

Multimodal Distraction and Driving Safety: A Statistical Study of Smartphone, Smartwatch, and HMI Usage in Kuwait

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Abstract

Road safety in Kuwait is increasingly compromised by the integration of smart devices into the driving environment. This study examines the effects of smartphones, smartwatches, and in-vehicle human-machine interfaces (HMIs) on driving safety using a cross-sectional dataset of 401 drivers. Descriptive statistics and regression models were employed to assess behavioral and safety outcomes. Results show that 66% of respondents reported prior accident involvement, while 63% admitted to smartphone use while driving. Smartwatch usage, although lower (24%), was associated with significant distraction effects, with 49% of users reporting missed road events. Logistic regression indicates that smartphone usage significantly increases accident likelihood ($\beta = 0.85$, $p < 0.01$), followed by HMI usage ($\beta = 0.41$, $p < 0.05$), while smartwatch usage shows a moderate but emerging effect ($\beta = 0.29$, $p = 0.087$). Linear regression results confirm that all device types significantly reduce driving performance, with smartphones having the strongest negative effect. The findings highlight the concept of multimodal distraction and emphasize the need for integrated engineering and behavioral interventions.

Keywords

Driving Safety, Smartwatch Distraction, HMI, Regression Analysis, Kuwait, Human Factors