

Convergent Validity of Leon Steiner's Measure of Driving Phobia

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Abstract

Background: There is a great need for psychological instruments to evaluate post-accident driving anxiety in a standardized manner. Steiner's Automobile Anxiety Inventory is a 23 item questionnaire of which 18 can be scored to provide a quantitative measure of vehicular anxiety (amaxophobia) as common in survivors of motor vehicle accidents (MVAs).

Method: Scores on Steiner's questionnaire were available for 33 survivors of car accidents (mean age 39.5 years, SD=12.8, 9 men, 24 women). Their scores on the Driving Anxiety Questionnaire and on Whetstone Vehicle Anxiety Questionnaire were also available, as well as scores on measures of PTSD (PCL-5), and of post-concussive and whiplash symptoms, pain, insomnia, depression, and anxiety.

Results and Discussion: Significant correlations of moderate size were found of Steiner's questionnaire to the Driving Anxiety Questionnaire ($r=.49$) and Whetstone questionnaire ($r=.45$) and also to the PCL-5 measure of PTSD symptoms ($r=.57$). Steiner's scores were significantly, but on a weaker level, correlated with scales of post-concussive and whiplash symptoms, but not with age, gender, measures of pain or insomnia, or with number of prior MVAs or with number of weeks since the MVA.

Conclusion: The results indicate an acceptable convergent validity of Steiner's Automobile Anxiety Inventory as a brief screening tool for driving phobia in clinical settings.

Keywords: amaxophobia, driving phobia, driving anxiety, PTSD, post-concussion syndrome, whiplash

INTRODUCTION

Many survivors of motor vehicle accidents (MVAs) subsequently develop a phobia of driving (amaxophobia), i.e., an excessive anxiety during car trips as a driver or passenger, and they avoid car trips, to the extent that their quality of life is substantially impaired. There is a need for a brief screening questionnaire for assessments of such excessive driving anxiety.

The Automobile Anxiety Inventory is a questionnaire

designed by Canadian clinical psychologist Leon Steiner, to measure the increase in anxiety in survivors of MVAs. It is a brief measure, formulated in simple English that even persons with a limited grasp on written English usually can follow, including recent immigrants or individuals from low educational strata. Since Steiner's questionnaire was never published, its full text is reproduced here in Table 1. The items printed in italics were not scored in the present study. The answers to the remaining items can be scored with 1 point for "yes" and with 0 for "No."

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Table 1. Leon Steiner's Automobile Anxiety Inventory (total score is based on all items except those listed in italics)

	Please circle:	
1. Are you more nervous in an automobile since your accident?	Yes	No
<i>Do you have a motor vehicle license?</i>	Yes	No
<i>Have you driven a car since your accident?</i>	Yes	No
2. Do you avoid driving whenever possible?	Yes	No
3. Do you drive much slower or more carefully since your accident?	Yes	No
<i>Have you been a passenger in a car since your accident?</i>	Yes	No
4. Do you avoid being a passenger in a car whenever possible?	Yes	No
5. Are you more nervous in a car after nightfall?	Yes	No
6. Are you more nervous in traffic?	Yes	No
7. Are you more nervous traveling on a highway?	Yes	No
8. Are you more nervous in an intersection?	Yes	No
9. Are you more nervous when outside the immediate area of your home?	Yes	No
10. Are you more nervous in the rain or in bad weather conditions?	Yes	No
<i>Please circle: Are you more nervous as a driver, or as a passenger, or no difference</i>		
11. Are you more nervous when certain people are in the car with you?	Yes	No
<i>Please explain your response to the Item 11:</i>		
12. Are you more nervous when other vehicles are in your immediate proximity?	Yes	No
13. Are you more nervous when you hear the sound of a car horn or brakes?	Yes	No
14. Are you more nervous when you pass the scene of the accident?	Yes	No
15. Are you more nervous as a pedestrian?	Yes	No
<i>If yes, are you more nervous (please circle): on sidewalks, or crossing streets or both</i>		
16. Do you keep thinking about the accident when you are in a car?	Yes	No
17. Do you often feel that you are about to have another accident?	Yes	No
18. Do you feel sometimes that you will never regain your former confidence?	Yes	No

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Note: The noun "licence" is spelled as "license" in the USA, but as "licence" in Canada, the UK, Ireland, Australia, New Zealand, and South Africa.

The present article evaluates statistically the convergent validity of Steiner's questionnaire. Convergent validity in this context can be examined by calculating correlation coefficients to measures that are theoretically expected to be related to (or could be considered as factors maintaining or contributing to) the phobia of driving. Significant correlations should be present to other widely used clinical measures of driving anxiety and probably also to measures of PTSD symptoms related to the patient's MVA.

Some clinicians might also suggest that correlations of driving anxiety should also be examined to factors such as persistent pain from an MVA (pain might be a reminder to the patient that driving is dangerous), or the pain related insomnia as it causes fatigue that perhaps may interfere with the self-confidence of the driver or passenger on car trips. Generalized anxiety in the aftermath of the MVA may also be theoretically

viewed as potentially linked to amaxophobia. The present study calculated correlations of amaxophobia scores on Steiner's questionnaire to scores on these potentially influential factors and also to other questionnaires clinically used to measure driving anxiety.

METHOD

De-identified archival data with Steiner's scores of 33 survivors of car accidents were available. The sample consisted of 9 men, 24 women, mean age 39.5 years (SD=12.8, age range 18 to 65 years). On average, their MVA occurred approximately 40.5 weeks ago (SD=25.5); they all still retained a personal injury lawyer due to administrative delays with insurance compensations. In their MVA, 24 were the drivers and 9 were passengers. In 19 cases, the collision involved impact to the side of the vehicle, in 8 to the back of the

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vehicle, and in 6 cases to its front. The majority (21 of 33) had no previous serious MVA associated with injuries, 10 patients had one such previous MVA, and 2 patients had 2 such prior MVAs.

In addition to their scores on Steiner's Automobile Anxiety Questionnaire, the archival data also included their scores on Items 3, 4, and 5 of the Brief Pain Inventory^[1] (i.e., ratings of worst pain, least pain, and of average pain on a scale from 0 to 10), Items 10 to 12 of the Whiplash Disability Questionnaire^[2] (ratings of anxiety, anger, and of depression via scales from 0 to 10), total scores on the Insomnia Severity Index^[3], Rivermead Post-Concussion Symptoms Questionnaire^[4], the Immediate Concussion Symptoms scale^[5] (retrospective ratings of 6 concussion symptoms as in the immediate aftermath of the accident), the Post-MVA Neurological Symptoms (PMNS)^[6] scale (a measure of subjective symptoms in the whiplash spectrum such as tingling, numbness, or reduced feeling in the limbs, tinnitus, impaired balance, hand tremor, syndrome of word-finding difficulty), and also scores on Whetstone Vehicle Anxiety Questionnaire^[8]

(published in this same journal in 2020).^[8]

The data also included these patients' responses to the Driving Anxiety Questionnaire designed by an unknown author that has been frequently used by psychologists in Ontario. The full text of that questionnaire and data on its criterion and convergent validity are reproduced in Whetstone et al.^[8]

According to documentation from clinical interviews, all but 2 of the 33 patients in our sample met the DSM5 criteria for the diagnosis of PTSD. Thirteen patients also completed the questionnaire measure of PTSD for DSM-5, known as PCL-5^[7], developed by the US National Center for PTSD. Only 2 patients failed to meet the PCL-5 diagnostic criteria for PTSD according to DSM5: these 2 are also the same 2 of our 33 patients who did not meet these DSM5 criteria in a clinical interview.

RESULTS

The mean scores and SDs of our 33 patients on the various measures are listed in Table 2.

Table 2. Mean Scores on Key Measures

	Mean score (SD)	Range
Steiner's Automobile Anxiety Inventory, N=33	14.9 (2.3)	10 - 18
Ratings on Items 3 to 5 of the Brief Pain Inventory ^[1] , N=33:		
<i>Worst pain</i>	8.0 (1.9)	0 - 10
<i>Least pain</i>	4.2 (2.1)	0 - 8.5
<i>Average pain</i>	6.1 (2.0)	0 - 9.5
Insomnia Severity Index ^[3] , N=33	22.9 (5.5)	0 - 28
Rivermead Post-Concussion Symptoms Questionnaire ^[4] , N=33	47.2 (11.0)	13 - 64
Immediate Concussion Symptoms scale ^[5] , N=33	4.1 (2.0)	0 - 7
Post-MVA Neurological Symptoms (PMNS) ^[6] scale, N=33	19.0 (12.9)	0 - 52
PCL-5 ^[7] scores for PTSD, N=13	53.5 (19.4)	16 - 80
Ratings on Items 10 to 12 on the Whiplash Disability Questionnaire ^[2] , N=33		
<i>Depression</i>	8.4 (2.0)	2 - 10
<i>Anger</i>	8.5 (2.1)	0 - 10
<i>Generalized Anxiety</i>	8.9 (1.9)	2 - 10
Driving Anxiety Questionnaire, ^[8] N=30	93.6 (28.4)	39 - 123
Whetstone Vehicle Anxiety Questionnaire ^[8] , N=20	70.6 (16.1)	23 - 93

We calculated Pearson correlations of scores on Steiner's Automobile Anxiety Questionnaire to all other measures,

see listing in Table 3. The N next to each variable indicates on how many of the 33 subjects the measures were available.

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Table 3. Pearson Correlations of Steiner's Inventory to Other Variables

	Steiner's Inventory	Significant p values (those at p<.05, 1-tailed)
Age in years, N=33	.27	
Gender (1=male, 2=female), N=33	.12	
N of weeks since MVA, N=33	-.02	
N of prior serious MVAs associated with injuries, N=33	.18	
Ratings on Items 3 to 5 of the Brief Pain Inventory ^[1] , N=33:		
<i>Worst pain</i>	.17	
<i>Least pain</i>	.05	
<i>Average pain</i>	.05	
Insomnia Severity Index ^[3] , N=33	.05	
Rivermead Post-Concussion Symptoms Questionnaire ^[4] , N=33	.34	.027
Immediate Concussion Symptoms scale ^[5] , N=32	.30	.049
Post-MVA Neurological Symptoms (PMNS) ^[6] scale, N=33	.45	.004
PCL-5 ^[7] scores for PTSD, N=13	.57	.020
Ratings on Items 10 to 12 on the Whiplash Disability Questionnaire ^[2] , N=33		
<i>Depression</i>	.24	
<i>Anger</i>	.21	
<i>Generalized Anxiety</i>	.28	
Driving Anxiety Questionnaire, ^[8] N=30	.49	.003
Whetstone Vehicle Anxiety Questionnaire ^[8] , N=20	.45	.024

Significant correlations of Steiner's questionnaire to the Driving Anxiety Questionnaire and to Whetstone's questionnaire indicate an acceptable level of its convergent validity and the same is true about the significant correlation to a measure of PTSD: these correlations can be all described as of moderate strength.

In our data set, the driving anxiety as measured by Steiner's questionnaire was not significantly related to ratings of post-MVA pain or to post-MVA insomnia. No significant correlations of Steiner's scores were found to age, gender, number of weeks since the MVA, and the number of prior MVAs.

Steiner's scores were significantly, but at a weak level, correlated with reports of whiplash symptoms as measured by the PMNS^[6] scale, to reports of post-concussive symptoms on the Rivermead scale^[4], and to retrospective reports of symptoms of cerebral concussion as they occurred in the immediate aftermath of the MVA.^[5]

Cronbach alpha coefficient of internal consistency calculated for Steiner's scale was .65, which could be considered as somewhat low, but still acceptable in exploratory studies or for a brief screening scale.

DISCUSSION

Although some other questionnaires to measure driving anxiety were published, they are more suited for novice drivers than for our post-MVA patients, i.e., for those who usually were relatively experienced, confident, and skilled drivers prior to their MVA. This has been already discussed in Whetstone et al.^[8] For example, the 20 item Driving Behavior Survey^[9] describes potential lack of driving skills or driving practice, see its Item 4. "I have trouble staying in the correct lane," 5. "I drift into other lanes," 6. "I forget to make appropriate adjustments in speed."

The Driving Cognitions Questionnaire^[10] also consists of 20 items that are also suited adequately to evaluate driving anxiety of novice drivers, particularly those with self-image problems, see Item 8. "People will think I am a bad driver," 15. "I will hold up traffic and people will be angry," 17. "People will laugh at me," and 20. "I will lose control of myself and act stupidly or dangerously." Such self-esteem or self-image issues are less prevalent in post-MVA patients some of whom drove without accidents and without emotional discomfort for decades, including large vehicles such as transport trucks.

The 20 item Driving and Riding Avoidance Scale^[11] describes various situations in which driving is avoided. As pointed out by Taylor and Sullman,^[12] the wording of most of its items could be considered somewhat problematic because it allows for responses that are not necessarily based on fear of driving, but may instead involve economic or practical issues. For example, the travel via subway trains in some major cities is more rapid than in cars or saves both gasoline and parking fees.

Compared to these questionnaires, Steiner's inventory seems to be more suitable as a brief measure of the change in levels of anxiety following an MVA.

The coefficients calculated in our study to evaluate the convergent validity are most probably underestimates consequently to the well-known adverse impact of restricted range of data on the size of correlation coefficients (see statistical explanations in Downie and Heath,^[13] page 101-103, or also in Whetstone et al.,^[8] page 31-32). The range of data from which the coefficients are calculated could be enlarged by including responses not only of the post-accident patients in the data set but also those of normal controls. The scores of normal uninjured persons are likely to be much lower not only on the Steiner's questionnaire (due to lower levels of driving anxiety), but also on other measures of pathology such as pain, insomnia, and post-concussive and whiplash symptoms. Thus, there would be a wider spectrum of scores, the high ones provided by the patients and the low ones by those uninjured normal controls.

Spanish, German, Italian, Russian, Czech, Arabic, and Chinese translations of Leon Steiner's Automobile Anxiety Inventory are available from professor Cernovsky (zcernovs@uwo.ca).

CONCLUSIONS

Correlational analyses indicate significant relationships of Steiner's amaxophobia scale to other measures of driving anxiety. Steiner's scores are also significantly correlated with reports of post-concussive and whiplash symptoms and also to retrospective reports of symptoms of cerebral concussion within the immediate aftermath of the MVA. These results indicate an acceptable convergent validity of Steiner's Automobile Anxiety Inventory as a brief screening tool for driving phobia in clinical settings.

REFERENCES

- [1] Cleeland CS. *The Brief Pain Inventory - User Guide*. Houston, TX: The University of Texas - M. D. Anderson Cancer Center, 2009.
- [2] Pinfold M, Niere KR, O'Leary EF, Hoving JL, Green S and Buchbinder R. Validity and internal consistency of a Whiplash-Specific disability measure. *Spine*. 2004;29(3): 263-268.
- [3] Morin CM, Belleville G, Bélanger L, and Ivers H. The insomnia severity index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*. 2011; 34:601-608.
- [4] Eyres S, Carey A, Gilworth G, Neumann V, Tennant A. Construct validity and reliability of the Rivermead Post-Concussion Symptoms Questionnaire. *Clinical Rehabilitation*. 2005; 19: 878-87.
- [5] Cernovsky Z, Istasy P, Bureau Y, & Chiu S. Scale for retrospective assessment of immediate concussion symptoms. *Mental Illness*. 2018; 10(2): 70-71, and Appendix (2 pages)
- [6] Cernovsky ZZ, Istasy PVE, Hernández-Aguilar ME, Mateos-Moreno A, Bureau Y, and Chiu S. Quantifying Post-Accident Neurological Symptoms Other than Concussion. *Archives of Psychiatry and Behavioral Sciences*. 2019; 2(1): 50-54.
- [7] Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, & Schnurr PP. *The PTSD Checklist for DSM-5 (PCL-5)*. The National Center for PTSD, US Department of Veterans Affairs, Washington, DC, 2013. www.ptsd.va.gov.
- [8] Whetstone JP, Cernovsky Z, Tenenbaum S, Poggi G, Sidhu A, Istasy M, Dreer M. Validation of James Whetstone's Measure of Amaxophobia. *Archives of Psychiatry and Behavioral Sciences*. 2020; 3(1): 23-33.
- [9] Clapp JD, Olsen SA, Beck JG, Palyo SA, Grant DM, Gudmundsdottir B, and Marques L. The Driving Behavior Survey: Scale construction and validation. *Journal of Anxiety Disorders*. 2011; 25(1): 96-105. doi: 10.1016/j.janxdis.2010.08.008

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- [10] Ehlers A, Taylor JE, Ehring T, Hofmann SG, Deane FP, Roth WT, Podd JV. The Driving Cognitions Questionnaire: development and preliminary psychometric properties. *Journal of Anxiety Disorders*. 2007;21(4):493-509.
- [11] Stewart AE, St Peter CC. Driving and riding avoidance following motor vehicle crashes in a non-clinical sample: psychometric properties of a new measure. *Behavior Research and Therapy*. 2004; 42(8):859-879.
- [12] Taylor JE, Sullman MJ. What does the Driving and Riding Avoidance Scale (DRAS) measure? *Journal of Anxiety Disorders*. 2009; 23(4):504-10. doi: 10.1016/j.janxdis.2008.10.006.
- [13] Downie NM, Heath RW. *Basic Statistical Methods*. New York, NY: Harper & Row, 1983.

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