1949-1999

THE Ergonomics society

FIFTIETH ANNIVERSARY

Contemporary Ergonomics

1999

Edited by

M.A. Hanson

E.J. Lovesey

and

S.A. Robertson

TAYLOR & FRANCIS

Founded 1798

MOTION SICKNESS SUSCEPTIBILITY AND OCCURRENCE IN HONG KONG CHINESE

Richard H.Y. So[1], Colleen M. Finney, and Ravindra S. Goonetilleke

Human Performance Laboratory,
Department of Industrial Engineering and Engineering Management,
Hong Kong University of Science and Technology,
Clear Water Bay, Kowloon
Hong Kong SAR
[1] rhyso@ust.hk

The prevalence rate of motion sickness occurrence and self-rated sickness susceptibility among Hong Kong Chinese aged between 19 to 29 are reported. The data are part of the results from a survey conducted at the Hong Kong University of Science and Technology. The sample size is 515 and the participants have been randomly selected from 5,600 undergraduate students. Results suggested that 14%±3% of the Hong Kong population aged 19 to 29 would rate themselves as not susceptible to motion sickness while the prevalence rates for different levels of susceptibilities are: 'slightly susceptible': 57%±4%; 'moderately susceptible': 22%±4%; 'very susceptible': 6%±2%; and 'extremely susceptible': 1%±0.08%. Effects of gender and sickness occurrences among different modes of transport are also reported.

Introduction

Motion sickness susceptibility among the Chinese population has been a topic of interest (e.g., Lin *et al.*, 1988, Xu *et al.*, 1992 and Stern *et al.*, 1993). When Chinese female subjects were exposed to a rotating optokinetic drum, they had a higher rated level of nausea, reported more symptoms of motion sickness, and showed significantly greater disturbances in gastric activity than their European-American and African-American counterparts (Stern *et al.*, 1993). Stern concluded that Chinese female adults are hyper-susceptible to motion sickness. Besides laboratory studies, the use of motion sickness history questionnaires have been a popular way to determine the susceptibility to motion sickness (e.g., UK sea travelers: Lawther and Griffin, 1986, 1988; US military personnel: Kennedy *et al.*, 1988, 1992). However, a review of the literature showed that there has been no published prevalence rate on motion sickness susceptibility and occurrence for the Chinese population. A survey of motion sickness occurrence and susceptibility has, therefore, been conducted at the Hong Kong University of Science and Technology. The objective was to establish a prevalence rate of motion sickness susceptibility and

occurrence among Hong Kong Chinese adults. It was hypothesized that females will report a higher level of susceptibility than males as found in a survey of 20,029 passengers aboard ferries in the English Channel (Lawther and Griffin, 1988).

Method

Over 500 completed questionnaires have been processed with a response rate of nearly 100%. Subjects were undergraduate students at the Hong Kong University of Science and Technology and they were randomly selected by class. The questionnaire consisted of three main questions focusing on the frequency of motion sickness occurrence and symptoms experienced in various forms of land and sea transport. Self-rated sickness susceptibility has also been obtained. This questionnaire was derived from Kennedy *et al.* (1992) and Turner and Griffin (1997). A copy of the questionnaire is included in the Appendix. Among the 515 survey participants, 51% were male. The high percentage of male students from the School of Engineering was balanced by the high percentage of female students from the School of Business. The age of the participants ranged from 19 to 29 with a mean of 21 years. Data analyses were conducted using the SPSS packages.

Results and discussion

As seen from the Appendix, the motion sickness susceptibility was measured using a five-point scale: (0) not-at-all; (1) slightly; (2) moderately; (3) very; and (4) extremely. The prevalence rates for the different categories were: not-at-all: 14%±3%; slightly: 57% ±4%; moderately, very, and extremely susceptible: 29%±4. The prevalence rate error was calculated using the following approximation (after Hazalett, 1996):

$$N = (1.96 / e)^2 \times [p\ (1\text{-}p)]$$

where

N is the number of the sample population;
e is the prevalence error in decimal form; and
p is the best estimation of the prevalence rate in decimal form.

A Kendall correlation test showed that there was a significant correlation between gender and susceptibility ($p<0.0001$). This is confirmed by a Mann-Whitney U test, which showed a significant difference between the susceptibilities of male and female participants ($p<0.0001$). Females had higher self-rated motion sickness susceptibility than males. This agrees with the findings by Lawther and Griffin (1986 and 1988). Sickness occurrences among different modes of land and sea transport were measured in percentages. Participants were asked to estimate how often they experienced motion sickness while travelling as a passenger in the past 12 months. Friedmann's two-way analysis of variance by ranks showed that mode of transport had a significant effect on the percentages of sickness occurrence ($p<0.0001$). The modes of transport in the order of their rankings are: jetfoil, bus, ferry, car, train (including underground) and elevator. The percentages of participants reported sickness occurrence (i.e., greater than 0% in Question 1, Appendix) while travelling in a jetfoil and a bus in the past 12 months are 39% and 42%, respectively. This corresponds to the prevalence rate of 39%±4%, and 42%±4%. Besides the sickness occurrence, participants were also asked to indicate the symptoms associated with the sickness occurrence with different modes of transport. The most frequently reported symptom was dizziness (15.4%) followed by nausea

(6.9%). Due to the page limit here, the interactions between the mode of transport and the reported symptoms could not be included.

Conclusions, limitations and future work

Results from a survey suggested that 29%±4% of the Hong Kong Chinese population aged between 19 to 29 are either moderately, very, or extremely susceptible to motion sickness. Consistent with published literature from the West, females have been found to have a significantly higher level of self-rated sickness susceptibility. About 39%±4%, and 42%±4% of the Hong Kong young adults will report some occurrence of motion sickness while travelling in a jet-foil and a bus.

As there has been no similar prevalence rate data published for the Chinese population, this represents a first initial attempt to establish the prevalence rate data concerning motion sickness occurrence and susceptibility of the Chinese population. So far, the survey has only covered university students; efforts to extend the sample population to clerical workers, building services workers, and the general population is continuing. In addition, collaboration with universities in the Chinese mainland has been started so that the prevalence rate of the mainland Chinese can also be established. As the competition for better transportation services continues in China, discomfort associated with motion sickness can no longer be ignored. Establishing the prevalence rates can help researchers to identify the mode of transport in which motion sickness occurrence is the highest.

References

Hazellet, C.B. (1996) Subject sampling for Health Service Research. Office of Educational Services, Faculty of medicine, University of Hong Kong.

Lawther and Griffin (1986) The motion of a ship at sea and the consequent motion sickness amongst passengers. Ergonomics Vol.29, 535-552.

Lawther and Griffin (1988) A survey of the occurrence of motion sickness amongst passengers at sea. Aviation, Space, and Environmental Medicine, 59, 399-406.

Lin, K.M., Poland, R.E., Lau, J.K., Rubin, R.T. (1988) Haloperidol and prolactin concentrations in Asians and Caucasians. J. Clin. Psychopharmacol, l8, 195-201.

Kennedy, R.S., Fowlkes, J.E., Berbaum, K.S. and Lilienthal, M.G.(1992) Use of a motion sickness history questionnaire for prediction of simulator sickness. Aviation, Space, and Environmental Medicine, July, 588-593.

Kennedy et al., (1988) Etiological significance of equipment features and pilot history in simulator sickness. Proceedings of AGARD Conference on Motion Cues in Flight Simulation and Simulator Induced Sickness (AGARD-CP-433).

Turner, M. and Griffin, M.J. (1997) Motion sickness history questionnaire. Human Factors Research Unit, Institute of Sound and Vibration Research, University of Southampton, Southampton, England. Personal Communication.

Xu, L., Koch, K.L., Summy-Long, J., Stern, R.M., Demers, L. and Bingaman, S. (1992) Neurohormonal and gastric myoelectrical responses to vection in healthy Chinese subjects. Gastroenterology, Vol.102, A535-8.

Stern, R.M., Hu, S., Leblanc, B.S. and Koch, K.L. (1993) Chinese hyper-susceptibility to vection-induced motion sickness. Aviation, Space, and Environmental Medicine. Sept, Vol.64, 827-832.

Appendix: a sample copy of the survey questionnaire

Motion Sickness Susceptibility Survey
暈浪敏感調查

This survey is being conducted to examine the motion sickness susceptibility of the Hong Kong Chinese population. All information in this survey will be kept confidential. This survey is **not a requirement** of this course and participation is to be done on a voluntary basis.

這是一個有關中國人對暈浪的敏感調查，所有調查所得的資料將會被保密。

Instructions: Please fill in this survey. Circle the answer which most closely corresponds to your own experience. Feel free to add comments you would like to make at the end of the survey.

請圈出你的答案。

Age 年齡：

Sex 性別：

School 學院: Business Engineering Science

The term motion sickness refers to symptoms, such as dizziness, fatigue, nausea, headache, sweating, and vomiting, which can be evoked in susceptible individuals by the perception of various kinds of periodic motion.

暈浪的定義就是一種病徵，例如流汗，作嘔，頭暈，頭痛或嘔吐。

1. In the past 12 months how often have you experienced motion sickness while traveling as a passenger in the following situations? (e.g., If you travel by bus 300 times a year and experience motion sickness 30 times, that would be 10% of the time.)

   在過去十二個月中有否在乘搭交通工具中有暈浪的經驗？例如：當你在三百次乘巴士經驗中，有三十次感到暈浪不適，答案就是10%)

Car/Taxi 私家車/的士	0%	1%-10%	11%-40%	41%-74%	75%-100%
Buses 巴士	0%	1%-10%	11%-40%	41%-74%	75%-100%
Cross-Ferry 輪渡	0%	1%-10%	11%-40%	41%-74%	75%-100%
Jet-Foil 飛翔船	0%	1%-10%	11%-40%	41%-74%	75%-100%
Trains 火車	0%	1%-10%	11%-40%	41%-74%	75%-100%
Elevators 升降機	0%	1%-10%	11%-40%	41%-74%	75%-100%

2. Please circle the symptoms experienced while in the following situations:
請圈出在暈浪的病徵？

Car/Taxi 私家車/的士	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐
Bus 巴士	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐
Cross-Ferry 輪渡	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐
Jet-Foil 飛翔船	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐
Trains 火車	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐
Elevators 升降機	Sweating 流汗	Nausea 作嘔	Dizziness 頭暈	Headache 頭痛	Vomiting 嘔吐

3. In general, how susceptible to motion sickness are you?
通常，你對暈浪的敏感程度有幾大？

Not at all 從不	Slightly 很少	Moderately 一般	Very 非常	Extremely 極端

Comments:
其他意見：_____
_____
_____
_____
_____

Thank you for participating in this survey. If you have any comments or questions please contact:
多謝你的參與。如有問題可找：

Dr. R.H. Y. So
e-mail: rhyso@ust.hk