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Evaluation of Pneumatic Massage in Automotive Seating.

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To address occupant discomfort during prolonged sitting in automobile seats, massage systems have been implemented by seat manufacturers. However, data regarding the efficacy of massage systems in automobile seats remains limited. In partnership with Leggett & Platt Automotive (L&P), this project evaluated if there is a measurable difference in automotive seat occupant physiological responses and reported discomfort during prolonged sitting, with and without exposure to a new active massage system. Using near-infrared spectroscopy of the erector spinae musculature, automated sphygmometry, visual analog scales, and an exit survey, this study quantified total hemoglobin (HbTot), oxyhemoglobin and deoxygenated hemoglobin difference (HbDiff), tissue saturation index (TSI%), heart rate, blood pressure, ratings of perceived discomfort (RPD), and individual preferences between seat conditions, bladder intensity, and bladder locations. Twenty (10 male [mean height 179.8cm, mass 79.7kg] and 10 female [mean height 168.9cm, mass 68.1kg]) participants (between 18 and 56 years of age) performed two separate one-hour simulated seating trials, one with and one without the massage system activated. There was a main effect of time for HbTot, TSI%, and blood pressure measurements. With respect to the massage condition, only statistically significant decreases in HbDiff and RPD were found, which indicates lower levels of oxygen consumption and decreased discomfort while the massage system was activated. The exit survey revealed that, although the physiological response to the massage system did not change in general, compared to when the massage system was not activated, 80% of participants reported that they preferred the massage condition over the control seat condition. Based on the positive results related to participant preference and ratings of perceived discomfort, the massage system used in this study should be tested further. Altering the intensity, pattern, and duration of massage activation may further enhance the experience for seat occupants.