

# EXPOSURE TO PARTICULATE MATTER AND ITS RELATIVE EFFECT ON HEART RATE VARIABILITY FOR DIFFERING PHYSIOLOGICAL STATES WITH IMPLICATIONS FOR COMMUTER MODAL CHOICE

Marguerite Nyhan, *Trinity College Dublin, Ireland*

**Background and Aims:** Links between particulate matter (PM) exposure and decreased heart rate variability (HRV) have been documented in studies of older, susceptible individuals, those with existing cardiovascular conditions (Gold et al 2000; Brook et al 2010) and also in young healthy adults (Vallejo et al 2006). HRV is a marker of the risk of sudden death from cardiac events in humans and PM<sub>2.5</sub> has been shown to be a cause of sudden death in humans. The objectives of the study comprises the measurement of HRV and personal exposure to PM<sub>2.5</sub> in cyclists, pedestrian, private car commuters and public transport commuters in Dublin City. This will assess the relative variation in HRV with particulate matter (PM) exposure of these groups performing differing levels of physical activity and having differing physiological states.

**Methods:** Healthy individuals who commuted to and from work or college during peak traffic times were studied. HRV was continuously monitored in subjects using an Actiheart unit over 24 hours. PM exposure over the same time period was measured using an ambulatory device.

**Results:** The uptake of pollutants was higher for cyclists due to higher breathing rates. This higher uptake led to larger decreases in heart rate variability indices in comparison to subjects using other modes of transport.

**Conclusions:** Exposure to PM was found to be linked to decreased HRV among healthy subjects. Differing modes of transport, these in turn leading to differing physiological states, led to varying percentage decreases in heart rate variability in response to PM exposure. The results of this study have definite implications for commuter modal choice.

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