

**Methods** Thirty semi-structured interviews were conducted with healthcare professionals involved in delivering hip fracture care at four hospitals across England. Staff were purposively sampled from across the care pathway, and comprised emergency department staff, orthogeriatricians, orthopaedic surgeons, physiotherapists and discharge coordinators. Data were analysed thematically and themes transposed onto constructs from eNPT.

**Results** The *capacity* of healthcare professionals to co-operate and co-ordinate their practice was achieved using formal mechanisms including shared information systems, multi-disciplinary team (MDT) meetings and integrated MDT documentation and protocols. Trauma coordinators organised important processes of care and facilitated MDT co-working. Transfer of patient information was compromised when these systems were not effectively implemented. Shared working spaces promoted frequent and spontaneous communication. Individual *potential* and commitment to operationalise services occurred through multiple processes. Training, mentoring and support for junior staff, particularly rotating doctors, helped their engagement in patient care. Shared commitment was undermined by complex dynamics between different professional groups, particularly medical and surgical staff. Clinical leads bridged these professional boundaries and promoted shared patient goals. *Capability* to deliver care was compromised by under-staffed and under-resourced services, including lack of geriatric and therapist input, particularly out-of-hours and at weekends, and lack of bed capacity. Staff identified strategies to mobilise existing resources including ‘upskilling’ of staff, effective prioritisation of patients and systems to track outlying patients on other wards. Bringing patients together on specialist wards enhanced workability by concentrating staff knowledge and expertise. Healthcare professionals made *contribution* by driving change and developing services through MDT meetings and consistent monitoring and auditing. Clinical leads were integral to service development by disseminating audit data, engendering enthusiasm and engaging staff from individual directorates. Ongoing development was shaped by executive support. Benchmarking services based on key performance indicators and linking clinical activity to funding mechanisms helped leverage executive support.

**Conclusion** Findings identify elements needed to implement hip fracture services successfully. Information will assist services in overcoming organisational barriers when implementing sustainable high-quality services to improve patient care.

Friday 17 September

Physical Activity, 09.00 – 11.30

OP49

**IMPACTS OF THE PARIS CYCLING LANE EXPANSION PLAN ON CYCLING LEVELS: A NATURAL EXPERIMENTAL STUDY\***

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**Background** Cities globally have started to seriously invest in more sustainable forms of transportation. Using routinely collected city-level data, we aimed to evaluate whether constructing new cycling infrastructure as part of the Paris Cycling

Lane Expansion Plan 2015–2020 affects cycling activity along new routes.

**Methods** Daily cycle count data from January 2018 to March 2020 were acquired for the city of Paris. Eight newly-built cycling infrastructure improvement projects were identified with pre-post data. Comparison streets were chosen if pre-intervention trends in cycling paralleled those at the intervention sites. Since data collection periods for each street were variable, several comparison streets were chosen for each site as follows: (A) one street for which monitoring data were available for the same one-year period as the intervention street, (B) one street that shared the same six-month pre- and post-monitoring periods as the intervention street. For streets without a full year of data (n=3), all available data were used. The average of all control streets for each method was calculated as an additional comparator. Difference-in-difference (DiD) analysis controlling for a public transportation strike during the study period was performed for all streets. In addition, for streets with at least one year of data, interrupted time series (ITS) analysis was conducted to corroborate DiD results.

**Results** There was some variation in effects between locations: significant net increases in cycling counts were observed in 4/8 streets (e.g. Boulevard Voltaire, Method A: 894 counts/day; 95% CI: 357, 1431). No significant effects were found for Rue Julia Bartet or streets assessed for only one month post-intervention (3/8). In general, DiD outcomes did not differ between methods for choosing control groups. However, comparisons with individually-matched control streets tended to have greater positive net effect sizes than those using the average of control streets, which were more likely to support the null hypothesis. In general, the ITS results corroborated DiD results in terms of direction of effect, but none of the ITS results besides the level and trend change for the strike were significant.

**Discussion** Infrastructural improvements were found to be effective for larger arterial streets and those with longer follow-up periods. The use of multiple control streets as well as ITS analysis lends weight to our findings. Further research should investigate why improvements were more effective at increasing cycling levels in certain streets than in others.

OP50

**PUSH AND/OR PULL: A SYSTEMATIC REVIEW AND META-ANALYSIS OF STUDIES EVALUATING THE EFFECTIVENESS OF ‘CARROT’, ‘STICK’, AND COMBINED INTERVENTIONS ON MODIFYING TRAVEL BEHAVIOUR**

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**Background** While active travel policies may positively affect health and the environment, evidence suggests small or inconsistent effects in these policies in changing travel behaviour. To identify which types of interventions are more effective, this systematic review and meta-analysis aims to (1) compare the effectiveness of positive (‘carrot’) strategies, negative (‘stick’) strategies, or a combination of the two on modifying travel behaviour and (2) assess which functions have greater impacts on travel outcomes.

**Methods** Nine databases were searched for controlled before-and-after studies of population-level interventions and travel

behaviour (e.g. driving, active travel, public transit, walking, and cycling) from adults in the general population. Interventions were categorized into functions (how the intervention seeks to affect behaviour). Depending on whether gains or losses of functions could occur, interventions were classified as carrots (e.g. new bikeshare programs), combined carrot and stick (e.g. traffic calming), or stick interventions (e.g. congestion charging). Harvest plots were used to visually summarize the findings weighted by study quality. Where possible, outcomes were converted into standardized mean differences (SMD) and random-effects meta-analyses were conducted.

**Results** We extracted data from 83 publications reporting 98 interventions. From these, we identified 20 intervention types and eight function categories. The majority of interventions were carrots (n=64), followed by carrot and stick (n=17) and stick (n=17). Harvest plots demonstrated that most evaluations, particularly those classified as higher quality, found changes in favour of the intervention. Results for carrot interventions, however, were more less consistent than for stick or combined interventions. This was consistent with findings from the meta-analysis, which were statistically nonsignificant but had point-estimates of greater magnitude for driving outcomes for sticks (SMD -0.21; 95%CI -0.43, 0.01) and combined carrot and stick interventions (-0.17; -0.65, 0.31) compared to carrots (-0.09; -0.21, 0.03). Likewise, for active travel outcomes, combined carrot and stick interventions had a higher SMD (0.39; -0.01, 0.78) compared to carrot interventions (0.10; -0.06, 0.25). Financial functions were found to be the most effective for driving outcomes, whereas access, convenience, safety, and space were more effective for active travel outcomes.

**Discussion** This is the first review to compare whether positive, negative, or combined strategies and their functions differ in terms of effectiveness on travel behaviour, which can aid policymakers in designing sustainable transportation policies. Further research is needed for interventions with a stick component, which suggest greater effectiveness yet remain less well-studied, possibly because they are less conducive to experimental manipulation.

OP51

#### ACTIVE GROUP-BASED PERFORMING ARTS INTERVENTIONS FOR PARKINSON'S DISEASE: SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background** Parkinson's disease (PD) is a common age-related neurodegenerative condition associated with a wide range of motor and non-motor symptoms. There has been increasing interest in performing arts interventions for PD, due to the limitations of pharmacological therapies. As no prior systematic review had addressed a wide range of artistic modalities, we systematically evaluated the potential benefit of all active group-based performing arts interventions in PD.

**Methods** In order to systematically evaluate the benefit of performing arts interventions in PD, searches on PsycINFO, AMED, CINAHL, EMBASE, and MEDLINE were performed in February 2020. Supplementary web searches and citation chasing were conducted. Included studies used any quantitative design to assess the benefit of any active group-based

performing arts intervention on quality of life, functional communication, speech, motor function or cognitive status for people with diagnosed PD. Following standardised duplicate screening and data extraction, data synthesis was conducted using thematic narrative synthesis and random effects meta-analyses using Review Manager 5.3. Risk of bias was evaluated using SURE checklists (Cardiff University).

**Results** Searches identified 2669 records, of which 260 proceeded to initial full-text review following de-duplication, 129 to detailed full-text review and 67 to inclusion in the systematic review, representing 56 separate studies. Data from 10 separate studies were included in meta-analyses. Risk of bias assessment revealed limitations across many studies. Dance was the most studied artistic modality (39 studies), followed by singing (12 studies), music therapy (4 studies) and theatre (2 studies). Narrative synthesis showed evidence for a benefit of dance, music therapy and singing on quality of life; singing on speech; dance and music therapy on cognition; and dance, music therapy, singing and theatre on motor function. There was no evidence of benefit on functional communication. In meta-analyses, tango-based dance predicted superior UPDRS motor than usual care (Z=2.87, p=0.004) and superior timed-up-and-go than exercise (Z=3.77, p=0.0002), while PD-specific dance predicted superior PDQ-39 quality of life than usual care (Z=3.77, p=0.0002).

**Conclusion** Performing arts interventions may offer benefit in PD. However, it is difficult to assess which performing arts modalities may be most beneficial for which outcomes, due to a lack of studies directly comparing different performing arts interventions. Key limitations included small sample sizes, differences in comparator interventions, differences in intervention frequency and duration, as well as differing disciplinary backgrounds of session leaders. Further research is needed with greater methodological rigour before firm conclusions can be drawn.

OP52

#### IDENTIFYING LOCAL AUTHORITY NEED FOR, AND UPTAKE OF, SCHOOL-BASED PHYSICAL ACTIVITY INTERVENTIONS IN ENGLAND – A CLUSTER ANALYSIS USING ROUTINE DATA

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**Background** Schools in England need effective, simple interventions to address shortfalls in children's physical activity. Areas in England where physical activity is low among children may particularly benefit from school-based physical activity interventions. Further, stark geographical inequalities for children's physical activity exist and have widened during Covid-19 lockdowns. The Daily Mile (TDM) is a school-based running programme that has been widely adopted across England. However, there is limited evidence of its equitability and whether it reaches children in most need. We aimed to i) identify local authorities in England with the highest need for children's physical activity promotion and ii) determine whether TDM reaches schools in areas of high need.

**Methods** This was a cross-sectional study linking routinely collected data from a range of sources including the Active Lives Surveys and national datasets. Characteristics of need were