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Development and evaluation of an intervention designed to increase the prioritisation of health by professionals working in the private sector of urban development: study protocol

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ABSTRACT

The built environment is known to have a significant influence on population and planetary health, including the incidence of non-communicable disease, but evidence suggests that professionals in the land and development industries struggle to prioritise health and health equity when making urban development decisions amidst challenging structures and competing priorities. The aim of this study is to use a mixed-methods approach to develop, deliver, optimise, and evaluate an intervention for professionals working in the private sector of urban development to increase their intention to act on health and health equity where possible. This protocol describes four planned research activities that constitute this intervention's development, delivery, and evaluation: 1) Intervention development using an iterative co-production process with non-academic industry partners using the Person-Based Approach and following Medical Research Council guidelines on the development of complex interventions; 2) Development of survey questions to assess intervention effectiveness; 3) Delivery and mixed-methods longitudinal evaluation of the intervention; and 4) Evaluation of the impact of co-production and delivery of the intervention with the project's industry partners.

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Urban development; power; norms; collective efficacy; psychological proximity; health

Background and rationale

According to the World Health Organisation, health is 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (World Health Organisation 2020, p. 1). Whilst widely used, it has nevertheless been argued that this definition does not take into account how individuals experience disease and that 'what matters to individuals is not simply the absence of disease, disability, or death, but also their responses to symptoms or diagnoses; their capacity to participate in work, family, and community; and their sense of well-being in many spheres' (Durch *et al.* 1997, p. 40). There are a multitude of social, economic, and environmental factors that make up the wider determinants of health (Bronfenbrenner 1977), ranging from individual-level variables such as age and sex up to the global ecosystem and climate change (Barton and Grant 2006). Socioecological models of health also emphasise the environmental and policy contexts of health alongside social and psychological influences (McLeroy *et al.* 1988, Sallis *et al.* 2008). As an example, Sallis *et al.* (2006) created an ecological model relating to active living, identifying domains such as the sociocultural environment, the natural environment, and the policy environment (e.g. transport and public recreation investments), behaviour settings (e.g. neighbourhood walkability), the perceived environment (e.g. perceived safety and accessibility), and intrapersonal characteristics (e.g. biological and psychological factors). This protocol describes the planned development and evaluation of an intervention that focuses on the built environment and therefore spans a number of these domains, including 'policy environment' and 'behaviour settings'.

Whilst there is a range of evidence quality and a complexity to the causal pathways, there is nonetheless now substantial evidence linking the quality of the built environment to non-communicable diseases such as cancers, diabetes, respiratory illness, and poor mental health (Public Health England 2017, Black *et al.* 2022), including those diseases linked to declining planetary health and climate change (Whitmee *et al.* 2015, The Lancet Oncology 2016, World Health Organisation 2023). The impact of the built environment on health occurs through a variety of mechanisms including transport infrastructure (Green *et al.* 2014), walkability (Smith *et al.* 2015), access to green space (White *et al.* 2013, McCracken *et al.* 2016, Ward Thompson *et al.* 2016, Rigolon *et al.* 2021), housing quality (Hayward *et al.* 2015), noise (Stansfeld *et al.*

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2000, Foley *et al.* 2017) and pollution (Foley *et al.* 2017, Fuller *et al.* 2022). Non-communicable disease is responsible for 88% of all deaths in the UK (World Health Organisation 2022) and is set to rise globally by 17% by 2030 (Wang and Wang 2020). Furthermore, health inequity, which refers to 'systematic differences in the opportunities groups have to achieve optimal health, leading to unfair and avoidable differences in health outcomes' (Weinstein *et al.* 2017, p. 100), has increased markedly since 2010; for instance, differences in life expectancy for people living in more deprived areas of the UK have increased, and more people in these areas are spending more of their lives in ill health (Marmot *et al.* 2020).[1] In addition to the human costs, such inequities in health are also costly for the public purse but have nevertheless not been prioritised by the national government (Marmot *et al.* 2020). Indeed, investment in prevention is marginal, even though non-communicable diseases are 'to a significant extent, preventable, and the costs, in human, social and economic terms, are largely avoidable' (House of Lords 2017, p. 74).

Urban development involves highly complex 'systems of systems' (Gardner 2016), with infrastructure sub-sectors including administrative, buildings, transport, water and waste, digital, educational, healthcare, and cultural (European Investment Bank 2024). Integrated across all of these are tiers of governance (local, regional, national, and international), influencing through not just planning policy but policy, legislation, and regulation across all sectors, as well as via highly complex networks of different communities and publics (Black *et al.* 2021). The UK is highly centralised, with public sector power concentrated in London; local governments are significantly under-resourced and with limited tax-raising powers. However, the driving force in urban development in the UK and across many industrialised nations globally, are large private sector actors, especially landowners, investors, and developers (Black *et al.* 2022). Our earlier research suggests that senior urban development professionals across both the public and private sectors agree that health is inadequately accounted for in urban development decision-making (Black *et al.* 2021), with competing priorities, vested interests, and inbuilt inertia making it difficult for these actors to prioritise health and health inequity within this context (Le Gouais *et al.* 2023).

'Tackling the Root causes Upstream of Unhealthy Urban Development' (TRUUD) is a research consortium which seeks to improve population health and reduce health inequities by preventing non-communicable disease (Black *et al.* 2022) through the improvement of urban environments. The TRUUD project spans multiple sectors (including academia, national and local government, community groups, and business) and disciplines (including psychology, management, public health, policy, economics, engineering, and law) so as to generate genuine transdisciplinary understandings and interventions in this space. The consortium collaborates with individuals and groups working across urban development (private, public, third sector and communities) to prioritise health and health equity in urban decision-making processes, specifically targeting professionals who substantially influence the shape of urban spaces early on in the urban development process. One established aim of the TRUUD project from the outset has been to understand why people make the decisions that they do and to determine the behaviour shifts needed in urban development in order to ensure the prioritisation of health and the prevention of non-communicable disease (Black *et al.* 2022).

The TRUUD project has had two distinct phases. Phase 1 focused on understanding and mapping upstream components of the urban development system. Between October 2019 and June 2022, the research team collected and analysed data from 123 interviews, four systems workshops, and two researchers in residence embedded in partner local authorities to gain a broad understanding of the role of health across the urban development system. Participants represented a broad range of stakeholders including local authorities, developers, central government officials, real estate investment trusts, local communities, development consultancies, land promotion agents, and social housing bodies. A key outcome was the identification of 50 potential intervention areas that were then narrowed down to seven areas to be taken forward in Phase 2.[2] In addition to the Changing Mindsets intervention that is discussed in this protocol, six other intervention areas were identified. As can be seen from Table 1, interventions were designed to target the needs and concerns of specific stakeholders within the urban development system that became clear through Phase 1. Phase 2 began in June 2022, with the seven intervention areas working to further design and implement their interventions.

The research process connecting Phase 1 to the Changing Mindsets intervention is detailed in Figure 1. Among the many findings from the Phase 1 interviews (Le Gouais *et al.* 2023), private sector professionals highlighted two main concerns: one, their peers continued to support 'business as usual' norms and thinking that did not sufficiently prioritise health; and two, they very often feel powerless to enact changes due to the barriers created in the norms and thinking. Therefore, it became clear that in order to enable professionals to act on health and health equity in their work outputs, the Changing Mindsets intervention is necessary where norms and power are explicitly interwoven to respond to the complex challenges that actors in this system face. This protocol therefore reports on a prospective study that aims to increase the intention to act on health by professionals working in

Table 1. TRUUD intervention areas and aims.

Intervention area	Aim(s)
Real estate investment	To incorporate health considerations within the property investment and land development processes
National government	To increase receptiveness for, and inclusion of, health and health inequities in Whitehall urban development decision making
Greater Manchester: Transport planning	To incorporate validated health impact measures into a Metro healthy streets strategy
Bristol: Spatial planning	To intervene at the city level to improve the way health impact and health inequities are considered in local policies and plans To strengthen public engagement in decisions about urban development
Law and local government	To strengthen legal capacity for health at local government level Use public engagement to identify routes for the promotion of the value of health in the decision-making of private developers and promote understanding To assist advocacy efforts to improve the legal determinants of health in urban development
Public engagement	To develop creative ways to involve the public more meaningfully in decision-making

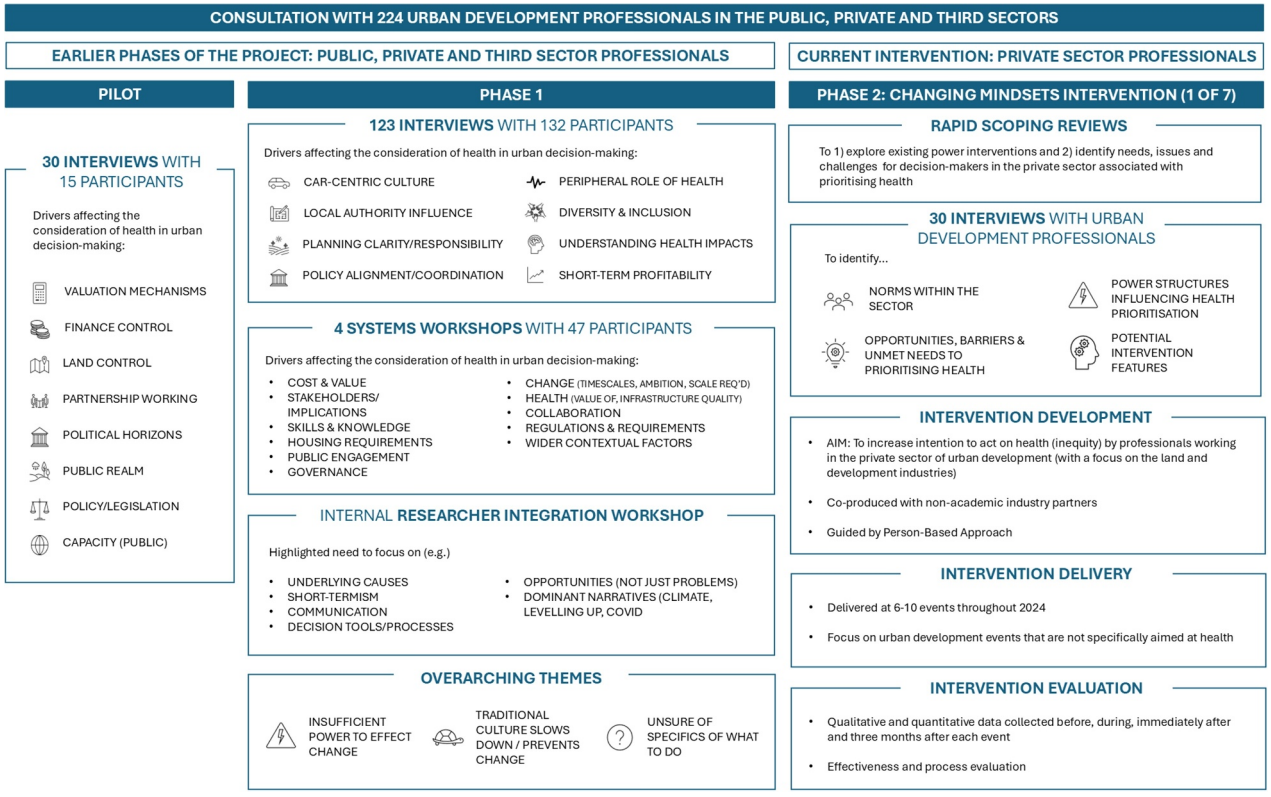

Figure 1. Data collection processes and summary findings over phases 1 and 2 of the TRUUD project.

the private sector of urban development, focusing on those in the land and development industries (hereafter described as the 'target group'). This target group has been chosen because they describe themselves and their peers as wanting to do more on health and health equity within their professional practice but struggle to do so for a number of reasons related to the many competing priorities and structural obstacles to doing more (Le Gouais *et al.* 2023). The Changing Mindsets intervention is specifically designed to reduce interrelated psychological and sociological barriers to acting on health and health equity aimed at those in the land and development industries who are not already focusing on health as a central part of their role and includes occupations such as land agents, architects, developers, investors, consultants, and surveyors.

Research design

Aim and study workstreams

The aim of this study is to use a mixed-methods approach to develop, deliver, optimise, and evaluate an intervention to increase intention to act on health and health inequity by private sector urban development professionals in the land and development industries. This will be achieved through the following workstreams:

(1) Intervention development using co-production methods with non-academic industry partners
(2) Identification and development of survey questions to measure collective efficacy, group norms, power, and psychological proximity
(3) Delivery of the Changing Mindsets intervention and mixed-methods evaluation, including its effectiveness, acceptability, and feasibility
(4) Evaluation of the impact of intervention co-production and delivery with the project's industry partners

Ethical and regulatory considerations

This research received ethical approval from the University of Bristol's Research Ethics Committee on 5 January 2024 (ref: 6402).

Workstream 1: intervention development and optimisation

The Changing Mindsets intervention will be co-produced with two non-academic industry partners (henceforth referred to as 'industry partners') from different organisations who are members of the target group, to ensure that the intervention is feasible, persuasive, and engaging for them. These industry partners are individuals who were seen as having substantive knowledge within the private sector of urban development; one is a senior development manager in a leading developer within the build-to-rent sector and the other is a director at a multinational real estate development firm. Each has upwards of 15 years' experience in the real estate and development industries.

The intervention development will use an iterative co-production process guided by the Person-Based Approach (Yardley *et al.* 2015) and following Medical Research Council guidelines on the development of complex interventions (Senn *et al.* 2013, Skivington *et al.* 2021). The Person-Based Approach (Yardley *et al.* 2015) includes three intervention stages: planning (Workstream 1), optimisation and refinement of the intervention (Workstream 1), and implementation with evaluation (Workstream 3).

Theoretical framework underlying the intervention

Building on the broader theoretical and empirical work of Phase 1 of TRUUD, the Changing Mindsets intervention was developed by drawing on two additional core literatures relevant to understanding how different aspects of power (resource-based, confirm-structuration, and knowledge-based) work in tandem with normative triggering to shape mindset change. These were as follows: (i) the psychology of decision-making, with a focus on normative messaging and group dynamics (Schwartz 1977, Steg and Vlek 2009, Onwezen *et al.* 2013, Tankard and Paluck 2016), and (ii) current theorisations of power dynamics (Haugaard 2003, 2010, Thomas *et al.* 2011). Combining relevant literature on norms and power resulted in the identification of four key constructs that substantively influence intention to act on health and health inequity: group norms, power, collective efficacy, and psychological proximity, the definitions of which are outlined below. The focus on these constructs is also supported by data from Phase 1 of the TRUUD project.

Group norms

Group norms are rules or guides that inform individuals about whether their behaviour is acceptable or not, according to their group (Cialdini and Trost 1998). They are developed through group member interactions and are adhered to if an individual feels a strong identification with the group (Terry and Hogg 1996). They are agreed on informally, not verbally, by those who are members of the group (Cialdini and Trost 1998) and can be transmitted both actively, through statements made by group members, or passively, through imitation of others' behaviour (Ehrhart and Naumann 2004). Although they are not discussed explicitly, a large body of research has demonstrated how influential group norms are on the behaviour of members of that group (e.g. Terry *et al.* 2000, Smith and Louis 2009, White *et al.* 2009). Understanding the norms present in a group can help to uncover underlying reasons for the actions of group members, and therefore changing group norms can be influential in creating behaviour change for a specific group (Postmes *et al.* 2001).

Power

Power, in this intervention, is seen as three-pronged: i) resource-based; ii) confirm-structuration; and iii) knowledge-based. Resource-based power is power that comes from the resources that someone holds, lending an individual the ability to influence another's behaviour (Fiol *et al.* 2001); money, personnel, time, education, and connections to powerful others are all examples of resources that can be used by an individual to influence the actions of others. Confirm-structuration is about the power of acting together (Arendt 1970). The power literature asserts that an individual has little power to act when they act alone, but through others around them picking up and confirming their actions, an individual can take power for themselves (Haugaard 2003). Finally, knowledge-based power is power that individuals gain through the ability to define what is true, to define a worldview and set of social scripts within a certain context, and to

define 'truth' through the discourse (Gordon and Grant 2004). This is done through understanding that one can act in a way that is different from what one has been told (Foucault 1981) and from the strategic presentation of personal priorities (Flyvbjerg 1998). These three forms of power interact with one another to allow individuals to create, maintain, and destroy power.

Collective efficacy

Collective efficacy is a social construct, incorporating cognitive and sociocultural factors that contribute to the shared beliefs of group members about whether their group has the collective power to achieve their desired results (Bandura 2000, 2002, Butel and Braun 2019). Collective efficacy influences selection of group goals (Delea *et al.* 2018), how well people use resources, how much effort they put into achieving their collective goals, how vulnerable they are to being discouraged and how resilient they are in the face of failure or opposition (Bandura 2000). Collective efficacy has three components: i) empowerment – the capacity for groups to gain understanding and control in order to take action to achieve their desired outcomes (Israel *et al.* 1994, Butel and Braun 2019); ii) social cohesion – the extent to which there are shared norms, values, and trust between group members (Sampson *et al.* 1997, Gearhart 2019b); and iii) social control – group members' willingness to enforce social norms and intervene for the common good (Lippman *et al.* 2016, Gearhart 2019a).

Psychological proximity

Psychological proximity is the subjective experience of how close an object, issue, or event is perceived to be, relative to the self, here and now (Trope and Liberman 2010, Lee *et al.* 2018, 2020). It is comprised of two dimensions (Lee *et al.* 2018); the first of these, cognitive proximity, is a mental representation of the closeness of certain issues or events, which is moulded by how much knowledge the person has about them. Cognitive proximity has three components: i) salience – the perceived urgency or importance of the issue to the person in question, which is shaped by their personal values and beliefs; ii) relevance – the extent to which the event has personal importance or consequence (a strong factor due to the egocentric nature of psychological proximity (Trope and Liberman 2010) – 'the anchor for psychological distance is always me' (Lee *et al.* 2018, p. 247); and iii) knowledge – important because if a person possesses detailed and substantial knowledge about an event or issue, their psychological proximity to that issue is increased (Lee *et al.* 2018). The second dimension of psychological proximity, emotional proximity, has two components: i) empathy – the ability to emotionally experience other people's emotional state and feelings; and ii) emotional connectedness – the intensity of emotion that the person feels about the event, which can reduce psychological distance and also sustain proximity to an issue (Lee *et al.* 2018).

Intervention planning

Rapid scoping reviews were first conducted to 1) Look at any existing power interventions to identify intervention features that might have been found to be effective, and 2) Collate existing evidence of needs, issues, and challenges for professionals in the private sector of urban development associated with prioritising health and health inequities in their work. The findings of these reviews were drawn together with the theoretical framework developed for this intervention, as described above, and are reported on in the intervention development paper (currently in submission). The theory and evidence were brought together in the intervention modelling phase, through the 'guiding principles'[3] (Yardley *et al.* 2015) and behavioural analysis tables for each of the intervention's target behaviours, which then informed the logic model.[4] A prototype of the presentation slides and website will then be developed and go through several rounds of feedback with the team before being shared with the industry partners for further feedback in the intervention optimisation stage. This will ensure that the behaviour change features and theoretical targets identified by the theory and intervention modelling phase are incorporated.

Foundational interviews

After the scoping reviews were completed, a qualitative interview study was conducted alongside the intervention development work with 30 professionals working in the private sector of urban development, including architects, land architects, and developers. These took place by video call between January and April 2024. The aims of the interviews were 1) to establish a baseline understanding of how these professionals articulated the norms and power structures shaping health within their experience of urban development, 2) to support intervention development, and 3) to support the construction of novel survey measures to be used in the intervention evaluation. For the development of the intervention, the interviews provided general insight into the needs, issues, and challenges this group face when integrating health into their work and provided concrete examples of how others in the private sector of urban development are overcoming these issues, which could be included as a 'call to action' in the intervention (as a lack of concrete examples was highlighted in one of

the scoping reviews as a barrier to integrating health for the target group). Furthermore, these interviews helped to identify the language and norms of those in the private sector of urban development that can be used to frame the intervention messaging. For the development of evaluation survey measures, discussion was encouraged around constructs for which there is not yet a measure appropriate for use in this research, namely: norms active in the space, knowledge-based power, and social control (a component of collective efficacy). This enabled the aforementioned constructs to be measured quantitatively by supporting the generation of candidate questions for the Workstream 2 scale development work.

The interviews were conducted and coded by two team members (MJ, ST). Thematic analysis (Braun and Clarke 2006, 2019) of these interviews was iterative, ongoing, and abductive, with deductive codes identified prior to the start of data analysis and inductive codes identified through deep immersion in the data (e.g. Timmermans and Tavory 2012). The coding process consisted of three stages: 1) independent coding of a set of transcripts by two researchers; 2) discussions between these researchers about emerging codes and the developing code hierarchy to improve shared understanding and consistent coding; and 3) double-coding by a third and senior member of the team (KB) with substantive experience in qualitative analysis. Many of the participants articulated norms that were common in their professional practice, including that it is acceptable to treat health as a low priority, that changing the way they work to incorporate health could be risky (and they are expected to make lower-risk decisions in their work), and that many of their peers are waiting for other sectors (e.g. government) to take responsibility for making health a higher priority and to provide the impetus for health improvements in urban development. In terms of power, participants talked about having the authority (or not) to prioritise health in their work and lacking an understanding of how their work impacts health via the built environment. These findings were used to shape the development of the intervention and to generate candidate questions for the construction of novel survey measures in Workstream 2. Further analysis of the interview data is ongoing.

Intervention optimisation and refinement through exploration of content and design with the target group

The intervention will then be optimised[5] and refined with the industry partners to ensure the messaging about health and health equity makes sense to, and is more likely to influence, attendees' thinking about health. Early designs of the presentation will be explored with the industry partners in 'think-aloud' feedback sessions conducted via video call. The think-aloud method is a form of cognitive interviewing (Miller *et al.* 2014) that allows researchers to gain a detailed understanding of what participants are thinking as they are working through a task (Aujla *et al.* 2020). This methodology will elicit their initial impressions of the material at the beginning of their involvement with the project to establish whether the design of the intervention is acceptable, feasible, interesting, persuasive, and easy to use (Yardley *et al.* 2015). There will be one session for each industry partner which will last up to two hours. The session will be organised by a topic guide that prompts participants to reflect on the pros and cons of each element of the intervention. Positive and negative comments will be recorded verbatim and added to the 'Table of Changes'.[6] Any suggested changes that are coded as easy and uncontroversial in the think-aloud session with the first industry partner will be made before the think-aloud session with the second industry partner to allow for views of the changes to be explored. The new version will be explored in an hour-long video call with the research team and both industry partners, where an accompanying script for the presentation will be developed. The subsequent feedback on the presentation and script will be conducted by email correspondence. The feedback on the webpage will also be conducted by email, where the industry partners will be given questions to focus their feedback.

All suggested changes will be recorded in the Table of Changes. Modifications will be made if they are likely to have an impact on behaviour change or a precursor to behaviour change (e.g. acceptability, feasibility, motivation, and engagement) and will be prioritised based on the MoSCoW (Must have, Should have, Could have, Would like) criteria (Bradbury *et al.* 2014, 2018). Findings will also be used to revise the Guiding Principles, behavioural analysis, and logic model of the intervention where appropriate (Senn *et al.* 2013). Proposed modifications will be discussed regularly where necessary with experts in the wider TRUUD team, to help identify appropriate modifications in response to problems identified by industry partners, or when conflicting changes are suggested. Industry partners will also be asked to provide examples for the presentation of how their organisation is incorporating health into their projects to address demand by urban planners and developers for intervention suggestions that are actionable, and evidence that provides costing for alternatives (Riley and De Nazelle 2019, Black *et al.* 2021). This is the only element of the intervention presentation (other than delivery style) that will differ by industry partner; the remainder of the intervention presentation will be the same and therefore changes made to the presentation following the think-aloud sessions will incorporate feedback from both of the industry partners and their teams.

Workstream 2: identification and development of survey questions

Measure identification

Prior to any scale development work, the research team conducted a scoping review of the literature to investigate whether there were any existing measures of the constructs of interest (collective efficacy, psychological proximity, power, group norms, and intention to act) that were suitable to use in the present context. Candidate questions were selected for inclusion if they were theoretically sound, had been used successfully in other populations, and could be used within the context of this intervention with no or very little alteration. Strong candidates were found for psychological proximity (Lee *et al.* 2020), resource-based power (Anderson *et al.* 2012), intention to act (Heath and Gifford 2006) and two of the three components of collective efficacy – empowerment (Israel *et al.* 1994) and social cohesion (Lippman *et al.* 2016). Candidate questions for these measures were compiled and discussed within the research team, and small amendments were made to their wording, where necessary, in order to make the questions applicable to the present research context. Due to power as confirm-structuration being about the actions of individuals within the group backing up new structures, it was decided that the assessment of confirm-structuration would be best conducted in the follow-up workstream of the intervention where new structures will have been set up and it will therefore be possible to see whether they have or have not been confirmed by others. No appropriate measures were found for group norms, knowledge-based power, or the collective efficacy component of social control, and therefore questions to measure these constructs will be developed as part of this workstream.

Question generation

Members of the research team with an existing in-depth understanding of power, social control, and group norms will first develop a conceptual framework for each of these constructs in order to facilitate question generation, providing a preliminary conceptual definition and confirming that there are no existing measures of these constructs that would be appropriate to use (Boateng *et al.* 2018). The interview data from the foundational interviews will then be used alongside the existing literature to generate candidate questions that the team agree capture knowledge-based power, social control, and group norms and represent as comprehensive a coverage of the constructs (as outlined by the conceptual frameworks) as is possible. Questions will be generated both deductively and inductively. Members of the research team with topic expertise will work together with members who have scale development experience to identify appropriate questions which will then be constructed into a draft questionnaire. These questions will then be circulated for evaluation by expert judges within the wider TRUUD team and to academic contacts of the research team (e.g. psychologists, engineers, and public policy experts) who have an understanding of these constructs and/or scale development and usage. This feedback will then be used to refine the initial pool of questions for each of the constructs before the questions are then piloted as part of the intervention evaluation work in Workstream 3. Due to time constraints, feedback will not be able to be sought from representatives of the target population other than the two industry partners that are involved with the project.

Workstream 3: delivery of the changing mindsets intervention and mixed-methods evaluation

Delivery

The Changing Mindsets intervention will then be delivered at 6–10 private sector urban development events throughout 2024. The number of events was chosen as a balance between delivering the intervention as many times as possible whilst not requiring too great a time commitment from the industry partners that would be delivering it. In order to reach target users who are not already concerned about health and health inequities, where possible the focus will be on delivering the intervention at general urban development events rather than those focused on health. The size of the events may vary; these may be sessions within larger events such as conferences or smaller events such as special interest meetings of private sector urban development professionals, and at least one of the events will involve both the target group and other policymakers. This is designed to address the issue of siloed working between sectors and to increase collaboration and cross-sector problem-solving (Carmichael *et al.* 2012, Black *et al.* 2021, Pineo and Moore 2022).

The core behaviour change components and source material will remain static for the different events. These will include a presentation, discussion during the intervention session, and a website that signposts to resources and existing networks/networks set up by the intervention team. However, the intervention may need to be adapted slightly to fit the different contexts (e.g. the industry partner may read the presentation slides at a small meeting as opposed to presenting it on a screen) and, along with bringing their own delivery style, industry partners will also include their own examples of how

their organisation, and others are beginning to take action to prioritise health so that attendees can see how the industry partners themselves are committed to prioritising health in their work. Small changes to the intervention (e.g. if participants express a desire for longer discussion sessions) may be made between intervention events.

The intervention session will be advertised through conference schedules and other event communication channels. The study team will also support the dissemination of the sessions and events by advertising to existing contacts within TRUUD and through TRUUD communication channels such as newsletters and social media. It is not possible to predict how many people are expected to be recruited at each event as it will depend on the uptake of the Changing Mindsets workshop on each occasion.

Evaluation

A mixed-methods evaluation will then be conducted exploring the effectiveness, engagement with, feasibility, fidelity, and acceptability of the Changing Mindsets intervention. The Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann *et al.* 2014) will be followed to ensure that appropriate details are included when reporting the findings of the study.

Quantitative data collection and analysis

Before the session, attendees will be asked to complete a survey which will collect baseline measures of the theoretical constructs of interest and sociodemographic data (see Appendix). The post-intervention questionnaire, which will capture any changes in the constructs of interest after the intervention, will be circulated at the end of the intervention session and will also include (i) process evaluation questions to assess the extent to which the intervention was delivered as intended, and (ii) questions about how the participants experienced the intervention. Attendees will then be emailed a link to complete a further follow-up questionnaire three months after the event to assess whether there have been any further changes in the variables of interest and to establish whether they have taken any actions following the intervention. The follow-up surveys will include free-text responses collecting information about ways in which the attendees have taken action to prioritise health (e.g. joined/developed networks, started an interest group in their organisation).

Guidance was sought from statistical consultants about the most appropriate analytical strategy for the project, particularly given the possibility of smaller sample sizes in one or more of the intervention groups. In line with their recommendations, multilevel modelling or repeated-measures ANOVA will be used to analyse the quantitative survey data, depending on the final sample sizes of each of the intervention groups and the normality of the data. If sample sizes are too small to use either of these methods, it may be feasible to compare two timepoints (pre/post or pre/3-months) using paired t-tests (or the non-parametric equivalent). Alternatively, a linear regression may be used with change in score between two timepoints as the dependent variable, adjusting for pre-scores as an explanatory variable.

Qualitative data collection and analysis

The intervention sessions will be audio recorded and observed by members of the research team who will be taking field notes to record discussions and feedback given in the session. These data will be analysed qualitatively, exploring discussions around power dynamics and norms. Any feedback on the intervention will be entered verbatim into the Table of Changes.

Three months after the intervention, follow-up interviews will be conducted which will seek to identify further impacts created by the intervention by understanding connections between the actions of participants. Short interviews of up to 60 min will be conducted with a purposive sample of participants. They will be eligible to be invited to interview if they have indicated that they are happy to be contacted about an interview and have provided contact details on the day of the intervention. The participants will be selected to ensure maximum variation in terms of socio-demographic characteristics, industry type, years in role, change in intention to act following the intervention session, and views of the intervention (positive or negative) expressed in the post-presentation survey. The interviews will be semi-structured following a topic guide that will seek to explore any action they have taken to integrate health into their work. Participants will also be asked for details of other individuals or organisations that they believe they have impacted as a result of the intervention, so as to identify the extent to which those not directly exposed to the intervention have nonetheless been impacted. These data will be analysed first by identifying impact pathways and second by inductively analysing those pathways to identify what factors influenced the continued impact.

Engagement with intervention components will be explored through attendance at the event session, field notes/recordings of engagement and discussion at the event, user journeys on the website, engagement with networks (set up by the research team and/or pre-existing networks), and through free-text responses from the surveys and direct questioning in follow-up interviews.

Combining qualitative and quantitative data

The quantitative and qualitative analyses will be used to build on each other; qualitative data will be used to explain quantitative findings, and quantitative data will be used to test hypotheses that have been generated by qualitative data (Moore *et al.* 2015). Triangulation approaches will be used to combine the mixed methods data (Plano Clark 2010, Fielding 2012).

Process evaluation

A mixed methods process evaluation will then be undertaken to ensure the internal validity of the intervention. The process evaluation will aim to explore:

(1) Whether the novel intervention can be successfully implemented across different contexts (i.e. events) where the target users may not be motivated to attend the intervention sessions;
(2) Whether the underlying theories of change (how the intervention produces change in participants) are accurate or whether they need to be revised to make the intervention more effective; and
(3) Whether the intervention is more effective when delivered in some contexts than others, in some population groups than others, or when delivered by one industry partner or the other.

Quantitative data will be used to address these questions by capturing information on the intervention's fidelity (was the intervention delivered as intended), dose (did the participant receive the right 'amount' of the intervention) and reach (did the intervention reach the target audience) in line with Moore *et al.'s* (2015) recommendations. The focus will be on fidelity of function, rather than form, as the intervention is not intended to be delivered in exactly the same way at each event, but it is intended that the same delivery goal will be achieved each time (Hawe *et al.* 2004). Descriptive quantitative information on fidelity, dose, and reach will be provided. Variations between participants or sites in terms of fidelity, dose (e.g. engagement with different aspects of the intervention), and reach (e.g. are there socioeconomic biases in who received the intervention) will be explored. Quantitative methods will also be used to measure key process variables, to allow for the testing of pre-hypothesised mechanisms of impact and contextual moderators (Moore *et al.* 2015), and to explore variation in effectiveness by socio-economic group, industry partner and event. Qualitative methods will also be used to capture emerging changes in implementation, experiences of the intervention and unanticipated or complex causal pathways, and to generate new theory (Moore *et al.* 2015).

Workstream 4: evaluation of the impact of co-production and delivery of the intervention with the project's industry partners

A pre- and post-intervention evaluation will be undertaken to evaluate the nature and extent of the impact of co-production on the project's non-academic industry partners with regard to the same key outcome variables that are to be investigated with the target users (see Workstream 3). The pre-evaluation will use the foundational interview questions and the pre-event survey questions, along with their respective methods, which will help to identify the thinking of each industry partner before participation in the development and delivery of the intervention. This process will be repeated after the delivery of the intervention is complete; in the post-intervention evaluation, semi-structured interview questions will focus on how the co-production has influenced their thinking about their professional practice. Data will be analysed using reflexive thematic analysis (e.g. Braun and Clarke 2006, 2019).

Results

The wider TRUUD project has an end date of September 2025. It is anticipated that data collection for the Changing Mindsets intervention will take place between June and October 2024 and that analysis should be complete by the end of February 2025. The expected research outputs from the project outlined in this protocol will include publication of findings from the foundational interviews, the development and evaluation of the Changing Mindsets intervention, and the findings of the follow-up interviews and survey. Results will also be shared through university press releases, TRUUD dissemination events, reports for industry partners, blogs, and opinion pieces. As this is an exploratory study, qualitative and quantitative insights gained at all stages of the project will be used to evaluate the effectiveness of the project, and all results (including negative and null findings) will be shared.

Discussion

There is now a wide body of evidence showing that urban environments are, through a complex web of causal pathways, increasing the burden of non-communicable diseases and health inequities substantially, including those linked to a changing climate and reduction in biodiversity. The Changing Mindsets intervention is a novel approach to influencing urban development actors in the private sector to help further prioritise health and health equity within their work. Its aim is to give professionals in the land and development industries more confidence to act on health and health equity through a number of

interdependent factors including networking with likeminded professionals and frank discussions of the norms that impede activity. A change in how health is managed during the upstream urban decision-making process could result in lower incidence of noncommunicable diseases such as asthma, diabetes, and cancer and in better mental health among residents and other users of urban environments, as well as benefits to early adopters in the urban development space who are subsequently seen as pioneers within their field with regard to this subject. Two main strengths of this research are the co-production of the intervention with non-academic industry partners and the delivery of the intervention by these 'insiders'. Combined, these are likely to strengthen the messaging of the intervention and lend it greater credibility with the target group. This research is significant and timely, as the global incidence of noncommunicable disease is known to be rising significantly, and presently, health is not being prioritised in urban development decision-making. The findings of this research could consequently inform policy and practice with regard to urban development and health and contribute to system change in an area that is crucial to the promotion of health and health equity. The intervention could also be adapted for other complex challenges that involve individuals and groups who do not feel like they have the power to effect change.

Notes

1. Between 2018–2020, the disparity in life expectancy between those living in the most deprived areas compared to the least deprived areas was 9.7 years for men and 7.9 years for women in England (Office for National Statistics 2022a) and 7.5 years for men and 6.3 years for women in Wales (Office for National Statistics 2022b). Comparable data for 2018–2020 are not available for Scotland and Northern Ireland, but between 2020-2022, the disparity in life expectancy between those living in the most deprived areas compared to the least deprived areas was 7.0 years for men and 5.8 years for women in Scotland (National Records of Scotland 2023) and 7.2 years for men and 4.8 years for women in Northern Ireland (Northern Ireland Statistics and Research Agency 2023).
2. Further information is available on the TRUUD project, Phase 1 findings, and Phase 2 intervention areas through the TRUUD website, www.truud.ac.uk, and in the Phase 1 report TRUUD Phase I Report | February 2024, also available on the website, https://truud.ac.uk/wp-content/uploads/2024/02/TRUUD-Phase-1-Report.pdf.
3. Within the context of the Person-Based Approach, guiding principles highlight how the intervention will address key issues that are crucial to the engagement of the target users within this particular context.
4. This is a diagram that summarises how each element of the intervention should lead to the intended behaviour change.
5. Within the context of the Person-Based Approach, this means using feedback from intended users of the intervention to make sure that the intervention elements are as meaningful and useful as possible (Yardley *et al.* 2015)
6. This documents all the positive and negative comments on each intervention feature and supports identification of possible solutions to any negative comments.

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No potential conflict of interest was reported by the author(s).

Notes on contributors

The Changing Mindsets team are a group of multidisciplinary academics within the wider TRUUD project with skills from a range of fields including management, environmental psychology, and health psychology, as well as expertise in urban environments and health impact assessments. Their work seeks to provide a better understanding of the power dynamics underpinning particular urban development activities in combination with psychological triggers to more effectively prompt changes in decisions related to healthy urban spaces.

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Appendix

Table A1. Workstream 3 survey questions.

Measure	Timepoint taken	Data type	Purpose
Sociodemographic information			
Gender identity	Baseline	Free text	To explore differences in effectiveness/uptake
Occupation	Baseline	Free text	To ensure the target group is being reached To explore differences in effectiveness/uptake
Industry	Baseline	Free text	To ensure the target group is being reached To explore differences in effectiveness/uptake
Age	Baseline	Free text	To explore differences in effectiveness/uptake
Years in role	Baseline	Free text	To explore seniority of participant in their job To explore differences in effectiveness/uptake
Ethnicity	Baseline	Free text	To explore differences in effectiveness/uptake
Outcome measures			
Psychological proximity (17 questions)	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Resource-based power (8 questions)	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Knowledge-based power†	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Group norms†	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Collective efficacy (11 questions + social control†)	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Intention to act (5 questions)	Baseline, post-session, follow-up	Likert scale	To explore intervention effectiveness
Process evaluation			
Have you previously attended this session?	Post-session	Yes/No	Dose
I feel like I have a better understanding about how to incorporate health into my work	Post-session	Likert scale	Fidelity (quality)
I know where to look for support/resources to help me to incorporate health into my work	Post-session	Likert scale	Fidelity (quality)
I felt able to engage in discussion in the session	Post-session	Likert scale	Dose Fidelity
I felt the discussions were valuable	Post-session	Likert scale	Dose Fidelity
I felt that the session was worth attending	Post-session	Likert scale	Fidelity (quality)
I found the presenter persuasive	Post-session	Likert scale	Fidelity (quality)
Is there any way in which the session could be improved?	Post-session	Free text	Intervention optimisation
Is there any way in which the delivery could be improved?	Post-session	Free text	Intervention optimisation
Is there anything else you would like us to know?	Post-session	Free text	Intervention/study optimisation
Other			
What were the top three things you found most influential or interesting about the presentation?	Post-session	Free text	Evaluation of industry partner impact

†To be developed during Workstream 2.