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Can the traffic locus of control (T-LOC) scale be successfully used to predict Swedish drivers' speeding behaviour?

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ABSTRACT

The first aim of the present study was to examine the factor structure of the traffic locus of control (T-LOC) scale in a Swedish sample of drivers. The second aim was to examine if this scale can be used to predict drivers' speeding behaviour. A sample of Swedish car owners ($N = 223$) completed a questionnaire including questions based on the traffic locus of control (T-LOC) scale as well as questions about their speeding behaviour. The results showed a five factor solution including *own skills*, *own behaviour*, *other drivers*, *vehicle/environment* and *fate*. *Own behaviour* and *vehicle/environment* could be used to predict drivers' speeding behaviour on roads with a 90 km/h speed limit while none of the variables included in the traffic locus of control (T-LOC) scale could be used to predict drivers' speeding behaviour on roads with a 50 km/h speed limit. On 90 km/h roads *own behaviour* was positively related to drivers' speeding behaviour while *vehicle/environment* was negatively related to their speeding behaviour.

1. Introduction

According to Rotter (1966) locus of control can be defined as a personality attribute reflecting the degree to which a person generally perceives events to be within their own control or within the control of powerful others or other outside forces. Furthermore, Rotter defined people who perceive that events are within their own behaviour or personal characteristics as having internal beliefs, while he defined people who perceive that events are a result of luck, chance, fate or within the control of powerful others as having external beliefs. In order to measure this personality variable he developed an *internal–external* (I–E) scale. The scale includes pairs of statements of which one targets internal beliefs and the other external beliefs. For each of these pairs the participants have to choose one. This scale has been used in several studies examining the relationship between locus of control and traffic accident involvement. Arthur et al. (1991) did, for example, conduct a meta-analysis of 13 studies and found a positive relationship (mean $r = .20$) between locus of control (measured with Rotter's I–E scale) and traffic accident involvement, where internal control was associated with lower traffic accident involvement. Guastello and Guastello (1986), on the other hand, found no significant relationships between locus of control and traffic accident involvement.

At the same time a new generation of multidimensional locus of control scales had started to emerge. Examples of such scales are the *multidimensional health locus of control* (MHLC) scales by Wallston et al. (1978) and the *internal* (I), *powerful others* (P) and *chance or fate* (C) scales by Levenson (1981). Around the same time it was also suggested that locus of control might be domain specific and therefore scales targeting specific areas were expected to work better than more general scales. As a result of this, Montag and Comrey (1987) developed the *driving internality* (DI) scale and the *driving externality* (DE) scale both of which target driving behaviour. Montag and Comrey (1987) found a negative relationship between the driving internality scale and involvement in fatal traffic accidents ($r = -.32$) while they found a positive relationship between driving externality and involvement in fatal traffic accidents ($r = .26$). In contrast to these results, Arthur and Doverspike (1992) found a positive relationship between driving internality and not-at-fault traffic accidents in 1990 while no significant relationship was found between locus of control and total traffic accidents, at-fault traffic accidents or fatal traffic accidents in 1988 or 1990, or for not-at-fault traffic accidents in 1988. Similarly, Iversen and Rundmo (2002) found no significant relationship between locus of control and traffic accident involvement.

As Montag and Comrey's (1987) scales, especially designed to target driving behaviour, did not show much clearer relationships with traffic accident involvement than Rotter's (1966) original scale did, Özkan and Lajunen (2005) hypothesized that scales based on internality and externality were too simple for targeting the causes behind traffic accidents. Therefore they developed the *traffic locus of control* (T-LOC) scale focusing on the whole traffic situation and

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including four dimensions: *self (equivalent to internal)*, *other drivers*, *vehicle/environment* and *fate (together equivalent to external)*. Based on data from 348 Turkish drivers multiple regression analyses showed that *self* predicted involvement in the total number of traffic accidents ($\beta = .17$, $p < .001$) as well as in active traffic accidents where the driver hits another road user or an obstacle ($\beta = .18$, $p < .001$) after controlling for gender, age, lifetime mileage and years holding a driving licence. As previous studies using Rotter's (1966) I–E scale as well as Montag and Comrey's (1987) DI and DE scales have shown very mixed results more research is needed in order to examine the predictive power of Özkan and Lajunen's (2005) traffic locus of control (T-LOC) scale.

The first aim of the present study is therefore to examine the factor structure of the traffic locus of control (T-LOC) scale in a Swedish sample of drivers. The second aim is to examine if the traffic locus of control (T-LOC) scale can be used to predict drivers' speeding behaviour. The reason for examining the relationship between drivers' traffic locus of control and their speeding behaviour, rather than their traffic accident involvement, is that traffic accidents are very infrequent events which impose several methodological limitations. Speed choice, on the other hand, is a continuous event with a well known relationship with traffic accident involvement (Finch et al., 1994; Nilsson, 1976; Taylor et al., 2000).

2. Method

2.1. Participants

A total of 223 Swedish drivers participated in the present study. Their age ranged from 21 to 68 years, with a mean age of 40 years. Fifty-seven percent of the drivers were men while 43% were women. On average the drivers had had their driving licence for 19 years and had driven approximately 14 000 km in the previous year.

2.2. Procedure

A postal questionnaire and a referral letter were sent out to 860 car owners in the county of Stockholm. In order to include a reasonable proportion of young car owners (which based on previous experience are known to have a low response rate) stratified selection was used. From the first strata 500 car owners born 1989–1977 were randomly selected and from the second strata 360 car owners born 1976–1940 were randomly selected. After one postal reminder, 109 (22%) questionnaires were returned from car owners born 1989–1977 and 118 (33%) questionnaires were returned from car owners born 1976–1940. Of these 227 questionnaires one was excluded from further analyses because the participant had not driven anything during the previous year and three were excluded because the participants had not completed the T-LOC questions. The present paper is thus based on the remaining 223 questionnaires. Data were also collected in Turkey but in the present paper only Swedish data will be presented.

2.2.1. Questionnaire

Both the questionnaire and the referral letter were written in Swedish. The questionnaire included questions based on the traffic locus of control (T-LOC) scale, speeding behaviour as well as demographic questions (age, gender, years holding a driving licence and mileage). The traffic locus of control (T-LOC) scale was based on an English version which was directly translated (as well as back-translated) to Swedish. The questionnaire also included questions based on the theory of planned behaviour (TPB), the driver behaviour questionnaire (DBQ) and questions about intelligent speed adaptation (ISA) but these questions will not be addressed here. The participants did not receive any incentives for completing the questionnaire.

2.2.1.1. The traffic locus of control (T-LOC) scale. In the present study the traffic locus of control (T-LOC) scale developed by Özkan and Lajunen (2005) was used with the addition of one new item (i.e. coincidences). The scale thus consists of 17 items of which 5 items target *self* (e.g. my own risk-taking), 6 items target *other drivers* (e.g. other drivers risk-taking), 3 items target *vehicle/environment* (e.g. mechanical failure in the car) and 3 items target *fate* (e.g. bad luck). For each item the drivers were asked to indicate, on a five-point scale (1 = not at all possible; 5 = highly possible) how possible they thought it was that the items would cause an accident when they considered their own driving style and conditions.

2.2.1.2. Speeding behaviour. In order to measure drivers' speeding behaviour several different types of questions were used. These questions targeted drivers' preferred speeds, their intention to comply with the speed limits as well as the time spent complying with the speed limits.

Drivers' preferred speed was measured by two items: "What speed do you prefer on rural/urban roads with the speed limit 50/90 km/h?"

Drivers' intention to comply with the speed limits was measured by six items based on the theory of planned behaviour (TPB; Ajzen, 1991). Three of these items targeted urban areas with a 50 km/h speed limit while the other three items targeted rural areas with a 90 km/h speed limit: "Do you intend to comply with the speed limit 50 km/h in urban areas/90 km/h in rural areas over the next 3 months?" 1 = *definitely do not*, 7 = *definitely do*, "How much do you want to comply with the speed limit 50 km/h in urban areas/90 km/h in rural areas over the next 3 months?" 1 = *not at all*, 7 = *very much*, and "How likely is it that you will comply with the speed limit 50 km/h in urban areas/90 km/h in rural areas over the next 3 months?" 1 = *very unlikely*, 7 = *very likely*. An index of each construct was then calculated by taking the mean of the different scales in urban and rural areas, respectively. Cronbach's α for 50 km/h roads was .87 and for 90 km/h roads it was .91.

Drivers' time spent complying with the speed limits was measured by two items: "Normally, when you drive on urban/rural roads with speed limit 50/90 km/h, how much of the time do you comply with the speed limit?"

2.3. Analyses

Using SPSS 13.0 missing values (49/3791; 1.3%) were replaced with means before the suitability of data for factor analysis was assessed. The correlation matrix for the 17 items included in the traffic locus of control (T-LOC) scale included several correlations greater than .3, the KMO-value was larger than .6 and Barlett's tests of sphericity was significant which show that the data was suitable for principal component analysis (Pallant, 2001). The items were subsequently subjected to a principal component analysis (PCA) with varimax rotation. Based on Kaiser's criterion of eigenvalues over 1.0, the Catell scree test and the solution's interpretability a five factor solution was chosen. Cronbach's α was then used to measure the internal consistency reliability for the different factors.

Based on the results of the factor analyses indices were created by taking the mean of the items included in the five factors, respectively. Hierarchical multiple regressions were then performed to examine how much of the variance in drivers' speeding behaviour could be explained by their traffic locus of control. To control for age, gender and years holding a driving licence these variables were entered into the model in the first block while the five factors included in locus of control were entered in the second block.