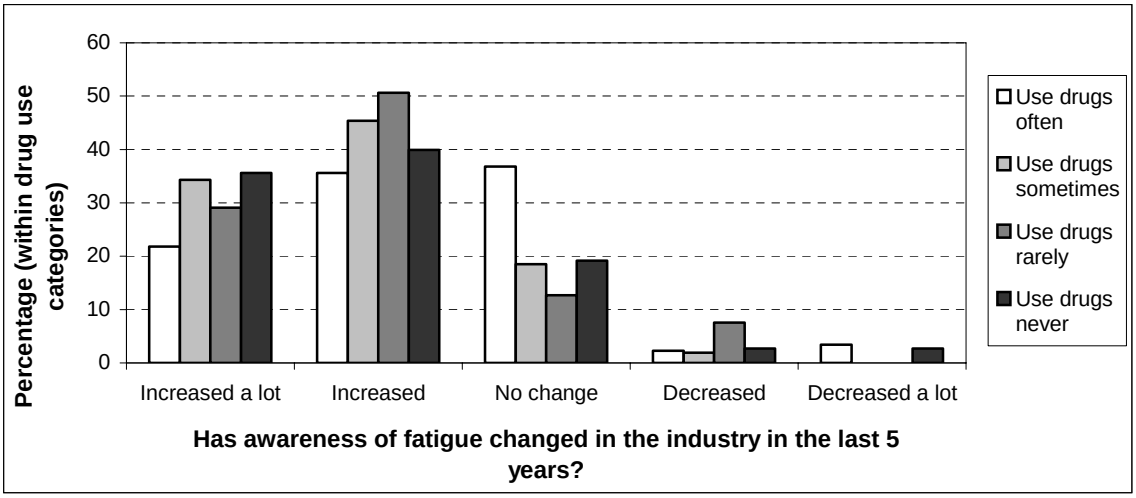


Figure 13 demonstrates the beliefs of the drivers in 1998 about the effectiveness of fatigue management in the industry. Drivers who took drugs often or sometimes were more likely than drivers who took drugs rarely or never to indicate that they believed that the industry was managing fatigue extremely badly. In comparison, those drivers who used drugs rarely were most likely to indicate that it was managed quite badly, whilst drivers who reported never taking drugs were more likely than drug users to indicate it was managed quite well ($\chi^2_{(12)} = 25.71$, p=0.012).

Figure 13: Effectiveness of industry management of fatigue and reported frequency of drug use in 1998.

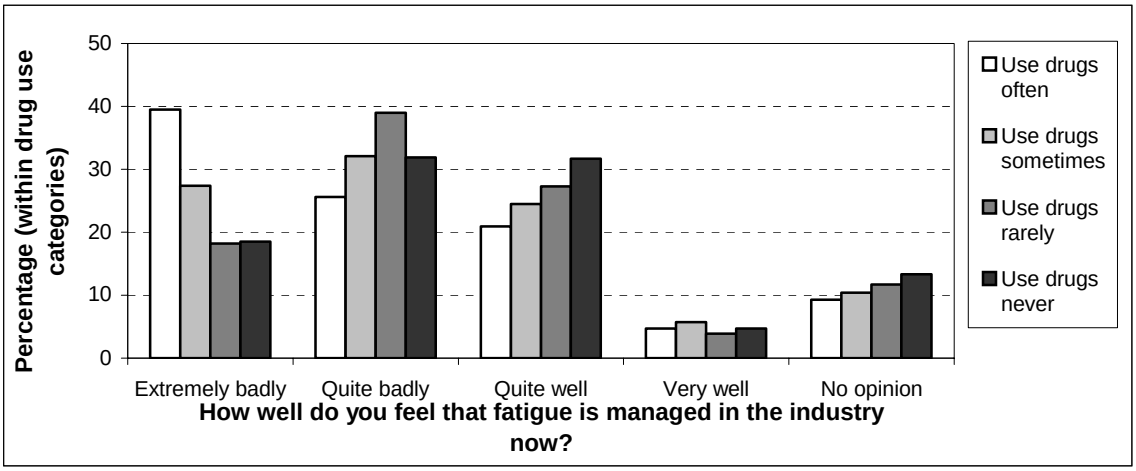


Table 6 shows the types of strategies that drivers in 1991 believe could be used in addressing driver fatigue. This shows that the majority of drivers who used drugs at least sometimes (often or sometimes) believed that taking prescription drugs should be permitted and they were much less likely to indicate that drug use should be prevented. In addition, these drivers were more likely to report that education of drivers would be a helpful strategy in managing fatigue. Table 6 also indicates which strategies drivers believe would be most helpful in managing fatigue. Drivers who used drugs at least sometimes were most likely to report that permitting the use of prescription drugs and the development of efficient loading procedures would be the most helpful strategies. In comparison, drivers who used drugs rarely or never indicated that the most helpful strategies in reducing driver fatigue would be stricter and more flexible driving hours, and better roads ($\chi^2_{(12)} = 25.713$, $p = 0.012$).

Table 6: Strategies reported by drivers that might be helpful, not helpful or most helpful in managing fatigue in the 1991 survey. Top figures are percentage of responses (%) from frequent drug users (often or sometimes); lower shaded figures are percentage of responses (%) from infrequent/non-drug users.[a]

STRATEGIES THAT MIGHT OR MIGHT NOT BE HELPFUL IN MANAGING FATIGUE			
	Not Helpful	***Helpful***	***Most Helpful***
Educate drivers	43.6	56.4	2.1
	29.4	70.6	1.6
Prevent drug use	91.2	8.4	0.8
	60.1	39.9	1.8
Permit prescription drug use	5.9	93.3	27.2
	43.2	56.8	4.9
Stricter driving hours	78.4	21.6	21.6
	73.7	26.3	26.3
Stricter enforcement	76.4	23.6	0
	64.6	35	1.8
Regulation of work time	45.1	54.9	3.4
	47.5	52.3	1.4
Regulation by industry	22.7	77.3	6.7
	19.6	80.4	4.3
Ban driving 2-6am	85.2	14.8	0
	87.4	12.5	1.4
More efficient loading	6.3	93.3	22.6
	12.6	87.4	16.7
Two-up driving	62.2	37.8	0.8
	57.1	42.9	2.5
Staged driving	43.2	56.8	5.1
	43.9	56.1	2.1
Pay increase	26.7	72.9	8.9
	32.2	67.8	9.4
Easing ETA's	9.6	90.0	17.1
	12.4	87.2	16.7
Improve truck design	40.9	59.1	2.6
	37.4	62.4	4.1
Fatigue monitors	43.4	56.6	0.4
	40.6	59.4	1.8
Better rest facilities	23.2	76.8	4.2
	18.5	81.5	9.7
Flexible driving hours	7.9	92.1	24.3
	8.4	91.6	26.1
Better roads	5.9	94.1	29.1
	4.7	95.3	39.1

[a]NB: Participants made multiple responses: columns and rows do not sum to 100%.

Table 7 represents the beliefs of drivers about strategies that the companies currently employ to manage fatigue in 1998. This shows that drivers who use drugs at least sometimes were much less likely than drivers who used drugs rarely or never to report that companies allowed more breaks, more sleep, more time off between trips, less night driving, easier schedules, more loading/unloading in a less efficient manner, and more information and training in order to manage fatigue. The only strategies where drivers who used drugs often or sometimes were similar in their responses to drivers who used drugs rarely or never were in relation to increased pay, staged driving and two-up driving. Table 7 also shows what strategies drivers in 1998 believe that companies should use to manage fatigue. Few differences were found between drivers regardless of level of drug use, except that drivers who use drugs at least sometimes were more likely than drivers who never or infrequently use drugs to report that companies should ease their schedules and allow more sleep and break time.

Table 7: Reported strategies that companies do, should do or should not do to manage fatigue in the 1998 survey. Top figures are percentage of responses (%) from frequent drug users (often or sometimes), lower shaded figures are percentage of responses (%) for infrequent/non-drug users.[a]

STRATEGIES THAT COMPANIES MIGHT OR SHOULD DO TO MANAGE FATIGUE			
	Does	***Should***	***Should Not***
Information and training	16.2	59.2	25.1
	30.0	61.1	23.2
Efficient load/unload	25.1	78.5	8.4
	31.5	76.4	9.7
Not having to load/unload	17.3	67.5	18.8
	24.1	60.2	26.7
Two-up driving	9.4	13.1	73.8
	11.1	18.8	70.8
Staged driving	15.2	36.1	51.3
	15.5	37.6	49.8
Increase pay rates	14.1	72.3	16.2
	13.9	72.9	18.6
Easing tight schedules	27.7	70.7	11.5
	34.1	63.5	16.7
Minimise night driving	4.2	27.7	61.8
	12.7	31.5	55.9
More time off between trips	22.0	55.0	29.8
	33.0	51.4	29.8
More time for sleep on the road	18.3	68.1	17.3
	35.5	57.7	23.3
More breaks during trip	20.0	58.6	25.7
	31.5	51.4	29.2

[a]NB: Participants made multiple responses: columns and rows do not sum to 100%.

Table 8 represents the drivers' beliefs about what strategies the government was employing to manage fatigue in 1998. This shows that drivers who use drugs at least sometimes were much less likely to indicate that the government prevents drug use, enforces driving hours regulations and depot to depot driving than drivers who rarely or never use drugs. The strategies that drivers believed that the government should implement to manage fatigue in 1998 are displayed also in Table 8. This shows that drivers in all drug use categories agreed on which strategies should be implemented by governments to manage fatigue except those strategies that related to drug use. Drivers who used drugs at least sometimes were much more likely to believe that governments should permit drug use, and less likely to believe that governments should prevent drug use, than drivers who rarely or never took drugs. Table 8 also represents the strategies that drivers believe the government should not implement to manage fatigue. This table shows that drivers were again similar in their beliefs, again with the exception of drug related strategies.

Table 8: **Reported strategies that the government do, should do or should not do to manage fatigue in the 1998 survey. Top figures are percentage of responses (%) from frequent drug users (often or sometimes); lower shaded figures are percentage of responses (%) from infrequent/non-drug users.[a]**

STRATEGIES THAT GOVERNMENT MIGHT OR SHOULD DO TO MANAGE FATIGUE			
	Does	***Should***	***Should Not***
Information and training	13.3	67.2	19.5
	15.0	69.0	21.8
Stricter policing of drug use	16.4	17.9	72.3
	22.5	54.8	34.7
Stricter driving hours	9.2	9.7	81.0
	11.7	13.5	81.5
Permitting drug use	2.6	75.4	19.5
	2.7	27.3	67.4
Stricter enforcement of current driving hours	16.9	22.1	65.6
	22.7	22.5	68.1
Better off-road facilities	11.3	86.7	5.6
	11.6	89.0	5.9
More flexibility to finish trip	3.1	91.3	1.0
	5.0	88.6	4.4
Greater flexibility in driving hours regulations	5.6	93.8	4.6
	4.0	91.1	8.0
Improvement to roads	14.4	92.8	2.0
	13.9	95.1	1.5
Slow vehicle lanes	22.1	78.5	6.2
	20.0	86.4	4.9
Depot to depot driving	5.1	78.5	12.3
	9.2	71.1	20.3
Uniform driving hours and road rules nationally	12.3	79.0	13.8
	11.3	89.0	6.2
Make schedulers accountable	9.2	85.1	8.2
	7.7	86.8	7.4
Educate public	8.2	92.8	1.5
	6.4	95.3	1.6
Permit industry self regulation	6.7	61.5	28.2
	5.5	62.8	27.4

[a]NB: Participants made multiple responses: columns and rows do not sum to 100%.

Experiences of fatigue

Figure 14a and 14b show drivers' personal experiences with fatigue in 1991 and 1998. Figure 14a shows that drivers who took drugs often in 1991 were more likely than drivers in the other drug use groups to report that fatigue was a major problem for them. Similarly, the majority of drivers who never took drugs indicated that fatigue was not a problem at all for them ($\chi^2_{(9)}$ = 86.66, p<0.001). In Figure 14b, which represents the 1998 data, the majority of drivers in all the drug use categories indicated that fatigue was a problem to them personally. However, a strong effect of fatigue was still seen with more frequent drug users reporting that fatigue was a greater problem ($\chi^2_{(9)}$ = 64.31, p<0.001).

Figure 14a: Extent of personal fatigue problems and reported frequency of drug use in 1991.

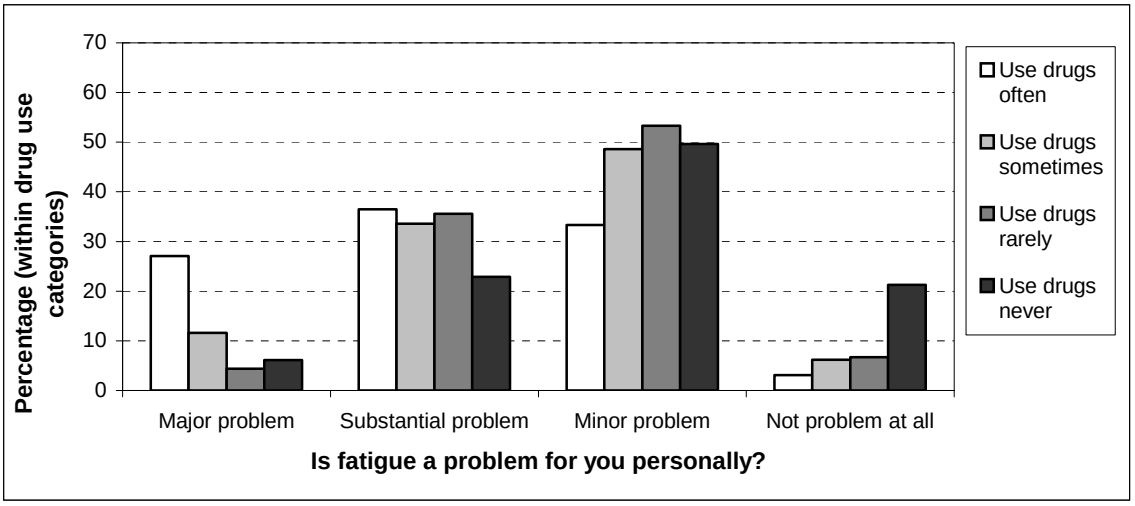


Figure 14b: Extent of personal fatigue problems and reported frequency of drug use in 1998.

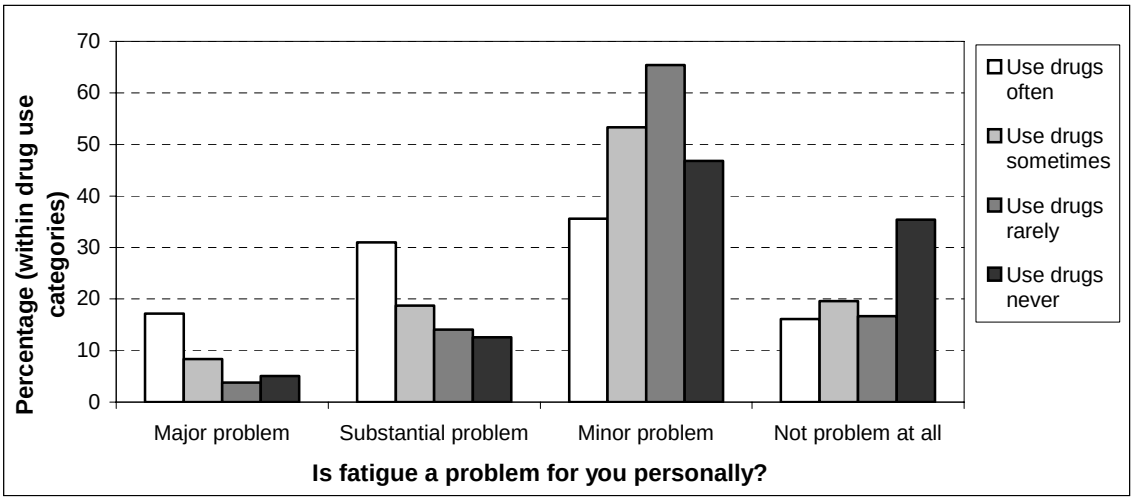


Table 9 shows the scores of drivers on the Epworth Sleep Scale from the 1998 survey. Analysis of the data demonstrated a significant difference in scores between drug use categories ($F_{(3,844)}$ = 13.205, p <0.001). Further investigation using Scheffe post hoc tests indicated that drivers who took drugs often or sometimes had significantly higher

Epworth scores than drivers who never took drugs. Drivers who took drugs often also had scores that were significantly higher than drivers who took drugs rarely.

Table 9: Epworth Sleep Scale scores and reported frequency of drug use in 1998.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Epworth Score (out of 24)	8.81 (3.81)	8.17 (4.05)	7.13 (3.46)	6.54 (3.65)

Figure 15a and 15b represent the frequency with which drivers reported becoming fatigued while driving in the 1991 and 1998 surveys. The 1991 data is shown in Figure 15a and indicates that drivers who took drugs often were more likely than drivers in the other drug use groups to indicate that they became fatigued on every trip or on most trips. In contrast, drivers who reported never taking drugs indicated that they became fatigued occasionally very rarely ($\chi^2_{(9)} = 92.99$, $p<0.001$). This pattern of results was also obtained in 1998 ($\chi^2_{(9)} = 59.33$, $p<0.001$).

Figure 15a: Frequency of becoming fatigued whilst driving and reported frequency of drug use in 1991.

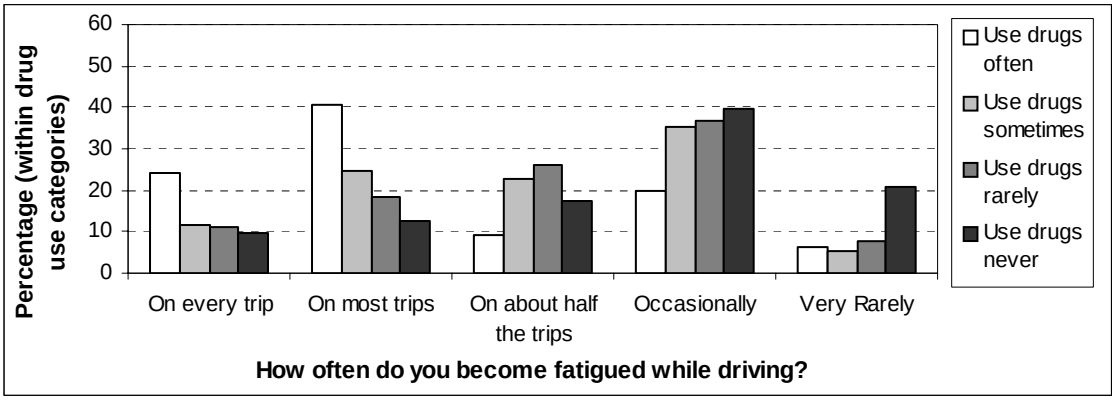


Figure 15b: Frequency of becoming fatigued whilst driving and reported frequency of drug use in 1998.

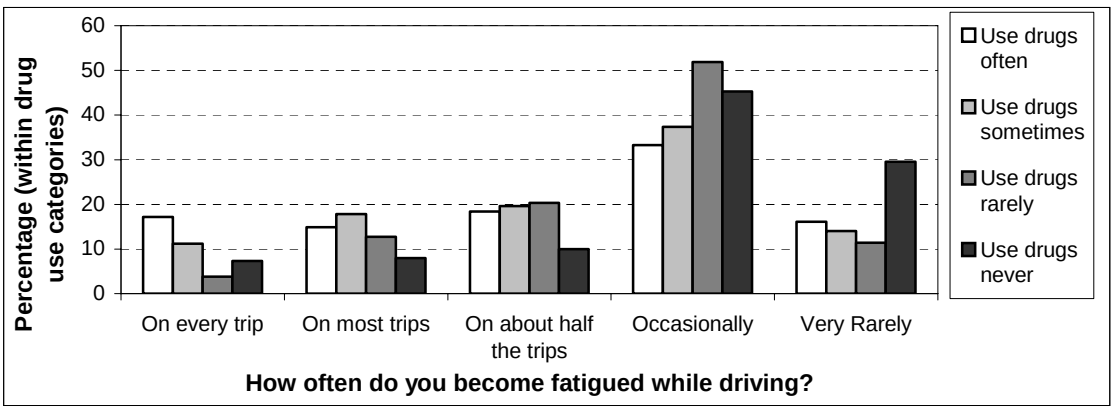


Table 10 shows the number of times that drivers reported being fatigued on their last trip before completing the survey in 1991. Analysis of variance showed a significant difference for number of times fatigued between the drug use groups ($F_{(3,758)} = 6.03$, $p<0.001$). Scheffe post hoc analysis indicated that drivers who never used drugs reported experiencing significantly fewer episodes of fatigue on their last trip than drivers who took drugs at any level. Data for number of episodes of fatigue was not available for 1998.

Table 10: Number of times fatigued on the last trip and reported frequency of drug use in 1991.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Number of times fatigued in last week (SD)	1.06 (1.24)	1.09 (1.26)	1.15 (1.18)	0.76 (1.01)

The number of hours after commencing work when fatigue begins is presented in Table 11. This shows that, in 1991, there was little difference between the drivers in any of the drug use categories regarding the numbers of hours worked before fatigue begins. Examination of the data revealed that the sometimes use drugs groups included three outliers who reported much longer hours to fatigue than all other drivers. In 1998, there was again little difference between the number of hours before fatigue begun for the four drug use categories.

Table 11: Hours before fatigue begins and reported frequency of drug use in 1991 and 1998.

	Category of drug use			
	Often	***Sometimes***	***Rarely***	***Never***
Hours before fatigue begins in 1991 (SD)	12.36 (7.43)	15.19 (16.75)	12.56 (8.90)	12.14 (9.16)
Hours before fatigue begins in 1998 (SD)	12.26 (8.26)	12.37 (10.96)	12.63 (13.09)	11.58 (7.29)

Figure 16 represents the change over the last 5 years in the personal awareness of fatigue for drivers in the 1998 study. This figure shows that drivers who used drugs often or sometimes were less likely to indicate that their awareness of driver fatigue had increased a lot over the past 5 years, compared with drivers who took drugs rarely or never. Drivers who used drugs sometimes were more likely than any other drug use group to indicate an increase in awareness of fatigue. By comparison, those drivers who reported taking drugs often were most likely to report no change in their awareness of fatigue ($\chi^2_{(12)} = 12.79$, $p = 0.38$).

Figure 16: Change in personal awareness of driver fatigue over the last 5 years and reported frequency of drug use in 1998.

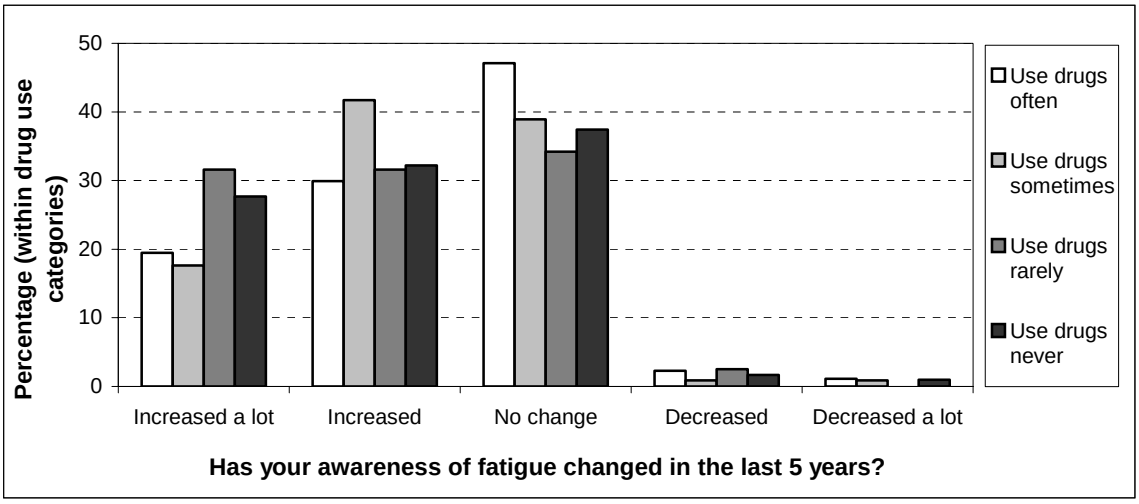


Figure 17a and 17b indicate which factors drivers considered to be the most important in contributing to fatigue in 1991 and 1998. The 1991 data shows that for drivers who took drugs at least sometimes, the majority reported that having to load or unload, long driving hours, poor diet, heavy city traffic, inadequate rest breaks, inadequate sleep during trips and the after effects of taking stay-awake drugs were the factors that were reported as the most important contributors to fatigue. In contrast, drivers who took drugs at least sometimes were less likely than drivers who rarely or never took drugs to indicate that inadequate sleep before the trip was the most important contributor to fatigue. Drivers who took drugs rarely or never were also more likely to report that the weather conditions, the monotonous driving route and driving at dawn were the most important contributors to fatigue. In 1998 drivers who took drugs at least sometimes again reported that the most important factors contributing to fatigue were having to load or unload, poor diet, heavy city traffic, insufficient rest breaks and insufficient sleep during the trip. However, in 1998, waiting to load/unload, too much non-driving work, family problems and monotonous driving were also identified as the most important factors contributing to fatigue by drivers who took drugs at least sometimes.

Figure 17a: Most important contributors to fatigue and reported frequency of drug use in 1991.

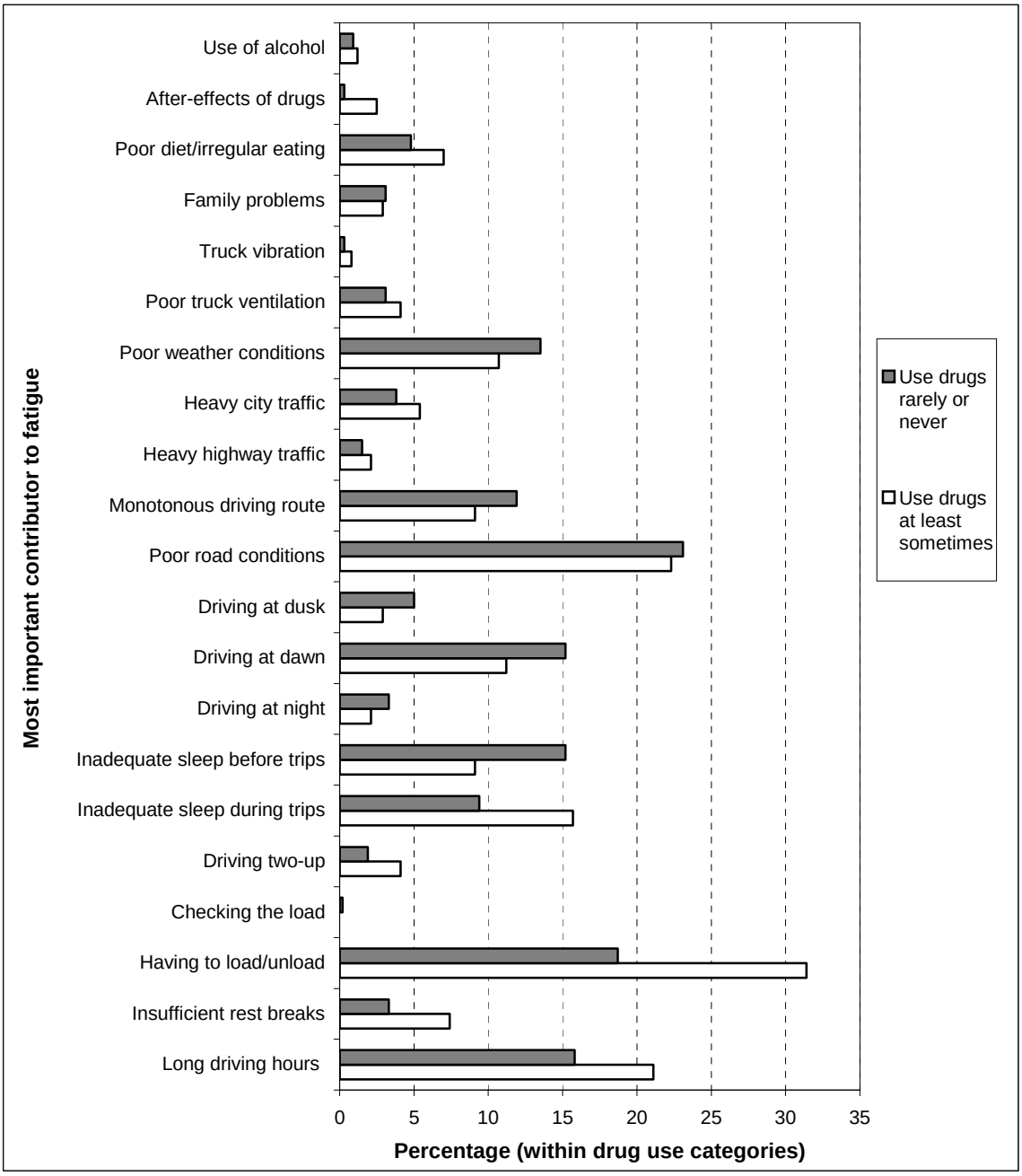


Figure 17b: Most important contributors to fatigue and reported frequency of drug use in 1998.

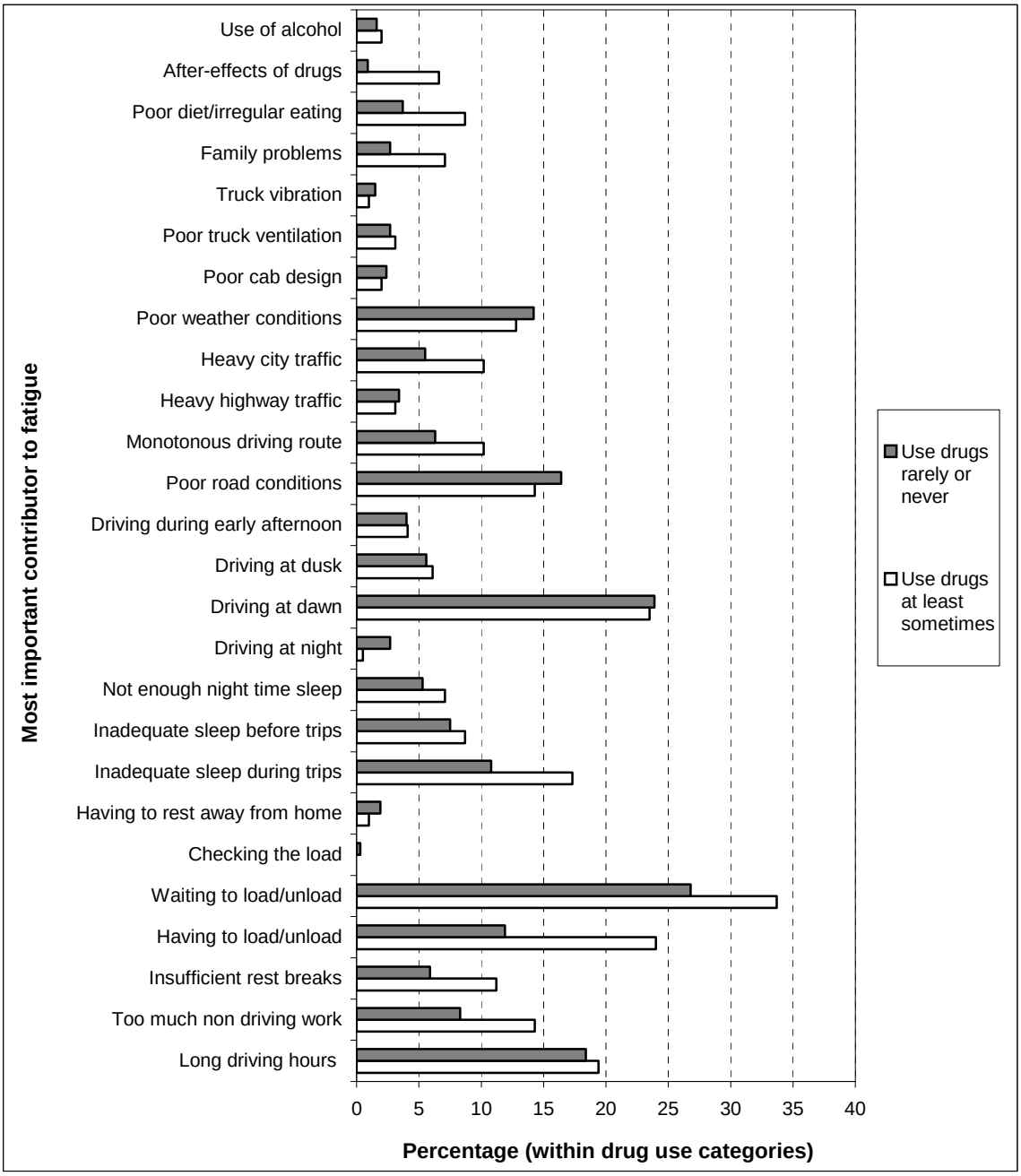


Figure 18a and 18b show the strategies used by drivers to manage fatigue. In 1991 drivers who took drugs at least sometimes indicated that they were more likely to have drinks containing caffeine, smoke, shower or use the CB radio to manage fatigue, compared with drivers who rarely or never took drugs. Drivers who used drugs frequently were less likely to rest as a fatigue management strategy. The 1998 data showed that drivers who took drugs at least sometimes were also more likely to manage fatigue by drinking caffeinated drinks, smoking, showering and using the CB radio. In addition, these drivers also reported that singing, eating while driving and ignoring the driving regulations in order to finish the trip were strategies used to manage fatigue. In comparison, drivers who rarely or never took drugs indicated that rest and sleep were the strategies used to manage fatigue more often than drivers who took drugs.

Figure 18a: Strategies used to manage fatigue and reported frequency of drug use in 1991.

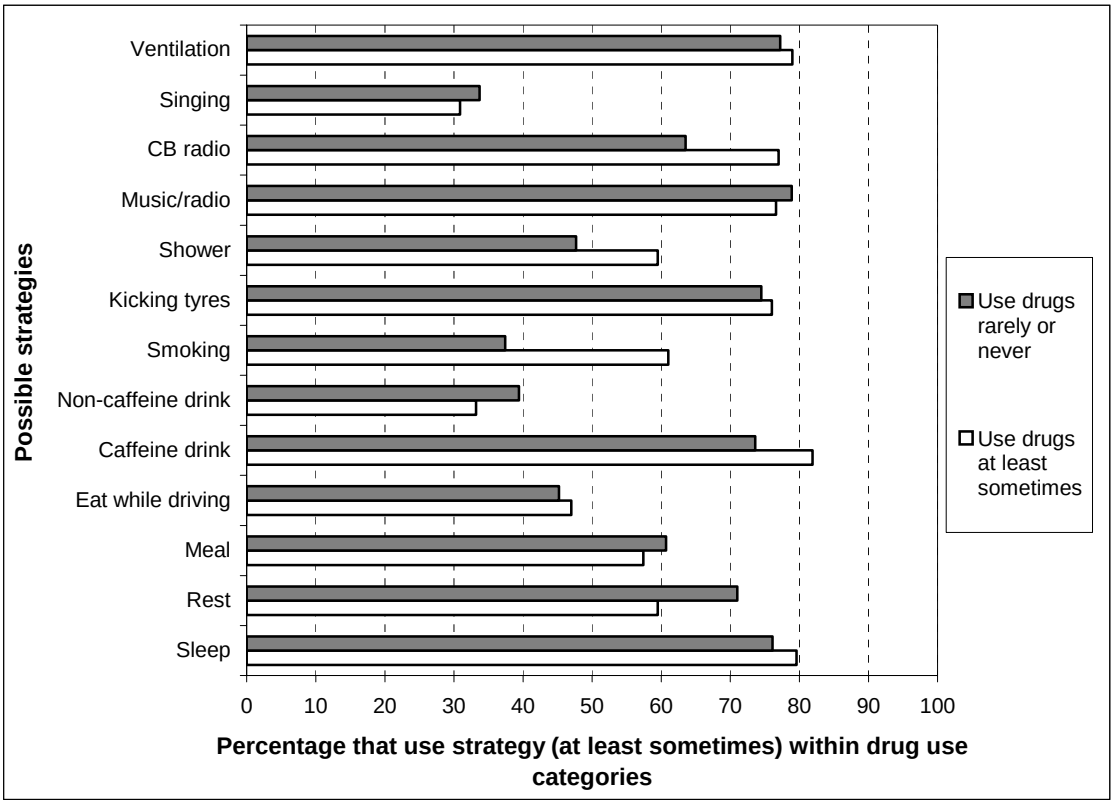


Figure 18b: Strategies used to manage fatigue and reported frequency of drug use in 1998.

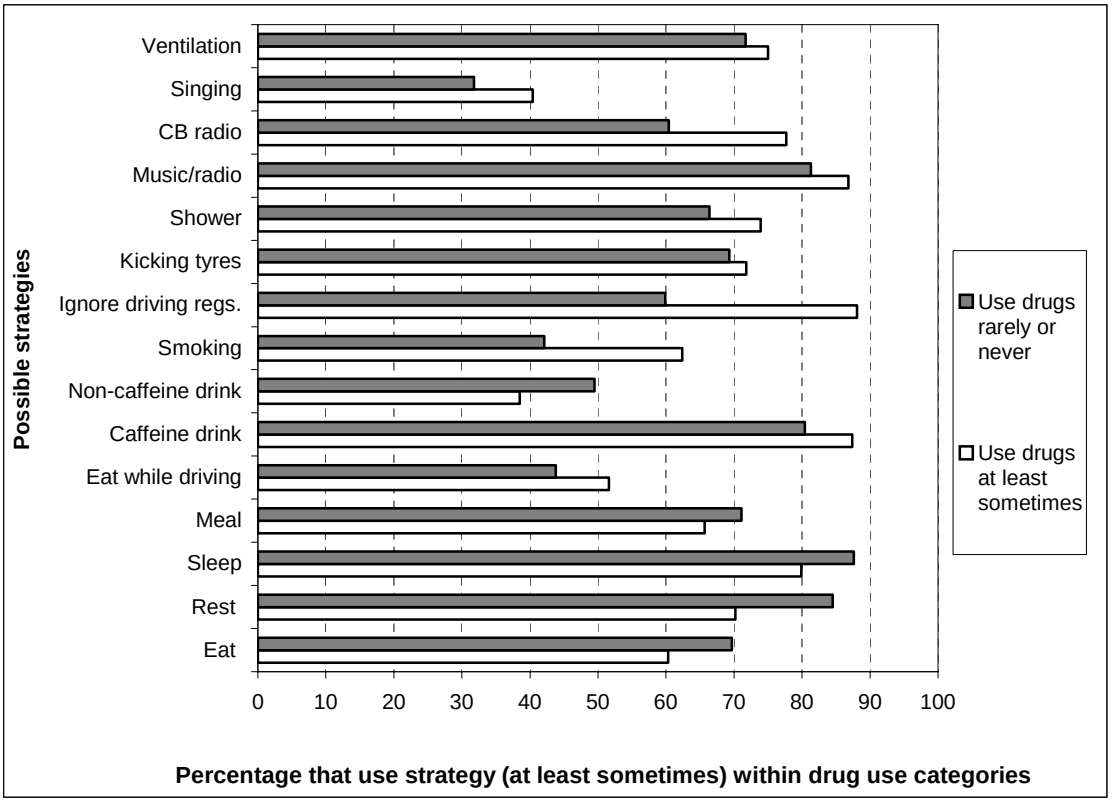


Figure 19a and 19b demonstrate which strategies drivers believe are the most helpful strategies that they currently use to manage fatigue. Figure 19a shows the data for 1991 and indicates that drivers who used drugs at least sometimes were much more likely than drivers who rarely or never used drugs to report that taking stay-awake drugs was the most helpful strategy used to manage fatigue. Drivers who rarely or never used drugs were more likely to report most other strategies as being the most helpful strategies used. In 1998, drivers who took drugs at least sometimes also reported that the use of stay-awake drugs was the most helpful strategy to manage fatigue more often than drivers who rarely or never took drugs. However, in 1998, these drivers also indicated that smoking and drinking a drink containing caffeine were the most helpful strategies to manage fatigue more often than drivers who rarely or never took drugs. The strategies indicated most often by those drivers who rarely or never took drugs were similar to those identified in 1991.

Figure 19a: Most helpful strategies used to manage fatigue and reported frequency of drug use in 1991.

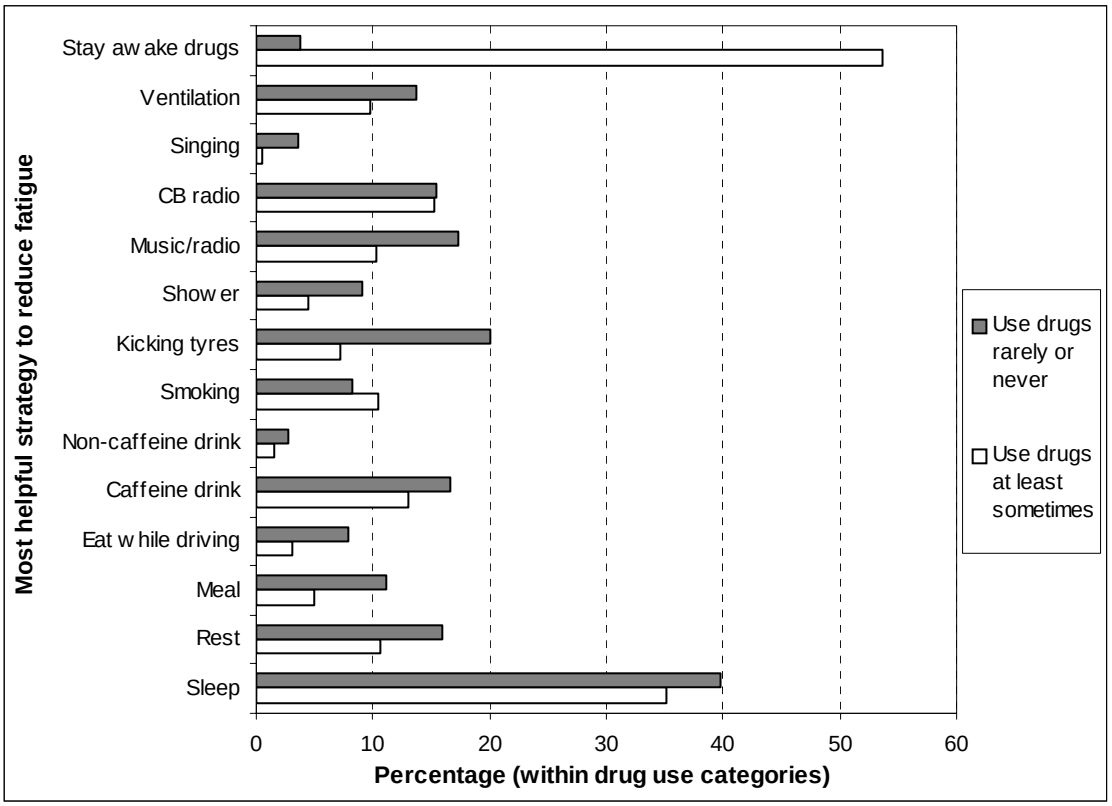


Figure 19b: Most helpful strategies used to manage fatigue and reported frequency of drug use in 1998.

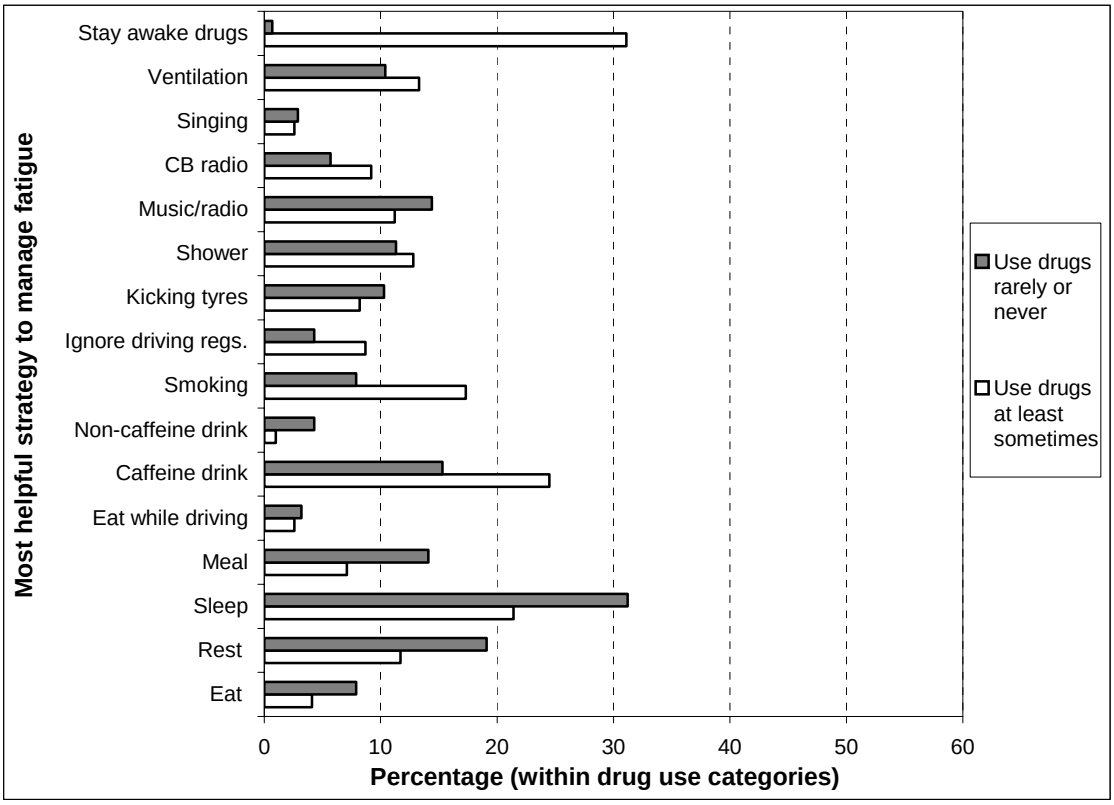


Figure 20 represents drivers' beliefs about the effectiveness of their own management of fatigue in 1998. This shows that those drivers who indicate never taking drugs were the group most likely to indicate that they managed fatigue very well. In contrast, drivers who used drugs often or sometimes were most likely to indicate that they managed their fatigue quite badly or extremely badly. Those drivers who reported rarely taking drugs were most likely to indicate that they managed their fatigue quite well ($\chi^2_{(12)} = 27.84$, p= 0.006). Data for the beliefs of drivers about the effectiveness of their own management of fatigue was not available for drivers in 1991.

Figure 20: Effectiveness of own management of fatigue and reported frequency of drug use in 1998.

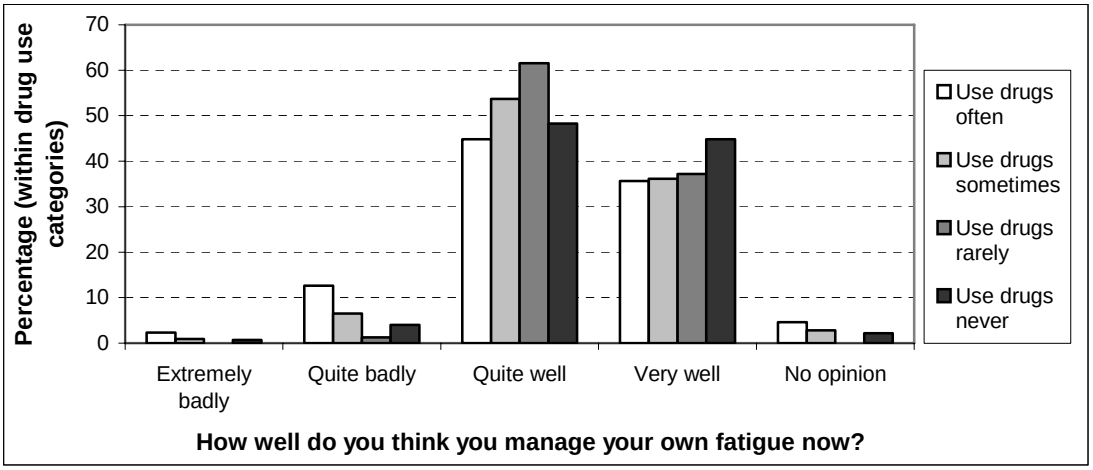
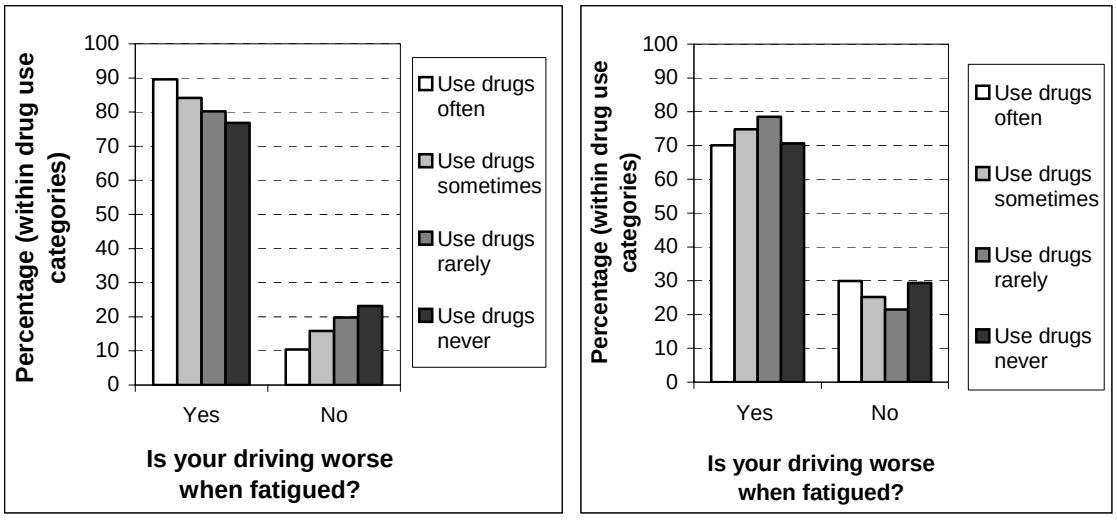


Figure 21a and 21b represent the frequency of drug use amongst drivers who believe that their driving is affected or not affected by fatigue. In 1991, drivers who took drugs often or sometimes were more likely to indicate that their driving was impaired by fatigue, while those drivers who never took drugs were more likely to indicate that their driving was not affected. There was little difference in 1998 amongst drivers from each of the drug use groups who indicated that their driving was affected by fatigue.

Figures 21a and 21b: Negative impact of fatigue on driving and reported frequency of drug use in 1991 and 1998 respectively.



The ways in which drivers believe that their driving is affected by fatigue is shown in Figure 22a and 22b. This shows little difference between the effects of fatigue on most aspects of driving across each of the drug use categories in 1991 with the exception of driving too slowly, poor gear changing and poorer steering, all of which were reported as more likely to be affected by a majority of drivers who took drugs at least sometimes. A similar pattern of results was indicated in 1998 expect for driving too slowly, which in 1998 was more likely to be reported as a factor which was impaired by fatigue by drivers who rarely or never took drugs.

Figure 22a: Ways in which driving is impaired while fatigued and reported frequency of drug use in 1991.

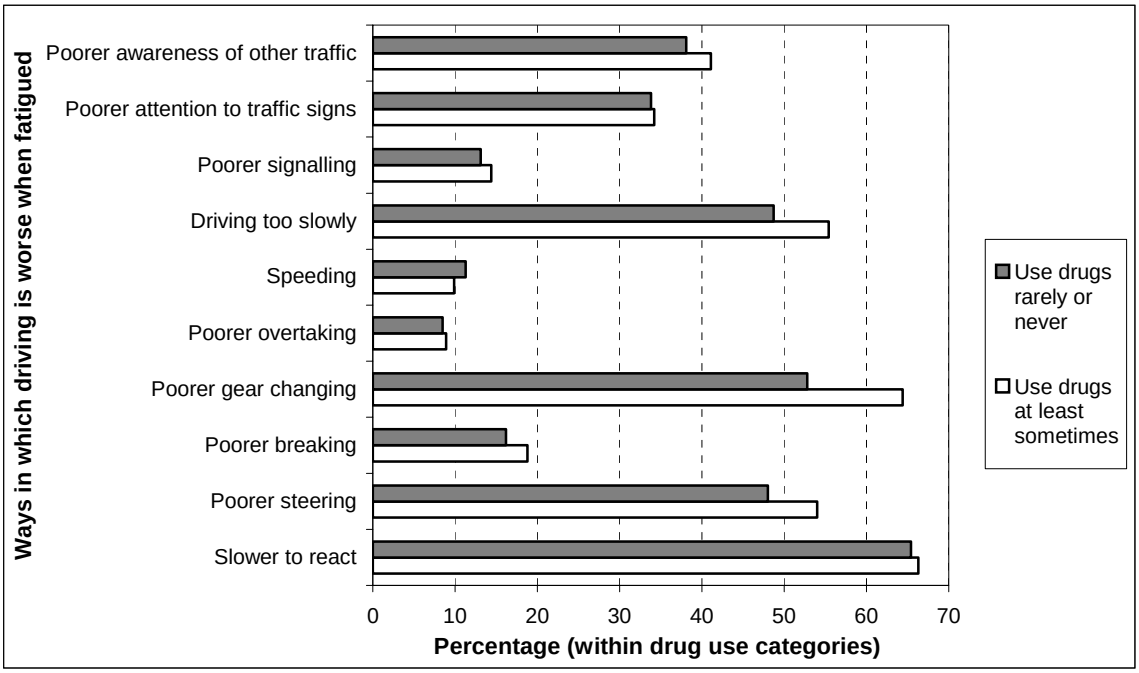


Figure 22b: Ways in which driving is impaired while fatigued and reported frequency of drug use in 1998.

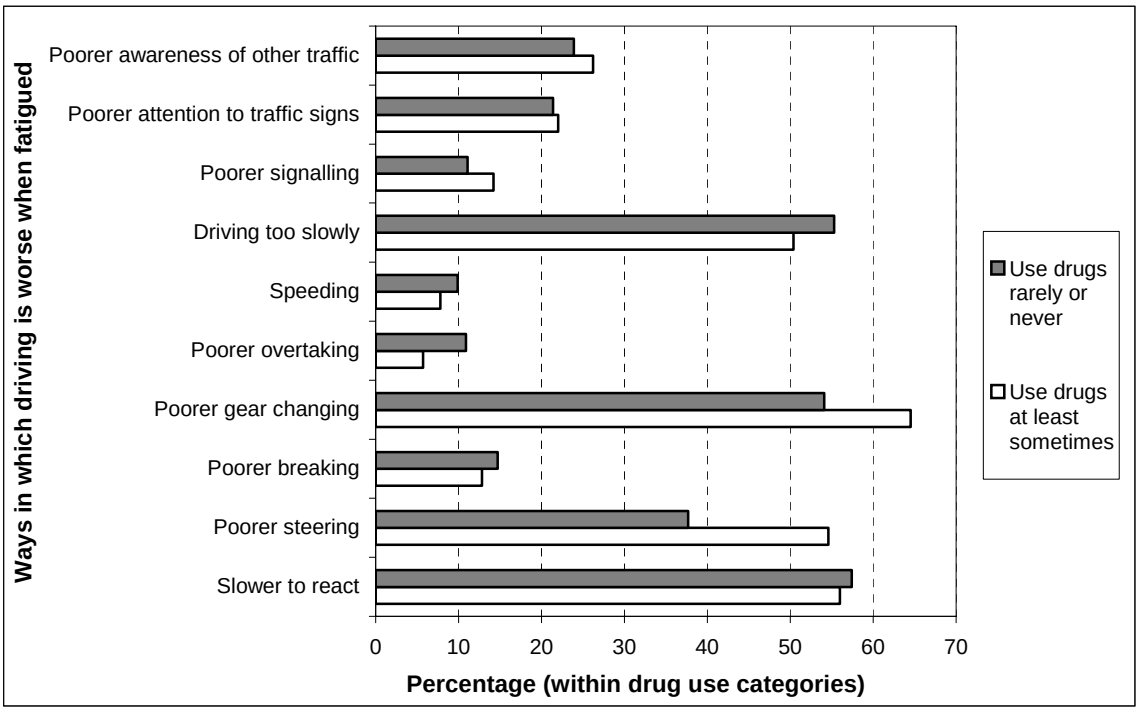


Figure 23 shows the reported frequency of falling asleep while driving by drivers in the 1998 survey. This figure indicates that those drivers who took drugs often or sometimes were more likely to report having fallen asleep often or sometimes compared with drivers who did not take drugs. Those drivers who never took drugs were more likely to report never falling asleep than drivers who used drugs at any level, $\chi^2_{(12)} = 68.45$, $p<0.01$.

Figure 23: Percentage of drivers who report falling asleep while driving and reported frequency of drug use in 1998.

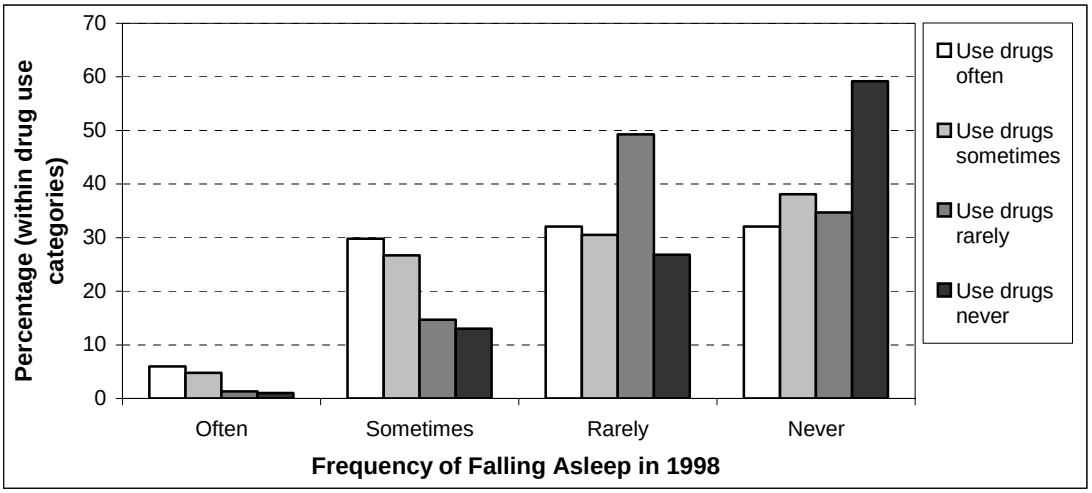
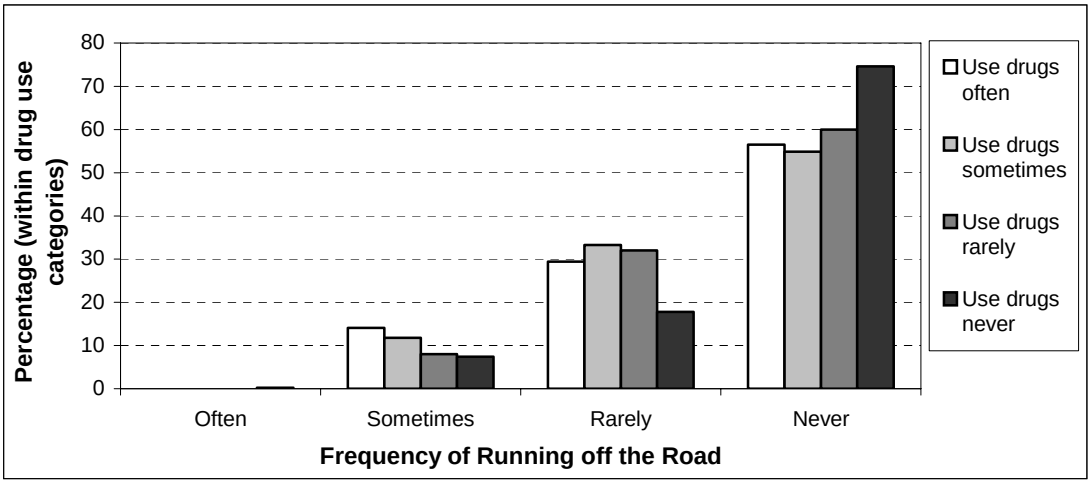


Figure 24 illustrates the percentage of drivers who report running off the road during 1998. This shows that drivers who take stay-awake drugs often or sometimes were more likely to report running off the road sometimes or rarely than drivers who never took drugs. Drivers who took drugs rarely were also more likely to report running off the road rarely than drivers who never took drugs. Drivers who never took drugs were more likely than drivers who did take stay-awake drugs to report never running off the road, $\chi^2_{(8)} = 29.86$, $p<0.01$.

Figure 24: Percentage of drivers who report running off the road and reported frequency of drug use in 1998.



There was no difference between the drug use groups or the number of collisions experienced over the previous 12 months

Rule compliance

Figure 25a and 25b shows the reported frequency of breaking regulations by drivers in the 1991 and 1998 surveys. Figure 25a presents the responses of drivers in the 1991 survey. While all driver use groups were more likely to report breaking working hours regulations, drivers who reported using drugs were most likely to report breaking rules often. In fact, the likelihood of more frequent rule breaking increased with increasing drug use. In comparison, there was little or no difference in the frequency of breaking the regulations for drivers who report rarely or never taking drugs ($\chi^2_{(15)} = 101.62$, $p<0.01$). This pattern of responses is similar in Figure 25b, which displays the 1998 data. The majority of drivers in all drug use groups reported breaking the regulations on at least half of trips but this effect was most pronounced for drivers who report using drugs often and sometimes ($\chi^2_{(16)} = 60.11$, $p<0.001$).

Figure 25a: Percentage of drivers who report breaking the working hours regulations and reported frequency of drug use in 1991.

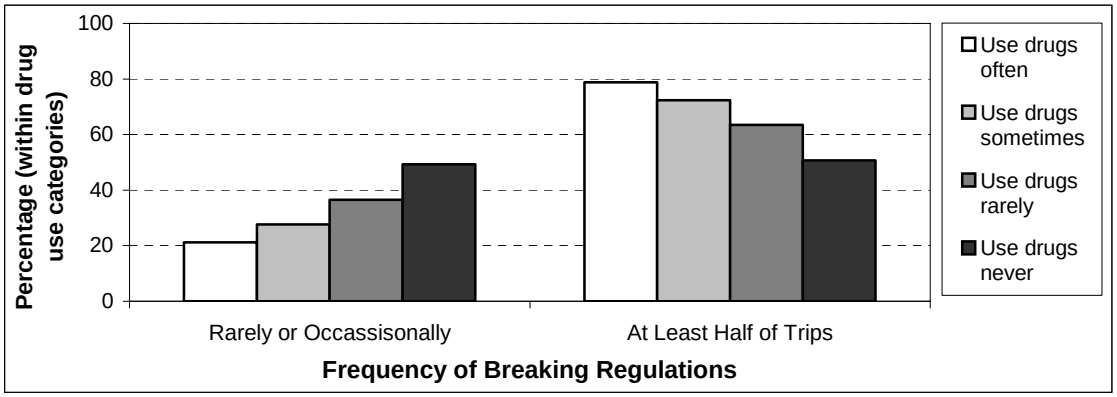
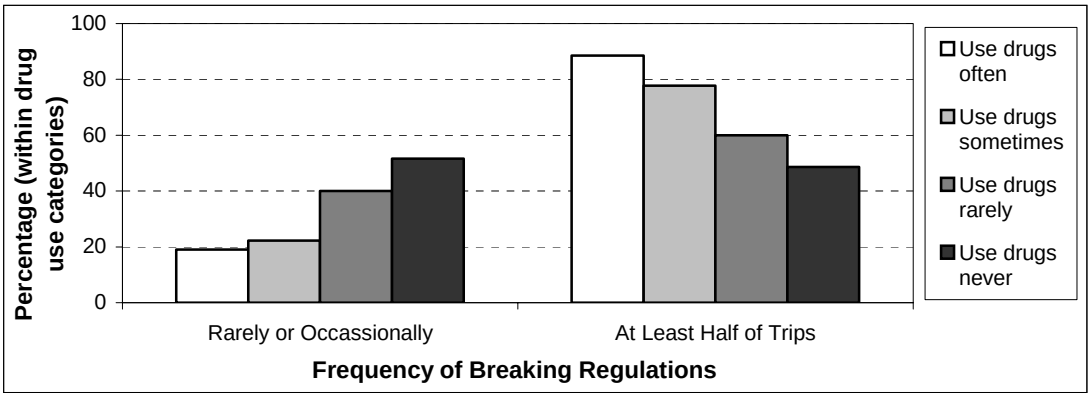


Figure 25b: Percentage of drivers who report breaking the working hours regulations and reported frequency of drug use in 1998.



The factors that drivers indicate are most influential in breaking the working hours regulations are illustrated in Figure 26a and 26b. Figure 26a provides the responses of drivers in 1991 and shows that for those drivers who report taking drugs either often, sometimes or rarely, the major factors involved in breaking the regulations were the tight schedule, to get in early to get the next load, in order to do enough trips to earn a living and in order to return home. For the drivers that did not report taking drugs, two factors were mentioned as most influential, to do enough trips to earn a living and in order to return home. The tight schedule and in order to get the next load were also identified by drivers who never take drugs as important. Reaching rest facilities was

the only identifiable factor that was more commonly mentioned by drivers who did not take drugs than those who did. In comparison the tight schedule, getting the next load and earning a living were all factors identified more commonly by drivers who took drugs often, with the tight schedule also being important for drivers who took drugs sometimes and in order to earn a living was identified as important by more drug takers using at any level. Figure 26b shows that the results for 1998 were the same as 1991. Drivers who reported using drugs often or sometimes were more likely to report earning a living, tight schedules, and to get the next load as reasons for breaking working hours regulations. In the 1998 survey, an additional option of keeping job was included. Drivers who reported using drugs most frequently were more likely to report "to keep their job" as a reason for breaking work hours regulations.

Figure 26a: Reasons for breaking the working hours regulations and reported frequency of drug use in 1991.

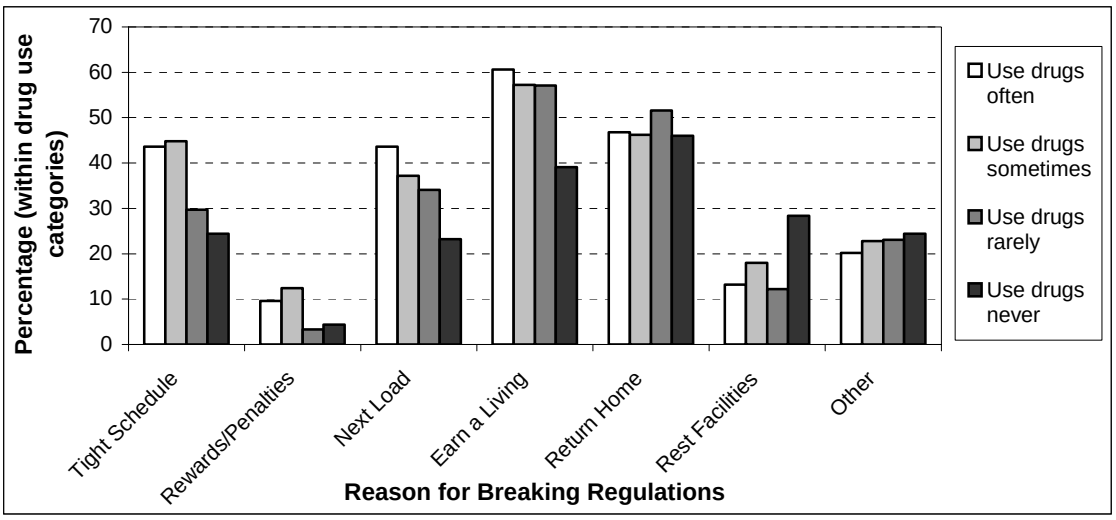
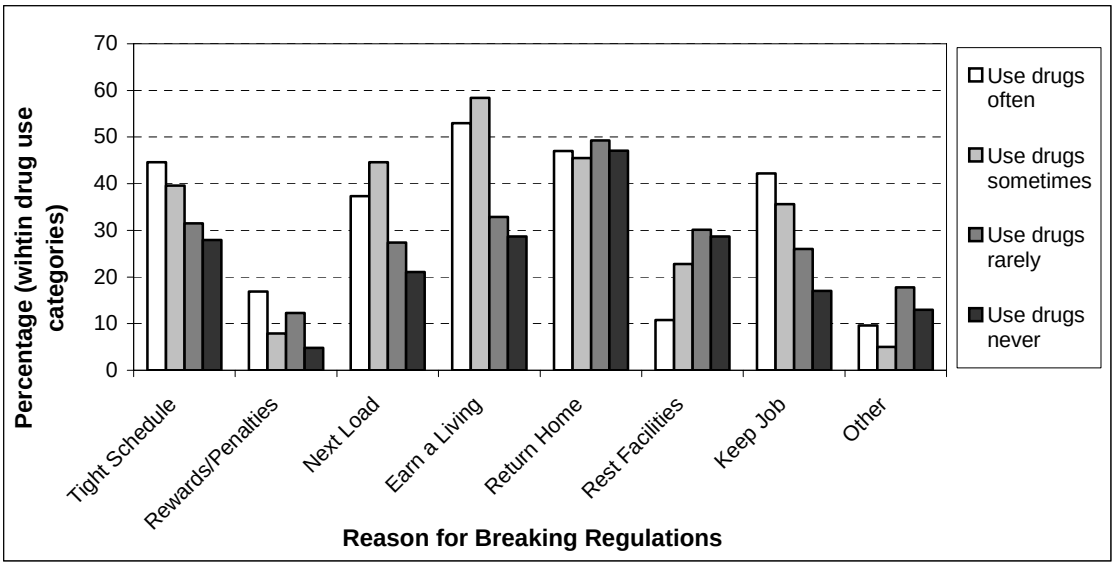


Figure 26b: Reasons for breaking the working hours regulations and reported frequency of drug use in 1998.



Figures 27a and 27b show the reported incidence of breaking the road rules. Figure 27a shows the results from the 1991 survey and indicates that majority of drivers who

take drugs often, report breaking the road rules on a least half of trips. In comparison, the majority of drivers who report taking drugs sometimes, rarely or never, also report breaking the rules rarely or occasionally ($\chi^2_{(15)} = 82.69$, $p<0.01$). This pattern of results is replicated in the 1998 survey represented in Figure 27b ($\chi^2_{(16)} = 92.37$, $p<0.01$).

Figure 27a: Percentage of drivers who report breaking the road rules and reported frequency of drug use in 1991.

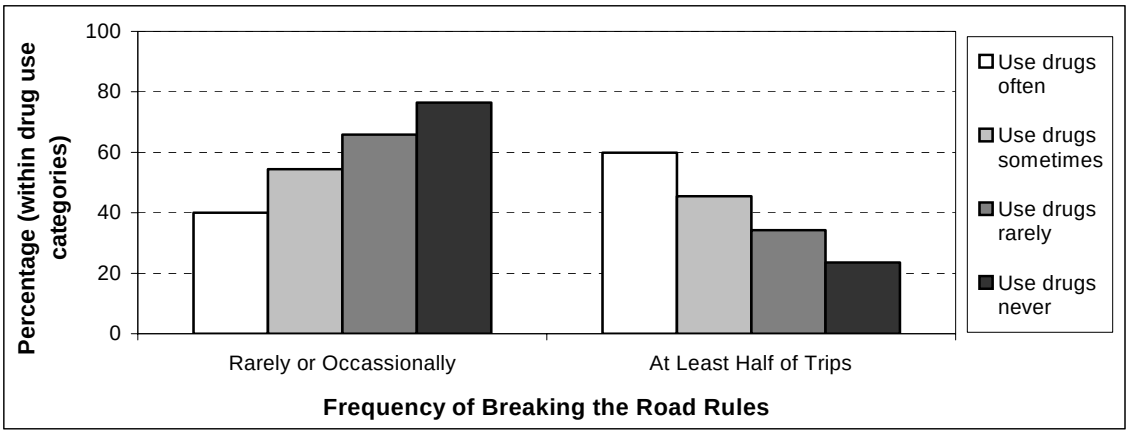


Figure 27b: Percentage of drivers who report breaking the road rules and reported frequency of drug use in 1998.

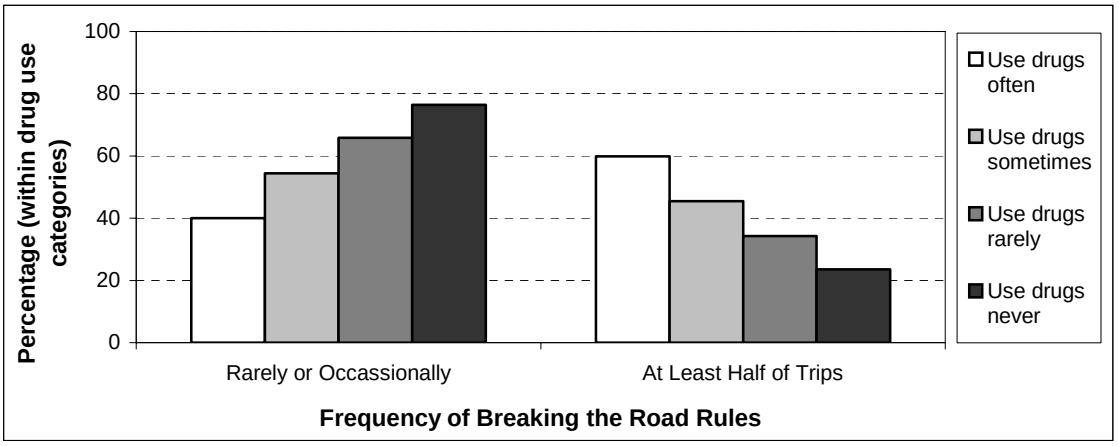


Figure 28a and 28b show the reasons identified as influential in breaking the road rules. Figure 28a shows the results from the 1991 survey and indicates that for those drivers who report taking drugs often or sometimes, the most influential factors involved in breaking the road rules are similar to those reported for breaking work hours regulations. Tight schedules, to do enough trips to earn a living and to get in early to get the next load are all mentioned more commonly by drivers who take drugs than by drivers who do not take drugs, with the effect most pronounced for drivers who report using drugs most often. The after effects of taking stay wake drugs was also influential in breaking the road rules for drivers who take drugs often compared to other drivers. Figure 28b contains the results for the 1998 survey. This indicates the same overall results as those found in the 1991 data with two main differences. In contrast to the 1991 survey, drivers who used drugs were less likely than those who

never used drugs to report that earning a living was a reason for breaking the road rules; however, it was still the most popular reason given by all drug use groups. Whereas in the 1991 survey there was no difference between drug use groups in the frequency of reporting fatigue as a reason for breaking the road rules, the 1998 survey showed that more frequent drug users were more likely to report fatigue as a reason for breaking the road rules.

Figure 28a: Reasons for breaking the road rules and reported frequency of drug use in 1991.

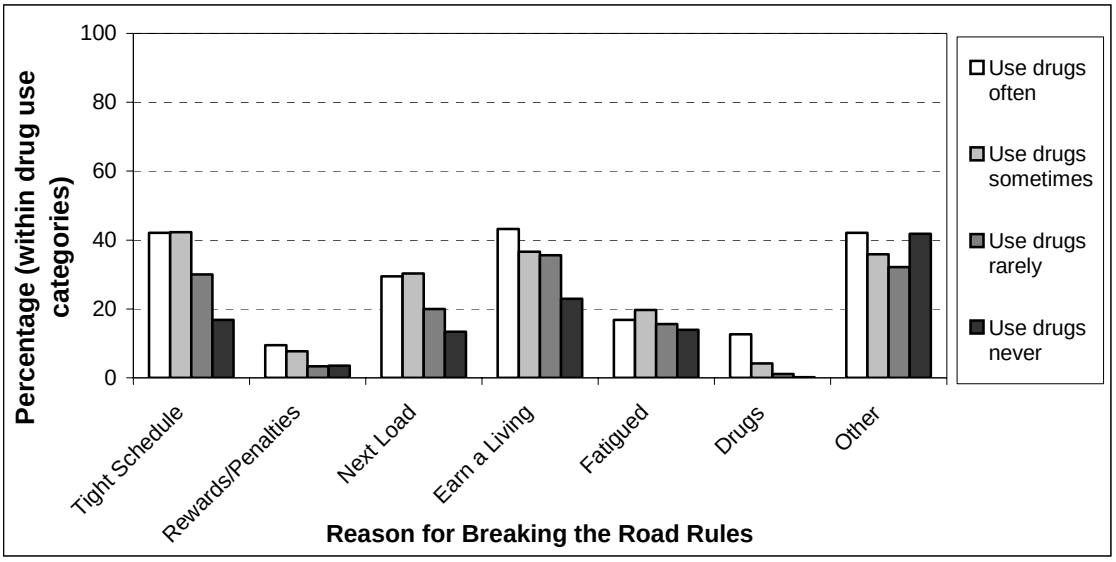
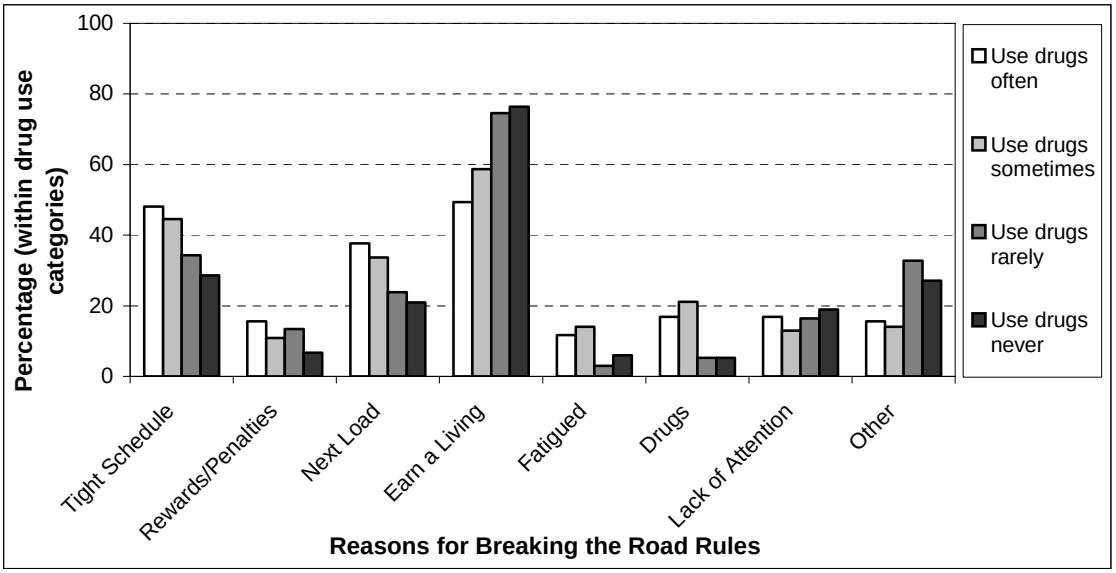


Figure 28b: Reasons for breaking the road rules and reported frequency of drug use in 1998.



Figures 29a and 29b show the reported cruising speed of drivers on the open road during their last trip before completing the survey. Figure 29a shows that in 1991

drivers who reported never taking drugs were more likely to travel at or below the speed limit than drivers who took drugs either often or sometimes. In comparison drivers who took drugs often or sometimes were more likely than drivers who never took drugs to travel at 15, 15-30 or 30kms/hr and above, above the speed limit $\chi^2(12) = 77.26$, $p<0.001$. This pattern of reposes is similar in the 1998 data, $\chi^2(9) = 64.09$, $p <0.001$.

Figure 29a: Cruising speed of drivers on the open road in their last trip and reported frequency of drug use in 1991.

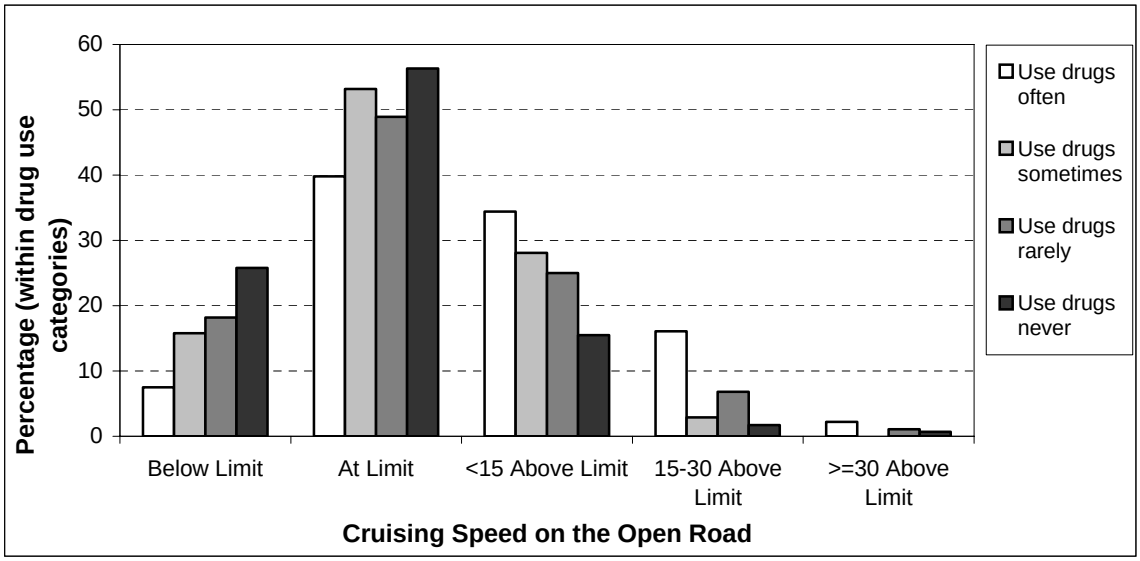
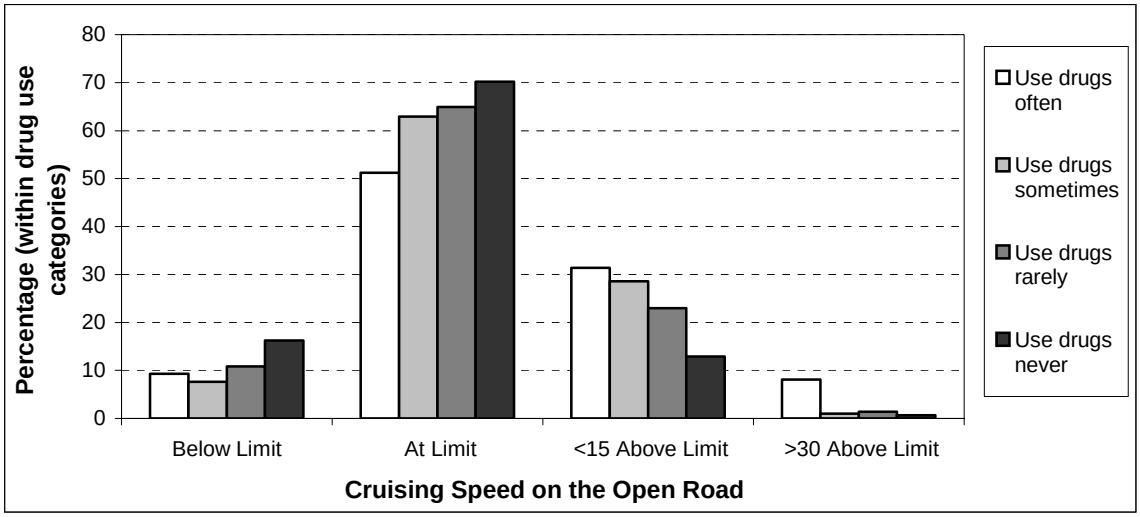


Figure 29b: Cruising speed of drivers on the open road in their last trip and reported frequency of drug use in 1998.



Multivariate Analysis

Multiple logistic regression analyses were performed separately for the 1991 and 1998 surveys to determine the main factors that were associated with drug use by long distance truck drivers. A binary dependent variable of drug use was created with drivers who reported using drugs at all while driving (often, sometimes, rarely) in one category and the other with drivers who reported never using stay-awake drugs while driving. The factors included in the analysis were length of driving experience, employment category (owner-driver or employee of small, medium or large companies), whether the driver had an expected time of arrival, the amount of pay relative to the industrial award for long distance road transport, the pattern of payment (time-based or piece-rate) and extent that fatigue was a reported personal problem. For the 1998 survey, the analysis did not include the expected time of arrival as this data was not collected in this survey.

The results for the 1991 survey (Table 12) show that the pattern of payment, amount of pay, experience of fatigue as a personal problem, employment category and driving experience were all significantly and independently associated with the stay-awake drug use while driving. Inspection of the odds ratios (OR) shows that drug use was more than three times more likely for drivers who were paid on a piece rate pattern of payment compared to those paid on a time basis (eg: per hour). Drivers who were paid less than the award rate were nearly twice as likely to report taking drugs while driving as those paid the award or above. In addition, drivers employed by small or medium size companies were also at least twice as likely as owner drivers to report using drugs. Drivers who reported that fatigue was a substantial or major personal problem were also twice as likely to report drug use while driving compared to those rating fatigue as a minor or no problem. Lastly, drivers with less experience were slightly more likely to take drugs compared to more experienced drivers.

For the 1998 survey, most of the same factors showed significant associations with drug use; the pattern of payment, fatigue as a personal problem and driving experience. As indicated by the odds ratios, piece rate payment patterns nearly doubled the likelihood of drug use compared to those on time-based payment patterns. Similarly, drivers who reported fatigue as a substantial or major personal problem were around 75 percent more likely to report drug use while driving compared to those seeing fatigue as a minor or no problem. Less experienced drivers were again more likely to be taking drugs, although this only increased the likelihood of drug use by a comparatively small amount (around 6 percent).

Table 12: Multiple logistic regression model of factors associated with drug use while driving reported in the 1991 survey.

Predictor variables - 1991	Coefficient	SE	OR	95% CI	P value
Years of driving	-0.03	0.012	0.97	0.95-0.99	0.012
Employment category:					
Owner driver*	0.000	0.000	1.00		
Employee –small company	0.71	0.28	2.03	1.19-3.49	0.01
Employee – medium company	0.98	0.31	2.66	1.46-4.87	0.001
Employee – large company	0.38	0.27	1.46	0.86 – 2.50	0.16
Driver has expected arrival time					
No expected arrival time*	0.00	0.00	1.0		
Expected arrival time	0.05	0.20	1.06	0.71 – 1.55	0.78
Amount of pay					
Award rate or higher*	0.00	0.00	1.0		
Paid less than award rate	0.58	0.24	1.8	1.11 – 2.88	0.016
Pattern of payment					
Paid on time basis*	0.00	0.00	1.0		
Paid by piece rate	1.13	0.26	3.09	1.87 – 5.11	<0.001
Fatigue as a personal problem:					
Minor or no problem*	0.00	0.00	1.0		
Major or substantial problem	0.74	0.19	2.09	1.43 – 3.05	<0.001

* reference or comparison category

Table 13: Multiple logistic regression model of factors associated with drug use while driving for the 1998 survey

Predictor variables - 1998	Coefficient	SE	OR	95% CI	P value
Years of driving	-0.06	0.011	0.94	0.92 – 0.96	<0.001
Employment category:					
Owner driver*	0.00	0.00	1.0		
Employee –small company	-0.12	0.27	0.89	0.53 – 1.49	0.89
Employee – medium company	0.01	0.26	1.01	0.61 – 1.67	0.99
Employee – large company	-0.024	0.31	0.98	0.53 – 1.8	0.94
Amount of pay					
Award rate or higher*	0.00	0.00	1.0		
Paid less than award rate	0.03	0.25	1.03	0.63 – 1.68	0.92
Pattern of payment					
Paid on time basis*	0.00	0.00	1.0		
Paid by piece rate	0.61	0.28	1.83	1.06 – 3.16	0.03
Fatigue as a personal problem:					
Minor or no problem*	0.00	0.00	1.0		
Major or substantial problem	0.56	0.24	1.76	1.09 – 2.82	0.02

* reference or comparison category

DISCUSSION

This study was an attempt to understand more about the use of stimulant drugs while driving by long distance road transport drivers through a reanalysis of two large surveys of the industry conducted over a seven-year interval. The results showed that drivers who reported taking drugs differed from those who did not in a number of ways. Furthermore, the predictors of drug use were quite similar for both surveys. For both surveys, the strongest predictors of drug use were the pattern of payment and the extent that drivers reported fatigue to be a personal problem. Drivers who were paid on the basis of the amount of work done, such as per trip or per load, were two to three times more likely to report taking stay-awake drugs than drivers whose pay was not dependent on the amount of work done. Similarly, drivers who reported fatigue as a major or substantial personal problem were around twice as likely to report taking drugs as drivers who felt that fatigue was no problem or only a minor personal problem. Driving experience was also a significant predictor of reported drug use in both surveys with less experienced drivers being more likely to report taking drugs, although the effect was relatively small.

The opportunity to compare the results of two almost identical surveys made it possible to test the findings of one against the other. It is notable that the same three predictors of drug use were found in both surveys, even though they were seven years apart. Some additional predictors were also found in the first survey, including the amount of pay and the employment status of the driver. Drivers paid less than the award rate of pay were nearly twice as likely to report taking drugs compared to those paid at least the award rate, and drivers who were employees of small and medium companies were also twice as likely to report drug taking compared to owner-drivers. In addition, there was some evidence from the first survey of a relationship between reported drug usage and the need to meet a strictly defined arrival time and penalties for failing to meet it, although these effects were not sustained in the multivariate analysis. All of these additional predictors add weight to the conclusion that these external factors play a role in promoting stimulant use while driving in the long distance road transport industry.

There are a number of possible reasons for additional predictors emerging from the first survey. First, the size of the drug user group was larger in the first survey. One-third of drivers reported drug use in the first survey compared to 20 percent of drivers in the second survey. Second, the employment status of drivers differed between surveys with more even distribution of employee drivers across companies of different sizes in the first survey compared to the second survey although the percentage of owner-drivers did not differ. Third, a significant proportion of drivers in the second survey could not report their pay level relative to the award whereas only a relatively small proportion of those in the first survey could not report the status of their pay relative to the award rate. This difference probably reflects the effect of the introduction of enterprise bargaining relationships in workplaces as a result of the 1996 Workplace Relations Act.

The strong association of payment by results, low pay and drug use in Australian long distance truck drivers is consistent with other research suggesting that economic factors are an important influence on health and safety in the workplace. There is evidence from a considerable number of studies of the adverse effects of precarious work on health and safety (Quinlan, Mayhew and Bohle, 2001). Many of these

studies highlight economic demands as one of the factors leading to poorer workplace safety. For example, a study by Rodriguez, Rocha, Khattak and Belzer (2003) examined the influence of economic and occupational factors on crash risk in a large US transport company over a 26 month period and showed that higher pay rates and pay increases were related to lower probability of crashes. Quinlan, Mayhew and Bohle (2001) also make that point that economically vulnerable employers such as small companies may be more likely to encourage work practices that are less safe and to undertake more high-risk activities. In the current study, drug use was more likely for drivers employed by small and medium companies where these companies were also associated with lower pay levels and payment by piece rate.

Combined with evidence from previous studies, the findings of this study lead to the conclusion that external pressures on long distance drivers encourage them to drive longer distances and longer hours despite their level of fatigue and their perceived problems with managing it. This study also showed that drug users reported doing longer hours of work in the last week before the survey and less sleep time in the ten hours leading up to their last trip. When taken together, these results point to the involvement of piece-rate payment and low levels of pay as important external factors that encourage drivers to do more hours of work and obtain less sleep which in turn increases the likelihood of fatigue. Stimulant drug use is a rational, if illegal, approach by long distance drivers to managing this relationship.

It could be pointed out that other strategies are available for long distance drivers to manage fatigue rather than resorting to stimulant drugs. Why are these alternative, legal strategies not used? The previous analysis of these surveys showed that a significant percentage of the drivers who use drugs did so because they found them most helpful strategies for managing their fatigue. In both surveys a significant percentage of the drivers who reported using drugs at least sometimes reported drug use as a most helpful fatigue management method (Williamson, Feyer, Coumarelos and Jenkins, 1992; Williamson, Feyer, Friswell and Finlay-Brown, 2001). Furthermore, the best strategies for dealing with the causes of fatigue, such as sleep and rest are less available to drivers who do the longest hours of work as they have less time available to obtain sufficient sleep and rest. It is notable that drivers who reported using drugs in both surveys were more likely to report using strategies that only have a temporary effect on fatigue and arousal such as caffeine-containing drinks, smoking, having a shower and talking on the CB radio. Never users were more likely to report sleep as rest as most helpful strategies for fatigue management.

If long distance drivers find stimulant use so effective for managing fatigue, it could be argued that they should be allowed to continue to do so. While stimulants seem to make drivers feel better if they attempt to drive while tired, there is evidence that they have negative effects on performance and on crash risk (Logan, 1996). This study also showed that reported drug use was associated with a number of adverse outcomes, including effects on compliance with road rules and regulations and most importantly on driving safety. Drug-using drivers were more likely to report breaking road rules such as driving at above the speed limit and breaking working hours regulations. Drivers who reported drug use were also more likely to report instances of falling asleep while driving, having a near miss and running off the road over the last 12 months compared to drivers who never used drugs. The effects on road safety-related performance are consistent with the findings of Drummer and colleagues (2003) who showed that stimulants were a factor in nearly one-quarter of fatal crashes

involving truck drivers in Australia. Furthermore, stimulant-involvement in these fatal truck crashes increased the odds of the truck driver being responsible for the crash.

It is not clear whether drug use actually increases the risk of the effects on compliance and safety or whether these outcomes stem from the same external factors as increase the likelihood of drug use. The reasons given by the drug-user group of drivers for breaking road rules and working hours regulations are clearly related to the external demands of tight schedules and economic pressures and differ from the reasons given by the never user group. This lends some support to the role of external demands explanation. On the other hand, a significant minority of more frequent drug users reported that the after-effects of drug use as one of the reasons for breaking road rules. Further research is needed to clarify the nature of the relationship between drug use and other adverse driving outcomes.

One of the important findings of this study is the evidence that reported drug use is likely to be a direct response to a need to overcome the effects of fatigue. More drug users reported fatigue as a personal problem and more reported that it occurred often compared to never-users. Drug users were also more likely to report that they managed fatigue badly and that fatigue made their driving worse through poorer gear changing and steering. Even the factors that drivers perceived to contribute to fatigue also differed for drug users compared to never-users. Drug users were more likely than never-users to report the need to load and unload, too little sleep and insufficient rest breaks on trips and the after-effects of drugs as contributors to their fatigue.

Not surprisingly, drug users reported stay-awake drugs as one of the most helpful approaches to managing fatigue. In fact, allowing drug use by prescription and not preventing drug use were the only options that distinguished drug users and never users when asked about a range of potential fatigue management strategies that could be implemented in the future. It seems that drug users clearly see stay awake drugs as an effective strategy for controlling their fatigue. This is an important consideration for attempts to discourage stimulant use in the long distance road transport sector and suggests that focussing on the drug use is likely to be ineffective. The problem of stimulant use is much more likely to be solved through attacking the fatigue problem in this industry.

Both surveys showed a small but significant effect of driving experience on drug use, with drug use more likely amongst younger drivers. Evidence from previous studies of shiftworkers suggests that long-term shiftworkers are a ‘survivor’ population, as individuals who do not tolerate or adapt to it tend to find other employment. Koller, Kundi and Cervinca (1978) showed higher ill-health and other adverse effects in ex-shiftworkers compared to current shiftworkers. It is likely that in the long distance road transport industry drivers who remain in the industry for long periods are better adapted to the rigors of the job, including shiftwork, and are consequently less likely to need to take drugs.

Overall, the results of this study indicate that drug use occurs because of the problem of dealing with fatigue in small part due to lack of experience with dealing with the pressures of driving but more importantly due to the external pressures of remuneration dependent on the amount of work done. The finding of a relationship between drug use and perceived fatigue as a personal problem is not surprising as

drivers who have the biggest problem with fatigue might be expected to need to take drugs. The strong influence of productivity-related payments on drug-use is more surprising, especially as this was a stronger effect than a range of other factors that could have played a role such aspects of the drivers' work-rest schedules. The study results also highlight important information for designing effective interventions to reduce drug use while driving. The finding that the fatigue management strategies that stimulant drug-users report as most helpful are drug related rather than sleep and rest needs to be taken into account in developing appropriate fatigue management interventions. Clearly where remuneration is dependent on work done, sleep and rest are not seen as viable solutions to fatigue problems. Changing the incentives for drivers to encourage fatigue reduction approaches is clearly a primary target.

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A survey of stimulant drug use in long distance truck drivers in NSW

April, 2006

Ann Williamson

NSW Injury Risk Management Research Centre
University of New South Wales

TABLE OF CONTENTS

SUMMARY 55
ACKNOWLEDGEMENTS 56
INTRODUCTION 57
METHOD 58
    Questionnaire 58
    Procedure 58
    Analysis 59
RESULTS 60
    Description of survey participants 60
    Characteristics of drug use for drivers reporting usage in the last five years 63
    Driver attitudes towards drug use 68
    Work characteristics 71
    Relationships between work characteristics and the use of stay-awake drugs 72
    Description of driving and scheduling on last trip for all drivers 75
    Driver strategies used to manage fatigue 78
DISCUSSION 84
REFERENCES 88
APPENDIX A Study Questionnaire 90

SUMMARY

The reanalysis of data from two national surveys of long distance truck drivers demonstrated that the main predictors of stimulant drug use in this occupational group were problems in managing fatigue and external pressures on drivers to extend their work time by productivity-based remuneration systems. The purpose of this survey was to update and extend the findings of the reanalysis to look in more depth at stimulant drug use and its effects. The survey involved 196 long distance truck drivers who completed and returned an anonymous questionnaire that was distributed at nine truck stops within 200kms of Sydney between August and October, 2005. The total return rate was just over 20 percent, comprising 168 self-administered questionnaires and 28 interviews from 973 questionnaires distributed. The results showed that more than half of the participants had experience of stimulant use at some stage in their driving career, just over one-quarter of drivers had used stimulants at some stage in the last six months and one in five currently used them at least sometimes to manage fatigue. These results are very similar to the prevalence of stimulant drug use by truck drivers seen in the last national survey. Also similar to the last national survey, drivers judged sleep and stimulants as the two most helpful strategies that they used to manage their fatigue.

Contrary to a previous study of West Australian truck drivers which found that appetite suppressants were the most common stimulant drug used and were accessed through doctors prescriptions and pharmacies, the majority of drivers in the current study used speed or amphetamine-related stimulants and obtained them through informal means, such as through friends or at truck stops. This may reflect greater access to illicit forms of stimulants, a recent trend that has been noted in other community groups. There was limited evidence of serious health effects of stimulant drug use by these drivers, although the health complaints reported were consistent with known effects of amphetamines, including mood changes and dental problems. Compared to population studies of self-assessed health status for a similar age group, however, these drivers were significantly less likely to report that their health was excellent, even though most reported that they had good to very good health.

The results were also consistent with the findings regarding predictors of stimulant use that emerged from the reanalysis of the national surveys. Long distance drivers who used stimulants experienced fatigue more often and earlier in the trip and rated their ability to manage fatigue lower than drivers who never use stimulants. Stimulant users also did longer hours work per week and were more likely to be remunerated on a productivity basis than never users. This study has clearly reinforced the findings of the previous one. It shows that stimulant use is a persisting characteristic of the long distance road transport industry and that the reasons for stimulant use have remained the same. Clearly, targets for reducing the need for stimulants by long distance truck drivers should focus on reducing their fatigue experience, but approaches for achieving this must involve reducing the amount of work done by many drivers and removing the external pressures on drivers that encourage high workloads through linking them with remuneration.

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INTRODUCTION

The previous study analysed data collected at two earlier times and found confirmatory evidence of drug use among long distance truck drivers. The study findings provide some evidence about the extent of usage of stay-awake drugs in the industry and about factors that increase their use by long distance truck drivers. The study did not, however, address the reasons for individual drivers using stay awake drugs nor look at the effects of these drugs on health and safety. In addition, the two earlier surveys that were used in the previous study were conducted some time ago, with the first survey conducted in 1991 and the second in 1998. While the analysis of the results of each survey showed very similar findings and many aspects of the task of long haul truck drivers will have remained the same over this period, it would be useful to update the evidence to the present time. The objective of the second part of this project therefore is to add depth to our understanding of the factors that promote drug use in the long distance road transport industry and to extend the findings of the first study.

Previous research on drug use on Australian roads has linked truck drivers and stimulant use. Drummer, Gerostamoulos, Batziris et al. (2003), for example, showed that stimulants were detected in only 4.1% of all drivers in road traffic crashes in Victoria, NSW and Western Australia, but in 23% of truck drivers. A study by Longo, Hunter, Lokan et al (2000) of crashes in South Australia added more information by showing that while a smaller proportion of truck drivers involved in crashes tested positive for drugs than in the Drummer et al. study, alcohol and stimulant use were the main types of drugs detected. Neither of these studies provide details of how or why stimulant drugs are used by long distance truck drivers in Australia, and provide no information about drivers who are not involved in crashes. This is important as stimulant use may have health effects as well as effects on driving performance that might impair safe driving. The only study to look in depth at the types of drugs used by long distance truck drivers who were not involved in crashes was by Mabbott and Hartley (1999). This study of Western Australian truck drivers showed that interstate drivers were more likely to use prescription and illicit stimulants to combat fatigue while drivers working within the state reported using over the counter stimulants. Prescription drugs used by drivers were mainly appetite suppressants and amphetamine was the main illicit drug used for fatigue management. Over the counter stimulants reported were mainly caffeine tablets, pseudoephedrine from cough medicines and herbal medicines. This study also looked at the drivers' knowledge of the side-effects of the use of stimulants and found a very low level of understanding of the effects of these drugs, although drivers with greater exposure to prescription or illicit drug-use, whether they actually reported taking them or not, were more aware of their side-effects. No information was collected in this study, however, on actual effects of stimulants on drivers who used them.

The second study in this project, therefore, aims to add to existing knowledge of the effects of stimulant use in truck drivers by focusing in particular on long distance truck driver experiences of drug use, including why they use drugs, what drugs are use and how they use them, as well as their effects on health and safety.

METHOD

Questionnaire

The questionnaire developed for this survey included a range of items covering the following items. The questionnaire was anonymous and took about 20 minutes to complete.
(a) Demographics and Characteristics of working arrangements: age, experience as heavy vehicle driver, employment status (employee or owner operator or owner driver), size of company,
(b) Fatigue related: frequency of fatigue while driving, time into trip when fatigue experienced, personal ability to manage fatigue, strategies used to manage fatigue
(c) Epworth sleepiness scale (Johns, 1991)
(d) Details of last trip: hours worked, length of trip, distance covered, activities in the 10 hours before the trip, experience of fatigue on last trip, experience of set schedule, remuneration arrangements
(e) Attitudes and experiences of use of stay-awake drugs in the industry: perceived frequency of use, reasons for use, whether they should be allowed and under what conditions
(f) Personal experience of stay-awake drug taking: experience ever, experience in last five years, reasons for personal use, patterns, nature and reasons for use in the last five years, after-effects of use, safety-related experiences associated with stay-awake drug use, -health-related experience associated with stay-awake drug use, dependence on stay-awake drug use.

The questions on demographics and working arrangements, details of last trip and fatigue were similar to those used in previous surveys of long distance truck drivers (Williamson, Feyer, Coumarelos and Jenkins, 1992; Williamson, Feyer, Friwell and Sadural, 2001)

Ethical approval to conduct the survey was obtained from the University of New South Wales Human Ethics Committee on 20th September, 2005 (HREC 05060).

Procedure

Long distance truck drivers were recruited at nine truck stops in the Sydney region and within around 200 kilometers. This included two stops on the F3 (one in either direction at Wyong), three stops on the Hume Highway (north and southbound at Pheasants Nest and Goulburn), one stop in the Blue Mountains (Mt Victoria) and three stops in the Western Sydney area (Yagoona, Greenacre and Glenfield). The truck stops were situated on many of the major highway routes for long distance freight in NSW. At each truck stop the purpose of the survey was explained to drivers who were visiting the truck stop and they were invited to participate. The questionnaire was designed to be self-administered so if the driver agreed to participate, he was handed a copy of the questionnaire with a reply-paid envelope attached. Drivers were told to place the questionnaire in the envelope when completed and post it back to the University. For a small sample of drivers who preferred to do so, the questionnaire was completed by interview.

Analysis

The analysis involved two main comparisons. The first involved analysis of the effects of drug use by comparing ever drug users with never drug users. The second involved an analysis of the effects of recency of drug use by comparing drivers who had used stay awake drugs over the last 6 months with drivers who had ever used drugs, but not over the last six months. Chi square tests, odds ratios and t-tests were used to examine differences between groups.

RESULTS

In all, 1,141 drivers were approached and invited to take part in the survey (see Table 1). In total 85.3 percent of drivers accepted the invitation and took the survey materials away to complete in their own time. A further 28 drivers were interviewed at the time they accepted the invitation to participate. Only 168 drivers declined to participate when approached (14.7% refusal rate). Overall just over 20 percent of the distributed questionnaires were returned completed.

Table 1: Number of survey acceptances and percentage response rates for self-administered surveys and interviews.

Outcome	n (%)
Total approaches	**1141 (100)**
Total Acceptances	**973 (85.3)**
Self-administered returns	***168***
Interview returns	***28***
Total returns (based on acceptances)	**196 (20.1)**
***one case excluded due to low kms/wk**	**195**

The data analysis focused on two main comparisons. The first looked at drug use and compared drivers with experience of stay awake drug use while driving with drivers who reported that they had never used drugs. The second looked at recency of drug use of drug use by comparing drivers who reported using stay awake drugs in the last six months with those who had ever used these drugs in the past. Table 2 shows the distribution of responses to the drug use questions. Just over half of driver participants reported using stay awake drugs at some time in the past, with around one-third reporting using drugs in the last five years. Of the drug user group, nearly half reported using in the last six months (recent usage).

Table 2: Reported drug use by participant drivers.

Drug use characteristic:	n (%)	n %
• **Total respondents**	**193 (100.0)**	
• **Never used**	**90 (46.6)**	
• **Ever used**	**103 (53.4)**	**103 (100.0)**
o **Used in last 5 yrs**	**62 (32.1)**	**62 (62.2)**
o **Recency of use:**		
– **Last six months (recent)**		**49 (47.6)**
– **Six months or more (non-recent)**		**54 (52.4)**

Description of survey participants

Personal characteristics

Table 3 presents the mean age and years of experience of drivers across the drug use and recency of use categories. The age and driving experience of drivers participating in this survey varied considerably. While the age of drivers and years of driving

experience for ever drug users did not differ significantly from the never user group, drivers who had used drugs in the last five years were significantly younger than the drivers who had never used drugs ($t_{(188)}$=4.3, p<0.001) and had shorter experience of driving ($t_{(186)}$=2.1, p<0.03). Drivers with very recent experience of drugs in the past six months were also significantly younger than non-recent users ($t_{(100)}$=3.69, p<0.001) and had fewer years of experience in the industry ($t_{(99)}$=3.56, p<0.01).

Table 3: Mean (range) age and driving experience in the long distance transport industry for all drivers, ever and never drug users and for drug users with recent and less recent experience.

		Drug use			Recency of use	
	Total n=194	**Ever used (n=101)**	**Used in past 5 years n=60**	**Never used n=92**	**Last 6 mths n=49**	**Non-recent n=53**
• Age	42.97 (22-73)	41.72 (22-62)	38.68 (22-58)	44.22 (23-73)	38.41 (22-58)	44.80 (26-42)
• Driving experience	19.22 (1-53)	19.33 (1-44)	16.85 (1-40)	18.74 (2-53)	15.93 (1-32)	22.49 (6-44)

Table 4 shows the drivers responses for the Epworth Sleepiness Scale. Mean Epworth scores for drivers who never used drugs did not differ significantly from drivers who had ever used drugs ($t_{(185)}$=1.56, ns), nor did recent users differ from non-recent users used ($t_{(98)}$=1.05, ns). All groups showed very similar patterns of the main situations in which they were reportedly most sleepy. The majority of drivers in each group reported a moderate to high probability of sleeping when lying down to rest in the afternoon and when watching television. Epworth Sleepiness scores were also compared for these drivers with normal daytime sleepiness and those defined as showing excessive sleepiness. For this comparison a cut-off score of 10 or less was defined as normal, scores of 11 to 15 defined as moderate risk of daytime sleepiness and 16 or above defined as high risk of daytime sleepiness (maximum total score is 24) (Johns, 1991). The results show that overall nearly three-quarters of study participants had Epworth scores in the normal range, and only a very small percentage had high risk sleepiness scores. There was also no relationship between experience of drug use and sleepiness scores. A slightly higher percentage of drivers with recent drug use had high risk sleepiness scores compared to drivers with less recent drug use experience, however this difference was not statistically significant.

Table 4: Epworth Sleepiness Scores for ever and never drug users and for drug users with recent and less recent experience.

	Total	Drug use		Recency of use	
		Ever used	Never used	Recent	Non-recent
Mean (SD) Epworth score (/24)	**n= 189**	**n=100**	**n=87**	**n=48**	**n=52**
	8.28 (4.19)	8.69 (4.17)	7.72 (4.12)	9.15 (4.71)	8.27 (3.60)
Moderate-high rating by item (%)	**n=195**	**n=103**	**n=90**	**n=49**	**n=54**
• Sitting and reading	39.7	39.8	38.2	44.9	35.2
• Watching TV	57.2	60.2	53.9	65.3	55.6
• Sitting inactive in a public place	21.1	22.5	18.9	22.9	22.2
• Passenger in a car for one hour	31.1	36.3	24.7	40.8	32.1
• Lying down to rest in the afternoon	81.5	86.4	75.6	87.8	85.2
• Sitting and talking to someone	5.2	3.9	5.6	2.0	5.6
• Sitting after lunch without alcohol	21.2	23.5	18.0	24.5	22.2
• In a car while stopped in traffic	3.6	3.9	3.3	4.1	3.7
Categorisation of Epworth scores (%)	**n=189**	**n=99**	**n=88**	**n=48**	**n=52**
• Normal (≤10)	72.8	75.8	75.0	68.8	80.8
• Moderate risk of sleepiness (11-15)	19.0	19.2	19.3	20.8	19.0
• High risk sleepiness (≥16)	5.8	5.1	5.7	10.4	1.9

Table 5 shows the frequency of experiencing fatigue, time before fatigue onset, and self-rated ability to manage fatigue across the drug use and recency of use categories. Overall, around 40 percent of drivers reported experiencing fatigue on at least half of their trips. Notably, one-quarter of drivers reported experiencing fatigue on most to every trip. There were differences between drug users and non-drug users in fatigue experience. Ever users were statistically significantly more likely than non-users to report fatigue experiences on about half or more of their trips, and less likely to report never or rarely experiencing fatigue ($\chi^2_{(3)}$=23.35, p<0.001). Drivers with recent experience of drug use, however, were not more likely to report experiencing fatigue more frequently than those with less recent experience ($\chi^2_{(3)}$=2.65, ns).

On average, drivers reported they usually experienced fatigue within eight to nine hours into their trips, although a significant minority reported that they typically experienced fatigue within the first five hours. Mean hours to fatigue onset was not statistically significantly different for ever and never drug users, but analysis of the distribution of sleep onset reports showed that drivers who had ever used drugs were statistically significantly less likely to report the longest fatigue onset periods of 10 hours or more ($\chi^2_{(2)}$=7.56, p=0.023). Drivers with the most recent experience of drug use were not statistically significantly different from those with less recent drug use in terms of the mean hours to fatigue onset or the distribution of their reports of hours to fatigue onset.

More than half of study participants reported that their ability to manage fatigue was very good or excellent. Drivers who reported stay-awake drug use, however, were more likely to rate their fatigue management ability as lower than drivers who had

never used stay-awake drugs. Ever users comprised a larger proportion of respondents who rated their ability as average or below and a smaller proportion of drivers who rated their fatigue management ability as excellent ($\chi^2_{(3)}$=13.83, p<0.003). Similarly, drivers with most recent experience of drug use were less likely than less recent users to report excellent or very good fatigue management ability, although this finding did not reach statistical significance ($\chi^2_{(3)}$=7.72, p<0.052).

Table 5: Fatigue experiences for all drivers, ever and never drug users and for drug users with recent and less recent experience.

	Total (%)	Drug use		Recency of use	
		Ever used (%)	Never used (%)	Recent (%)	Non-recent (%)
Fatigue frequency	**n=193**	**n=101**	**n=90**	**n=48**	**n=53**
Most to every trip	25.9	28.7	22.2	35.4	22.6
About half trips	15.0	21.8	7.8	22.9	20.8
Occasionally	40.4	42.6	37.8	35.4	49.1
Never to rarely	18.7	6.9	32.2	6.3	7.5
Mean (SD) hrs to fatigue onset	**n=172**	**n=88**	**n=82**	**n=44**	**n=44**
	8.73 (4.55)	8.31 (3.91)	9.07 (5.08)	7.68 (3.82)	8.94 (3.95)
<5 hrs	22.7	20.5	25.6	25.0	15.9
5-10 hrs	43.6	53.4	32.9	52.3	54.5
>10hrs	33.7	26.1	41.5	22.7	29.5
Ability to manage fatigue	**n=193**	**n=101**	**n=90**	**n=48**	**n=53**
Excellent	22.8	13.9	31.1	8.3	18.9
Very good	38.9	36.6	42.2	31.3	41.5
Good	28.0	34.7	21.1	47.9	22.6
Average or below	10.4	14.9	5.6	12.5	17.0

Characteristics of drug use for drivers reporting usage in the last five years

Analysis of the characteristics of drivers who reported using stay awake drugs in the last five years shows that slightly less than half of these drivers reported using drugs on half of their trips or more (see Table 6). Two-thirds of these drivers reported using speed or amphetamines and a small proportion reported using over-the-counter stay-awake drugs. The most common times that the drugs were used was, not surprisingly, when they were most likely to be needed, between midnight and dawn, although one-third of drivers reported using them earlier than the circadian downturn, during the evening period. It is possible that drugs were being used at this stage to prevent the effects of fatigue likely to occur later in the evening. In the main, these drugs were obtained by non-conventional means, including from friends or at truck stops. Only around one in five drivers reported obtaining stay awake drugs by prescription or over the counter. Interestingly, though, only one driver reported obtaining the drug from his employer.

The majority of drivers reported that the drugs lasted for between three and nine hours. Around half felt that when the effects of the stay awake drugs wore off their fatigue

level was about the same as before they took the drug, although more than one-third reported that their fatigue level was worse. Only a small percentage of drivers felt that their fatigue level was lower when the effects of the drug wore off. In addition, most drivers reported that they did not use other drugs to help them sleep.

Table 6: Frequency, reasons for use, type of drug use and duration and after-effects of drug use for drivers reporting having used in the last five years.

	Used in last 5 yrs (%)
Frequency of stay-awake drug use	**n=60**
• All trips	10.0
• Most trips	20.0
• Half trips	11.7
• Less than half trips	23.3
• Rarely	35.0
Stay-awake drug type	**n=56**
• Speed	66.1
• Duromine	5.4
• Speed and duromine	3.6
• Over-the-counter	14.3
• Other	10.7
Time most likely to use drugs	**n=42**
• 0:00 – 5:59	57.8
• 6:00 – 11:59	2.2
• 12:00 – 17:59	6.7
• 18:00 – 23:59	33.3
Means of obtaining stay-awake drugs	**n=57**
• Employer	1.8
• Friend within transport industry	28.1
• Friend outside of work	14.0
• Truck stop	12.3
• Prescription/over-the-counter	22.8
• Dealer	10.5
Duration of effects of stay awake drugs	**n=60**
• 1-3 hrs	8.3
• 3-6 hrs	35.0
• 6-9 hrs	28.3
• 9-12 hrs	16.7
• 12-15 hrs	8.3
• >15 hrs	3.4
Experience of fatigue when effects wear off	**n=61**
• Less fatigue	13.1
• More fatigue	37.7
• About the same level	49.2
Use other drugs to help sleep	**n=59**
• Never	79.7
• Sometimes	15.3
• Often	5.1

Stay-awake drug users and effects on work capacity, safety and health outcomes

Drivers who had experience of stay awake drug use in the past five years were asked a number of questions about the effects of stay awake drugs on aspects of their productivity, safety and health. Nearly half of these drivers reported that they had at some time felt they could not do their job without stay awake drugs (see Table 7). Approaching three-quarters of these drivers felt that taking stay awake drugs when they were tired decreased the likelihood of crashing, with virtually all of the remainder reporting that drugs made no difference to crash risk. Hardly any of the drivers who used drugs in the last five years felt that their crash risk was increased. Despite this, a small minority reported that they had experienced a crash or near miss either when using stay awake drugs or when the drugs effects had worn off. In fact, eight drivers (12.9%) reported having safety-related incidents when using and during the after effects of the drugs.

Table 7: Effects of drugs on work capacity, perceived crash risk and crash experience for drivers with experience of using stay awake drugs in the last five years.

	Used in last five years n (%)
Capacity to do the job relies on stay awake drugs	**n=62**
• Agree	29 (46.8)
• Disagree	33 (53.2)
Perceived effect of stay awake drugs on chance of crashing	**n=60**
• Increased likelihood	3 (5.0)
• Decreased likelihood	43 (71.7)
• No difference	14 (23.3)
Experience of accident related to stay awake drug use	**n=62**
• Crash or near miss when using stay awake drugs	8 (12.9)
• Crash or near miss when experiencing after effects of stay awake drugs	8 (12.9)

Most drivers reported good to excellent health, although nine drivers (14.5%) reported a health problem related to drug use (see Table 8). These problems mainly related to mood state and dental problems. In the majority of cases drivers dealt with the problem themselves and did not seek professional medical assistance. The National Health Survey provides the opportunity to compare the results from this survey with those of a national survey of self-assessed health status. For this comparison the distribution of self-assessed health status for NSW males in the 25 to 44 years age range was used to compare with the study sample of drivers with drug use experience in the last five years using a Chi-square analysis. As shown in Table 8 study participants who had used drugs in the last five years were significantly less likely than the national health survey sample to report their health as excellent ($\chi^2_{(3)}=9.93$, $p<0.019$).

Table 8: Self-reported health outcomes for drivers reporting drug use in the past five years.

	Used in last five years n. (%)	Self-assessed health status 25-44 yrs from National Health Survey, NSW - 2004-2005 (%)
Status of health	**n=62**	
• Excellent	6 (9.7)	19.7
• Very good	27 (43.5)	39.8
• Good	24 (38.7)	28.8
• Fair/Poor	5 (8.1)	11.7
Health problems associated with drug use	**n=9**	
• Mood problems	3 (33.3)	
• Dental problems	3 (33.3)	
• Other	3 (33.3)	
How the problem has been dealt with	**n=9[#]**	
• Tried to deal with it myself	6 (66.7)	
• Sought advice from friends	2 (22.2)	
• Visited Doctor or GP	3 (33.3)	
• Other	1 (11.1)	

[#] more than one alternative allowed

Reasons for drug use or non-use

As can be seen from Table 9, study participants' reasons for using stay-awake drugs fell mainly under the umbrella of fatigue-related issues such as combating fatigue and avoiding sleep while driving. Relatively smaller proportions of drivers specified productivity-related reasons. Analysis of the differences between recent and non-recent drug users showed no statistically significant differences for any of the reasons.

Table 9: Reasons for using stay-awake drugs for ever users and recent and less recent users.

Reason	Ever used (%) n=102	Used in last 5 yrs (%) n=62	Recency	
			Recent (%) n=49	Non-recent (%) n=53
Fatigue-related reasons				
• Combat fatigue	65.7	72.6	73.5	58.5
• To avoid falling asleep while driving	69.6	67.7	69.4	69.8
• Very long trip	29.4	21.0	22.4	35.8
• To avoid accidents	37.3	41.9	46.9	28.3
Productivity-related reasons				
• Time pressures	30.4	25.8	26.5	34.0
• To earn more money	14.7	9.7	12.2	17.0
• Fear of losing job	11.8	9.7	12.2	11.3

Drivers who reported never using stay-awake drugs were asked to indicate their reasons for not using stay awake drugs (see Table 10). Most never users responded that they did not use stay-awake drugs as they did not need them. Negative side effects or after effects of stay awake drugs and not wanting to break the law were cited by around one-third of drivers as reasons for not using stay-awake drugs. Only a small proportion of drivers indicated economic concerns or fear of being caught by the authorities as reasons for not using stay-awake drugs.

Table 10: Reasons reported by never drug users for not using stay-awake drugs.

Reason	Never used (%) n=89
• Don't need them	88.8
• Too expensive	14.8
• Difficult to obtain	8.0
• Side effects/after effects	35.2
• Fear of being caught by authorities	14.8
• Don't want to break law	36.0

Experience of amphetamine use

As speed or amphetamines was the most common stay awake drug reported, further analysis was conducted on the characteristics of its use (see Table 11). Fifty percent of the drivers who reported using speed reported using it on at least half of their trips. The main means of administration was by swallowing, followed by inhalation and mixing with drinks. There was considerable variation in the reported length of effectiveness of speed, with well over one-third of drivers reporting that it lasted only between three and six hours, but a further one-fifth of drivers reporting effectiveness up to 12 hours. The majority of drivers gave the same reason for using speed. More than three-quarters reported that reason for using speed was its effectiveness. Ease of obtaining and administration were also reported as reasons by a significant minority of drivers.

Table11: Details of speed use for drivers reporting usage in the last five years.

	Used in last 5 yrs (%) n=37
Frequency of speed use	
• All trips	16.7
• Most trips	22.2
• Half trips	11.1
• Less than half trips	27.8
• Rarely	22.2
Means of administering speed	
• Swallow	64.9
• Smoke	8.1
• Inhale (snort)	45.9
• Injection	13.5
• Mix in drink	40.5
Length of drug effectiveness	
• 1-3 hrs	5.6
• 3-6 hrs	38.9
• 6-9 hrs	22.2
• 9-12 hrs	19.4
• 12-15 hrs	11.1
• >15 hrs	2.8
Reason for using speed	
• Cost effective	5.4
• Easy to obtain	32.4
• Fewer side effects	24.3
• More effective	78.4
• Easy to administer	29.7

Driver attitudes towards drug use

Drivers were asked to estimate the percentage of drivers in the long distance road transport industry that they think use stay awake drugs. As shown in Table 12 there was a great variation in the participant responses, with estimates ranging from less than 10 percent to more than 50 percent. The drivers' judgements varied significantly according to their own drug use experience. Drivers who used stay-awake drugs were much more likely to report that drug use is common than drivers who never used drugs ($\chi^2_{(3)}$=15.73, p=0.001). This effect was even stronger for drivers with the most recent use of drugs. Compared to non-recent users, recent drug users were much more likely to give higher estimates than non-recent users ($\chi^2_{(3)}$=30.80, p=0.001).

Table 12: Participant estimate of the percentage of drivers using stay-awake drugs.

Estimate	Total (%) n=168	Drug use		Recency of use	
		Ever used (%) n=93	Never used (%) n=73	Recent (%) n=46	Non-recent (%) n=47
• 10% or less	31.5	22.6	41.1	8.7	36.2
• 11% to 30%	30.4	25.8	37.0	17.4	34.0
• 31% to 50%	14.9	19.4	9.6	15.2	23.4
• over 50%	23.2	32.3	12.3	58.7	6.4

Similar differences between drug user and never user drivers were seen in responses to the question about whether or not stay awake drugs should be allowed in the industry (see Table 13). Overall, 40% of drivers said that stay-awake drugs should be allowed in the long distance transport industry. For ever users, however, about two thirds answered in the affirmative to the question "Should stay-awake drugs be allowed in the long distance transport industry?" compared with only a handful of never users (12%) ($\chi^2_{(1)}$=54.28, p=0.001). Strong associations were also found between support for permitting stay-awake drug use and recency of drug use ($\chi^2_{(1)}$=24.52, p=<=0.001) with nearly all of the drivers who reported using drugs in the last six months reporting that they should be allowed.

Table 13: Driver opinion on whether stay-awake drugs should be allowed in the industry.

Stay-awake drugs allowed?	Total (%) n=190	Drug use		Recency of use	
		Ever used (%) n=100	Never used (%) n=89	Recent (%) n=48	Non-recent (%) n=52
YES	40.0	65.0	12.4	89.6	42.3
NO	60.0	35.0	87.6	10.4	57.7

Perceptions of reasons for drug use by other drivers

All study participants were asked for their views about why drivers use drugs in the long distance road transport industry. Participants' views of the reasons for other drivers using stay awake drugs differed greatly from their personal reasons (see Table 14). Drivers' perceptions of why other drivers use drugs included a much broader range of reasons than they reported for themselves. Although the main reasons given by drivers for their own drug use related to attempting to control fatigue and its effects, they perceived that other drivers also used them for productivity-related reasons such as to deal with time pressures, for fear of losing their job and to a lesser extent, to earn more money.

Table 14: Comparison of the reasons for personal drug use and the perceived reasons for use by other drivers

Reason	Reasons for personal use for drivers who have Ever used drugs (%) n=102	Why other drivers use drugs according to ever drug users (%) n= 99		
		True	False	Don't know
Fatigue-related reasons				
• To combat fatigue	65.7	89.5	4.2	6.3
• To avoid falling asleep	69.6	96.9	1.0	2.1
• Very long trip	29.4			
• To avoid accidents	37.3	68.1	25.3	6.6
Productivity-related reasons				
• Time pressures	30.4	81.5	13.0	5.4
• To earn more money	14.7	58.9	28.9	12.2
• Fear of losing job	11.8	70.8	19.1	10.1

Perceptions of the reasons for use of stay awake drugs within the long distance road transport industry also differed between drivers with experience of drug use and those without (see Table 15). While the majority of drivers from both groups reported that other drivers use drugs to combat fatigue and the potential for falling asleep while driving, significantly more drivers with experience of drug use reported avoiding accidents as a reason ($\chi^2_{(1)}$=8.4, p=0.004) and significantly fewer reported the need to earn more money as reasons ($\chi^2_{(1)}$=7.71p=0.005). The same effect was seen for recency of drug use. Again while most drivers from both recent and non-recent users felt that combating fatigue and falling asleep at the wheel were reasons for other drivers taking stay awake drugs, significantly more recent users reported avoidance of accidents ($\chi^2_{(1)}$=19.7p<0.001) and significantly fewer recent users reported earning money as motivators for other drivers to use drugs ($\chi^2_{(1)}$=5.23, p=0.02).

Table 15: Comparison of the perceptions of drug users and non-users of the reasons for other drivers' drug use

	Drug use		Recency of drug use	
	Ever users (%) n=97	Never users (%) n=85	Recent users (%) n=45	Non-recent users (%) n=51
Fatigue-related reasons				
• To combat fatigue	89.5	88.0	95.6	84.3
• To avoid falling asleep while driving	96.9	89.3	100.0	94.1
• To avoid accidents	68.1	46.3	90.9	47.9
Productivity-related reasons				
• Time pressures	81.5	85.9	79.5	83.7
• To earn more money	58.9	78.8	46.3	70.0
• To avoid losing job	70.8	64.6	70.5	71.7

Work characteristics

Employment information provided by surveyed drivers is presented in Table 16. Employee drivers accounted for the majority of survey respondents, with smaller numbers observed for owner operators and owner drivers. Employee drivers were fairly evenly distributed across companies ranging in size from fewer than 5 trucks to more than 50 trucks. Just over half of owner operators (55.5%) owned one or two trucks and only a small percentage operated five or more trucks (11.1%). The majority of owner operators said they acted as prime contractors (62.5%), but one quarter were freelance subcontractors (25%). Analysis of the relationships between drug use and recency of drug use and employment type showed that drug use was as common amongst employee as owner operators/owner drivers. Within the group of employee drivers, size of company was also not related to the likelihood of drug use.

Table 16: Patterns of drug use and recency of drug use by driver employment type.

	Total (%)	Drug use		Recency	
		Ever used (%)	Never used (%)	Recent (%)	Non-recent (%)
Employment type	**n=193**	**n=102**	**n=89**	**n=49**	**n=53**
• Employee driver	85.0	84.3	86.5	85.7	83.0
• Owner operator	11.4	4.9	4.5	2.0	7.5
• Owner driver	4.7	10.8	11.2	10.2	11.3
Employer fleet size	**n=161**	**n=85**	**n=75**	**n=42**	**n=43**
• <5 trucks	19.3	16.5	22.7	19.0	14.0
• 5-10 trucks	26.1	23.5	29.3	14.3	32.6
• 11-50 trucks	30.4	34.1	25.3	40.5	27.9
• >50 trucks	24.2	25.9	22.7	26.2	25.6

Relationships between work characteristics and the use of stay-awake drugs

As can be seen from Table 17, the majority of drivers who participated in the survey were renumerated according to kilometres covered or tonnage carried per trip, with fewer drivers receiving an hourly rate of pay. The majority of drivers surveyed were paid the award rate or above and only a small percentage of participants reported having to negotiate rates for each load. Furthermore, more than one-third of participants reported having an ongoing contract for all of their loads.

Analysis of the relationship between payment characteristics and drug use showed that a greater proportion of drivers who used drugs reported being paid on a per trip payment type (km/tonne) compared to drivers who never used drugs. When the categories were analysed by comparing trip-based payments and time-based payments (hourly or flat rate schedules) drug users were found to be twice as likely to be paid by trip rates than never users (OR=2.07, CI=1.08-3.97; $\chi^2_{(1)}$=4.82, p=0.028). No such difference was observed, however, between recent drug users and non-recent users. There were no differences between drug users and non-users or between drug users with recent or non-recent experience of use for any of the other payment characteristics.

Table 17: Payment types and arrangements across drug use and recency categories.

Payment characteristics	Total (%)	Drug use		Recency of use	
		Ever used (%)	Never used (%)	Recent (%)	Non-recent (%)
Payment type	**n=191**	**n=100**	**n=89**	**n=47**	**n=53**
• Hourly rate	19.4	13.0	25.8	8.5	17.0
• Daily rate	2.1	0.0	4.5	0.0	0.0
• Weekly rate	7.3	9.0	5.6	10.6	7.5
• Rate per trip (km/tonne)	63.9	71.0	56.2	72.3	69.8
• Pay system other	7.3	7.0	7.9	8.5	5.7
Payment rate	**n=186**	**n=97**	**n=89**	**n=46**	**n=51**
• Less than award	16.1	21.6	10.1	19.6	23.5
• Award level or greater	75.3	72.2	78.7	73.9	70.6
• Don't know	8.6	6.2	11.2	6.5	5.9
Negotiate each load	**n=186**	**n=99**	**n=87**	**n=46**	**n=53**
• Negotiated	5.4	7.1	3.4	6.5	7.5
• Not negotiated	94.6	92.9	96.6	93.5	92.5
Ongoing contract	**n=159**	**n=87**	**n=72**	**n=43**	**n=44**
• For all loads	37.7	37.9	37.5	39.5	36.4
• For some loads	9.4	10.3	8.3	11.6	9.1
• None	52.8	51.7	54.2	48.8	54.5

As shown in Table 18 driver participants reported working long hours each week on average, although there was considerable range in the hours reported (3.5 to 144 hours per week). Most noteworthy, however, is the finding that around 30 percent of participants reported working more than 72 hours in a usual week, which is longer than the regulated hours for this industry. Consistent with the finding of long hours for a large proportion of study participants is the finding that many covered long distances each week. Around half of the drivers reported doing more than 4,000 kilometres per week.

There was a significant relationship between use of stay awake drugs and the hours and distances usually worked. Drivers who reported drug use worked, on average, 6.35 hours longer per week than drivers who reported non-use ($t_{(178)}=2.07$, $p<0.04$). Drivers who reported drug usage also covered significantly greater distances than non-users with, on average, 657 more kilometres travelled over a usual week ($t_{(180)}=2.76$, $p=0.006$). Closer inspection of the differences between the two groups in kilometres covered shows that drivers with experience of drug use were considerably more likely to report doing more than 5000 kms during the course of a usual week and less likely to report shorter trips of less than 3000kms, compared to non-users ($\chi^2_{(3)}=12.09$, $p=0.007$). There was no relationship between hours worked or distance travelled each week and recency of drug use.

Table 18: Details of usual driving hours and distances covered per week for drug use and recency of use categories.

	Total n=184	Drug use		Recency of use	
		Ever used n=95	Never used n=85	Recent n=45	Non-recent n=50
Mean (SD) hrs per wk	68.5 (20.7)	71.4 (23.4)	65.0 (16.7)	73.4 (27.0)	69.5 (19.6)
Mean (SD) kms per wk	4152.5 (1506.7)	4433.66 (1585.61)	3823.53 (1364.92)	4575.63 (1761.80)	4294.59 (1396.12)
• <3000kms (%)	18.5	19.8	33.7	16.7	16.3
• 3000-4000kms (%)	32.1	20.8	27.9	22.9	26.5
• 4000-5000kms (%)	32.6	34.4	30.2	29.2	38.8
• >5000kms (%)	16.8	25.0	8.1	31.3	18.4

Just over half of the participating drivers reported that they had an estimated time of arrival (ETA), with most being within a specified hour, but relatively few reported that they were penalised for failure to meet the ETA (see Table 19). Comparison of drivers who had experience of drug use and those who did not showed a nonsignificant trend for ever drug using drivers to be more likely to have an ETA ($\chi^2_{(1)}$=3.52, p=0.061, and to have penalties imposed for not meeting their ETA ($\chi^2_{(1)}$=3.42, p=0.064), although both groups were equally likely to have a tight ETA of within a specific hour. There were similar differences between recent and non-recent drug users but these were not statistically significantly different.

Table 19: Experiences of Estimated Time of Arrival (ETA) for all drivers and for drivers with and without drug use experience, both recent and non-recent.

ETA variable	Total (%)	Drug use		Recent	
		Ever used (%)	Never used (%)	Recent (%)	Non-recent (%)
ETA	**n=194**	**n=103**	**n=89**	**n=49**	**n=54**
• ETA	58.8	65.0	51.7	71.4	59.3
• No ETA	41.2	35.0	48.3	28.6	40.7
ETA specificity	**n=112**	**n=65**	**n=46**	**n=34**	**n=41**
• Within hour	60.7	63.1	58.7	67.6	58.1
• Within part of day	29.5	26.2	32.6	20.6	32.3
• Within day	9.8	10.8	8.7	11.8	9.7
ETA penalties	**n=115**	**n=67**	**n=47**	**n=35**	**n=32**
• YES	23.5	29.9	14.9	40.0	18.8
• NO	76.5	70.1	85.1	60.0	81.3

Approaching three-quarters of the study participants reported that their company had a policy against drug use, and about two-thirds of these drivers reported that the policy was enforced (see Table 20). This pattern was different, however for drivers with

experience of drug use compared to never users ($\chi^2_{(1)}$=19.00, p<0.0001). Most drivers with experience of drug use worked in companies with either no policy against drug use or a policy that was not enforced. Drivers who never used stay awake drugs, on the other hand were most likely to have companies with enforced policies against drug use. There was no similar relationship between recency of use of drugs and nature of company policy.

Table 20: Company policy on drug use by driver experience with stay awake drugs and recency of use.

Enforcement	Total (%) n=186	Drug use		Recency of use	
		Ever used (%) n=99	Never used (%) n=87	Recent (%) n=46	Non-recent (%) n=53
• Policy enforced	45.2	31.3	60.9	21.7	39.6
• Policy not enforced	25.3	36.4	12.6	37.0	35.8
• Discourages drug use	15.6	14.1	17.2	15.2	13.2
• Has no policy	9.1	12.1	5.7	17.4	7.5
• Encourages drug use	1.1	1.0	1.1	2.2	0
• Don't know	3.8	5.1	2.3	6.5	3.8

Description of driving and scheduling on last trip for all drivers

Length of last trip information

Study participants were asked a range of questions about their experiences on their last trip. Table 21 shows the results for the length of the last trip for all drivers and for the drug use and recency of use subgroups. Drivers, on average, spent just over 15 hours behind the wheel during the last trip but there was a large variation in driving time. The majority of drivers spent less than 12 hours driving and over one quarter spent between 12 and 30 hours behind the wheel. A handful of drivers reported considerably longer driving times of more than 30 hours behind the wheel on their last trip. When loading/unloading time was considered, the average last trip length increased to just under 23 hours, indicating that for many drivers a considerable component of total trip length was devoted to tasks other than the primary task of driving. The average kilometres covered on the last trip was around 1395kms with half of the drivers covering between 700 and 1550 kilometres, and fairly equal proportions conducting shorter trips under 700km and longer trips greater than 1500km in length. There were no significant differences between users of stay awake drugs and never users or between drivers with recent experience of drug use and those with less recent experience.

Table 21: Duration and length of last trip by drug use experience and recency of use.

	Total n=176	Drug use		Recency of use	
		Ever used n=97	Never used n=77	Recent n=45	Non-recent n=52
Mean (SD) hrs driving	15.6 (16.5)	14.0 (9.3)	16.7 (21.1)	15.5 (11.5)	12.8 (6.5)
<12 hrs (%)	63.0	61.1	64.5	60.0	62.0
12-30 hrs (%)	28.9	31.6	26.3	26.7	36.0
>30 hrs (%)	8.1	7.4	9.2	13.3	2.0
Mean (SD) trip length (hrs)	22.5 (25.3)	21.9 (22.1)	22.7 (28.4)	28.3 (29.5)	16.2 (9.5)
<12 hrs (%)	31.3	28.3	34.7	23.3	32.7
12-30 hrs (%)	51.8	53.3	50.0	48.8	57.1
>30 hrs (%)	16.9	18.5	15.3	27.9	10.2
Mean (SD) kms	1394.6 (1379.1)	1441.9 (1211.9)	1353.1 (1582.5)	1602.5 (1215.6)	1303.0 (1204.0)
<700 km (%)	23.3	17.5	29.9	15.6	19.2
700-1500 km (%)	51.1	52.6	49.4	46.7	57.7
>1500 km (%)	25.6	29.9	20.8	37.8	23.1

Analysis of the time spent on activities in the ten hour period leading up to their last trip showed that drivers spent on average between five and six hours sleeping, around 30 minutes in loading-related activities and around 25 minutes waiting to load or unload. There were no statistically significant differences in the amount of time spent in any of these activities between drivers with and without drug use experience or between recent and non-recent users (see Table 22).

Table 22: Mean (SD) hours spent on activities reported by drivers during the 10 hours before the start of last trip by drug use experience and recency of use.

Activity	Total n=162	Ever used n=89	Never used n=71	Recent n=40	Non-recent n=49
• Sleeping	5.98 (2.48)	5.86 (2.45)	6.18 (2.46)	5.44 (2.70)	6.20 (2.19)
• Loading/unloading	0.47 (0.89)	0.59 (0.95)	0.32 (0.77)	0.63 (1.11)	0.64 (1.02)
• Waiting to load/unload	0.38 (0.84)	0.44 (0.86)	0.28 (0.78)	0.46 (1.00)	0.41 (0.75)

Table 23 shows details of start time, time to first break and the duration of the first break for drug use and recency groups of drivers . Last trip start times were fairly evenly distributed across the four 6 hour time blocks for all drivers. Just under a quarter of all drivers began their last trip in the early hours of the morning between 12 midnight and 6 am. Over half of the driver participants took their first break between

three to five hours after commencing their last trip. The first break taken was for most drivers half to one hour in length, with fewer drivers taking shorter breaks of less than half an hour or longer breaks of more than one hour. There were no statistically significant differences between drivers with experience of drug use and never users or between recent drug users and non-recent drug users on trip start time or time and length of the first break in the last trip.

Table 23: Start time, time to first break and length of first break on the last trip for drivers with and without drug use experience and for recent and non-recent drug users

		Drug use		Recency of use	
	Total (%) n=147	**Ever used (%) n=71**	**Never used (%) n=75**	**Recent (%) n=30**	**Non-recent (%) n=41**
Start time					
• 00:00 – 05:59	24.5	26.8	22.7	20.0	31.7
• 06:00 – 11:59	29.9	31.0	29.3	23.3	36.6
• 12:00 – 17:59	28.6	23.9	32.0	26.7	22.0
• 18:00 – 23:59	17.0	18.3	16.0	30.0	9.8
Time to first break					
• <3 hrs	25.9	20.0	31.9	18.5	20.5
• 3–5 hrs	58.5	58.5	58.0	59.3	59.0
• >5 hrs	15.6	21.5	10.1	22.2	20.5
Length of first break					
• <0.5 hr	14.1	9.1	19.1	7.4	10.3
• 0.5-1 hr	66.7	66.7	66.2	66.7	66.7
• >1 hr	19.3	24.2	14.7	25.9	23.1

Fatigue experiences on last trip

Table 24 presents participant self reports on the incidence of fatigue and the elapsed time before fatigue onset on their last trip. Close to two thirds of drivers responded in the affirmative to the question "Did you feel fatigue at any stage on your last trip?". For drivers who experienced fatigue, the majority felt fatigue within ten hours or less. On closer inspection it can be seen that most fatigued drivers felt the onset of fatigue between 5 and 10 hours into the last trip, followed by a similar proportion who felt fatigue in under 5 hours. Only a handful of drivers said they did not feel fatigue until more than 10 hours of the trip had elapsed.

Consistent with the earlier findings about the usual fatigue experienced by participants (see above), drivers who used drugs were more likely, than drivers who never used drugs, to report that they experienced fatigue on their last trip ($\chi^2_{(1)}$=12.18, p=0.001). Experienced and never drug users did not differ significantly in the onset of fatigue. A similar pattern of results was observed for the recency of drug use categories. A greater percentage of recent drug users said they experienced fatigue on their last trip than their non-recent counterparts, although this difference was only marginally statistically

significant ($\chi^2_{(1)}$=3.68, p=0.055). Recent and non-recent users also did not differ in the hours to onset of fatigue.

Table 24: Drivers experience of fatigue during last trip by drug use experience and recency of use.

	Total	Drug use		Recency of use	
		Ever used	Never used	Recent	Non-recent
Fatigued on last trip?	**n=193**	**n=100**	**n=91**	**n=48**	**n=53**
YES (%)	60.1	72.0	47.3	81.3	64.2
NO (%)	39.9	28.0	52.7	18.8	35.8
Mean (SD) hrs to fatigue	**n=112**	**n=70**	**n=41**	**n=38**	**n=33**
	6.63	6.21	7.45	5.42	7.12
	(4.06)	(3.87)	(4.34)	(3.52)	(4.10)
<5 (%)	41.1	41.4	29.3	47.4	33.3
5-10 (%)	46.4	48.6	53.7	44.7	54.5
>10 (%)	12.5	10.0	17.1	7.9	12.1

Driver strategies used to manage fatigue

Drivers with experience of taking stay awake drugs in the last five years were asked about their views of effective alternatives to these drugs. As shown in Table 25, around half of the drivers felt that there were effective alternatives with half of these drivers citing more sleep and just over one-third citing reductions in the amount of work and deadlines.

Table 25: Alternatives to drug use for drivers reporting drug use in the past five years

	Used in last five years n (%)
Are there effective alternatives to stay awake drugs?	**n=61**
• Yes	33 (54.1)
• No	28 (45.9)
Alternatives to stay awake drugs	**n=32[#]**
• Sleep-related	16 (50.0)
• Reduce amount of work and deadlines	12 (37.5)
• Improve pay rates	3 (9.4)
• Personal lifestyle-related	5 (15.6)

[#] more than one alternative allowed so percentages do not sum to 100%

Study participants were provided with a list of potential strategies for fatigue management while driving and were asked to indicate which strategies they used, how often they used it and which strategies they found most helpful. The results for all drivers are shown in Table 26. Listening to radio and music, stopping to sleep and having a caffeine drink were the strategies used often by 50 percent or more of drivers, followed fairly closely by stopping to rest and using the CB radio. This group of commonly used strategies, however, were not necessarily viewed as the most helpful by the drivers who used them. Stopping to sleep was judged as the most

helpful strategy by the largest percentage of drivers that used it. Stay awake drugs were the next most helpful strategy for the drivers who used them, followed by stopping to rest.

Table 26: Strategies used to manage fatigue while driving for all driver participants showing frequency of use and percentage of drivers who used each strategy who found it most helpful.

Strategy	How often strategy used n=193				Strategy rated most useful by drivers who used it (% drivers using strategy)[#]
	Often (%)	Sometimes (%)	Rarely (%)	Never (%)	
Stopping to sleep	55.0	29.6	13.2	2.1	74.5
Stopping to rest	41.4	45.2	7.5	5.9	54.5
Stopping for a meal	37.2	37.8	16.5	8.5	39.3
Eating while driving	31.9	33.0	20.2	14.9	22.8
Having a caffeine drink	50.5	25.8	11.6	12.1	37.1
Having a non-caffeine drink	27.6	31.9	18.4	22.2	11.7
Smoking	36.2	9.0	0.5	54.3	36.1
Stay-awake drugs	8.4	12.6	7.9	71.2	57.5
Exercise	8.5	26.6	30.3	34.6	22.9
Taking a shower	22.0	37.2	17.8	23.0	32.7
Talking to another person	13.8	29.3	24.5	32.4	29.3
Listening to music/radio	68.6	18.8	8.9	3.7	40.4
Using the CB radio	41.2	32.6	13.9	12.3	27.3
Singing	17.6	20.9	19.8	41.7	22.9
Adjusting ventilation	33.2	39.4	13.5	14.0	28.1

[#] more than one alternative allowed so percentages do not sum to 100%

Comparison of drivers with drug use experience and those without on their use of alternative strategies for fatigue management (see Table 27) showed very similar use of most strategies by both types of drivers. The only significant differences were that experienced drug users were more likely to use talking to another person ($\chi^2_{(1)}$=4.99, p=0.026) and using the CB radio ($\chi^2_{(1)}$=9.92, p=0.002) than never users.

Table 27: Strategies used by drivers to manage fatigue: comparison of drug users and never users showing number and percentage of drivers who use each strategy and odds ratios and confidence intervals for each comparison.

Strategies used by drivers	Drug use		Odds ratio	95% CI
	Ever used n (%) n=98	Never used n (%) n=88		
Stopping to sleep	97 (98.0)	86 (97.7)	1.1	0.16-8.2
Stopping to rest	93 (95.9)	80 (92.0)	2.03	0.57-7.2
Stopping for a meal	90 (91.8)	80 (90.9)	1.13	0.40-3.14
Eating while driving	83 (84.7)	76 (85.4)	0.95	0.42-2.12
Having a caffeine drink	89 (89.9)	76 (85.4)	1.52	0.63-3.67
Having a non-caffeine drink	71 (74.0)	72 (82.6)	0.59	0.29-1.22
Smoking	49 (50.0)	35 (39.8)	1.5	0.85-2.7
Exercise	66 (67.3)	56 (63.6)	1.18	0.64-2.16
Taking a shower	81 (80.2)	64 (72.7)	1.5	0.78-2.99
Talking to another person	73 (74.5)	52 (59.1)	2.0	1.08-3.77*
Listening to music/radio	98 (98.0)	84 (94.4)	2.92	0.55-15.4
Using the CB radio	92 (94.8)	70 (79.5)	4.7	1.68-13.37**
Singing	52 (53.1)	55 (63.2)	0.66	0.37-1.19
Adjusting ventilation	91 (89.2)	74 (83.1)	1.68	0.73-3.87

* $p<0.01$, **$p<0.001$

As shown in Table 28, analysis of the differences between fatigue management strategies used by recent drug users and non-recent users showed that recent users were significantly less likely to use non-caffeinated drinks ($\chi^2_{(1)}=5.72$, $p=0.017$) and less likely to stop for a meal to manage fatigue ($\chi^2_{(1)}=5.59$, $p=0.018$) compared to non-recent users.

Table 28: Strategies used by drivers to manage fatigue: Comparison of recent and non-recent drug showing number, percentage of drivers who use each strategy and odds ratios and confidence intervals for each comparison.

Strategies used by drivers	Recency of use		Odds ratio	95% CI
	Recent n (%) n=47	Non-recent n (%) n=53		
Stopping to sleep	46 (97.9)	52 (98.1)	0.89	0.05-14.55
Stopping to rest	44 (93.6)	50 (98.0)	0.29	0.03-2.9
Stopping for a meal	40 (85.1)	51 (98.1)	0.11	0.01-0.95*
Eating while driving	40 (85.1)	43 (84.3)	1.1	0.35-3.2
Having a caffeine drink	45 (93.8	44 (84.6)	2.73	0.68-10.96
Having a non-caffeine drink	29 (63.0)	43 (84.3)	0.32	0.12-0.83*
Smoking	27 (56.3)	23 (45.1)	1.57	0.71-3.46
Exercise	34 (72.3)	33 (63.5)	1.51	0.64-3.53
Taking a shower	42 (87.5)	40 (74.1)	2.45	0.86-7.0
Talking to another person	35 (76.1)	39 (73.6)	1.14	0.46-2.8
Listening to music/radio	46 (95.8)	53 (100)	-	-
Using the CB radio	44 (93.6)	49 (96.1)	0.6	0.1-3.75
Singing	27 (57.4)	26 (50.0)	1.35	0.61-2.99
Adjusting ventilation	46 (93.9)	46 (85.2)	2.67	0.66-10.69

* $p<0.02$

The strategies found to be most helpful for experienced and never drug users are shown in Table 29. This analysis shows that the strategies judged to be most helpful for managing fatigue were the same for both types of drivers (apart from drug use) and there were no significant differences between the driver groups in the percentage of drivers reporting each strategy as most helpful. A majority of drivers from both groups reported that stopping to sleep and rest were most helpful for managing fatigue.

Table 29: Strategies used and found most helpful for fatigue management: Comparison of drug users and never-users showing number, percentage of drivers who use each strategy and rate it as most helpful and odds ratios and confidence intervals for each comparison.

Strategies used and found most helpful	Drug use		Odds ratio	95% CI
	Ever used n (%) n=75	Never used n (%) n=73		
Stopping to sleep	49 (69.0)	59 (81.9)	0.49	0.22-1.07
Stopping to rest	35 (51.5)	38 (57.8)	0.77	0.39-1.54
Stopping for a meal	17 (25.4)	23 (34.4)	0.65	0.31-1.38
Eating while driving	14 (22.2)	15 (23.8)	0.91	0.4-2.1
Having a caffeine drink	26 (39.4)	22 (34.4)	1.24	0.61-2.53
Having a non-caffeine drink	6 (11.1)	7 (12.5)	0.88	0.29-2.79
Smoking	15 (42.9)	7 (29.2)	1.82	0.6-5.5
Exercise	13 (24.5)	9 (21.4)	1.19	0.45-3.13
Taking a shower	23 (38.3)	13 (25.5)	1.82	0.80-4.11
Talking to another person	19 (33.9)	10 (24.4)	1.59	0.65-3.9
Listening to music/radio	30 (41.1)	29 (40.8)	1.01	0.52-1.96
Using the CB radio	24 (35.3)	20 (34.5)	1.03	0.5-2.16
Singing	7 (18.9)	12 (27.3)	0.62	0.22-1.53
Adjusting ventilation	21 (31.8)	15 (24.6)	1.43	0.66-3.12

The same analysis of the most helpful fatigue management strategies was also conducted to compare drivers with recent and non-recent experience of drug use (see Table 30). This comparison showed that most recent users were significantly more likely to report that eating while driving ($\chi^2_{(1)}$=4.67, p=0.031) and caffeine-containing drinks ($\chi^2_{(1)}$=5.84, p=0.016) were most helpful fatigue management strategies compared to non-recent users. Again, the majority of drivers in both groups reported sleep and stopping to rest were the most helpful strategies.

Table 30: Strategies used and found most helpful for fatigue management: Comparison of recent and non-recent drug users showing number, percentage of drivers who use each strategy and rate it as most helpful and odds ratios and confidence intervals for each comparison

Strategies used and found most helpful	Recency of use		Odds ratio	95% CI
	Recent n (%) n= 34	Non-recent n (%) n= 41		
Stopping to sleep	19 (61.3)	30 (75.0)	0.53	0.22-1.46
Stopping to rest	19 (63.3)	16 (42.1)	2.37	0.89-6.35
Stopping for a meal	5 (17.9)	12 (30.8)	0.49	0.15-1.6
Eating while driving	10 (34.5)	4 (11.8)	3.95	1.08-14.4*
Having a caffeine drink	17 (54.8)	9 (25.7)	3.51	1.24-9.89*
Having a non-caffeine drink	3 (14.3)	3 (9.1)	1.67	0.30-9.16
Smoking	10 (52.6)	5 (31.3)	2.44	0.61-9.8
Stay-awake drugs	21 (63.6)	2 (33.3)	3.5	0.56-22.03
Exercise	6 (23.1)	7 (25.9)	8.6	0.25-3.0
Taking a shower	13 (44.8)	10 (32.3)	1.71	0.6-4.88
Talking to another person	11 (44.0)	8 (25.8)	2.26	0.73-6.97
Listening to music/radio	14 (42.4)	16 (40.0)	1.11	0.43-2.82
Using the CB radio	14 (45.2)	10 (27.0)	2.22	0.81-6.13
Singing	3 (16.7)	4 (21.1)	0.75	0.14-3.94
Adjusting ventilation	13 (40.6)	8 (23.5)	2.22	0.77-6.42

* $p<0.05$

DISCUSSION

The results of this survey showed that stimulant use is currently reasonably common among long distance truck drivers in NSW. In this survey 21 percent of driver participants reported currently using stay awake drugs at least sometimes. This is very similar to the findings of our previous survey in 1998 using the same question where around 20 percent of drivers reported using drugs at least sometimes (Williamson, et al., 2001). Furthermore, in the current survey an even higher proportion of drivers had past experience of stimulant drug use, with over half reporting having ever used them and half having used drugs in the past six months. It seems, from this survey, that even though many truck drivers are currently not using stimulants, they have done so in the past.

Overall, drivers in this survey had long experience in the long distance road transport industry, but the drivers who had stimulant drug use experience, especially those with recent experience, were younger and less experienced than drivers who had never used drugs. The previous national surveys also demonstrated this effect (Williamson et al., 1992; Williamson, et al., 2001). The most common type of stimulant drug reported by around two-thirds of drug users was amphetamines or related drugs. This was also found by Mabbot and Hartley (1999) for West Australian truck drivers. Around half of the drivers reported using stay awake drugs on at least half of their trips, taking them mainly in periods when they would be expected to be most useful; the midnight to dawn period to help overcome the effects of the circadian trough (Akerstedt and Gillberg, 1982) or the late evening period to prevent the same effects. Drivers reported taking these particular stimulant drugs as they were most effective for managing fatigue and overcoming sleepiness, rather than due to cost factors, a finding also consistent with the Mabbot and Hartley study.

Drugs were accessed mainly through informal means, from friends or at truck stops. This is contrary to the findings of Mabbott and Hartley where more than one-third of West Australian drivers reported accessing drugs through doctors, chemists or illegal prescriptions where the drugs were mainly appetite suppressants. The differences between studies may be because access to the amphetamines that were used most commonly by drivers in the current study is very controlled and consequently not readily available through conventional channels. In the current study very few drivers reported using appetite suppressants (Duromine), for example. Mabbot and Hartley predicted that greater difficulties in obtaining stimulant medications by prescription would increase the need for long distance truck drivers to access them from non-legal sources. This may be the reason for the differences in finding between the two studies. There is evidence of increasing use and apparent availability of amphetamine-related substances in the community in Australia (McKetin, McLaren, Kelly, Hall, Hickman, 2005), making them more readily available to long distance truck drivers.

Around half of the drug users perceived no after-effects of using drugs, and most did not use other drugs to help them sleep. A notable minority of drivers (38%), however, reported that they experienced more fatigue after the effect of the stimulant drugs wore off so the low use of hypnotic drug use is not really surprising. Compared to population data on the self-reported health of similar aged NSW males (ABS, 2006), drug users in this survey were significantly less likely to report their health as excellent although most drug users self-assessed their current health as very good or

good. For the few drug user drivers who reported specific health problems, the problems were consistent with known effects of amphetamines and related drugs. Mood changes are a commonly cited long term effect (Baker and Dawes, 2005). Dental caries have also been reported as common in amphetamine users due to amphetamines causing hyposalivation, the resultant higher use of sugary carbonated drinks and a general lower concern for health commonly seen in amphetamine users (Klasser and Epstein, 2005). Overall, health effects were reported that could be plausibly attributed to stimulant use, but only comparatively few drivers were affected. Similarly, only a small number of drug users reported crashes or near misses due to stimulant use or their after effects.

Drug using drivers in this survey reported that they use drugs because they find them a most helpful for managing fatigue. In fact only sleep had a higher percentage of drivers rating it as a most useful for fatigue management. Half of the drivers who used stimulants reported that they found them most helpful for managing fatigue, nearly half felt that they could not do their job without stay awake drugs and that there was no effective alternative to using them. These findings confirm those of the previous national surveys of long distance truck drivers in Australia (Williamson, et al., 1992; Williamson, et al., 2001). They show that stimulant drug use by truck drivers is linked strongly with the need to manage occupational fatigue. Further support for this interpretation is provided by the drivers' responses to the questions about their reasons for drug use. Whereas never users mainly reported that they didn't use stimulants as they didn't need them, drivers with drug use experience cited reasons relating to fatigue management and avoidance of falling asleep while driving. Comparatively few drivers with drug use experience reported productivity-related reasons such as the need to earn more money or fear of losing their job.

Even more compelling is the finding that fatigue management seemed to be a particular problem for drug using drivers in this survey. Drivers who had ever used stay awake drugs were more likely to experience fatigue on at least half of their trips, more likely to report experiencing fatigue on their last trip and reported that they had poorer fatigue management abilities compared to never users. All of these findings provide support for the strong relationships between drug use and fatigue shown in the in-depth analysis of the two previous national surveys. Furthermore, the higher fatigue experienced by drivers who used stay awake drugs appeared to be related to work rather than greater general daytime sleepiness. The drivers who reported taking drugs did not score significantly higher on the Epworth Sleepiness scale (Johns 1992) nor were they more likely to be in the high risk or even moderate risk of sleepiness categories.

In addition, this survey showed relationships between stay awake drug use and similar external influences as in the re-analysis of the two previous surveys. Drug using drivers in this survey reported doing greater distances and longer hours of work each week compared to never users. Other organisational factors shown to be important in distinguishing drug users from never users in the previous analysis were also important in the current survey. Drug users were more likely to be paid on a productivity or piece-rate basis, were somewhat more likely to have fixed ETA's and penalties for not meeting them and were less likely to work in companies where drug use policies were in existence or were enforced. It seems that this smaller current survey has also confirmed the same factors as predictors of drug use as the in-depth reanalysis of the two national surveys and reinforces the results of a study by

Rodriguez, Targa and Belzer (2005) which also showed relationships between lower pressure to increase workloads through higher pay and reductions in crashes.

Drivers with drug use experience had different attitudes to drug use than those who had never used and this was most obvious for drivers with the most recent drug use experience. Perhaps not surprisingly, users, and recent users especially, much more likely to feel that stay awake drug use should be allowed in the industry. Furthermore, users perceived drug use as more normative in the long distance road transport industry, with well over half of drivers who have used drugs in the last six months reporting that more than 50 percent of drivers use stay awake drugs at some time. Certainly, drug using drivers were more likely to work in companies that did not have policies against drug use or did not enforce existing policies and so may have more liberal attitudes to drug use or more pressure to get the work done in any manner.

Interestingly, the perceptions of the reasons for other drivers taking stimulant drugs also differed between drivers with drug use experience and never users. While all drivers reported that fatigue and sleep management were important reasons for drug use in the industry, ever users and especially recent users of stimulants were much less likely to feel that the need to earn money is a motivator for other drivers to take drugs. This is the same pattern of reasons as the drug user drivers reported for themselves. It seems that only drivers who have never taken drugs are very likely to think that monetary gain is a reason for drug use in the industry. Most drivers who actually take or have taken drugs have a different point of view. This is an important point for the development of strategies for reducing the use of stimulants in the industry. Clearly, interpreting truck driver drug use as a symptom of greed and a strategy for increasing their work output, is misunderstanding the their motivations. Truck drivers who use or have used drugs clearly perceive the need to use drugs as a way of responding to work pressures which increase their fatigue.

It has been argued that stimulant drug use should be allowed in the long distance road transport industry on the basis that stimulants like amphetamines have well established benefits, such as improving performance on reaction time and monitoring tasks which are especially relevant to driving and are most beneficial when fatigued or sleep deprived (Buysse, 1991). Following this argument, for a tired driver who is not able to take the best strategic approach to reducing their fatigue, that is sleep, stimulants may be an effective option that will allow them to continue driving safely until they have the opportunity to sleep. There are several counter-arguments to this idea. First, professional long distance truck drivers should not need to resort to drug use as their work should be planned to prevent fatigue. Even if a driver finds himself more tired than expected in the middle of a trip, they should be able to take necessary breaks to allow sleep and recovery rather than resorting to taking drugs. Second, stimulant use has a number of known side-effects on health as seen in this survey. While only a few drivers in the current study reported health problems, there was some evidence that the health of the drivers who used stimulants was not as good as would be expected. Lastly, there is some recent evidence that amphetamine use, particularly in higher doses, increases driver impairment (Silber, Papafotiou, Croft et al., 2005 Gustavsen et al., 2006), although it is not clear whether the impairment is due to risky behaviour while driving or the potential effects of withdrawal from amphetamine use (Logan, 1996).

A potential limitation of this survey is the comparatively low return rate obtained from the drivers who accepted questionnaires. It is not possible to interpret the effect that this might have on the types of responses obtained from drivers. It is possible that the busiest drivers, and consequently those who may be most vulnerable to fatigue and potentially also more likely to use stay awake drugs may not be represented in the sample as they did not have time to complete it. On the other hand, it may be that drivers who have experience of fatigue and drug use were motivated to respond to the questionnaire as they wanted to air their views. It is notable, however, that the return rate was similar to that obtained for the first national survey which was also around 20 percent, but somewhat lower than the 34 percent obtained for the second national survey. It may be that the response rate obtained for the current survey is fairly typical for this occupational group. There is some evidence that the respondents in the current survey are representative of the driver population since the driver characteristics are similar with respect to reported stay awake drug use between the three surveys. In all three surveys drivers with drug use experience were younger, less experienced in the long distance road transport industry, typically did longer work hours and longer distances, experienced fatigue more often and managed fatigue less well, were more likely to be paid based on productivity, were more likely to have fixed times of arrival and penalties for not meeting them and found stay awake drugs most helpful for managing fatigue. The fact that the same characteristics of drug using drivers were found in three different surveys conducted over 15 years builds a strong case for their validity.

Conclusions

Overall, the results of this survey reinforce findings of the previous analysis of the involvement of fatigue management problems and productivity-based payment systems in predicting or encouraging drug use. The main objective of this survey was to update and the findings of the previous national surveys regarding drug use. There are great similarities between the findings of the most recent survey and the earlier ones which simply reinforce the earlier findings and did not change the conclusions in any way. This survey showed that drug use by long distance road transport drivers is still comparatively common, with at least one in five drivers using stay awake drugs at least sometimes. It showed that the reasons for drug use have not really changed. External pressures resulting from productivity-based payments, strict ETA's and penalties, long distances and hours of work and resultant difficulties in managing fatigue are all factors that still differentiate drivers who report using stimulant drugs from those who do not. The influence of these factors has not diminished. The task ahead must be to address these factors as sources of fatigue for long distance truck drivers and to reduce the drivers' need to resort to strategies like drug use to help them do their job safely.

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APPENDIX A Study Questionnaire

UNSW

THE UNIVERSITY OF NEW SOUTH WALES

Predictors and Health Outcomes of the Use of Stimulants by Drivers in the Long Distance Road Transport Industry

I R M R C

The aim of this questionnaire is to learn about the effects of fatigue, the use of stimulants and their overall effect on your health and safety whilst driving.

All information you give to us will be **ANONYMOUS**.

On the following pages there are some questions about these matters that we would appreciate you filling in as carefully as possible.

THANK YOU FOR YOUR HELP

Section 1. In this section we ask questions about yourself and the truck you usually drive. Please remember that all the information you give is ANONYMOUS.

1. **What is your age?**_____years

2. **Are you an employee driver (i.e., work for a company)?** *(please tick one only)*

   - ❑ YES
   - ❑ NO

   If **YES**, how many trucks does your company operate? *(please tick one only)*

   - ❑ Less than 5 trucks
   - ❑ Between 5 and 10 trucks
   - ❑ Between 11 and 50 trucks
   - ❑ More than 50 trucks
   - ❑ Don't know

3. **Are you an owner operator (i.e., own and operate more than one of your own trucks)?** *(please tick one only)*

   - ❑ YES
   - ❑ NO

   If **YES**, how many trucks do you own?_____

   Which of the following are you? *(please tick one only)*

   - ❑ Prime contractor
   - ❑ Subcontractor in company colours
   - ❑ Freelance subcontractor
   - ❑ Other *(please describe)*_____

4. **Are you an owner driver (i.e., own and drive your own truck)?** *(tick one only)*

- ❑ YES
- ❑ NO

If **YES**, which of the following are you? *(please tick one only)*

- ❑ Prime contractor
- ❑ Subcontractor in company colours
- ❑ Freelance subcontractor
- ❑ Other *(please describe)*_____

5. **How many years have you been driving heavy vehicles for a living?**

_____years

Section 2. In this section we ask about your experience with fatigue in various situations including whilst you are driving. Please remember that all the information you give is ANONYMOUS.

6. **How often do you become fatigued when driving?** *(please tick one only)*

- ❑ On every trip
- ❑ On most trips
- ❑ On about half your trips
- ❑ Occasionally
- ❑ Very rarely
- ❑ Never

7. **How many hours after starting work do you usually begin to feel fatigue?**

_____hours

8. **Which of the following describes your ability to manage fatigue?**
(please tick one only)

- ❑ Excellent
- ❑ Very good
- ❑ Good
- ❑ Average
- ❑ Less than average
- ❑ Poor

9. How likely are you to DOZE OFF OR FALL ASLEEP (in contrast to just feeling tired) in the following situations?

Note: These situations refer 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 likely you think it is you would doze off.

To answer Question 9, use the following scale to choose the most appropriate NUMBER to indicate how likely it is you would doze in each situation.

0 Would NEVER doze
1 SLIGHT chance of dozing
2 MODERATE chance of dozing
3 HIGH chance of dozing

Situation	Chance of Dozing (tick one box for each situation)			
Sitting and reading	❑ 0	❑ 1	❑ 2	❑ 3
Watching TV	❑ 0	❑ 1	❑ 2	❑ 3
Sitting inactive in a public place (e.g., in a movie theatre or at a meeting)	❑ 0	❑ 1	❑ 2	❑ 3
As a passenger in a car for an hour without a break	❑ 0	❑ 1	❑ 2	❑ 3
Lying down to rest in the afternoon when circumstances permit	❑ 0	❑ 1	❑ 2	❑ 3
Sitting and talking to someone	❑ 0	❑ 1	❑ 2	❑ 3
Sitting quietly after a lunch without alcohol	❑ 0	❑ 1	❑ 2	❑ 3
In a car, while stopped for a few minutes in traffic	❑ 0	❑ 1	❑ 2	❑ 3

10. How often do you use the strategies listed below to deal with your driver fatigue during trips?

To answer Question 10, you need to do two things:

(1) **First**, tick one of the options next to each strategy to show how often you use it.
(2) **Then**, circle the strategies you find most helpful.

	How often do you use each strategy? *(tick one option for each strategy)*			
Strategy	**Often**	**Sometimes**	**Rarely**	**Never**
Stopping to sleep	❑	❑	❑	❑
Stopping to rest	❑	❑	❑	❑
Stopping for a meal	❑	❑	❑	❑
Eating while driving	❑	❑	❑	❑
Having a drink containing caffeine (e.g., coffee, tea, Coca-Cola)	❑	❑	❑	❑
Having a non-caffeine drink	❑	❑	❑	❑
Smoking (even in breaks)	❑	❑	❑	❑
Taking stay-awake drugs	❑	❑	❑	❑
Exercise (in breaks)	❑	❑	❑	❑
Taking a shower	❑	❑	❑	❑
Talking to another person (e.g., passenger, co-driver)	❑	❑	❑	❑
Listening to music/radio	❑	❑	❑	❑
Using the CB radio	❑	❑	❑	❑
Singing	❑	❑	❑	❑
Adjusting the ventilation (e.g., windows, air conditioning, heater)	❑	❑	❑	❑
Other *(please describe)*				

Remember to circle the strategies you find most helpful.

Section 3. This section asks for details relating to the last trip you drove. Please remember that all the information you give is ANONYMOUS.

11. Please fill in the following details about the *last trip* you did.

Note: A trip is defined as the round trip from point of origin to point of destination and return (e.g., Melbourne to Brisbane and Melbourne).

Details	Last Trip	
	Time	**Day of week**
The time you started work (including loading time)	am/pm	
Time driving started	am/pm	
Time you finished driving	am/pm	
Time you finished work (including unloading)	am/pm	
Length of trip in hours (driving only)	hrs	
Length of trip in hours (including loading/unloading)	hrs	
Distance of trip in kms	kms	

12. In the 10 hours before you started driving on your last trip, how long did you spend on the following activities? *(please enter details)*

Activity	Time spent
Sleeping	hrs
Resting and relaxing (but not sleeping)	hrs
Checking or repairing heavy vehicle	hrs
Loading or unloading heavy vehicle	hrs
Waiting to load or unload heavy vehicle	hrs
Other yard work	hrs
Driving a light vehicle	hrs
Driving a heavy vehicle	hrs

13. How many hours do you usually work each week?_____hours

14. How many kilometres do you usually drive in a week?_____kilometres

15. Did you feel fatigue at any stage on your last trip? *(please tick one only)*

- ❑ YES
- ❑ NO

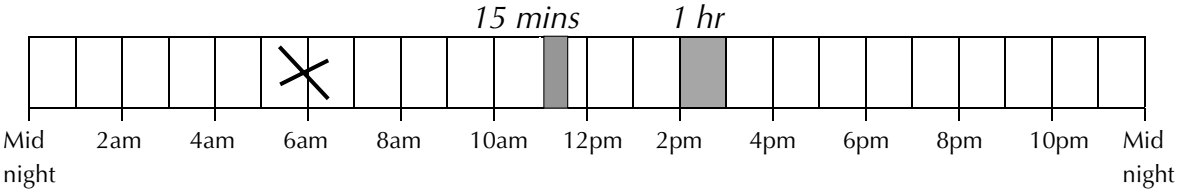
If **YES**, how many hours into your last trip did you start to feel fatigue?

_____hours

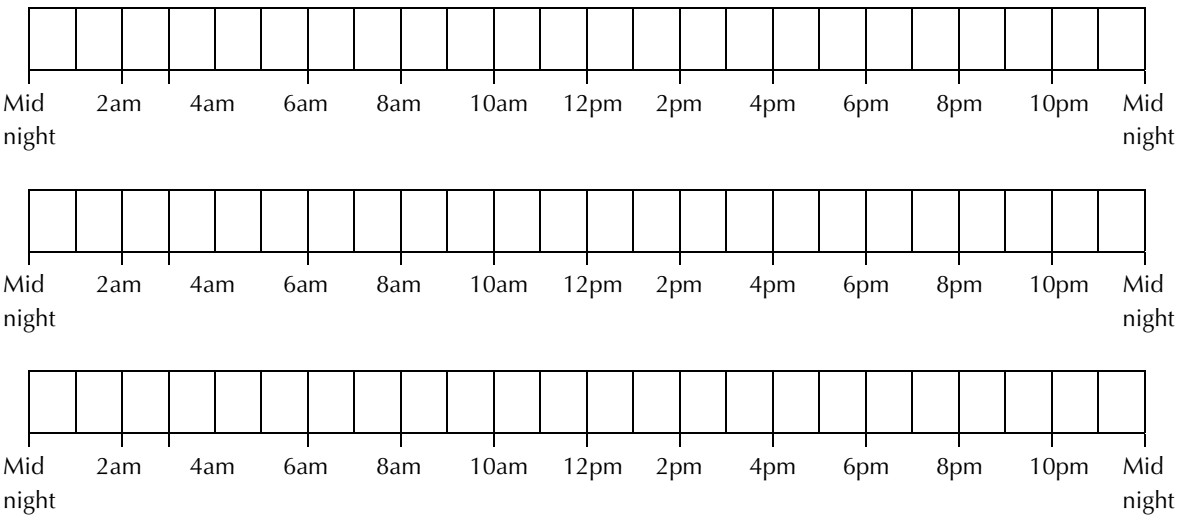
16. How many hours after starting work for your last trip did you take breaks?

Please mark the time that your last trip started with a cross then shade the times when you took each break.

EXAMPLE: If your trip started at 6am and you took a 15 minute break at 11am then a one hour break at 2pm, you would show it like this



NOW, please show when you took breaks on your last trip



17. Do you usually have an ETA? *(please tick one only)*

- ❑ YES
- ❑ NO

If you answered **YES**, is your ETA: *(please tick one only)*

- ❑ Within a specified hour?
- ❑ Within part of a day?
- ❑ Within a day?

Are you penalised for not achieving your ETA? *(please tick one only)*

- ❑ YES
- ❑ NO

Who sets your ETA?

- ❑ Yourself
- ❑ Your employer
- ❑ Other *(please describe)*_____

18. Do you negotiate your rate of pay for each load? *(please tick one only)*

- ❑ YES
- ❑ NO

If you answered **NO**, do you have an ongoing contract for any of your loads? *(please tick one only)*

- ❑ Yes, for all my loads
- ❑ Yes, for some of my loads
- ❑ No

19. How are you usually paid? *(please tick one only)*

- ❑ Hourly rate
- ❑ Daily rate
- ❑ Weekly rate
- ❑ Rate for each trip (based on kms travelled and/or tonnage carried)
- ❑ Other *(please describe)*_____

20. At what rate are you usually paid? *(please tick one only)*

- ❑ Less than the award rate
- ❑ Award rate or above
- ❑ Don't know

Section 4. This section asks about your experience with and views on drug use in the trucking industry. Please remember that all the information you supply is ANONYMOUS.

21. In your experience, what percentage of long distance truck drivers use stay-awake drugs? *(please circle one only)*

Note: Stay-awake drugs DO NOT include caffeinated beverages (e.g., coffee, Coca-Cola).

0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	100%

22. Why do you think long distance truck drivers use stay-awake drugs?
(please circle one response next to each reason)

To combat fatigue	True	False	Don't know
Time pressures	True	False	Don't know
To earn more money (by increasing workload)	True	False	Don't know
To avoid losing job	True	False	Don't know
To avoid accidents	True	False	Don't know
To avoid falling asleep while driving	True	False	Don't know
Other *(please describe)*			

23. Do you think the use of stay-awake drugs should be allowed in the long distance transport industry? *(please tick one only)*

- ❑ YES
- ❑ NO

If you answered **YES**, please answer the following questions:

- Which stay-awake drugs do you think should be allowed? *(tick one only)*
  - ❑ Only drugs currently on prescription or over-the-counter drugs
  - ❑ All stay-awake drugs (prescription/over-the-counter and illegal)
- How should drivers be allowed access to stay-awake drugs? *(tick one only)*
  - ❑ By prescription only
  - ❑ Distribution at truck stops
  - ❑ Distribution by companies
  - ❑ Other *(please describe)*_____

What do you think is the best way to manage the use of stay-awake drugs?

_____

24. In the long distance road transport industry, do you think prescription stay-awake drugs are used by drivers more than illegal drugs? *(please tick one only)*

- ❑ YES
- ❑ NO
- ❑ DON'T KNOW

25. What is your company's view of drivers using stay-awake drugs? *(tick one)*

- ❑ Has a policy against drug use and enforces it
- ❑ Has a policy against drug use but doesn't enforce it
- ❑ Discourages drug use, but has no formal policy about it
- ❑ Has no policy about drug use
- ❑ Encourages drug use
- ❑ Don't know

26. Have you EVER used stay-awake drugs when driving? *(please tick one only)*

- ❑ YES
- ❑ NO

If you answered **NO** (i.e., you have NEVER used stay-awake drugs when driving), what factors prevent you using stay-awake drugs? *(tick as many as needed)*

- ❑ Don't need them
- ❑ Too expensive
- ❑ Difficult to obtain
- ❑ Fear of being caught by authorities
- ❑ Side effects/after effects
- ❑ Don't want to break the law
- ❑ Other reason *(please describe)*_____

If you answered **YES** (i.e., you HAVE used stay-awake drugs when driving), please answer the following two questions:

- When did you last use stay-awake drugs when driving? *(tick one only)*

  - ❑ Less than a week ago
  - ❑ Less than a month ago
  - ❑ In the last 6 months
  - ❑ In the last 12 months
  - ❑ In the last 2 years
  - ❑ In the last 5 years
  - ❑ More than 5 years ago

- Why did you use stay-awake drugs while driving? *(tick as many as you need)*

  - ❑ To combat fatigue
  - ❑ Very long trip
  - ❑ Time pressures
  - ❑ Fear of losing job
  - ❑ To earn more money (by increasing workload)
  - ❑ To avoid falling asleep when driving
  - ❑ To avoid accidents
  - ❑ Other reason *(please describe)*_____

27. If you HAVE USED stay-awake drugs in the last 5 years, please answer the following questions.

If you have NOT used any stay-awake drugs in the last 5 years, please go to question 28.

- How often do you use stay-awake drugs? *(please tick one only)*

  - ❑ On all trips
  - ❑ On most trips
  - ❑ On about half of my trips
  - ❑ Less than half of my trips
  - ❑ Rarely
  - ❑ Never

- Which stay-awake drugs do you usually use? *(describe)*_____

- How do you take these drugs? *(please tick as many as you need)*

  - ❑ Swallow
  - ❑ Smoke
  - ❑ Inhale (snort)
  - ❑ Injection (needle)
  - ❑ Mix in drink
  - ❑ Other method *(describe)*_____

- Why do you use these particular drugs? *(please tick as many as you need)*

  - ❑ Price
  - ❑ Easy to obtain
  - ❑ Less side effects
  - ❑ More effective
  - ❑ Easier to take
  - ❑ Other reason *(describe)*_____

- Where do you get them? *(please tick as many as you need)*

- ❑ The company you work for
- ❑ The people you work with
- ❑ Truck stops
- ❑ Chemist
- ❑ Doctor's prescription
- ❑ Other person/method *(describe)*_____

- What time of the day would you be most likely to take stay-awake drugs? *(please tick one only)*

  - ❑ Midnight to 3 am
  - ❑ 3am to 6 am
  - ❑ 6am to 9am
  - ❑ 9am to midday
  - ❑ Midday to 3am
  - ❑ 3pm to 6pm
  - ❑ 6pm to 9pm
  - ❑ 9pm to midnight

- How long do the effects of stay-awake drugs **usually** last when you take them? *(please tick one only)*

  - ❑ 1 to 3 hours
  - ❑ 3 to 6 hours
  - ❑ 6 to 9 hours
  - ❑ 9 to 12 hours
  - ❑ 12 to 15 hours
  - ❑ 15 to 18 hours
  - ❑ 18 to 21 hours
  - ❑ 21 to 24 hours
  - ❑ More than 1 day

- How do you feel when the effects of the drugs **start to wear off?** *(tick one)*

  - ❑ Less fatigued (than before taking the drugs)
  - ❑ More fatigued (than before taking the drugs)
  - ❑ The same (as before taking the drugs)

- What do you do to manage the after effects of stay-awake drugs? *(describe)*

  _____

  _____

  _____

- Do you use other drugs to help you sleep? *(please circle one only)*

Never	Rarely	Sometimes	Often	Always

- Have you had any near misses/road traffic accidents when **using** stay-awake drugs? *(please tick one only)*

  ❑ YES

  ❑ NO

- Have you had any near misses/road traffic accidents when experiencing the **after effects** of stay-awake drugs? *(please tick one only)*

  ❑ YES

  ❑ NO

- When you drive when fatigued, does taking stay-awake drugs make it: *(please tick one only)*

  ❑ More likely that you will have an accident?
  ❑ Less likely that you will have an accident?
  ❑ Have no effect on your chances of having an accident?

- In general, would you say your health is: *(please circle one only)*

Excellent	Very good	Good	Fair	Poor

- Has using stay-awake drugs given you any health problems? *(tick one only)*

  ❑ YES

  ❑ NO

  If you answered **YES**, please describe the problem *(describe)*

  _____

  _____

- What have you done about the problem? *(tick as many options as needed)*

  ❑ Tried to deal with it yourself
  ❑ Sought advice from friends/colleagues
  ❑ Visited local Doctor or GP
  ❑ Visited Emergency Department
  ❑ Other *(describe)*_____

- Have you ever felt that you could not do your job without stay-awake drugs?
  (please tick one only)

  ❑ YES

  ❑ NO

- Do you think there are any effective alternatives to using stay-awake drugs?
  (please tick one only)

  ❑ YES

  ❑ NO

  If you answered **YES**, which alternatives work? *(describe)*

  _____

28. Do you have any other comments? *(please provide details)*

_____
_____
_____

Thankyou for participating in this survey! Your assistance in providing information about fatigue and the use of stimulants in the long distance road transport industry is greatly appreciated.