Mental health and driving behaviour of students and alumni of a university in the United Arab Emirates: a cross-sectional study

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Abstract

Background: The United Arab Emirates has set the goal to reduce traffic-related deaths to 3 per 100 000 people by 2021. To do this, authorities must assess the factors related to risky driving behaviour.

Aims: To verify if there are any correlations between driving behaviour and certain variables, including years of driving experience, daily hours of sleep, general markers of mental health, and symptoms of attention deficit hyperactivity disorder (ADHD).

Methods: Two hundred and seventy-five participants responded to a survey made up of the Manchester driver behaviour questionnaire, the general health questionnaire, the adult ADHD self-report scale, and 2 additional questions. Spearman's coefficient was calculated for correlations between these variables, at statistical significance level $P < 0.05$.

Results: Years of driving experience and hours of sleep had no correlations with driving performance. Markers of general mental health had a weak correlation with risky driving behaviour, and symptoms of ADHD had moderate correlation with risky driving behaviour.

Conclusion: Policymakers and public health officials should screen for ADHD during driver licensing examination.

Introduction

Over the last few years, the United Arab Emirates has been making significant progress in road traffic injury prevention. Following the 725 traffic-related deaths and 6681 injuries in 2016, the Government of the United Arab Emirates made a deep commitment as part of its national agenda to reduce traffic-related deaths to 3 per 100 000 people by 2021 (*1*).

Research has provided much relevant information on this topic. Previous studies have suggested that mental health is associated with improved driving performance, and consequently, with increased traffic safety (*2*). However, it is not known which aspects of mental health are associated with driving performance. Since mental health is a broad category, policy-makers must focus on particular mental health markers and their relationship with particular dimensions of driving behaviour. This study addressed this question, and its correlations in the United Arab Emirates, because only few studies conducted on driving performance have paid attention to their relationship with mental health.

In this study we investigated whether 5 dimensions of mental health (social dysfunction, anxiety, loss of confidence, hours of sleep, attention deficit/hyperactivity) had any correlation with dangerous driving behaviour in the United Arab Emirates.

Methods

This was a cross-sectional study that measured age, sex, hours of sleep, years of driving experience, mental health, driving behaviour and levels of attention deficit hyperactivity disorder (ADHD).

An integrated questionnaire of 27 items was approved by the research ethics committee of Ajman University, # M-H-F-31-May. The questionnaire was sent (via email) to students and alumni of the university who live permanently in the United Arab Emirates. Participants were recruited on the basis of convenient non-probability sampling, considering availability and willingness to answer questionnaires during the COVID-19 lockdowns.

Participants were informed about the nature of the study and that they could refuse to answer questions at any time. They were requested to sign consent and instructed to carefully complete all questions in the survey to avoid any potential loss of data. The survey was designed using software that would not allow the participant to go on to the next question without answering the previous one. This method ensured that the returned questionnaires would not have any missing data. Consequently, the level of missing data was 0. We sent out 350 questionnaires; 275 were returned, giving a response rate of 79%.

The survey gathered demographic information (age, sex). One question asked participants how many hours

of sleep they got daily. Another question asked how many years of driving experience they had. The rest of the questions were made up of 3 questionnaires combined.

The first set of questions were taken from a 12-item version of the general health questionnaire (GHQ-12), which assesses 3 non-psychotic dimensions of mental health obtained from factor loading analyses: social dysfunction, anxiety and loss of confidence (3). Social dysfunction assesses individuals' capacity to properly function in society (e.g. Have you recently felt capable of making decisions?); anxiety assesses situations of stress and/or depression (e.g. Have you recently felt unhappy and depressed?); loss of confidence assesses situations in which the respondent does not feel they are functioning for optimal performance (e.g. Have you recently felt losing confidence?).

Participants were asked to rate how frequently they experienced particular situations expressed in the items. Responses were given on a Likert scale, from 0 (not at all) to 3 (more than usually), with higher scores indicating worse mental health.

The second set of questions were taken from a 9-item version of the Manchester driver behaviour questionnaire (Mini-DBQ). On the basis of previous factor loading analyses, the Mini-DBQ is structured around 3 dimensions: violations (e.g. I drive especially close or "flashing" the car in front as a signal for that driver to go faster), errors (e.g. I fail to notice, because lost in thought or distracted, someone waiting at a zebra crossing, or that a pelican crossing light has just turned red), and lapses (e.g. I forget where I left my car in a multi-level car park).

Participants responded by identifying how frequently they engaged in each of the habits expressed in the items, on a Likert scale from 0 (never) to 5 (nearly all the time), with higher scores indicating poorer driving performance. The Mini-DBQ has good reliability, with a Cronbach alpha = 0.9. It has been properly validated (4).

The third set of questions were taken from a 6-item version of the World Health Organization's Adult ADHD self-report scale (ASRS), which assesses symptoms of ADHD among adults. Participants were asked about the frequency of particular situations (e.g. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?), and they respond on the basis of a Likert scale (1 = never; 5 = very often), with higher scores indicating greater levels of ADHD. The ASRS is considered to have good reliability (5), and it has been validated across various settings (6).

Given that most variables included an interval (rather than a ratio) level of measurement, Spearman's test (instead of Pearson's) was selected to establish correlation, in line with the recommendation of most statisticians for interval levels of measurement. Coefficients were calculated for correlations between driving behaviour (violations, lapses, errors) and general mental health (social dysfunction, anxiety, loss of confidence), years of driving experience and daily hours of sleep.

Statistical significance was $P < 0.05$.

Results

We surveyed 275 participants: 64 males and 211 females. Mean age was 27.3 (standard deviation 7.24) years.

Spearman's coefficients for correlations between dimensions of driving behaviour (violations, errors and lapses) and symptoms of ADHD, years of driving experience and hours of sleep, are presented in Table 1. Results show that ASRS had a weak but statistically significant correlation with violations ($r = 0.31$; $P < 0.01$), a moderate and statistically significant correlation with errors ($r = 0.49$; $P < 0.01$) and a moderate and statistically significant correlation with lapses ($r = 0.47$; $P < 0.01$). Neither years of driving experience nor hours of sleep had any statistically significant correlation with any dimension of driving behaviour.

Spearman's coefficients for correlations between dimensions of driving behaviour (violations, errors and lapses) and dimensions of general mental health (social dysfunction, anxiety, loss of confidence) are presented in Table 2.

Social dysfunction had a very weak but statistically significant correlation with violations ($r = 0.15$; $P < 0.05$) but no statistically significant correlation with errors or lapses. Anxiety had a weak but statistically significant correlation with violations ($r = 0.25$; $P < 0.01$), with errors ($r = 0.27$, $P < 0.01$) and with lapses ($r = 0.29$; $P < 0.01$). Loss of confidence had a weak but statistically significant correlation with violations ($r = 0.21$; $P < 0.01$), with errors ($r = 0.27$; $P < 0.01$) and with lapses ($r = 0.25$; $P < 0.01$).

Discussion

We found that years of driving experience had no correlation with any of the assessed dimensions of driver behaviour. This would imply that road safety does not improve with greater experience, and most likely, driver behaviour remains constant. Similar findings have been reported in previous research. For example, one large study found "no evidence of a group of drivers whose aberrant behaviour decreased over time" (7).

More surprisingly, our study reveals that hours of sleep had no correlation with any of the dimensions of driving behaviour. This finding runs counter to previous research, in which sleep deprivation was related to poor

Table 1 Correlation between the driving behaviour questionnaire and physical factors in a survey of 275 permanent residents of the United Arab Emirates

Factor	Spearman's coefficient (df = 273)			
	Violations	Errors	Lapses	DBQ (total)
ASRS	0.31**	0.49**	0.47**	0.50**
Years of driving experience	0.002	−0.04	0.06	0.03
Hours of sleep	0.002	−0.08	−0.03	−0.05

ASRS = attention-deficit hyperactivity disorder self-report; DBQ= driving behaviour questionnaire
**P < 0.01.

Table 2 Correlations for the driving behaviour questionnaire and markers of mental health in a survey of 275 permanent residents of the United Arab Emirates

Factor	Spearman's coefficient (df = 273)			
	Violations	Errors	Lapses	DBQ (total)
Social dysfunction	0.15*	−0.08	−0.09	–
Anxiety	0.25**	0.27**	0.29**	–
Loss of confidence	0.21**	0.27**	0.25**	–
GHQ-12 total	–	–	–	0.18**

GHQ-12 = general health questionnaire; DBQ= driving behaviour questionnaire
*P < 0.05; **P < 0.01.

driving performance (*8*). One possible explanation for this study's failure to replicate such results is that, while insufficient sleep time may indeed negatively affect driving behaviour, the participants may not have had sufficient insight to self-report it in a questionnaire.

Additionally, it is possible that a hidden variable may be responsible for this lack of correlation between sleep and dangerous driving behaviour. The present study assessed usual hours of sleep in participants, but specific episodes of sleep deprivation (not necessarily persistent over time) may have a correlation with dangerous driving behaviour. In fact, previous research suggests that isolated sleep deprivation episodes can detrimentally affect driving performance, regardless of general sleeping patterns (*9*).

Our results show that general mental health scores have only a weak correlation with risky driving behaviour. These results fail to replicate previous studies in which markers of general mental health as assessed by the GHQ-12 had stronger correlations with drivers' behaviours in countries such as the Islamic Republic of Iran. We found that social dysfunction scores had only a negative weak correlation with driving violations; loss of confidence scores had a negative (somewhat stronger but still overall weak) correlation with violations, errors and lapses in driving behaviour.

Previous research in the United Arab Emirates had found that "drivers who reported feeling depressed were more than twice as likely to be at fault for their collision than drivers who did not report such feelings" (*10*), and more extensive research had documented that, indeed, depression may negatively impact driver safety (*11*). Likewise, anxiety may impair driving skills as stress may influence working memory, and it may consume mental resources needed to prevent lapses and errors in driving performance (*12*). Nevertheless, in our study, anxiety (and its corollary, depression) scores had only negative weak correlations with violations, error and lapses. Future research controlling for other variables may be needed to determine whether this failure to fully replicate such results was only an anomaly or whether some other variables were responsible

Some caution in considering the relationship between anxiety and driving performance must be considered. In this study, the relationship between both variables was negative and monotonic (i.e. the value of one variable increased as the value of the other decreased). But research suggests that the relationship between anxiety and performance (not only in driving, but any task) may also be non-monotonic (*13*). Too high levels of anxiety are detrimental to optimal performance, but at the other extreme, too low levels of anxiety may also be detrimental to performance. For example, excessive relaxation may cause reduced caution in drivers (and consequently, increased errors and lapses) since drivers do not feel the stress necessary to concentrate on the task.

Interestingly, symptoms of ADHD did have a much stronger correlation with dimensions of driving behaviour. The correlation with violations was only weak. This is very much expected as violations in driving behaviour relate to deliberate attempts to break traffic rules, and in this regard attention deficit and hyperactivity do not have a strong impact. However, symptoms of attention deficit and hyperactivity do have a moderate positive correlation on the propensity to commit errors and lapses while driving.

Prior research has established that, indeed, symptoms of ADHD are a considerable risk in driving performance. One study concluded that "drivers (with ADHD symptoms) rate themselves as more angry, risky and unsafe drivers and reported experiencing more losses of concentration and vehicular control" (*14*). Our results replicate such findings to the extent that there was a moderate correlation between self-report of ADHD symptoms and self-report of risky driving habits. One plausible theoretical explanation for these results is that, inasmuch as driving in increasingly complex urban settings requires sustained attention and concentration, individuals with deficits in those particular mental skills would be more likely to engage in poorer driving performance.

The impulsivity dimension of ADHD may also have a significant detrimental effect on driving performance. Previous research has established that impulsivity increases dangerous driving behaviour (*15*). This is expected, given that, in complex urban settings, driving decisions must be taken with confidence, yet at the same time assessing the risks involved. Overly impulsive behaviour impairs this capacity, to the extent that drivers may attempt particular manoeuvres without the necessary deliberation for their decisions.

Study limitations

This study had some limitations. Sampling was limited to students and alumni of Ajman University, and consequently, the results can only be taken as an initial assessment of the driving behaviour in the United Arab Emirates, but not as a robust indicator. Further studies with broader segments of the United Arab Emirates population would provide more robust conclusions. Availability for recruitment amongst participants was easier with women, and therefore sampling included significantly more women than men. This needs to

be considered a limitation, and further studies with a more balanced sample in the sex variable could provide stronger conclusions.

Another limitation of the study was its cross-sectional nature. Data were collected at a particular moment, but in order to obtain more robust conclusions, more advanced designs (e.g. cohort and case–control studies) should be done. For practical timing purposes in the administration of the surveys, a shortened version of the general health questionnaire was used. In future studies, a comprehensive assessment of mental health should be included to thoroughly examine the dimensions of mental health and their possible relationship to driving performance. Perhaps most importantly, this study relied on self-reporting of driving behaviours. This is an important limitation, given that a more robust assessment of driving behaviour relies on independent observation.

While acknowledging these limitations, some tentative conclusions and recommendations can be made. Based on the study results, policymakers and public health officials in the United Arab Emirates should support programmes aimed at improving general mental health in the population because such programmes can improve driving performance.

The results show that symptoms of ADHD had a moderate correlation with risky driving behaviour, traffic safety policymakers in the United Arab Emirates should implement a twofold policy. First, greater awareness of the risks of ADHD is needed. Second, screening procedures during drivers' licensing examination should begin to consider assessment of attention deficit and hyperactivity.

Santé mentale et comportement au volant des étudiants actuels et anciens d'une université aux Émirats arabes unis : étude transversale

Résumé

Contexte : Les Émirats arabes unis ont fixé l'objectif de réduire le nombre de décès liés à la circulation à trois pour 100 000 habitants à l'horizon 2021. Pour ce faire, les autorités doivent évaluer les facteurs liés aux comportements de conduite à risque.

Objectifs : Vérifier s'il existe des corrélations entre le comportement au volant et certaines variables, dont les années d'expérience de conduite, les heures de sommeil quotidiennes, les marqueurs généraux de la santé mentale et les symptômes du trouble déficitaire de l'attention avec hyperactivité (TDAH).

Méthodes : Deux cent soixante-quinze participants ont répondu à une enquête composée du *Manchester Driver Behaviour Questionnaire*, du *General Health Questionnaire*, de l'*Adult ADHD Self-Report Scale* et de deux questions supplémentaires. Le coefficient de Spearman a été calculé pour les corrélations entre ces variables, au niveau de signification statistique *p* < 0,05.

Résultats : Les années d'expérience de conduite et les heures de sommeil n'avaient aucune corrélation avec les performances de conduite. Les marqueurs de la santé mentale générale et les symptômes du TDAH avaient une corrélation respectivement faible et modérée avec le comportement de conduite à risque.

Conclusion : Les décideurs et les responsables de la santé publique devraient dépister le TDAH lors de l'examen du permis de conduire.

الصحة النفسية وسلوك القيادة في الإمارات العربية المتحدة: دراسة مقطعية

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الخلاصة

الخلفية: أعلنت الإمارات العربية المتحدة أنها تستهدف الحد من الوفيات المرتبطة بحوادث المرور إلى 3 حالات لكل 100 ألف نسمة. ولتحقيق ذلك الهدف، يجب على السلطات تقييم العوامل المتعلقة بسلوكيات القيادة الخطرة.

الأهداف: هدفت هذه الدراسة الى التحقق من وجود ارتباط بين سلوكيات القيادة ومتغيرات معينة، وتشمل سنوات الخبرة في القيادة، وساعات النوم يوميًّا، والواسمات العامة للصحة النفسية، وأعراض اضطراب نقص الانتباه مع فرط النشاط.

طرق البحث: أجاب مائتان وخمسة وسبعون مشاركًا على مسح مكون من استبيان مانشستر لسلوكيات السائقين، واستبيان الصحة العامة، ومقياس الإبلاغ الذاتي لاضطراب نقص الانتباه مع فرط النشاط لدى البالغين، بالإضافة إلى سؤالين إضافيين. وحسب الباحثون معامل سبيرمان للارتباط بين هذه المتغيرات، وذلك عند مستوى دلالة إحصائية تقل فيه القيمة الاحتمالية عن 0.05.

النتائج: سنوات الخبرة في القيادة وساعات النوم لا ترتبط بالأداء في القيادة. وكان الارتباط ضعيفًا بين سلوكيات القيادة الخطرة وواسمات الصحة النفسية العامة، ولكنه كان متوسطًا بين تلك السلوكيات وأعراض اضطراب نقص الانتباه مع فرط النشاط.

الاستنتاجات: ينبغي لواضعي السياسات ومسؤولي الصحة العامة إجراء فحص للكشف عن اضطراب نقص الانتباه مع فرط النشاط في أثناء الفحص الطبي للحصول على رخصة قيادة.

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