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Experience as a Safety Factor in Driving; Methodological Considerations in a Sample of Bus Drivers

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Abstract: Experience is generally seen as an important factor for safe driving, but the exact size and details of this effect has never been meta-analytically described, despite a fair number of published results. However, the available data is heterogeneous concerning the methods used, which could lead to very different results. Such method effects can be difficult to identify in meta-analysis, and a within-study comparison might yield more reliable results. To test for the difference in effects between some different analytical methods, analyses of data on bus driver experience and crash involvement from a British company were conducted. Effects of within- and between-subjects analysis, non-linearity of effects, and direct and induced exposure methods were compared. Furthermore, changes in the environmental risk were investigated. Between-subject designs yielded smaller effects as compared to within-subjects designs, while non-linearity was not found. The type of exposure control applied had a strong influence on effects, as did differences in overall environmental risk between years. Apparently, "the effect of driving experience" means different things depending upon how calculations have been undertaken, at least for bus drivers. A full meta-analysis, taking several effects of methodology into account, is needed before it can be said that the effect of driving experience on crash involvement is well understood.

Keywords: experience; safety; driving; accident; crash; bus driver

1. Introduction

Experience with driving, usually measured as the number of years spent driving since licensure, is generally seen as a positive factor in traffic safety research. It is usually implied that there is a fairly linear or somewhat curvilinear negative association between amount of experience and accident rate [1–3]. This can be seen, for example, in some studies where experience is held constant [4,5]. In addition, the concept seems to underpin the use of graduated licensing, where supervised experience is one of the tools for accident reduction [6]. Furthermore, experience is sometimes used in research as a proxy for safety [7], which indicates that researchers believe that the association between experience and accident involvement is rather strong [2,3,8].

This kind of conclusion about experience would seem to be well substantiated, given the many studies on individual differences in road safety that have reported positive effects of experience [9–14].

However, things are not quite that simple. The basic problem of experience is that it is a within-subject effect, but it is often used as a between-drivers variable. In addition, most research on individual drivers' safety is between-subjects and the methodology is therefore mostly geared towards the latter subject. These factors make results difficult to compare.

Furthermore, it will be proposed here that it is difficult to know whether the experience effect is substantial or not (i.e., how large it is), for a number of reasons. First, no meta-analysis of this

association has been published, and therefore no overall estimate of the effect size is available. Second, results for professional and non-professional drivers can be expected to differ strongly, due to their very differing exposure. Third, driving experience in traffic can be conceptualized and measured in several different ways. This can be expected to have a strong impact on the effects found [15–19], thus obscuring the estimate of the true effect size (whatever that is) in terms of both size and shape.

One such possible methodological difference between studies is whether effects have been calculated for the same drivers for different years [20] or different drivers for the same years [21]. The latter method should result in larger standard deviations and therefore smaller effect sizes, under the assumption that the differences between years are small. On the other hand, within-driver designs are susceptible to the biasing factors of self-selection and history (changes in the driving environment), which would probably deflate effects.

Another problem when calculating how experience affects accident rate is whether the effect is non-linear in some way. If this is so, correlations which include non-linear parts of the association will under-estimate the effect. Here, there are two possibilities; first, there could be an initial contrary effect, where crashes increase after some short initial period of relatively safe driving. Such an effect has been reported by Kaneko and Jovanis [22] and Pelz and Schuman [23], and the results of Begg, Langley, Brookland, Ameratunga and Gulliver [24] could also be interpreted in this way. However, Blom, Pokorny and van Leeuwen [20] found that this effect was only apparent among drivers below thirty years of age. This might be due to methodological factors not being controlled for, such as self-selection [24] or previous, unknown experience that had been acquired [22]. An effect of an initial insecurity behind the wheel and heightened caution that wears off over time would also be a possible explanation, as suggested by Brown [25].

Second, the effect of experience might level out, i.e., a stage is reached where improvement is no longer possible. Thereafter, a confounding with cognitive or physical effects of old age might cause an increase in crash involvement, thus creating a curvilinear, vaguely U-shaped association.

The importance of non-linearity lies in how to interpret correlations of experience and accidents if these are calculated for a time period including the first few years of driving as well as very high levels of experience [5]. If the effect is non-linear, a correlation will yield an average effect over the whole time span, while a more fine-grained analysis will probably indicate that effects are different at different times as experience increases.

In a similar vein, controlling for differing amounts of exposure to driving is often very difficult in studies on individual differences in accident involvement. Exposure is usually considered to be a confounding variable, e.g., [8], which reduces the effects of other predictors by inserting random error variance into the accident variable. However, recent results seem to indicate that exposure to driving risk co-varies with other variables, and might increase the effects [17,19]. On the other hand, controlling for exposure by dividing by mileage or time spent driving might infer a statistical problem. Low-exposure drivers with one or two accidents will create extreme outlying values, which can strongly influence effect sizes, positively or negatively. As for experience specifically, exposure and experience are actually the same thing, although usually treated differently in the analysis [25]. This is especially problematic when newly licensed drivers are studied, as experience can then lead to positive coefficients with crashes [26].

Furthermore, exposure/experience might be measured in several different ways; by mileage [27], by actual time driving [22], by time working [20], by time as license holder or employee [28], by induced exposure [29] or combinations of these [30]. The differences in effects between these methods have rarely been compared [31,32]. The induced exposure method [33], especially, could be expected to yield different results, as its assumptions are very different from those of the others.

Finally, a very basic problem inherent in the between subjects design in research on experience and crash involvement is that of changes in environmental risk. If the rate of accidents decrease in a sample over a few years, is that because the drivers or the road environment have become safer, or both?

The effect of using different methods on the experience–crash association can be investigated in two different ways. First, by conducting a meta-analysis on existing results on experience and crash involvement, and secondly, by applying different methods on the same set of data and compare the effects. The advantage of this latter methodology over a meta-analysis is that there will be no between-samples variance added, and it will thus be easier to detect method effects, which thereafter be applied in a meta-analysis to test whether these effects have also influenced the published literature. A large sample of bus driver data was available for this purpose. This type of population is very useful for all kinds of crash involvement studies, as the environment and exposure tend to be known. Furthermore, exposure and risk is higher than for non-professionals, and the number of crashes per year therefore higher, which reduces the statistical problems otherwise associated with crash data.

Summing up, the aim of the present study was to contribute to the existing literature with regards to experience as a safety factor when driving by investigating four possible effect size biasing factors (i.e., how the method of calculation influences the effect size). Therefore, the effect sizes for experience versus accidents when using different calculation methods were compared, in a large set of data for bus drivers. It was expected that the effects would differ due to the methodological differences of between- versus within-subject design, using different experience time periods for calculations (non-linear effects), and the type of exposure measure used. Finally, the influence of changes in risk in the driving environment was investigated.

2. Materials and Methods

2.1. Data

Data on bus accidents (all types of incidents with material damage or injuries) with buses in the London (UK) area was available from a major British bus operator, for the time period 2006–2008. Data for full-time drivers working sometime during this time period was extracted. The files contained data on the start date of employment, and the end date if employment had ended, and date of birth. No information about sex of drivers, or previous driving experience with other companies or private vehicles was available.

In the analyses, different sub-samples were extracted from the full sample for each specific analytic goal.

2.2. Analysis

The basic problem of the current type of investigation is to identify a statistical method that can be applied to different types of data, to make the effects comparable. As several different statistical problems, such as non-linearity and outliers, were expected in the analysis, it was decided to, whenever possible, use the simplest and most comparable forms of statistical measures for the comparisons between methods; Pearson correlations, Cohen's d and percent difference.

Otherwise, several different statistical methods were used when possible, to show the characteristics of the data, and the reasons for differences between methods.

In principle, some of the calculations on effects reported here are not really comparable at all, because they use different subjects, etc. However, that is the point; an effect should not just be reported as an "effect of experience" but rather specifically as the effect in a "between-subjects, induced exposure measure for the first three years of driving" design, and so forth.

Tests for significance and/or confidence intervals were rarely used, as the point of the current paper was not how reliable any specific effect was, but what kind of difference in findings an analysis would report, given the different methods used.

This dataset is still in use and therefore not publicly available.

3. Results

3.1. General

First, descriptive statistics for all variables were computed (see Table 1). It can be seen that there was a wide range of values in all variables. The level of experience of drivers was comparable to those for Dutch bus drivers reported by Blom, Pokorny and Van Leeuwen [20] and the British drivers in Dorn and af Wåhlberg [30], while being much lower than that of city bus drivers in Sweden [34] and Finland [35]. The accident rate was higher than in Sweden, but lower than in the Netherlands and in Finland (although this last comparison is probably more reflective of the difference in general traffic safety between time periods than any national difference). The correlation between age and experience was 0.4 for the total sample (N = 5060) as well as the sub-sample of drivers working throughout the whole 2006–2008 period (N = 2277). One extreme outlier was present in the accidents per 1000 days variable.

Table 1. Descriptive statistics for the sample of full time bus drivers, who worked sometime during the period 2006–2008. Shown are the absolute numbers of crashes of all types during the time period 2006–2008, and thereafter per 1000 days employed during this period. Experience calculated as the difference between employment start date and end date, or 31 December 2008, whichever came first. N = 5060.

Variable	Mean	Standard Deviation	Min–Max
All accidents	2.14	2.34	0–18
All accidents/kday employed	3.19	6.95	0–333
Age 30 June 2007 (years)	42.2	10.4	18.6–77.6
Experience at end of service or time period (years)	5.33	5.59	0–45.32

3.2. Between- Versus within-Subjects Design

To compare effects between designs, the effect (given in Cohen's d) was calculated as the difference between years (2006/2007 and 2007/2008) for drivers hired in 2005 (within group). It can be seen in Table 2 that the effect was positive for both comparisons and rather strong for such a short time period. The between-subjects effect was calculated within years for the within group versus drivers hired in 2004. Thereafter, this operation was repeated by using the group hired in 2004 as within-subjects, and then comparing them to a group hired in 2003. All these drivers worked full time to the end of 2008.

Table 2. Comparisons of within- and between-drivers effects of experience, given in Cohen's d and percent. For between-subjects effects, drivers hired in consecutive years were compared for crashes in each of the years 2006–2008. Within-subjects effects were calculated between consecutive years for the same drivers.

Effects for Comparing One Year Periods for 1–5 Years of Experience				**Mean**
Between, comparing drivers hired 2005 and 2004 (N = 208 + 366)	2006	2007	2008	
	−0.034 −3.6%	0.162 17.2%	−0.007 −0.9%	0.040 4.2%
Within, hired 2005 (N = 208)	2006, 2007	2007, 2008	-	
	−0.259 −25.1%	−0.107 −12.0%	-	−0.183 −18.5%
Effects for Comparing One Year Periods for 2–6 Years of Experience				**Mean**
Between, comparing drivers hired 2004 and 2003 (N = 366 + 363)	2006	2007	2008	
	−0.036 −3.9%	−0.132 −14.4%	−0.043 −5.1%	−0.070 −7.8%
Within, hired 2004 (N =366)	2006, 2007	2007, 2008	-	
	−0.056 −6.2%	−0.278 −27.8%	-	−.167 −17.0%

It can be seen in Table 2 that, as expected, the within-drivers effect was much larger than the between-subjects effect. However, a full interpretation of this result cannot be made until further analyses have been carried out in the following sections.

3.3. Non-Linear Effects

First, drivers were divided into groups according to their level of experience in the period 2006–2008. In Figure 1, the mean number of accidents in groups of drivers defined by one-year steps of experience (except the highest levels, where *N* was too small for such a breakdown) is shown. This analysis indicates that accident risk first increases, and then decreases, after the first year of bus driving, although this effect is not significant.

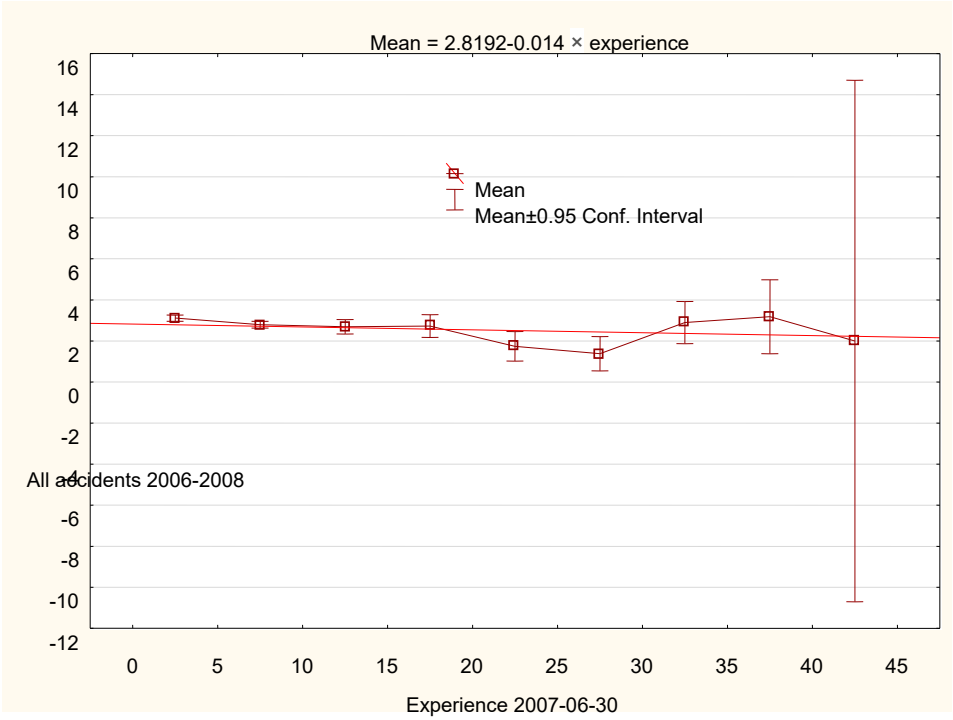

Figure 1. The mean number of accidents in 2006–2008 by years of experience in bus driving (at this company), a between-subjects design. Only full time drivers who worked for the whole period of 2006–2008 included. $N = 2277$.

However, this discontinuity could still affect the correlation in a between-subjects design. In Table 3, the Pearson correlation between accidents and experience for the driver sample in Figure 1 can be seen. Thereafter, the analysis was repeated, without drivers hired after 1 January 2005 (i.e., low experience excluded), and then without drivers of more than twenty years of experience. It can be seen that this did not increase the size of the association. If the analysis used only accidents in 2006, the results were the same.

Table 3. The correlations between experience and accidents 2006–2008 in a between-subjects analysis, comparing different ranges of experience. Drivers all worked full-time for the whole period of 2006–2008.

Group	*N*	Correlation with Experience
All levels of experience	2277	−.074 ***
>1 year experience	2069	−.074 ***
<20 years experience	2200	−.058 **
≤5 years experience in 2006	1481	−.038

** $p < .01$, *** $p < .001$.

These effect sizes of experience versus accidents, however, are under-estimates of the true one, because the accidents were canvassed during a three-year period. With such a rapidly changing behaviour as that evidenced in Figure 1, the time period used for the dependent variable should be shorter, or different levels of experience will be mixed within drivers. Therefore, the association was re-calculated for drivers with less than five years' experience for accidents in 2006. The results can be seen in the last row of Table 3 and in Figure 2. It is evident that there is little discontinuity in these data for the first period of service, regardless of how this is calculated.

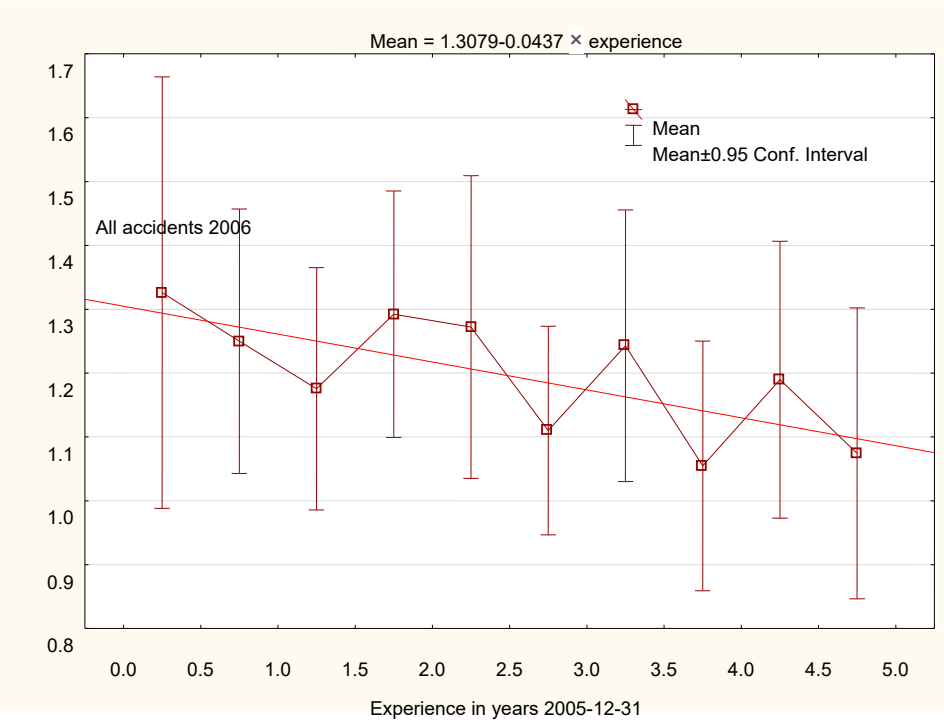

Figure 2. The mean number of accidents in 2006 for drivers with differing, but less than five years', experience at the beginning of this year. Only full time drivers who worked for the whole period of 2006–2008 included. $N = 1481$.

3.4. Controlling for Exposure

In the previous calculations, only full-time drivers who worked for the full period of 2006–2008 were included, thus keeping their exposure fairly constant. If instead the exposure measure would be to have worked sometime during the time period for accidents (thus including drivers who were hired later or left earlier), the results become very different, as can be seen in Table 4. As the number of days worked in 2006–2008 per driver correlated 0.438 ($p < 0.001$, $N = 5060$) with their number of accidents during this period, it is reasonable that not controlling for such a strong effect would yield results which are not very reliable. Indeed the result where this influence is controlled for is similar to the results in Table 3, where exposure is controlled for in a different way. It is also apparent from the results in Table 4 that exposure becomes a more important biasing factor when experience is small, as could be expected when exposure becomes a larger part of the experience.

Finally, a comparison can be made between induced exposure and total number of accidents for drivers who worked for the whole period (which could be said to control for exposure by hours driving, which is also similar to mileage in a homogenous driving environment). This analysis overlaps with the investigation of environmental effects in the next section and is described there. Here, it need only be observed that the results for the comparison between 2006 and 2007 were fairly similar between methods, while for 2007 and 2008 they differed substantially (Table 5).

Table 4. Correlations between experience and accidents in 2006–2008, as a raw number and per day worked, for all drivers and two sub-samples.

Variable	All Drivers	<3 Years Work in 2006–2008	<3 Years Work and <5 Years Experience
All accidents 2006–2008	.113 ***	.072 ***	.173 ***
All accidents/kday 2006–2008	−.046 ***	−.011	.027
N	5060	2783	2526

*** $p < 0.001$.

Table 5. Descriptive statistics for accident involvement (means and standard deviations) and calculations on the ratio between at fault and not at fault crashes, expressed as Cohen's d and percent. Also shown are the changes between years in percent. $N = 2277$ (drivers who worked the full period 2006–2008).

	2006	Percent Change 2006 and 2007	2007	Percent Change 2007 and 2008	2008
All accidents	1.13/1.32	−13.0%	1.00/1.18	−22.0%	0.78/0.96
At fault	0.52/0.81	−17.3%	0.43/0.70	−20.9%	0.34/0.62
Not at fault	0.61/0.92	−4.9%	0.58/0.87	−24.1%	0.44/0.71
Ratio at fault/not at fault	0.85	−10.6%	0.74	4.1%	0.77

3.5. Environmental Effects

The method of comparing the same drivers over a number of years was in some way an improvement on the between-drivers method (as it yielded larger effects). However, a certain peculiarity about these data made it prone to being a biased estimate. During the years 2006–2008, the United Kingdom experienced a strong reduction in number of deaths and injuries on the roads [36,37]. If this trend was present in the available bus driver data too, within-driver effects would be biased.

The number of at fault and not at fault crashes (as judged by the bus company) by year, and the relations between the two categories can be seen in Table 5. It can be noted that both categories are in rapid decline. While the reduction of culpable incidents should be an effect of experience, the reduction of not at fault crashes indicates an environmental effect, although not very reliably so [15,38,39]. In this case, the ratio of at fault to not at fault is well below 1, and the results therefore difficult to compare to those of the standard induced exposure method, where drivers in two-vehicle crashes are compared [40].

The within-driver effects presented in Section 3.2 would therefore to some degree seem to be due to an environmental change, not experience, although the exact effect size cannot be reliably determined from these results. However, the size of this bias could be better estimated by comparing sub-samples hired in different years for their accidents in their third year of driving. If no changes in driving environment risk had occurred during 2006–2008, the means should be similar. The results of this analysis can be seen in Figure 3. From this data it can be calculated that it is likely that about three quarters of the change in mean number of accidents for the within-drivers design in Table 2 was due to a general reduction in accident risk in the environment, unless the company managed to hire increasingly better drivers in two consecutive years.

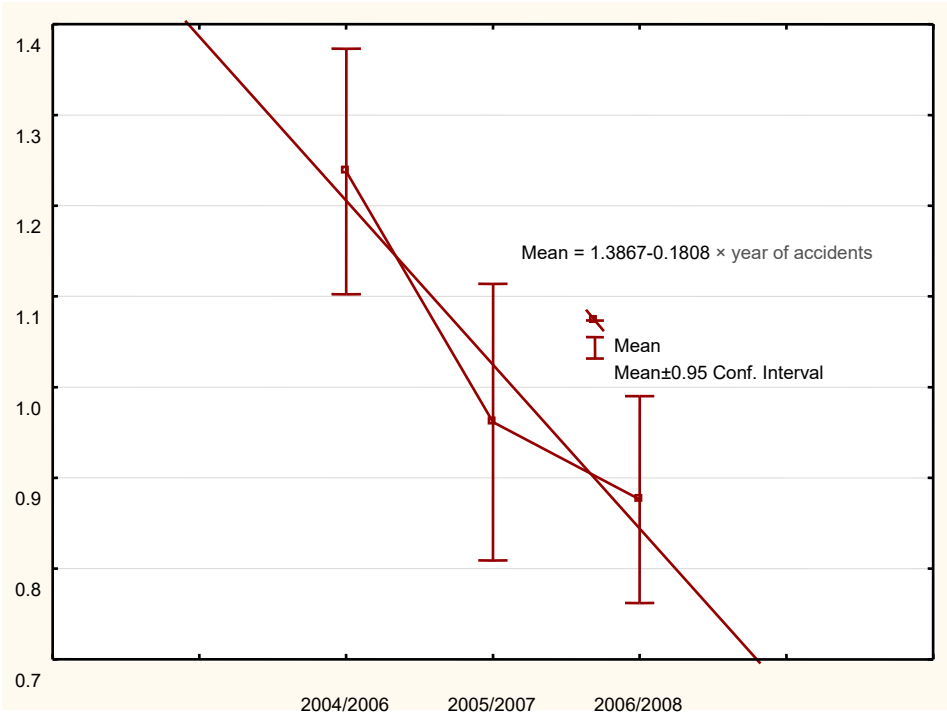

Figure 3. The mean number of accidents in the third year of driving for drivers hired in different years (the column titles show the year of hiring and the year of accidents). Only full time drivers who worked to the end of 2008 were included. *Ns* = 366, 208, 323.

4. Discussion

4.1. Results

Several conclusions may be drawn from the present study. First, the effects of experience on crash involvement differ a lot, depending upon how it is calculated (and several different methods are available). It is also susceptible to environmental effects. A meta-analysis of experience versus crashes would therefore need to take all of these factors into account.

There was a very noticeable difference between within- and between-subjects designs. This should be self-evident, as these designs investigate very different problems, but it is rarely mentioned in research on experience. However, the present results over-estimated the effect in the within-drivers design, as the effect was probably boosted by a strong change in the environment.

There was no evidence of non-linearity in the data, such as an initial increase in crashes, or a levelling off of the reduction in accidents with higher levels of experience. This is in contrast to other results from similar populations, i.e., Häkkinen [41] for Finnish bus drivers, af Wåhlberg [34] for Swedish bus drivers, and Dorn and af Wåhlberg [30] for bus drivers from a different UK company. In both of these studies, the experience effect levelled off after five years. In addition, the present data did not support an increase in accident tendency after a short period of service, as found by Blom, Pokorny and van Leeuwen [20] for bus drivers in the Netherlands.

Similar to the experience effect, the finding of virtually no effect for age on accident record in the present data, regardless of type of calculation, is of some interest, as it differs from other results. For example, Cornwall [28] found that age and experience both had independent, negative effects on accident tendency for bus drivers. Other results for tram and bus drivers can be interpreted in the same way, although some restrictions in the methods and reporting make these effects less clearcut [41–43]. It would seem to be evident from these comparisons that even within the population of bus drivers, studies with rather large samples are not in agreement concerning the effect of experience on accident rate.

In the present data, when exposure is not controlled for, correlations between experience and accidents were positive, and when controls were applied, they became negative. This change in sign would seem to be a strong indicator that there is a great need to measure exposure precisely and control for it, especially when drivers are very young and/or inexperienced. Actually, under such circumstances, only a within-subjects design can yield even approximately correct effect estimates, according to the present analyses.

4.2. Limitations

As usual, it is difficult to draw any firm conclusions about a general mechanism from a single sample, although a fairly large one, which comes from a population (bus drivers) and country with possibly unusual features. What can be concluded with certainty, however, is that the type of calculation strongly influenced the effect size in the present data.

Systematic biases within the data are always possible, and one such source of error (the general reduction in number of accidents at the national level over time) was found, estimated and subtracted from the experience effect. Whether other such effects could exist was not possible to know, as the data was supplied by the bus company. There may be possibly important features of the data gathering process that were not known. For example, it is possible that some of the bus drivers already had experience driving heavy vehicles from some other company, thus inserting error into the calculations. This is also a problem, which is not peculiar to the present paper, but probably more of a general nature. Studies on professional drivers using recorded data usually do not have access to data on previous driving experience. This is a serious limitation that should be addressed in future studies.

The present data had a rather low mean level of (known) experience, and it was therefore difficult to reliably investigate non-linearity due to high levels of experience. On the other hand, this meant that the data for novice bus drivers was more plentiful.

In the present data, it was not possible to run separate analyses for men and women (as the majority of bus drivers are usually men). This is a shortcoming, as men and women might have different learning trajectories in traffic as found by [8], but not by [27]. This is a further detail of the experience–accident effect, which should be investigated.

Similarly, age was not entered into the calculations, although it was available, because there was virtually no zero-order association at all between this variable and crash involvement at a more general level (while interaction effects by specific age and experience bands were not investigated). It is possible that this was due to drivers having experience from other companies before they joined the company for the presently used population. However, as the rationale of this paper was not to make an exact estimate of the effect of experience, but to point out the differences when using different methods of calculation. Therefore, this shortcoming was not considered to be of interest to the current study.

4.3. Further Methodological Problems

In the present paper, four methodological effects in the measurement of the effect of driving experience on traffic accident involvement have been tested and found to have medium to strong effects. However, there are a few other possible problems that have not been investigated.

For example, a within-subjects design, can lead to self-selection of drivers, especially within transportation fleets [28,44,45], and therefore to a possible mis-estimation of the effect. This mechanism is, however, totally unknown as to its effect on calculations on experience. It might be the case that drivers who are initially risky but learn fast remain with the company, something that would over-estimate the effect of experience. On the other hand, drivers who are initially safe could remain with the company, which would under-estimate the effect. Furthermore, it could be expected that the experience effect is not linear and uniform (with regards to age, gender, etc.). These possible differences are scarcely referred to in the literature.

Although studies on experience versus accidents have been published on some different populations, the results for bus drivers have not been compared to those of car drivers. Here,

yet another possible difference could be expected. In general, it should be more difficult to learn to drive a larger vehicle than a smaller one, all else being equal. Therefore, the effects of experience on crash involvement amongst professional drivers may therefore be smaller. On the other hand, bus driver accident rate per year is higher than for car drivers, and the statistical problem of restricted variance is therefore smaller [15]. It can be noted, however, that the accidents that drivers are involved in do not seem to change their subsequent driving behaviour [15,46,47]. Furthermore, experience is usually measured by adding up the number of years spent driving since licensure. This measure, however, is very different for private and professional drivers, as the latter involves vastly more hours and kilometres on the road in a given year. We could therefore expect a stronger effect per year for professionals, while for private drivers, a maturation (age) effect would be stronger than for the professional drivers.

In the present analysis, all kinds of accidents were used as the dependent variable, apart from in the induced exposure calculations, despite the fact that a categorization for at fault and no fault crashes was available. Theoretically, experience should only influence at fault accidents, as the behaviour of the drivers should not be a factor in no fault incidents [15]. Therefore, effect sizes should be larger for at fault crashes only [16,48]. However, this conclusion assumes a correct judging of culpability, which is not always at hand [39], and would not seem to be present in the current data [38]. So far, the issue of culpability has rarely been acknowledged in investigations on experience and crash involvement [49–52].

Similarly, the use of self-reported data is a limitation of many studies, as noted by McCartt et al. [8]. Apart from the generally low validity of self-reported crashes [15], there are also systematic biases in such data, such as strong under-reporting by drivers with many crashes on record [53].

5. Conclusions

Given the results in this paper, the informal acceptance of experience as a well-known phenomenon in traffic safety is questioned. Qualitative reviews of experience versus accidents might yield the impression that the findings are well established. However, the comparative analyses presented here, which takes methodology into account, show a much more complicated picture. Actually, given the many different methodologies and statistical methods applied across the literature, it is currently very difficult to assess exactly how experience influences the risk of crashing. This is especially so as it is very uncommon for studies to have exact data on experience, whether it concerns previous driving in another company for professionals, or total mileage for non-professionals.

Similarly, it is questioned here whether experience is a strong factor in traffic safety, as compared to individual differences of various types. Although a formal meta-analysis is needed to calculate whether this is the case, traffic safety researchers seem to take for granted experience as a strong influence on crash involvement. However, at least for bus drivers, the effect sizes seem to be smaller than for some other variables with known effects.

The trust in experience as a strong safety factor is indicated by its use as a dependent variable, i.e., a proxy variable for safety in some studies [54]. Such a practice is questionable, given the very weak associations between all safety proxies used, and actual crash involvement [15]. Traffic offences, for example, which is probably the most popular traffic safety proxy variable, only correlates about 0.18 with crash involvement [55].

In general, it is argued here that research on individual differences in traffic safety need to change in many ways. The methods used are mainly sub-optimal [15], and the statistics reported are often not useful, being multi-variate [17,18,56]. If this situation is to improve, one important change is for traffic safety researchers to move away from qualitative reviews to meta-analysis. This will not only change our beliefs concerning effects in individual differences in safety [19], but probably also lead to better reporting of statistics and methods. Thus, a higher percentage of published papers will actually be part of our cumulative knowledge, instead of being forgotten.

In addition, researchers discussing results on experience need to state explicitly which kind of methodology was used, and the effect size found. A graph showing a rapid decline in risk during the first six months of driving might look impressive [2], but it might not actually be a large effect, as compared to other effects in traffic safety.

Given the current results, it is recommended that researchers investigating the effect of experience on crash involvement report very detailed, simple and standardized statistics and methodological information. It should be noted how the data was acquired and analysed, descriptive results on experience, age, type of vehicle used and any other confounding variables. Most importantly, effects should be calculated between rather short time periods, and given both in Cohen's d and absolute values or percent. See af Wåhlberg [56] for comprehensive reporting in traffic safety research.

In the end, it is argued that experience might not be such an important factor in traffic safety as we might think. Before this can be decisively concluded, however, the effects of experience on accident involvement need to be thoroughly meta-analysed, taking into account the many possible and proven methodological effects noted here.

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