Validation of James Whetstone's Measure of Amaxophobia

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Abstract

Background: Whetstone's Vehicle Anxiety Questionnaire is a 31 item measure of driving anxiety (amaxophobia) as common in survivors of motor vehicle accidents (MVAs).

Method: Scores on Whetstone's questionnaire were available for 53 survivors of car accidents (mean age 40.2 years, SD=13.6, 15 men, 38 women). Their scores on the Driving Anxiety Questionnaire and on Steiner's Automobile Anxiety Inventory were also available, as well as scores on measures of PTSD (PCL-5), and on scales of post-concussive and whiplash symptoms, pain, insomnia, depression, and anxiety. Whetstone's scores were also available for 24 normal persons (mean age 51.7 years, SD=17.5, 14 men, 10 women) who were never injured in a serious car accident.

Results and Discussion: With respect to criterion validity, Whetstone's scores were significantly higher (r=.88) in the patients than in the controls. The highest Whetstone score of the controls was 19 and the lowest of the patients was 23: there was no overlap between the two groups.

With respect to convergent validity, high correlations were found of Whetstone questionnaire to the Driving Anxiety Questionnaire (r=.83) and to the PCL-5 measure of PTSD symptoms (r=.78). Whetstone scores were found to be also highly correlated with the post-concussion syndrome (r=.63) and moderately with whiplash symptoms (r=.46), post-MVA insomnia (r=.56), ratings of post-MVA pain (rs ranging from .43 to .51), and ratings of depression (r=.40) and of generalized anxiety (r=.43). Significant correlation was also found of Whetstone to Steiner's Automobile Anxiety Inventory (r=.45).

Conclusion: The results indicate an excellent criterion validity and convergent validity of Whetstone's Vehicle Anxiety Questionnaire as a clinical assessment tool for amaxophobia.

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

INTRODUCTION

Clinical signs of phobia of driving (amaxophobia) are frequently reported by persons who survived serious motor vehicle accidents (MVAs). They complain of an excessive anxiety during car trips as a driver or passenger. They avoid car trips, might experience frightening dreams of car accidents, and their quality of life is substantially impaired by such phobic symptoms. In some cases, the amaxophobia interferes with their professional career. Canadian psychotherapist James Whetstone has developed a questionnaire to assess various facets of the driving phobia as a tool to facilitate

its psychological treatment. Since the questionnaire was never previously published, the full text of the questionnaire is reproduced here in Table 1.

Whetstone questionnaire maps the driving phobia along its 6 dimensions: (1) Compensating driving behaviours (Items 1 to 6), (2) Passenger anxieties (Items 7 to 10), (3) Physical manifestations of anxiety (Items 11 to 16), (4) Limitations to mobility (Items 17 to 21), (5) Avoidance behaviours (Items 22 to 26), and (6) Challenges to personal and relationship stability (Items 27 to 31).

The answers to Whetstone items can be scored with 0 points for "Not at All," 1 for "Mildly," 2 for "Frequently," and with 3 points for "Constantly." In clinical use, the patients are also asked to provide ratings, on a scale from 1 to 10, of anxiety as a driver or as a passenger since their accident and then, also separately the rating of their driver and passenger anxiety over the years before the accident (see the text after Item 31 of the Whetstone questionnaire in Table 1). Our data file did not include the patients' and the controls' scores on these last rating scales, at this time.

Table 1. *Whetstone Vehicle Anxiety Questionnaire*

Instructions: This questionnaire has been designed to give information as to how your driving anxiety has affected you. Read each statement and check the column next to the statement. Please answer every question.

	NOT AT ALL	MILDLY I do a little.	FREQUENTLY I do this often.	CONSTANTLY I always do this.
1. I feel anxious when vehicles approach from the side.	0	1	2	3
2. I do not move into traffic until I feel completely sure, even if I have to check four or five times.	0	1	2	3
3. I notice that other drivers often blow their horn at me or make rude gestures because I hold them up.	0	1	2	3
4. I worry other vehicles will not stop at red lights (or stop signs).	0	1	2	3
5. When driving, I am very concerned when vehicles following behind are close.	0	1	2	3
6. I worry that my pain will distract me and make paying close attention to driving difficult.	0	1	2	3
7. I am anxious when others drive and I am often pointing out hazards to them.	0	1	2	3
8. As a passenger, I am anxious when vehicles approach from the side.	0	1	2	3
9. As a passenger, I worry about vehicles behind us.	0	1	2	3
10. I feel a "need to be in control" when I am a passenger.	0	1	2	3
11. I feel light-headed or dizzy being in a vehicle.	0	1	2	3
12. I get headaches or pains when I am in a vehicle.	0	1	2	3
13. I feel stomach sickness or nausea when I am in a vehicle.	0	1	2	3
14. I perspire more than normal when I am in a vehicle.	0	1	2	3

	NOT AT ALL	MILDLY I do a little.	FREQUENTLY I do this often.	CONSTANTLY I always do this.
15. I notice that my body is stiff or tight when I am in a vehicle.	0	1	2	3
16. My sleep is interrupted by thoughts of driving or of collisions.	0	1	2	3
17. I worry I might be in another collision.	0	1	2	3
18. I am now aware of driving noises or smells that previously went unnoticed.	0	1	2	3
19. I feel anxious if I must drive on a highway.	0	1	2	3
20. I change driving plans because of weather.	0	1	2	3
21. When I think about getting in a vehicle, I get upset.	0	1	2	3
22. I worry a day or two ahead about driving long distances or in traffic.	0	1	2	3
23. I hide my feeling of being anxious about driving from others.	0	1	2	3
24. I take alternate routes to avoid highways, intersections or locations.	0	1	2	3
25. I worry about what might happen next; such as, being hit again or other disasters.	0	1	2	3
26. I feel driving is not fun anymore.	0	1	2	3
27. Aggressive drivers frighten me much more than before.	0	1	2	3
28. I get into more family arguments about driving than I did previously.	0	1	2	3
29. I am nervous when motorists blow their horn or make some gesture at me.	0	1	2	3
30. I feel when others see me driving, they are critical of my driving skills.	0	1	2	3
31. I feel others don't understand my fears of being in a vehicle.	0	1	2	3

Please rate the average level of anxiety you are experiencing, as a driver and passenger **since your motor vehicle collision**, with "1" being the lowest and "10" the highest level of anxiety.

Anxiety as a Driver:

| Very Little | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very High |

Anxiety as a Passenger:

| Very Little | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very High |

Please rate the average level of anxiety you had usually experienced, as a driver and passenger **in the years before** your motor vehicle collision

Anxiety as a Driver:

| Very Little | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very High |

Anxiety as a Passenger:

| Very Little | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very High |

The present article evaluates statistically the criterion validity and convergent validity of the Whetstone questionnaire. We evaluated the criterion validity by comparing Whetstone questionnaire scores of normal controls to those of persons complaining of driving anxiety.

Convergent validity was examined in this study 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 standard measures of PTSD symptoms related to the patient's MVA. Some clinicians would also predict that driving phobia could also be correlated to factors such as generalized anxiety and depression in the aftermath of the MVA, or persistent pain from an MVA (pain might be a persistent reminder to the patient that driving is dangerous), or to post-MVA insomnia as it causes fatigue that could undermine or erode the driving self-confidence of the driver or passenger on car trips.

The present study calculated correlations of amaxophobia scores on Whetstone questionnaire to these potentially influential factors as well as to other questionnaires clinically used to measure driving anxiety.

METHOD

De-identified archival clinical data with Whetstone's scores of 53 survivors of MVAs were available. The sample consisted of 15 men, 38 women, mean age 40.2 years (SD=13.6; age range 18 to 69 years). On the average, their MVA occurred approximately 63.1 weeks ago (SD=49.8). They all retained a personal injury lawyer due to administrative delays with insurance compensations. In their MVA, 46 were the drivers and 7 were passengers. In 22 cases, the collision involved an impact to the side of the vehicle, in 17 to the back of the vehicle, and in 14 cases the impact was frontal or combined. The majority of the patients (33 of 53) had no previous serious MVAs associated with injuries, 18 patients had one such previous MVA, and 2 patients had 2 such prior MVAs.

Statistical analyses in the present study are based on Items 1 to 31 of Whetstone Vehicle Anxiety Questionnaire. In addition to the patients' scores on the Whetstone questionnaire, the archival data used in the present study 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 ("no pain") to 10 ("pain as bad as you can imagine"). The archival data also included the patients' scores on Items 10 to 12 of the Whiplash Disability Questionnaire[2], i.e., ratings of anxiety, anger, and of depression via scales from 0 ("not at all") to 10 ("always"). The data also included total scores on the Insomnia Severity Index[3], Rivermead Post-Concussion Symptoms Questionnaire[4], the Immediate Concussion Symptoms[5] scale (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, and syndrome of word-finding difficulty), and also scores on Steiner's Automobile Anxiety Inventory[7].

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 first 14 items list the following situations: *1. Walking up to your vehicle, 2. Sitting in vehicle, 3. Driving short distances, 4. Driving longer distances, 5. In traffic, 6. On highways, 7. After nightfall, 8. Inclement weather, 9. Approaching Intersections, 10. Crossing Intersections, 11. When cars are following too close, 12. Making turns, 13. Changing lanes,* and *14. Near buses/ trucks*. The patients are rating their anxiety, as a driver, for each of these situations by choosing the response of No anxiety=0, Mild=1, Moderate=2, or Severe=3. The same set of situations is then repeated as items 15 to 28, but this time the patients are to rate their anxiety in those situations as a passenger.

Items 29 to 35 of the Driving Anxiety Questionnaire describe the feelings and behavior of the patient as a driver: *29. Feeling tense and uneasy, 30. Clutching wheel or other objects, 31. Checking mirrors too often, 32. Driving too slowly, 33. Overly vigilant, 34. Checking blind spots too often, 35. Bad temper/ road rage*. The intensity of these symptoms is rated by patients as 0 for symptom absent, 1 for mild, 2 for moderate, and 3 points for severe.

Items 36 to 42 of the Driving Anxiety Questionnaire describe the feelings and behavior of the patient as a passenger: *36. Feeling tense and uneasy, 37. Clutching objects, 38. Checking areas for danger, 39. Feeling compelled to give instruction, 40. Feeling like driver is not driving safely,* and *41. Urge to press floor to "brake."* The intensity of these symptoms is also rated by patients as 0 points for symptom absent, 1 for mild, 2 for moderate, and 3 points for severe. Item 41 describes the "phantom brake" phenomenon in which the patient, as a passenger, unwittingly presses the foot on the floor as if in an effort "to brake." Some data on the Driving Anxiety Questionnaire and also the full text of that questionnaire are included in a recent article on validation of Steiner's measure of amaxophobia[7].

According to documentation from clinical interviews, all but 2 of the 53 patients in our sample met the DSM5 criteria for the diagnosis of PTSD. Fifteen patients also completed the questionnaire measure of PTSD for DSM-5, known as PCL-5[8], 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.

Responses to the Whetstone questionnaire were also available for 24 normal persons (mean age 51.7 years, SD=17.5, 14 men, 10 women) who were never injured in a serious car accident. As a group, they are significantly older (r=.34, p=.002, 2-tailed) and include significantly more males (phi=.29, p=.011, 2-tailed) than the group of patients. This is very unlikely to bias the results because there was no significant correlation in the control group of Whetstone scores to age or gender (p>.05, 1-tailed) and also in the group of patients (p>.05, 1-tailed).

Items of the Whetstone questionnaire have 4 response categories scored in the present study as follows: "Not at All"=0, "Mildly"=1, "Frequently"=2, and "Constantly"=3. The total score on the Whetstone questionnaire is calculated as the sum of all its 31 items.

In clinical use, the patients are also asked to provide ratings, on a scale from 1 to 10, of anxiety as driver or as passenger since their accident and then also separately the rating of their driver and passenger anxiety over the years before the accident (see the text after Item 31 of the Whetstone questionnaire). Our data file did not include the patients' and the controls' scores on these last rating scales, at this time.

RESULTS

Difference in the Whetstone Scores between the Patients and the Normal Controls

The Whetstone's scores of the patients ranged from 23 to 93, with the average at 65.5 (SD=17.4). These scores ranged only from 0 to 19 in the control group, with the average at 6.8 (SD=5.1). It is very important to note that there is no overlap between the score distribution in the group of patients (lowest score was 23) and the control group (highest score was 19). The Pearson point biserial correlation coefficient between these two groups is very high (r=.88, p<.0001). This indicates an excellent criterion validity of the Whetstone questionnaire.

Scores of the Patients on Various Measures

The mean scores and SDs of our 53 patients are summarized in Table 2.

Table 2. *Mean Scores of the Patients' Group on Various Measures*

	Mean score (SD)	Range
Whetstone Vehicle Anxiety Questionnaire, N=53	65.5 (17.4)	23 - 93
Ratings on Items 3 to 5 of the Brief Pain Inventory[1]: *Worst pain, N=53* *Least pain, N=53* *Average pain, N=52*	 8.3 (1.6) 4.6 (2.3) 6.5 (1.8)	 0 - 10 0 - 10 0 - 10
Insomnia Severity Index[3], N=52	23.7 (4.9)	0 - 28
Rivermead Post-Concussion Symptoms Questionnaire[4], N=53	47.8 (9.7)	13 - 64
Immediate Concussion Symptoms scale[5], N=52	4.5 (1.8)	0 - 7
Post-MVA Neurological Symptoms (PMNS)[6] scale, N=53	21.7 (11.0)	0 - 52

PCL-5 scores for PTSD[8], N=15	58.0 (17.3)	16 - 80
Ratings on Items 10 to 12 on the Whiplash Disability Questionnaire[2], N=53 *Depression* *Anger* *Generalized Anxiety*	 8.4 (2.0) 8.5 (2.1) 8.9 (1.9)	 2 – 10 0 – 10 2 - 10
Driving Anxiety Questionnaire, N=50	93.7 (25.6)	30 - 123
Steiner's Automobile Anxiety Inventory[7], N=20	15.3 (2.2)	10.5 - 18

Correlations of the Whetstone's Scores of the Patients to Other Measures

We calculated Pearson correlations of scores on Whetstone Vehicle Anxiety Questionnaire to all other measures, see listing in Table 3. The N next to each variable indicates on how many of the 53 subjects the measures were available. Only the significant p values (1-tailed) are listed in this table.

Table 3. *Pearson Correlations of Whetstone Questionnaire to Other Variables*

	Whetstone Vehicle Anxiety Questionnaire	Significant p values (those at p<.05, 1-tailed)
Age in years, N=53	.12	
Gender (1=male, 2=female), N=53	-.04	
N of weeks since MVA, N=53	-.18	
N of prior serious MVAs associated with injuries, N=53	.17	
Ratings on Items 3 to 5 of the Brief Pain Inventory[1], N=53: *Worst pain, N=53* *Least pain, N=53* *Average pain, N=52*	 .43 .45 .51	 p=.001 p<.001 p<.001
Insomnia Severity Index[3], N=52	.56	p<.001
Rivermead Post-Concussion Symptoms Questionnaire[4], N=53	.63	p<.001
Immediate Concussion Symptoms scale[5], N=52	.06	
Post-MVA Neurological Symptoms (PMNS) scale[6], N=53	.46	p<.001
PCL-5[8] scores for PTSD, N=15	.78	p<.001
Ratings on Items 10 to 12 on the Whiplash Disability Questionnaire[2], N=53 *Depression* *Anger* *Generalized Anxiety*	 .40 .44 .43	 p=.002 p<.001 p=.001
Driving Anxiety Questionnaire, N=50	.83	p<.001
Steiner's Automobile Anxiety Inventory[7], N=20	.45	p=.024

The Pearson correlations of the Whetstone questionnaire to the Driving Anxiety Questionnaire and to the PCL-5[8] measure of PTSD are not only significant but high (rs>.77): they indicate an excellent convergent validity. These correlations demonstrate that the concepts assessed by the Whetstone questionnaire extensively overlap with those assessed by the Driving Anxiety Questionnaire and also by the PCL-5 which, in the present study, specifically referred to the PTSD from MVAs.

The correlation of the Whetstone questionnaire to Steiner's Automobile Anxiety Inventory[7] is significant, but is only moderate. The two questionnaires use, to some extent, a slightly different approach as shown in the wording of their items. Above all, Steiner's items are responded to in a dichotomous manner ("Yes" versus "No" responses) and they aim only at assessing a post-MVA change (an increase) in driving anxiety.

Thus, most of Steiner's items are placed within the following context "*Since the accident, are you more nervous when ....*"

Furthermore, the Whetstone questionnaire seems to cover more driving situations, it also mentions some consequences of driving anxiety on lifestyle, personal mobility, and close relationships, and is verbally more complex and likely to provide more detailed and valuable information for psychotherapists of amaxophobia. Steiner's questionnaire is in more simple English and much better suited when needing to assess only partly literate persons, or clients who read rarely or reluctantly, or whose grasp on English may be tenuous, in some respects.

Of major clinical interest are the various significant correlations of the Whetstone questionnaire to the PMNS[6] measure of subjective symptoms of whiplash, the Rivermead scale[4] of post-concussive symptoms, the ratings of worst, least, and average pain on the Brief Pain Inventory[1], ratings of generalized anxiety and of depression on items of the Whiplash Disability Questionnaire[2], and to insomnia scores[3]. All these correlations can be described as of moderate strength,

except for the high correlation involving the post-concussive symptoms. These correlations provide a very substantial conceptual support for convergent validity of the Whetstone questionnaire.

It is also important to note that no significant correlations of Whetstone scores were found to age, gender, number of weeks since the MVA, and the number of prior MVAs: at the time of the clinical assessments, all patients still experienced active symptoms of amaxophobia and demographic variables such as age or gender had presumably no relevant impact on the fear of driving.

Cronbach alpha coefficient of internal consistency calculated for the Whetstone's scale in the patients' group was .95, which is excellent.

It is noteworthy that the Driving Anxiety Questionnaire (the full test is reproduced here in the Introduction section) the author of which remains unknown to us, but which is widely used by clinical assessments in North-America, also performs well with respect to its own convergent validity, see its correlations to relevant target variables in Table 4. Only the significant p values (1-tailed) are listed in this table.

Table 4. *Pearson Correlations of Driving Anxiety Questionnaire to Other Variables*

	Driving Anxiety Questionnaire	Significant p values (those at p<.05, 1-tailed)
Age in years, N=50	.16	
Gender (1=male, 2=female), N=50	-.07	
N of weeks since MVA, N=50	-.14	
N of prior serious MVAs associated with injuries, N=50	.20	
Ratings on Items 3 to 5 of the Brief Pain Inventory[1]:		
Worst pain, N=50	.47	p<.001
Least pain, N=50	.41	p=.001
Average pain, N=49	.55	p<.001
Insomnia Severity Index[3], N=49	.59	p<.001
Rivermead Post-Concussion Symptoms Questionnaire[4], N=50	.48	p<.001
Immediate Concussion Symptoms scale[5], N=49	.01	
Post-MVA Neurological Symptoms (PMNS) scale[6], N=50	.36	p=.005
PCL-5[8] scores for PTSD, N=14	.65	p<.006
Ratings on Items 10 to 12 on the Whiplash Disability Questionnaire[2], N=50		
Depression	.39	p=.003
Anger	.44	p=.001
Generalized Anxiety	.34	p=.008
Whetstone Vehicle Anxiety Questionnaire, N=50	.83	p<.001
Steiner's Automobile Anxiety Inventory[7], N=20	.57	p=.005

The data in Table 4 indicate that the Driving Anxiety Questionnaire shows good convergent validity, as shown by its moderate size but statistically significant correlation to measures of pain, insomnia, and to scores on Steiner's questionnaire, and also by its high correlations to the measure of PTSD (PCL-5) and to Whetstone questionnaire. The Cronbach alpha coefficient calculated for the 41 items of the Driving Anxiety Questionnaire is .97, i.e. excellent.

The Most Frequently and the Least Frequently Endorsed Whetstone's Items

All Whetstone items were endorsed by at least one of the patients. This suggests that all of them are clinically relevant. More than two-thirds (i.e., > 66.3%) of patients responded with "Constantly" to the Item 4 (endorsed by 73.6%), Item 25 (endorsed by 73.6%), Item 17 (endorsed by 71.7%), Item 5 (endorsed by 67.9%), and Item 10 (endorsed by 67.9%): this means that the most frequent fears were worries that "other vehicles will not stop at red lights or stop signs," those of "being hit by another vehicle," being in another collision, worries that "vehicles following behind are close," and also concern about the lack of control over the car when being present only as a passenger.

In the group of normal controls, all responded with "Not at All" to items 12, 16, 21, and 31: this means that none of them reported "getting headaches when in a vehicle," sleep "disrupted by thoughts of driving or collisions," getting upset when "thinking about getting in a vehicle," or "feeling others don't understand his/her fears of being in a vehicle."

None of the normal controls chose the response "Constantly" to any of the items. The most frequently endorsed by the normal controls (items endorsed by at least 50%) were Item 4 (endorsed by 62.5%: by 14 with "Mildly" and by one with "Frequently"), Item 5 (endorsed by 58.3%: by 11 with "Mildly" and by 3 with "Frequently"), Item 2 (endorsed by 50.0%: by 9 with "Mildly" and by 3 with "Frequently"), and Item 20 (endorsed by 50.0%: by 11 with "Mildly" and by one with "Frequently"). This indicates that the most frequent concern of normal controls was that "other vehicles will not stop at red lights or stop signs," or

that "vehicles following behind are close," and anxiety associated with entering a busy roadway ("I do not move into traffic until I feel completely sure, even if I have to check four or five times"), and changing "driving plans because of weather." These are realistic concerns or worries of cautious normal drivers.

Discussion

Criterion and Convergent Validity of the Whetstone Questionnaire

The results indicate an excellent level of criterion validity and convergent validity of the Whetstone questionnaire. The clinical data from the present study suggest that all items of the Whetstone questionnaire are relevant in assessment of persons suffering from amaxophobia.

Comparisons of Existing Measures of Driving Anxiety

The Driving Anxiety Questionnaire and Steiner's Automobile Anxiety Inventory have been already briefly discussed in the present article. They are significantly correlated with the Whetstone Vehicle Anxiety Questionnaire and each of these 3 questionnaires seems to have a useful clinical role. The advantage of the Whetstone questionnaire is the narrative style of its items and inclusion of factors such as changes in driving plans due to inclement weather, or fear that other drivers might tailgate recklessly or fail stopping at red lights or stop signs, or the patient's attempts to hide his or her driving anxiety from others, and the tendency to choose "alternate routes." The advantage of the Driving Anxiety Questionnaire lies in providing an easy overview for behavior therapists of which situations, as a driver or as a passenger, cause their patient least anxiety and which cause most intense anxiety: this allows the therapist to create the related hierarchy of situations for in vivo exposure treatments. The advantage of Steiner's questionnaire is its style of comparing patients' reactions before their accident to those at present. Steiner's questionnaire is especially well suited for patients who read rarely or only reluctantly or for those with only elementary knowledge of written English. Since each of these 3 questionnaires has a slightly different focus, it is often

of advantage to use all 3 jointly in clinical assessments, as long as enough time is available.

It should be noted that yet some other questionnaires to measure driving anxiety were published, but they seem more intended for novice drivers than for our post-MVA patients. For example, the Driving Behavior Survey (DBS)[9] consists of 20 items (each of which is rated on a scale from 1=never to 7=always) and contains items such as 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*." Lack of experience with driving or lack of driving skills in novice drivers constitutes a different trigger of anxiety than the post-MVA anxiety of drivers who were self-confident in cars until their MVA. The post-MVA patients experience anxiety that vehicular accidents might occur no matter how skilled or experienced they themselves are, because some other drivers on the same road might disrespect the traffic rules or lose control over their vehicles.

The Driving Cognition Questionnaire (DCQ)[10] also consists of 20 items. These are rated on a scale from 0=never to 4=always. This questionnaire is also suited well for driving anxiety assessment in novice drivers rather than for post-MVA patients, particularly due to items such as 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-image issues are less common in post-MVA patients some of whom drove without accidents and without emotional discomfort for decades.

The Driving and Riding Avoidance Scale (DRAS)[11] also consists of 20 items. These are scored from 0="rarely or none of the time" to 4="Most or all of the time." All 20 items describe various situations in which driving is avoided. As discussed by Taylor and Sullman[12], the wording of DRAS items allows for responses that are not necessarily based on fear of driving, but could also involve economic or practical issues. For instance, the travel via subway trains within the center of some major North American cities such as Toronto is far more rapid than in cars and saves both gasoline and parking fees.

Compared to these 3 questionnaires (DBS, DCQ,

and DRAS), the Whetstone questionnaire seems a more practically useful source of information for psychotherapists about anxiety levels of experienced drivers following an MVA.

Of course, the DBS and DCQ may be useful in assessments of novice drivers, those who have never driven without phobic anxiety and might never overcome their amaxophobia without therapeutic help.

Translations of the Whetstone Questionnaire into Other Languages

German, Spanish and Arabic translations of the Whetstone questionnaire are available from professor Cernovsky (zcernovs@uwo.ca). Other translations are forthcoming.

Methodological Consideration for Future Statistical Studies of the Whetstone Questionnaire

First of all, as already explained, the Whetstone questionnaire has 6 dimensions (subscales) derived intuitively by its author, James Whetstone, from his clinical experience. A statistical analysis of these six subscales is of much clinical interest, but it would be beyond the scope of this first publication of the Whetstone questionnaire and should be preferably carried out on a larger sample of patients and of normal controls. The validity of each of these subscales would have to be evaluated separately.

There is another, even more pressing statistical issue that arises from considering *the effect of restricted range of scores on the size of correlation coefficients*, see an excellent discussion in Welkowitz, Ewen, and Cohen, page 188.[13] Briefly, when the data on two variables is restricted to only a certain range, the resulting correlation coefficients calculated between these two variables tend to underestimate the size of the relationship. For instance, see simplified fictitious data in the scatterplot in Figure 1: if scores on the x axis are restricted only to those > 7 points, the dispersion of the dots suggests a lack of a noteworthy relationship between x and y scores, and the resulting Pearson r is only .09. When the full range of x scores in Figure 1 is included, from 0 to 11, then the dots seem to ascend from left to right, and the r=.82.
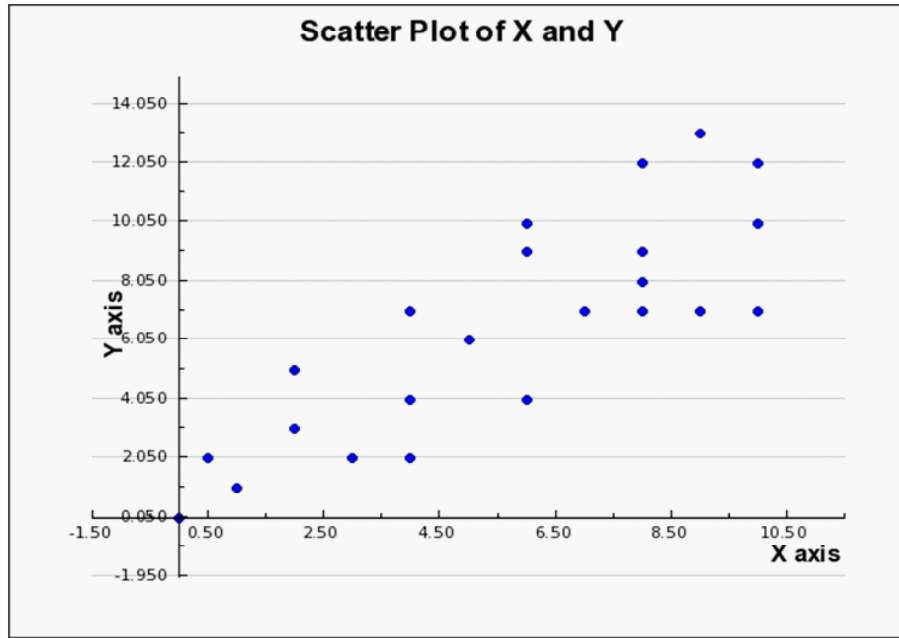
Fig 1. *Illustration of the impact of restricted range on the size of correlation coefficients (fictitious data)*

In the present study, the convergent validity of Whetstone questionnaire was assessed via its correlations to measures such as the Rivermead post-concussion symptoms scale and the PCL-5: since only the injured post-MVA patients were included in these correlational analyses because the Rivermead and PCL-5 data were not available for our normal controls, there were no persons with scores of zero or close to zero on the Rivermead and PCL-5. This suggests to experienced statisticians that our results somewhat underestimate the convergent validity of the Whetstone questionnaire. Although in the present study the Whetstone correlations to Rivermead (r=.63) and to PCL-5 (r=.78) were high, they might perhaps be even higher if data on normal controls were available to be included in these calculations. The same assumption might apply to the other variables such as ratings of pain or of depression and anxiety. The Whetstone scores of normal controls would be much lower than those of post-MVA patients (as already reported here, the lowest Whetstone score in the group of patients was 23 points and the highest score of normal controls was 19). If only the Whetstone scores of the patients are placed on the x axis and their ratings of pain on the y axis, the scatterplot would fit less well an ascending straight line than if the full range of Whetstone scores were included with those of normal controls, because their pain ratings would also usually be at zero or close to zero.

For the same reasons, we can suspect that the convergent validity coefficients calculated here for the Driving Anxiety Questionnaire, and also those ones calculated for the Steiner's questionnaire in another recent article,[7] somewhat underestimate the convergent validity of these two questionnaires because our data was based on injured patients only. If possible, future studies should also include uninjured normal controls in similar calculations of convergent validity.

Conclusions

Our statistical analyses indicate an excellent criterion validity and also an excellent convergent validity of the Whetstone's Vehicle Anxiety Questionnaire as a clinical assessment tool for amaxophobia. Correlational analyses indicate significant relationships of Whetstone's amaxophobia scale to other measures of driving anxiety. Whetstone's scores are also significantly correlated with reports of post-concussive and whiplash symptoms, post-MVA pain and insomnia, post-MVA generalized anxiety and depression, and to a measure of PTSD related to the MVA.

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