

(false negatives and false positives) were prominent as part of the translational pathway from quantitative summary estimates of test accuracy to management decisions. Summary measures that separate the two dimensions of test accuracy in the absence of prevalence information (for example sensitivity and specificity) appeared to result in a misplaced emphasis on one or other of false positive or false negative test errors. Presenting test accuracy data using the 2x2 diagnostic table or a pictograph attenuated this effect.

Conclusion Choice of test accuracy metric appears to have a profound effect on diagnostic decision making. Understanding, contextual factors and motivational biases are likely to be contributing factors to the observed variability. It is unclear to what extent any advantage of test accuracy metric for informed decision making is based on familiarity as opposed to their intuitive nature. Simultaneous illustration of both dimensions of test accuracy in order to facilitate informed diagnostic decision making requires further exploration.

Plenary Session

PL01 A SIMPLE MORBIDITY SCORE FOR UK PRIMARY CARE: A NEW TOOL FOR RESEARCH AND HEALTHCARE OUTCOME MONITORING

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Background Adjustment for morbidity level is important in ensuring fair comparison of outcomes between patient groups and healthcare providers. The Quality and Outcomes Framework (QOF) in UK primary care, which records numerous diseases systematically, offers potential for developing a standardised morbidity score that can be easily applied in research and service settings.

Methods Using The Health Improvement Network (THIN), a large primary care database of 375 UK general practices in 2008–9, half the practices were randomly selected as a training set to derive a morbidity score based on chronic conditions recorded in QOF, and the other practices formed a validation set to assess predictive performance. A total of 653,780 patients aged 60 and over registered in 2008 were included, and mortality at one year was assessed.

Results Nine QOF conditions were identified as robust co-predictors (Hazard Ratio ≥ 1.2) of mortality independent of age and sex, and were assigned integer score weights based on the strength of their association with mortality. Cancer (HR=3.4) and Dementia (HR=2.8) were the strongest predictors. In a Cox model with age and sex included, the addition of the QOF score improved model discrimination in predicting mortality (c-statistic=0.82 vs. 0.78), performing similarly to the Charlson index, an established morbidity index. In a multilevel logistic model, an individual's QOF score explained more of the variation in mortality between practices than the Charlson index (46% compared to 32%). At practice level, the mean QOF score per patient was strongly correlated with practice standardised mortality ratios ($r=0.64$) and explained more variation in practice death rates than the Charlson index.

Conclusion A simple score derived from routine QOF recording provides a morbidity index which is highly predictive of one year mortality in older UK Primary Care patients, is simpler to implement than existing morbidity scores, and explains practice level variations in mortality. This new score has potential utility in research and healthcare outcome monitoring and could be easily implemented nationally through existing mechanisms for anonymised collection of QOF data from practices.

PL02 BREASTFEEDING AND SOCIAL MOBILITY: NEUROLOGICAL DEVELOPMENT OR STRESS MECHANISMS?

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Background Breastfeeding has been associated with higher cognitive scores, better test results and fewer socio-emotional problems in childhood. These outcomes in turn predict social mobility. This study examines the effect of breastfeeding on inter-generational social mobility and the role of two biologically plausible mechanisms: via improved neurological development due to the long-chain polyunsaturated fatty acids in breast milk and via hypothalamic-pituitary-adrenal (HPA) axis functioning due to growth hormones in breast milk.

Methods We use data from two birth cohorts (the 1958 National Child Development Study and the 1970 British Birth Cohort) to examine breastfeeding's relationship with social mobility. Social class at 10/11 years was based on father's class. Both class of origin and own social class in adulthood (age 33/34) were measured by the Registrar General's social class (RSGC). Neurological development was assessed using cognitive tests and assessments of fine motor function. HPA functioning was assessed using socio-emotional behaviour scales and a physical symptoms of stress score.

Results Rates of breastfeeding were higher in the 1958 cohort than the 1970 cohort (43% vs. 21% breastfed 1+ months). Breastfeeding was more socially patterned by 1970, with advantaged mothers being more likely to breastfeed. A propensity score approach matched breastfed and non-breastfed children on a large number of characteristics before estimating the effect of breastfeeding on social mobility. We modelled the odds of upward and downward social mobility conditional on being breastfed for 1 month or more and social class of origin. Results show that breastfeeding increased the odds of upward mobility (1958 cohort: OR 1.25 95% CI 1.13, 1.37; 1970 cohort: OR 1.14 95% CI 1.00, 1.31), and reduced the odds of downward mobility (1958 cohort: OR 0.81 95% CI 0.74, 0.90; 1970 cohort OR 0.79 95% CI 0.69, 0.91). Controlling for the measures of neurological development and stress functioning attenuated the effect of breastfeeding to marginal or non significance. Gender differences in these findings will be discussed.

Conclusion Breastfeeding promotes upward social mobility and protects against downward mobility. The effects appear to operate through enhanced neurological development and more effective stress processes.

PL03 SOCIO-ECONOMIC INEQUALITIES IN LUNG CANCER TREATMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background Intervention-generated inequalities in health result from the way that health interventions are organised and delivered. There is some evidence that socio-economic inequalities in care may occur for some common cancers and treatment inequalities may contribute to socio-economic differences in survival. Although the incidence and outcome of lung cancer varies with socio-economic status (SES), it is not known whether socio-economic inequalities in treatment occur. We conducted a systematic review and meta-analysis of existing research on socio-economic inequalities in receipt of treatment for lung cancer.

Methods Systematic methods were used to identify relevant studies, assess study eligibility for inclusion and evaluate study quality. Cohort studies of adults with a primary diagnosis of lung cancer, published in peer-reviewed English language journals up to 2011, were examined. All studies reporting rates of receipt of any treatment for lung cancer according to a measure of SES were included in the review. Studies that reported odds ratios for receipt of treatment, adjusted for at least age and sex, were included in the meta-analysis. Subgroup analyses by healthcare system (universal healthcare system or insurance-based system), histology and stage were conducted.

Results From the initial 1345 studies identified, 46 studies were included in the review and 29 in the meta-analysis.

Socio-economic inequalities in receipt of lung cancer treatment were observed. Low SES was associated with a reduced likelihood of receiving any treatment (OR=0.79, CI (0.74 to 0.84) $p<0.001$), surgery (OR=0.71 (CI 0.65 to 0.77), $p<0.001$) and chemotherapy (OR=0.81 (CI 0.73 to 0.91), $p<0.001$), but not radiotherapy (OR=0.95 (CI 0.84 to 1.07), $p=0.41$), for lung cancer. The association was found in both insurance-based and universal healthcare systems and remained when stage and histology were taken into account for receipt of surgery.

Conclusion This systematic review and meta-analysis found that lung cancer patients living in more socio-economically deprived circumstances were less likely to receive any type of treatment, surgery and chemotherapy. These inequalities cannot be accounted for by socio-economic differences in stage at presentation or by type of healthcare system. Further investigation is required into the patient, clinician and system factors that may contribute to socio-economic inequalities in receipt of lung cancer care and how these inequalities may impact on survival, and also into how to reduce such inequalities.

Poster Programme

PS01 ASSOCIATIONS OF HEALTH, PHYSICAL ACTIVITY AND WEIGHT STATUS WITH MOTORISED TRAVEL AND TRANSPORT CARBON DIOXIDE EMISSIONS

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Background Motorised travel and associated carbon dioxide (CO₂) emissions generate substantial health costs, many of which disproportionately affect socio-economically disadvantaged groups. These health costs may include contributing to rising obesity levels. Obesity has in turn been hypothesised to increase motorised travel and/or CO₂ emissions, both because heavier people may use motorised travel more and because heavier people may choose larger and less fuel-efficient cars. These hypothesised associations have not been examined empirically, however, nor has previous research examined associations with other health characteristics. Recent years have, however, seen increasing research and policy attention to the potential 'co-benefits' of pursuing policies which simultaneously enhance public health and promote environmental sustainability. We therefore aimed to examine how and why weight status, health, and physical activity are associated with transport CO₂ emissions.

Methods 3463 adults (18–91 years, 45% male) completed questionnaires in the baseline iConnect survey at three study sites in the UK, self-reporting their health, weight, height and past-week physical activity. Seven-day recall instruments were used to assess travel behaviour and, together with data on car characteristics, were used to estimate CO₂ emissions. We used path analysis to examine how

far active travel, motor travel and car engine size mediated associations between health characteristics and CO₂ emissions.

Results CO₂ emissions were higher in overweight or obese participants (multivariable standardized probit coefficients 0.16, 95% CI 0.08, 0.24 for overweight vs. normal; 0.16, 95% CI 0.04, 0.28 for obese vs. normal). Lower active travel and, particularly for obesity, larger car engine size explained 19–31% of this effect, but most of the effect was directly mediated by greater motorised travel distance. Walking for recreation and leisure-time physical activity predicted higher motorised travel distance and therefore higher CO₂ emissions, while active travel predicted lower CO₂ emissions. Poor health and illness did not independently predict CO₂ emissions.

Conclusion Establishing the direction of causality between weight status and travel behaviour requires longitudinal data, but the engine size association suggests at least a potential causal effect of obesity on CO₂ emissions. More generally, transport CO₂ emissions are differently associated with different health characteristics, including associations between a health good and an environmental harm (recreational physical activity and high emissions). Thus health-environmental 'co-benefits' cannot be assumed. Instead, attention should also be paid to identifying and mitigating potential areas of tension, for example promoting low-carbon recreational activity.

PS02 "WE CAN ALL JUST GET ON A BUS AND GO": RETHINKING INDEPENDENT MOBILITY IN THE CONTEXT OF THE UNIVERSAL PROVISION OF FREE BUS TRAVEL TO YOUNG LONDONERS

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Background Recent years have seen increasing attention to 'independent mobility' as a determinant of children's physical health and psychosocial development. Previous research, however, largely frames independent mobility as a matter of having parental permission to travel without adults. It also predominantly focuses upon walking any cycling trips in the local area by young children. We therefore aimed to extend the independent mobility literature by examining mobility on public transport, mobility beyond the local area and mobility by adolescents. For this we use as a case study the recent provision of universal free bus travel to all young people in London, UK. We argue that idea of independent mobility can usefully be situated within the broader conception of opportunity and process freedoms which underpin Amartya Sen's influential 'capabilities approach' to human development.

Methods As part of the *On the buses* study, 118 young Londoners (age 12–18, 65 females) took part in 43 in-depth interviews (group size 1–3, 61 individuals) and 10 focus groups (group size 4–8, 57 individuals). Interviews and focus groups elucidated tacit, or everyday, influences on and effects of young people's transport mode choices. We analysed this data qualitatively, drawing on techniques from the constant comparative method, including initial micro-level open coding and an iterative approach to identifying and refining emerging conceptual categories.

Results Free bus travel enhanced young Londoners' capability to shape their daily mobility, both directly by increasing financial access and indirectly by facilitating the acquisition of the necessary skills, travelling companions and confidence. These capabilities in turn extended both opportunity freedoms (e.g. facilitating non-"necessary" recreational and social trips) and process freedoms (e.g. feeling more independent by decreasing reliance on parents). Moreover, the universal nature of the entitlement often seemed crucial as