In Contemporary Ergonomics and Human Factors 2011. Editor: M. Anderson. Taylor & Francis. pp163-167. ISBN 978-0-415-67573-4.

EFFECTS OF A MID-MORNING CEREAL BAR ON HAZARD PERCEPTION IN DRIVING

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Very little research has been conducted on the effects of snacking on driving performance. The first aim of the present study was to examine the effects of a mid-morning cereal bar on hazard perception while driving. Fifty one participants completed the study. Hazard perception was assessed using two commercially available DVDs. Participants carried out a baseline session and then consumed either a mid morning cereal bar or nothing. The results showed that those who consumed the cereal bar performed better on the hazard perception task than those who had no snack. Further research is needed to determine what underlies this beneficial effect. It is speculated that it may reflect the high carbohydrate composition of the cereal bar.

Introduction

Previous research suggests that cognitive performance can be improved following consumption of snacks (Benton, Slater and Donohoe, 2001; Mahoney, Taylor and Kanarek, 2005) and caffeinated drinks (Lieberman, 1992). Consumption of snacks leads to increased ratings of alertness and other aspects of mood and improved performance on recall memory (Benton, Slater and Donohoe, 2001). Consumption of caffeinated drinks led to improvements in reaction time, attention and alertness (Brice and Smith, 2001). What is now of interest is whether these improvements can be translated to real life activities such as driving. Much research has been conducted looking at the effects of alcohol and caffeine on road traffic accidents and performance on a driving simulator. Alcohol has been found to increase the risk of a crash (McClean, Holubowycz and Sandow, 1980), significantly increase the time taken to respond to hazards (West et al., 1993), slow reaction times and increase

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body sway (Liguori et al., 1999). In contrast caffeine can reduce driver fatigue, a leading cause of road crashes (Reyner and Horne, 2002), decrease steering wheel movements (Brice and Smith, 2001), decrease lane drifting and improve reaction times (Horne and Reyner, 2001).

Very little research has been conducted examining the effects of a snack on driving performance. A literature review found no studies which consider the effects of breakfast cereal on a driving simulator. Consumption of a chocolate bar led to fewer track collisions than no snack or an equicaloric snack of cheese and biscuits (Smith and Rich, 1998). This result suggests that improvements of driving performance cannot be attributed to consumption of food per se and therefore different foods may produce different results. The majority of previous research has been conducted using driving simulators however researchers have started to explore new ways of measuring driver performance. This can be split into driving skill and driving style. Driving skill can be improved with practice or training, driving style focuses on how people choose to drive or driving habits which have developed over time. One source of individual differences in road accidents is hazard perception (Elander, West and French, 1993). Hazard perception is the process of identifying hazardous objects and events in the traffic system and quantifying their dangerous potential (Brown and Groeger, 1988). The hazard perception test was introduced into the driving theory test in November 2002 to help reduce the number of people killed and seriously injured on Britain's roads by 40% by 2010 (Driving Standards Agency). The aim of the current study was to provide preliminary information on the effects of a mid-morning cereal bar snack on hazard perception.

Method

Participants

A total of 60 participants were recruited for the study. Fifty-one participants completed the study, the other 9 were unable to attend due to work commitments. In this final database there were 25 in the no snack condition and 26 in the snack condition. The participants consisted of students and members of the general public. Students were recruited through a poster advertisement at Cardiff University. Members of the general public were recruited from a general public participant database. All participants were paid for taking part in the study. Exclusion from the study was determined as; (a) Participants with an existing disease or long term medication; (b) Those who were heavy smokers (i.e. >10 cigarettes a day) or alcohol consumption above 20 units a week (females) and > 30 units a week (males), (c) relevant food allergies.

Design

The study was a between subjects design with a baseline session and a post snack session.

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Hazard Perception Test

Hazard perception was measured using 2 commercially available DVDs for learner drivers. Participants had to click the left mouse button when they detected a potential hazard. If the programme detected any rhythmical clicking patterns then the participants were told that they had cheated on that clip and therefore received a score of "0". At the end of each test a record screen was bought up on the screen. This gave a mark out 5 for each clip (mark out of 10 for one clip), whether the participant had passed or failed and their total score out of 75. Scoring for each clip was based on how quickly participants responded to the developing hazard. Scoring "0" on a clip was recorded as an error as the participant had failed to recognise the hazard. Scoring "1" on a clip was recorded as a long response as they only just identified the hazard.

Procedure

Participants had to abstain from eating and drinking caffeinated products from 10.00pm the previous evening. Participants came into the unit at 8.00am and were given an information sheet detailing the study and written consent was obtained. Participants completed 3 practice trials and were provided with feedback about their performance. They then completed the baseline session, which consisted of 14 clips. Each clip contained one developing hazard except one, which contained 2. The baseline session lasted approximately 15 minutes. Those in the snack condition were given a cereal based snack bar at 10.00am. The second test session was done from 10.45-11.00am. Participants remained in the unit while they weren't completing the tests. Participants were allowed to drink water during the course of the study.

Analysis

A series of between subjects ANCOVAs were used to assess the effects of the mid-morning snack on scores on the hazard perception test, number of errors, number of long responses and number of times participants were detected as cheating. Baseline measures included as a covariate.

Results

A total of 51 participants completed the study. They consisted of 19 males and 32 females and had a mean age of 23.7 years.

Hazard Perception Test

Post snack session. No significant differences were found for number of errors, number of long responses and number of times participants were detected as cheating. A significant main effect of snack was found for total score on the hazard perception test ($F(1, 46) = 5.5$, $p<.05$) with those in the snack condition scoring higher than those in the no snack condition. These effects are shown in Table 1.

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Table 1: Adjusted mean hazard perception test scores for the post snack test session (test 2) with standard error in parenthesis.

	Nothing	Snack
Whether passed test 2	64%	66% (13%)
Score test 2	40.7 (1.7)	46.2 (1.6)
Errors test 2	2.3 (0.4)	1.8 (0.4)
Long responses test 2	1.01 (0.2)	0.76 (0.2)
Times cheated test 2	0.04 (0.1)	0.04 (0.1)

Discussion

The present study showed a benefit of consuming a cereal-based mid-morning snack on hazard perception. Participants who received a mid-morning snack scored significantly higher on the test than those who did not. Previous research found that consumption of a chocolate bar was associated with improved performance on a driving simulator when eaten either mid-morning or mid-afternoon (Smith and Rich, 1998). The researchers concluded that one possible explanation for this effect was the high carbohydrate composition of the chocolate bar. The cereal based snack bar used in the current study was very similar in carbohydrate composition to the chocolate bar (cereal bar 65g per 100g; chocolate bar 69g per 100g). It would appear that a high carbohydrate snack eaten during the mid-morning could potentially improve driving performance. Further research is required to test this view.

Acknowledgements

The research was supported by a BBSRC PhD studentship and industrial sponsorship from the Kellogg's Company Ltd.

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