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# Whole body vibration exposures in metropolitan bus drivers: A comparison of three seats

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### Abstract

Using a repeated measures study design, three different seats were evaluated as 12 metropolitan bus drivers drove a standardized test route including city streets, old and new freeways, and a street segment containing 10 large speed humps. Three comparisons were made: (1) comparing seats made by different manufactures (Seats 1 and 2), (2) comparing seats with a standard foam (Seat 2) and silicone foam (Seat 3) seat pans, and (3) comparing WBV exposures based on individual factors such as seat pressure settings and body weight. Whole body vibration (WBV) exposures were measured using a tri-axial seat pan accelerometer and the attenuation capabilities of each seat were evaluated by comparing the vibrations measured at the floor and seat of the bus. There were significant WBV exposure differences between the various street types, which was shown across all seat types. The city street and older freeway segments had

the highest WBV exposures with both segments producing WBV exposures slightly above the action limit for vibration dose value (VDV). Relative to Seat 2, Seat 1 performed better at attenuating impulsive and shock related WBV exposures; however, neither seat performed significantly better when average vibration ( $A_w$ ) and VDV WBV exposures were compared. In addition, no performance differences were seen between the standard foam (Seat 2) and silicone foam (Seat 3) seat pans. Seat suspension stiffness (air pressure) was also examined, and the results indicated that the higher the seat air pressure the lower the  $A_w$ , VDV, and static compressive dose ( $S_{ed}$ ) vibration exposures. This study provided a unique opportunity to evaluate on-the-job whole body vibration exposures in a standardized, controlled setting.



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