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Addressing the inverse training law: developing, sustaining and expanding GP training in socioeconomically disadvantaged neighbourhoods: A Qualitative Study

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Abstract

Background

Training in socioeconomically disadvantaged neighbourhoods offers unique educational opportunities for developing competence in navigating complexity, cultural diversity, and health inequalities. The Deep End (DE) Network supports general practices serving the most socioeconomically disadvantaged communities. Despite greater population need, the inverse training law means that registrars have fewer opportunities to learn in these settings. Previous evaluation of the TrainDEEP (TRaining Assistance INitiative in DEep End Practices) intervention demonstrated that investment in trainer development and protected time could successfully establish new GP training practices within DE communities. The intervention has evolved to support training continuity and growth within established training practices. This study aimed to explore how training capacity can be developed, sustained, and expanded in DE settings, while examining the learning experiences and professional development of those involved in training and delivering care in these contexts.

Methods

A qualitative thematic analysis of semi-structured interviews with professionals across 8 DE practices in the North East and North Cumbria, England. Participants included GP trainers, intending trainers, registrars, GPs and practice managers.

Results

23 interviews were conducted between January-May 2026. Four key themes were identified. (1) *Learning in the Deep End* described how exposure to clinical complexity, cultural diversity, and health inequalities enhanced learning, while also presenting emotional and professional challenges. (2) *Developing and sustaining educational capacity* highlighted the importance of protected time, trainer development, succession planning, and organisational support. (3) *Preparing and supporting learners in disadvantaged settings* identified gaps in training related to health inequalities, consultation skills, and complex biopsychosocial care, alongside a need for enhanced peer support. (4) *Influence on professional identity and career intentions* demonstrated how DE placements increased confidence in working with underserved populations and, for some trainees, influenced future career choices.

Conclusions

DE practices provide rich educational environments that support experiential learning, professional identity formation, and the development of competencies needed to care for populations experiencing socioeconomic disadvantage. Sustaining and expanding training in these settings requires investment in trainer development, succession planning, educational infrastructure, and learner support. Interventions such as TrainDEEP may help address the inverse training law while strengthening both workforce sustainability and health-equity-focused GP education.

Introduction

The environments in which doctors train shape both their educational development and future career choices. In postgraduate general practice (GP) training, workplace-based learning enables registrars to develop clinical expertise and confidence through exposure to diverse patient populations and healthcare contexts (1-3). Internationally, there is increasing recognition that medical education has a key role in preparing clinicians to address health inequalities and deliver equitable care in complex healthcare systems(4-7).

Practices located in socioeconomically disadvantaged neighbourhoods (SDNs) provide valuable learning environments for GP registrars. Compared with practices in more affluent areas, patients more commonly present with multimorbidity, mental health problems, substance misuse, polypharmacy, language barriers, and complex social circumstances (4, 8). These settings provide opportunities for registrars to develop skills in managing clinical uncertainty, navigating complexity, communication, and understanding the relationship between social disadvantage and health (7, 9). Such experiences can enhance registrars' preparedness for practice while fostering a better understanding of health inequities and their impact on patient care.

Despite their educational value, training opportunities in SDNs are limited. This reflects the interaction of two related phenomena. First, the inverse care law describes how communities with the greatest health needs often experience the greatest barriers to

accessing healthcare (10-12). Second, the inverse training law highlights that there are proportionally fewer GP training practices in disadvantaged areas, limiting registrar exposure to these important learning environments(4, 8, 9, 13). This is concerning, as training location is known to influence career decisions, with doctors more likely to work in areas where they have trained following completion of training(1, 7, 13). It is also known that SDNs struggle to recruit and retain doctors (10, 14) due to challenging work that leads to high stress and burnout rates (14). Limited exposure to practices in SDNs during training may therefore contribute to workforce maldistribution and ongoing health inequalities.

Addressing these challenges has become a national and international priority. In England, both the NHS Long-Term Workforce Plan and the NHS 10-Year Health Plan for England emphasise the expansion of GP training capacity and the development of a workforce capable of delivering care in underserved communities, focusing on a shift to neighbourhood health(15-17). Similar efforts to improve workforce distribution and reduce health inequalities have been implemented in Australia, Canada and the United States(5, 18, 19). For medical educators, there is a growing interest in how training programmes can simultaneously support educational excellence, workforce sustainability and health equity.

The North East and North Cumbria Deep End Network (NENC DEN) supports GP practices serving populations experiencing the highest levels of socioeconomic disadvantage (20-23). Practices are eligible to join if at least 50% of their population resides within the 15% most deprived neighbourhoods in England according to the Index of Multiple Deprivation (20). Currently, the NENC DEN comprises of 52 practices. However, only 54% (28/52) of DE practices are training practices, compared with 69% (207/302) of non-DE Practices (24). DE practices often face substantial recruitment and retention challenges, alongside high levels of workload and professional burnout (25), creating additional barriers to building and sustaining training capacity.

To address these challenges, the NENC DEN developed the TRaining Assistance INitiative in DEep End Practices (TrainDEEP) (Version 1) intervention in 2023 (26). This supports non-training practices to become training practices and is summarised in Figure 1. The TrainDEEP intervention was expanded in 2025/2026 (Version 2) to support existing training practices in sustaining and increasing training capacity. This is to enhance system resilience and address the risk of depletion of the training capacity through, for example, the retirement of experienced trainers. The intervention is summarised in Figure 2.

Previous evaluation of TrainDEEP Version 1 in 2023-2025 demonstrated that targeted investment in trainer development and protected learning time could successfully support the establishment of new training practices within disadvantaged neighbourhoods (26). However, little is known about how training capacity can be sustained and expanded over time in these settings, how educational provision is maintained in resource-constrained environments, or how registrars experience learning within the DE. Given the growing interest in educational approaches that support both workforce development and health equity, a better understanding of these issues is required.

This study aimed to qualitatively explore how the TrainDEEP intervention supports the long-term sustainability and expansion of GP training in DE practices. Specifically, it examined experiences of maintaining training within practices that became training practices through the original TrainDEEP model (version 1) and of increasing training capacity and resilience within established training practices supported through the expanded intervention (version 2). The study also explored the experiences of trainers, registrars and practice staff involved in delivering and undertaking training in these settings.

Methods

Study design and setting

A qualitative study using semi-structured interviews was conducted. Interview transcripts were thematically analysed to develop key themes and insights.

Sampling and recruitment

Within the NENC DEN, there were 24 non-training practices and 28 existing training practices eligible for the TrainDEEP intervention. Practices were recruited to the intervention through an open expression of interest circulated via email managed by the NENC DE network. 8 DE practices participated in the TrainDEEP intervention.

Research participants were recruited from the 8 practices participating in the DE network TrainDEEP intervention using a combination of convenience, purposive, and snowball sampling(27). Convenience sampling enabled recruitment of available staff within

participating practices. Purposive sampling was used to ensure representation across a range of roles, including GP trainers, intending trainers, GP registrars, salaried GPs, GP partners, and practice managers, to capture diverse perspectives on training delivery and experience. Snowball sampling was used to recruit GP registrars who had completed placements in participating practices.

Ethical approval for the research was granted by Newcastle University (ref 36236/2023). The research was conducted in accordance with the Declaration of Helsinki. Potential participants were invited via email and provided with a participant information sheet (Appendix 1) and consent form (Appendix 2) before interview.

Staff from the two practices involved in the original TrainDEEP (version 1) evaluation were re-interviewed to explore longer-term experiences of training delivery after 2–3 years as accredited training practices alongside staff from the additional practices involved in the expanded TrainDEEP intervention. Registrars were interviewed during or following completion of their DE placement, while staff from existing training practices were interviewed before or during implementation of the expanded TrainDEEP (version 2) intervention. No repeat interviews of the same participant were undertaken as part of this research study.

Data collection

Following completion of electronic consent forms, one-to-one semi-structured interviews were conducted, recorded and transcribed via Microsoft Teams (version 26120.3106), lasting 25-45 minutes. The interview content was based on a topic guide to ensure consistency while allowing flexibility to explore participants' experiences in depth (Appendix 3). AG, a clinical research associate, conducted all of the interviews between January and May 2026.

Interview transcripts generated by Microsoft Teams (version 26120.3106) were checked by AG for accuracy and errors.

Data analysis

Transcripts were analysed using reflexive thematic analysis, following Braun and Clarke's six-phase framework. An inductive approach was used to identify patterns and themes within the data (28).

The primary researcher (AG) undertook initial coding through line-by-line analysis to generate both inductive and a priori codes. A second researcher (JL) independently coded a subset (10%) of transcripts to enhance analytic rigour. Codes were organised into themes using NVivo software (version 15), and themes were iteratively reviewed and refined through regular discussions between researchers to ensure coherence and credibility.

Reflexivity

The primary researcher (AG), a resident doctor and clinical research associate with experience in primary care research and practice, conducted all interviews and led the analysis. Reflexive consideration was given to how the researcher's background and perspectives may have influenced data collection and interpretation. Regular discussions within the research team supported critical reflection and minimised individual bias.

Results

Participants

23 participants from 8 DE practices took part in the study, including experienced GP trainers (n=4), new trainers (n=2), intending trainers (n=4), GP registrars (n=6), salaried GPs (n=2), GP partners (n=2), and practice managers (n=3). This enabled exploration of the TrainDEEP intervention from the perspectives of those delivering, supporting, and undertaking GP training in DE settings.

The practice characteristics are outlined in Table 1. The information in Table 1 is from individual practice data and the Office for Health Improvement and Disparities National General Practice Profiles(29). The information was correct at the time of access in June 2026.

Practice	A	B	C	D	E	F	G	H
List size grouping	(7500-10,000 patients)	7500-10,000 patients)	7500-10,000 patients)	15,000-17,500 patients)	20,000-22,500 patients	10,000-12,500 patients	5000-7500 patients	7500-10,000 patients
Number of GPs	Between 6-10	Between 1-5	Between 6-10	Between 6-10	Between 11-15	Between 11-15	Between 1-5	Between 1-5
Location	Urban coastal	Inner city	Inner city	Inner city	Inner city	Inner city	Urban coastal	Inner city
Mean patient age (years old) (29)	43.1	34.4	39.7	35.5	37.7	38	42.9	35.2
Involvement with TrainDEEP intervention	Became a training practice through TrainDEEP v1 in 2024.	Became a training practice through TrainDEEP v1 in 2024. Now going through TrainDEEP v2.	TrainDEEP v2.	TrainDEEP v2.	TrainDEEP v2.	TrainDEEP v2.	TrainDEEP v2.	TrainDEEP v2.

Table 1: Participatory Practice Characteristics

Overview of findings

Participants described how the TrainDEEP intervention enabled the development and sustainability of GP training in socioeconomically disadvantaged areas, while also highlighting the educational value and challenges of training in these settings.

Themes

Findings are presented across four key themes:

1. Learning in the Deep End.
2. Developing and sustaining educational capacity.
3. Preparing and supporting learning in disadvantaged settings.
4. Influence on professional identity and career intentions.

Learning in the Deep End

For many registrars, this was their first experience of working in the DE. These placements were described as both educationally valuable and challenging.

Registrars reported gaining a deeper understanding of the interaction between medical and social complexity, and the broader role of general practice in coordinating care:

'It was eye-opening to see the challenges that the migrant population at [Deep End practice] face. On the surface, it was a medical problem, but when you dig deeper, they have such difficult, complex social circumstances going on that a GP practice becomes a central hub that can coordinate or signpost patients to other services. That's an aspect that I didn't quite appreciate of [Deep End practices]'. - registrar #2, practice B.

Registrars felt able to meaningfully help patients, and staff noted that they were more likely to see rare and complex presentations in the DE than in an affluent area, thus providing wider learning opportunities.

'It was satisfying picking up on serious conditions and getting people treatment, which is why I went into medicine. So, I would probably foresee myself working more in a Deep End practice, more than a sort of general, more affluent area'- registrar #3, practice A.

'They're going to learn an awful lot quicker because generally you see a lot more pathology and a lot more medicine. Your communication skills also improve a lot more quickly because you have to deal with interpreters, you have to be more sensitive to cultural differences and things like that.'- experienced trainer, practice G.

Participants highlighted that these settings provided enhanced learning opportunities, including exposure to complex pathology. However, this complexity was also associated with uncertainty and an increased need for supervision, particularly early in the placement:

'The biggest hurdle in training is probably having more complex medical patients and not knowing what to do, having to speak to someone more experienced and ask 'How do you manage this in the GP setting?' But that was fine, because everyone was approachable.'- registrar #2, practice A.

Despite this support, many participants highlighted the emotional burden associated with consultations in which patients' needs extended beyond what could be addressed medically. One registrar described the cumulative impact of this emotional strain, particularly when communication barriers were also present:

'I emotionally found it really hard. A lot of people come in with concerns that you can't necessarily help with as a doctor, and learning to manage that was really tiring. And doing that either with English as a second language or with an interpreter, and that added level of risk gets then added to that because of that situation. By the end, I was just really exhausted.'- registrar #1, practice B.

Registrars also reflected on the difficulties of building rapport with patients whose social, cultural, and lived experiences differed significantly from their own. These perceived gaps sometimes led to a sense of disconnection and uncertainty about their ability to provide meaningful support, which, in turn, challenged their developing professional identity:

'I felt a real barrier of class and experience. I felt like, how am I supposed to be relatable to you as a trusted healthcare professional who is meant to understand and empathise when my life experiences are totally alien to yours. Not just my life experiences, but my cultural worldview and my value system? That felt like a real barrier and contributed to the sense of what can I even do to help?.' – registrar #3, practice B.

Developing and sustaining training capacity

Participants described how the TrainDEEP intervention enabled practices to establish and expand training capacity, primarily through funding protected time for intending trainers. This reduced workload pressures and allowed GPs to complete trainer training:

'It'll be purely used for backfill with a locum, so it will allow us to give them the time they need to do the [intending trainers] course and not be under pressure'- experienced trainer, practice C, trainer, practice E.

The sustainability and resilience of training provision was closely linked to succession planning. Participants emphasised the importance of having multiple trained GP trainers within a practice to ensure continuity and mitigate disruption caused by staff turnover:

'There's a definite advantage to at least two trainers…if one leaves, there's another who can keep training going.' -experienced trainer, practice A.

Planning and succession strategies were viewed as essential to maintaining training status over time:

'It's sustainable so long as there's forward planning, we've got to have a succession plan.' – intending trainer, practice F.

Organisational capacity, including physical infrastructure, was also highlighted as a prerequisite for expanding training:

'We can consider having more registrars, as we worked in the right order. We created that capacity so we'll have two extra rooms and can have extra people in.'- intending trainer, practice H.

However, participants noted that workforce instability, particularly difficulties in recruiting partners, could threaten the sustainability of training practices:

'The sustainability of being a training practise does rely a little bit on whether we can recruit partners within the practice.' - GP partner, practice A.

Some practices reported that becoming a training practice acted as a catalyst for wider workforce development, extending beyond GP training to include clinical and non-clinical staff:

'As much as this is about the GP training programme, we do look at other areas to bring in training. We are bringing in student nurses, apprentices at a business admin level. For us, it's a whole lot more. If it starts at the top, it comes all the way through, which I think is the route to keep people in, especially for [socioeconomically disadvantaged locality].' - practice manager, practice C.

Preparing and supporting learners in disadvantaged settings

Alongside curricular gaps, participants described a lack of recognition of deprivation-related challenges within wider healthcare systems. Expectations and performance targets were often perceived as uniform across practices, regardless of differences in population need:

'We feel very frustrated in our practice with some of the letters that are being put out by the ICB. Not one of them gives any serious nod to deprivation. We've had meetings with the ICB and said, 'How is this fair that we're being asked to deliver and perform to the same level as other practices that aren't in the Deep End?' And, there's no answer, they don't get it.'- new trainer, practice A.

Trainers described how providing DE training opportunities is beneficial, even if registrars decide they would not like to work there in the future, as this helps GPs make an informed decision about their career, and could reduce high staff turnover levels:

'It's almost as important for those who don't want to do it, who might think, oh, I really should, because they need more GPs. But actually, if it's not your kind of practice, it's a terrible decision because you're unhappy, and then the patients are unhappy.'- new trainer, practice B.

Registrars working as the sole trainee within a practice reported feelings of isolation and suggested that dedicated peer networks could support shared learning and provide a space to discuss challenges:

'A WhatsApp group for [Deep End] trainees would be helpful to say, 'guys, I'm finding this really hard. Are you guys seeing most patients with an interpreter? Because it's taken me so long.' You can have that safety within your peers rather than always going through a senior. It is different when it's your peers-you're going through it together for the first time and trying to understand.' – registrar #1, practice B.

Similarly, GP trainers mentioned having a DE trainers group, where trainers could network, share learning and support the development of trainers:

'I'm wondering about seeing what interest there might be in setting up a Deep End trainer group. Because now, the trainer groups include people from a wide range of practices. I think some Deep End specific things might be quite good.'- new trainer, practice B.

Participants identified a gap between the demands of working in DE settings and the preparation provided by the standard GP training curriculum. In particular, registrars were seen as underprepared for managing complex biopsychosocial presentations and consultations involving interpreters:

'A few of our registrars do comment on the complexity of the work. I don't think there was a focus on how to manage consultations with interpreters and medical complexity in training. And I do think you would get more out, if there's more of a focus on working with Deep End populations.' – intending trainer, practice D.

Influence on professional identity and career intentions

Exposure to DE training environments was perceived to play a key role in shaping career intentions. Participants described how familiarity with the patient population and working environment reduced perceived barriers to working in deprived areas:

'If I hadn't worked there, would I have been so keen to join? Because it is complex. I think when you've worked there as a registrar, then you're more comfortable staying.'- salaried GP, Practice C.

Several participants reported that registrars who trained in DE practices expressed intentions to return post-qualification, suggesting a potential “pipeline” effect:

‘Our challenging demographic means kind of once you've got somebody training who knows what we're dealing with and how we work, it's key that if they enjoy that, that we try and retain them. Becoming a training practice has been absolutely brilliant for retention. Our registrar, who is finishing training elsewhere, will come back to us when she qualifies. We realise how key it is.’- Practice Manager, practice C.

Participants explained how the network of trainers and registrars linked to training practices helps to share information about jobs by word of mouth, which can help with recruitment and retention:

‘I ended up in a Deep End practice because of who I knew. I hadn't worked in [Deep End Practice] beforehand. I think that was a big influence for me, knowing that that was a good Practice in terms of it being recommended by someone that I knew.’- salaried GP, practice A.

Discussion

This study builds on previous evaluation of the TrainDEEP pilot, which explored how to support non-training DE practices to become training practices(26). While the initial evaluation focused on establishing training capacity, the current study examined how that capacity can be sustained and expanded over time and explored the experiences of those delivering and undertaking training within these settings. By incorporating perspectives from practices that became training practices through TrainDEEP (version 1) and longer-established training practices participating in the expanded model (version 2), this study provides insight into the development of educational capacity in SDNs.

A key finding is that creating training practices only represents the first stage of educational capacity building. Participants described how protected time, trainer development, succession planning and organisational support were necessary to sustain and expand training opportunities. In contrast to the initial TrainDEEP model (version 1), which focused on establishing training practices(26), the expanded intervention (version 2) seeks to address the longer-term challenge of maintaining educational provision despite workforce turnover and increasing service demands. These findings suggest that sustainable training in SDNs requires the development of resilient educational systems rather than relying on individual trainers alone (4, 30-32).

The study also provides insight into DE learning experiences and their influence on subsequent career intentions. Participants described how working in DE settings increased familiarity, reduced perceived barriers, and, in some cases, influenced intentions to work in these areas following the completion of training. This aligns with the wider literature suggesting that training location is a key determinant of future practice (7, 10, 13, 26), and supports the argument that expanding training opportunities in underserved areas could contribute to strengthening workforce provision in socioeconomically disadvantaged areas.

Participants identified gaps between the realities of DE practice and the preparation provided by existing training curricula. Registrars felt particularly underprepared for managing complex biopsychosocial presentations, working effectively with interpreters and responding to the effects of poverty on health. These findings raise concerns that standardised training models may inadequately prepare clinicians for practice in socioeconomically disadvantaged contexts. A greater emphasis on health inequalities, deprivation-focused practice and the social determinants of health within postgraduate curricula is therefore required. There are deprivation-focused training programmes across the UK and Ireland which provide potential models for wider implementation to be based upon (9, 33, 34).

This study highlights the dual nature of training in DE settings as both educationally valuable and emotionally demanding. Registrars described these environments as highly educational, with exposure to complexity accelerating the development of clinical reasoning, communication skills and contextual understanding of patient care. These findings resonate with theories of experiential and situated learning, where knowledge is constructed through engagement with real-world complexity(2, 3). However, this learning was accompanied by significant emotional labour, particularly when registrars encountered unmet social needs or perceived limitations in their ability to help patients. Feelings of disconnection related to social and cultural differences further illustrate the challenges of developing professional identity in unfamiliar contexts, which are cited in the literature(35, 36).

These findings underscore the importance of structured support systems for registrars working in high-deprivation settings. Participants highlighted the potential value of peer networks and dedicated support mechanisms to reduce isolation and facilitate shared learning, which strengthens the growing evidence base(37, 38). Given the association between emotional burden, burnout, and patient safety, embedding pastoral support and reflective spaces within training programmes is critical for registrar wellbeing, workforce sustainability and patient care.

Finally, participants raised concerns about the lack of recognition of deprivation within wider healthcare structures. Consistent with previous research (20, 39, 40), uniform expectations across practices serving markedly different populations were felt to be insufficient in recognising the additional complexity associated with deprivation. The findings therefore suggest that efforts to sustain and expand training opportunities in underserved communities must be accompanied by broader organisational and policy support. Without recognition of the additional pressure and resources required to deliver both patient care and high-quality training in these settings, educational capacity may remain vulnerable despite interventions such as TrainDEEP.

Strengths and limitations

A key strength of this study is the inclusion of a diverse range of participants, including GP trainers, intending trainers, registrars, GPs and practice managers. This enabled exploration of both educational and organisational factors influencing training delivery and learning experiences. Several practices were included, allowing for comparisons to be made between different geographic areas, patient populations and organisational structures. Included practices were at different stages of training development, which strengthens the findings by capturing variation in experiences of the intervention. The qualitative study design facilitated in-depth discussions surrounding the delivery and experience of GP training in the DE. Importantly, the study evaluates a real-world educational intervention in a context where training opportunities have previously been limited, offering findings with relevance to health-equity-focused education and workforce development (15, 16).

Several limitations should also be considered. The use of convenience and self-selection sampling may have resulted in participation from individuals and practices who were more engaged with training, potentially limiting representation of less-resourced practices or those facing greater barriers to educational delivery.

The study was conducted within a single regional DE network, which may limit the transferability of findings to other regions with different healthcare systems, training structures, or patient populations. Furthermore, this evaluation reflects early experiences of the TrainDEEP intervention, and longer-term outcomes, particularly in relation to sustained recruitment and retention, are not yet known.

Implications for research and practice

This study suggests that socioeconomically disadvantaged communities represent important, but underutilised, learning environments within postgraduate GP education. DE practices exposed registrars to multimorbidity, social complexity, cultural diversity, interpreter-mediated consultations, and the practical consequences of health inequalities. These experiences align with theories of experiential and situated learning(2, 3) and may help develop competencies increasingly required within contemporary primary care. Medical educators should therefore consider how to increase equitable access to these learning environments within GP training programmes.

These findings support previous calls for greater emphasis on health inequalities, deprivation-focused practice, and the social determinants of health within medical education(4, 34). A specific training scheme for general practice in disadvantaged areas would equip registrars with knowledge and skills tailored to populations such as those DE practices serve. There are a few existing initiatives in the UK(33, 34), yet the wider development of similar curricula across England and the UK is crucial to prepare the future workforce to serve those with the greatest health needs and to tackle the inverse care law.

Strengthening support systems for both registrars and trainers is essential. The development of DE-specific peer support networks for registrars and collaborative forums for trainers could reduce isolation, enhance shared learning and improve overall training experiences. Given the emotional demands identified in this study and the wider literature(20, 41), structured pastoral and supervisory support should also be prioritised to mitigate burnout, which would likely reduce staff turnover rates and improve patient safety(42).

The findings are also relevant to current workforce policy. Expansion of GP training capacity in socioeconomically disadvantaged areas as a strategy to address health inequalities(6) and workforce sustainability are key aspects of the NHS 10 Year Health Plan(16) and the NHS Long-Term Workforce Plan(15, 43). Developing training opportunities for other staff groups also helps to support the

LTWF plan, which outlines increasing training places for several roles(15), and the NHS 10 Year Plan, particularly the shift from hospital to community, as these staff could support 'Neighbourhood Health Services(44, 45).

Finally, the findings suggest that initiatives such as TrainDEEP may have wider system benefits beyond GP training, contributing to multidisciplinary workforce development and strengthening local training pipelines.

Future research should therefore examine the broader impact of such interventions, alongside longitudinal evaluation of their effects on workforce retention in deprived areas. Comparative work exploring differences between DE and non-DE training environments would further inform the design of equitable and context-sensitive training models.

Conclusion

This study demonstrates that interventions such as TrainDEEP can support the development, sustainability, and expansion of GP training in SDNs. DE practices provide valuable learning environments, helping registrars develop skills in managing complexity, understanding health inequalities, and caring for underserved populations. However, these opportunities are accompanied by organisational, educational, and emotional challenges that require sustained support. Building training capacity in these settings requires investment in trainer development, succession planning, protected time, and support for both learners and educators. TrainDEEP offers one approach to strengthening educational capacity and helping future GPs develop the skills and experience needed to care for populations with the greatest health needs.

Abbreviations

DEN- Deep End Network

GP- general practitioner

NENC- North East and North Cumbria

NHS- National Health Service

SDN- socioeconomically deprived neighbourhood

Declarations

Ethics Approval and consent to participate

Ethical approval has been granted by Newcastle University Research Ethics Committee (ref 68060/2023). The research was conducted in accordance with the Declaration of Helsinki.

All participants signed an electronic consent form.

Consent for publication

All participants provided informed consent for participation in the study and for the use of anonymised quotations in publications arising from the research.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to the potential risk of participant identification from qualitative interview data but are available from the corresponding author on reasonable request.

Competing interests

Dr Sarah Sowden is the public health and academic lead for the NENC Deep End Network. Dr Sameena Hassan is the clinical co-lead for the NENC Deep End Network. The network developed and funded the TrainDEEP initiative through the NENC Integrated Care Board.

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Authors' contributions

AG and SS conceived and designed the study. AG conducted the interviews and led the data analysis. JL contributed to data interpretation. AG drafted the manuscript. JL, SH, GV and SS critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Figures

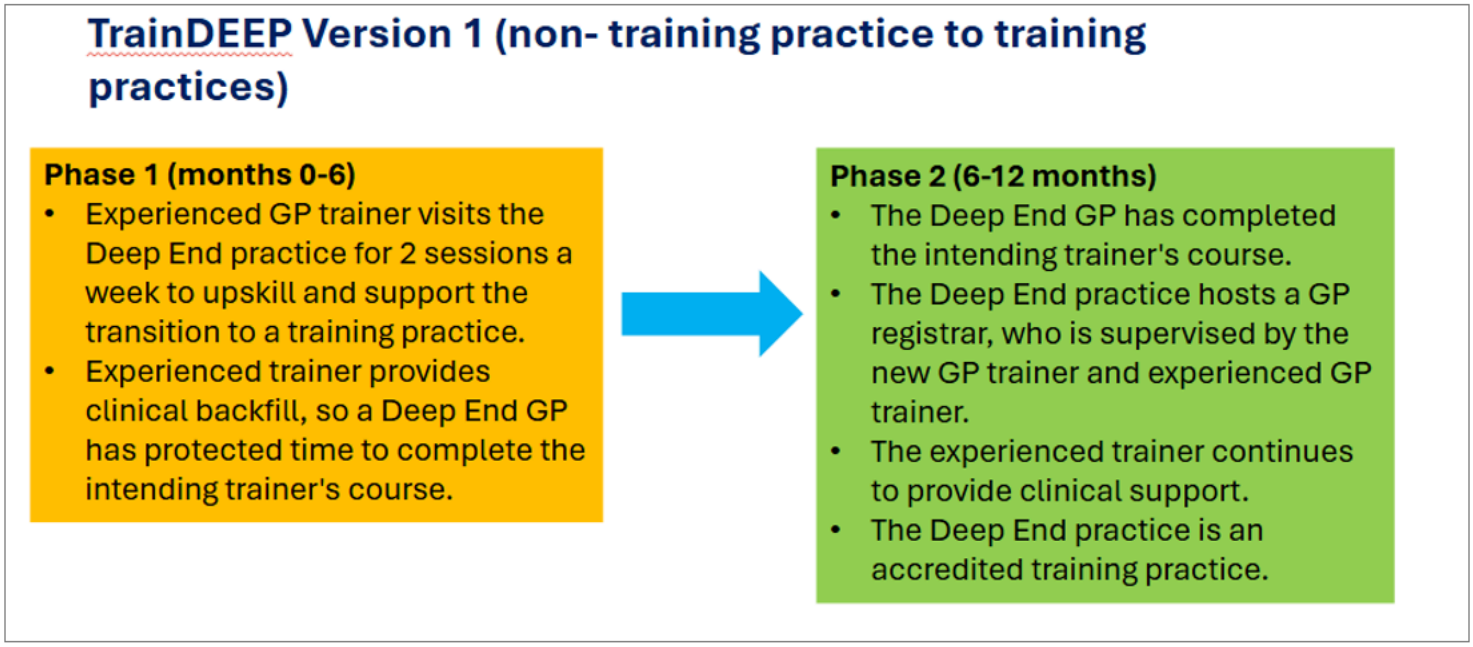


Figure 1

Summary of the original TrainDEEP model, supporting non-training practices to become training practices.

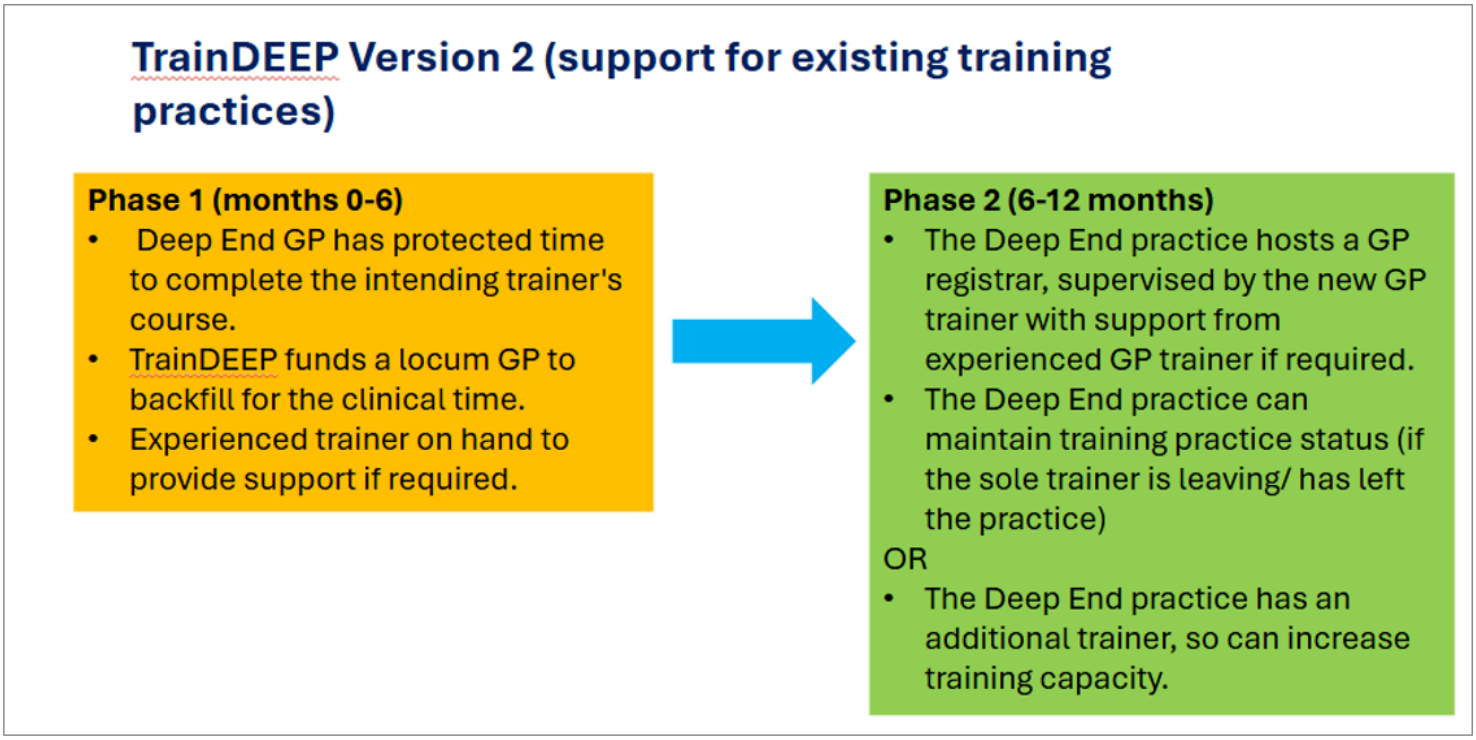


Figure 2

Summary of the new iteration of TrainDEEP, supporting existing training practices.

Supplementary Files

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- TrainDEEPappendices.docx