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2 Where next for the design, delivery and evaluation of community-based physical
3 activity prescription? Emerging lessons from the United Kingdom.

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Abstract

28 Despite widespread use, community-based physical activity prescription is
29 controversial. Data limitations have resulted in a lack of clarity about what works, under
30 what circumstances, and for whom, reflected in conservative policy recommendations.
31 In this commentary we challenge a predominantly negative discourse, using
32 contemporary research to highlight promising findings and ‘lessons learnt’ for design,
33 delivery, and evaluation. In doing so, we argue for the importance of a more nuanced
34 approach to future commissioning and evaluation.

35 Community-based physical activity prescription, most commonly known as
36 exercise referral, is widespread globally. Such schemes typically involve referral via
37 primary care and are targeted at those who are inactive and have, or are at risk of,
38 chronic health conditions. First introduced in the 1990s, exercise referral schemes
39 expanded internationally, initially without a substantial evidence base.¹ Subsequent
40 policy has attempted to enhance practice; for example, in the UK a national quality
41 assurance framework² and national clinical guidance;^{3,4} however, implementation has
42 been challenging. Emerging from a symposium considering the future of exercise
43 referral within the UK, this piece amalgamates reflections from researchers working on
44 physical activity prescription within that context. We hope that this learning may
45 stimulate reflection on and comparison with practices in international systems.

46 Common to other health interventions which vary across service providers, there
47 have been challenges in terms of conducting rigorous yet ecologically-valid evaluations.
48 Data sharing to compare schemes has been particularly problematic. As a result, policy
49 for exercise referral schemes has been ambiguous.⁵ Evidence reviews⁶⁻⁹ have had to
50 synthesise findings from schemes employing heterogenous practices which are often not
51 underpinned by evidence-based designs, behaviour change theory, nor include long-
52 term follow up. Consequently, there remains outstanding questions regarding what
53 works, for whom, in what circumstances and why. Recent policy reflects this; for
54 example, the UK's National Institute of Clinical Excellence's 2018 guidance review
55 reiterated the paucity of the evidence base and consequently made only conservative
56 recommendations for ongoing commissioning.

57 One would be forgiven for thinking that exercise referral-based research had
58 stagnated. Here, we argue this is not the case. Localisation of health policy and funding
59 in the UK has enabled research and practice-based innovation, that addresses some of
60 the more complex challenges of design, implementation, and evaluation within this
61 field. There is growing evidence to suggest that exercise referral schemes work better
62 for some groups than others,^{10,11} and tailored behaviour change approaches can promote
63 more holistic physical activity engagement than is typical through gym-based exercise
64 prescription.¹² Where psychosocial constructs are augmented (i.e., through either
65 explicit or implicit use of behaviour change strategies), adherence is supported.¹⁰ Here,
66 we collate learning from exemplar case studies and emerging research to demonstrate
67 how understanding of community-based physical activity prescription is advancing. In
68 doing so, we highlight both promising findings and areas of contention, deliberately
69 showcasing diverging perspectives to invite debate concerning future approaches. Given
70 the expansion of exercise referral internationally, and social prescribing in the UK, this
71 is a pertinent and timely issue.

72 **1. Design**

73 A key advancement for provision and research has been moving from seeking
74 system-wide standardisation (“top down”) towards a “bottom up” approach involving
75 intervention design with local stakeholders. For example, the Co-PARS programme,^{12,}
76 ^{13, 14} was a three-year process of iterative coproduction, refinement and evaluation of an
77 exercise referral scheme in Liverpool. Two key learning points emerged. First,
78 collaborative relationships between multiple interdependent stakeholders (e.g.,

79 commissioners, providers, users) can be fostered through “levelling” power and
80 promoting a sense of shared intervention ownership.¹⁵ Buckley et al.^{12, 13, 14} facilitated
81 this through weighting practitioner and participant experience equally to academic
82 knowledge; using a non-specialist, impartial facilitator; and separating stakeholder
83 groups for discussion of sensitive issues (e.g., funding and resources). Second, the
84 design benefitted from being an iterative cyclical process, allowing ongoing
85 intervention refinements.¹⁶ Buckley et al.’s engagement with stakeholders went beyond
86 the formal “co-production” phase, allowing practitioners to feedback challenges,
87 address logistical problems, and adapt delivery systems in response to pilot data.

88 Crucially, when reflecting on the improved outcomes compared to usual care
89 exercise referral and between pilot¹² and trial¹⁴ phases, the authors concluded that the
90 iterative, participatory development process may be as important for effective and
91 sustainable community-based physical activity prescription as the content of the
92 intervention itself. Indeed, the former should inform the latter. This is consistent with
93 wider design-focused work demonstrating how prototyping (iterative refining to
94 delivery context while a programme is ‘live’) can offer a time-efficient alternative to
95 full co-production.¹⁷ These developing strands of work highlight a need for policy-
96 driving evidence syntheses to look beyond standardised trial designs and positivist
97 research paradigms. In doing so, policy-makers might seek good practices rather than
98 best practice, and replace the quest for “off the shelf” content with sustainable models
99 that allow context-driven adaptation.

100 **2. Delivery**

101 A second key area of development has been the implementation of schemes; that is,
102 what should be delivered and how, to maximise effectiveness. While guidelines^{2, 3}
103 recommend access to activities alongside use of behaviour change techniques (e.g.,
104 goals, action and coping plans), work has demonstrated how delivery can be challenged
105 by issues of technique fidelity,^{18, 19} time pressures on the workforce,²⁰ and poor
106 attendance.²¹ Innovations in this area are trialling new delivery methods, including
107 theory-based behaviour change consultations,¹⁴ referral to “green” physical activity in
108 outdoor environments,²² and home-based delivery.²³ Such diversification of delivery
109 may be particularly important amidst the changing climate of the Covid-19 pandemic,
110 where home-based or outdoor PA could offer accessible alternatives to the traditional
111 gym environment for elderly or clinically vulnerable populations.²⁴

112 Findings are not always as expected. For example, the PACERS pilot trial^{25, 26}
113 explored the feasibility of embedding a web portal and accelerometry-based
114 monitoring device within the Welsh National Exercise Referral Scheme versus scheme-
115 only provision, aiming to diversify delivery, widen access, and enhance motivational
116 support to improve adherence and outcomes. The trial demonstrated challenges of
117 device engagement (due to technical access and literacy) and disproportionately high
118 engagement from those in the least deprived quintile. Of note, this differs from patterns
119 of engagement observed in a multi-scheme dataset that show greatest uptake in the
120 higher (but not the highest) deprivation deciles.²⁷ Together this reinforces the need to
121 better understand how different delivery approaches may impact, or be tailored to suit,
122 different types of participants.

123 **3. Evaluation**

124 One longstanding challenge in understanding the impact of exercise referral in the
125 UK has been the heterogeneity of data collected and reported. In recent years we have
126 seen considerable innovation in the evaluation of schemes. For example, the now open-
127 access National ReferAll Database (NRD)^{28, 29, 30} curated by ukactive (UK-wide
128 professional member organisation), Refer-All (a company providing software solutions
129 for exercise referral), and the National Centre for Sport and Exercise Medicine, enables
130 between-scheme comparisons at scale. So far, research using the database has
131 highlighted key areas for development, including the need to adapt practices if we are to
132 recruit and retain participants who are least active,³⁰ and that schemes do well at
133 engaging (but not retaining) participants from ethnic minority communities.²⁷ In
134 addition, key learning from the processes of constructing and analysing the NRD
135 reinforces the need to support schemes in the production of high quality and consistent
136 outcome evaluation data, and of engaging delivery partners in evaluation.

137 Given the relative paucity of evaluation of long-term behaviour change and
138 maintenance of outcomes, it is clear that longitudinal follow-up must become more
139 commonplace.³¹ Progress is being made, for example in work exploring longitudinal
140 uptake and referral patterning in the Welsh National Exercise Referral Scheme by
141 linking referral scheme and health data.³² Considering the heterogeneity seen in scheme
142 level outcomes in multi-scheme datasets,^{28, 30} long-term follow ups might better inform
143 as to what schemes work best and for whom.

144 In a contrasting approach, theory-driven realist evaluations are increasingly being
145 used to explore interactions between proposed mechanisms, contexts and outcomes.
146 Such work^{15, 33} has identified that people within schemes (e.g., participants, deliverers,
147 commissioners) provide rich sources of information about factors that enhance
148 outcomes. These include diverse and well-integrated staffing team, accessible venues
149 (leisure and non-leisure), and embedded social opportunities.²⁷ Learning from these in-
150 depth evaluations with multiple stakeholders has also reaffirmed the importance of
151 understanding the complexity and politics of delivery contexts. For example, in a case
152 study of an East Midlands county scheme¹⁵ researchers identified conflicting
153 interpretations, power imbalances, and tensile relationships between service users,
154 practitioners and commissioners, that ultimately affected the scheme's
155 decommissioning. Similarly, a recent ethnography highlighted the importance of
156 person-centred climate and established supportive communities of practice when
157 seeking to influence motivation and capability within exercise referral practitioners.³³
158 More research on operational contexts is needed to complement traditional effectiveness
159 studies.

160 Another final key shift in evaluation focused work has responded to calls²⁷ for more
161 consideration of the impact of schemes on health inequalities. While schemes target
162 those with poorer health or risk of poor health, emerging work highlights a mixed
163 picture as to the success of supporting these groups. Data has demonstrated widening
164 inequalities in recruitment to a national scheme, over time,³² and also, that although a
165 regional exercise referral programme largely did not increase inequalities in patients

166 referred for weight reasons, it did not reduce them either.³⁴ The publication of a new
167 Physical Activity Referral Scheme taxonomy³⁵ is likely to support consistent reporting
168 and classification of schemes, enabling more informed interpretation of differences in
169 outcomes. Relatedly, while the breadth of outcomes impacted by schemes is
170 encouraging, both the case for their use, and evaluation of their effectiveness, are
171 altered depending on how their stated purpose is framed. Examples of primary
172 outcomes vary, including: demonstrating a clinically-meaningful change (e.g., in
173 physical or mental health indices), achieving a guideline-based physical activity level
174 (potentially important in some clinical populations, e.g., cancer pre-habilitation),³⁶ or
175 demonstrating readiness for, or engagement in, sustainable independent activity.
176 Transparency in purpose at commissioning stages, and selecting outcomes both
177 appropriate to the population and realistic given the scheme, are vital for meaningful
178 design, delivery, and evaluation.

179

180 **Conclusions**

181 Crucially, emerging evidence is reinforcing that meaningful health and social
182 gains can be provided by exercise referral schemes, whilst highlighting some consistent
183 messages and recommendations. First, that ‘one size’ does not fit all; researchers should
184 design and develop new methods of delivery with underserved groups to support those
185 who cannot engage with traditional schemes. Second, while scheme content may
186 justifiably differ based on tailoring to individuals and local contexts, there is a need for
187 some standardisation of reporting and evaluation, at least in similarly-designed

188 approaches, to facilitate robust understanding of effective practices. We argue that this
189 must take place alongside evaluation approaches that appropriately capture relevant
190 contextual details, factors that influence and impact on inequalities, and the nuances of
191 complex delivery systems. Third, the projects discussed demonstrate that it is vital to
192 continue to work with stakeholders to enhance the quality, awareness, and impact of
193 emerging evidence. Whilst individual tailoring, standardised evaluation and stakeholder
194 engagement have been established within the public health landscape for some time,
195 they have not consistently been applied within the exercise referral field. With the
196 expansion of social prescribing, and political focus on physical activity in COVID-19-
197 related discourse, this presents a key ‘policy window’³⁷ to enable a change in agenda
198 and messaging relating to physical activity prescription. To ensure we take advantage of
199 this opportunity, we must continue to strengthen the evidence base to earn a seat at the
200 policy table³⁸ and extend our engagement with the service users, practitioners and
201 policy-makers who use it.

202 In this commentary we have drawn together key findings and lessons learnt from
203 emerging research within the UK to demonstrate how understanding of community-
204 based physical activity prescription schemes is advancing. Specifically, we highlight
205 innovations in scheme design, delivery, and evaluation, and invite broader engagement
206 in and with this research to inform future policy and practice. In particular, work that
207 shares and contrasts both intra- and inter-national data is particularly required, to
208 amalgamate learning from different policy, funding, political and structural contexts.

209 Doing so will drive progress towards ensuring that the potential benefits of exercise
210 referral schemes are fully realised, in an equitable way.

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371 Conflicts of Interest

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373 The authors have no conflicts of interest to declare.

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Table 1: Summary of lessons learnt and future directions for community-based physical activity prescription

Lessons learnt	Recommendations for future action
Outcomes can be enhanced by co-designed schemes and through processes that enable iterative refinement of delivery.	<p>Scheme development (and ongoing refinement) should involve stakeholders that represent all facets of the delivery process. This should include commissioners, referring health professionals, service managers, practitioners and service users. For more holistic, systems-level approaches, there may also be value in including local sports development, community liaison, social prescribers/link workers, physical activity officers, and clinical representatives.</p> <p>It must be recognised that complex interventions take time to develop, thus smaller-scale pilots might be useful prior to wider implementation. Commissioners and service providers should be open to altering delivery approaches, including post-contract award.</p>
There are important differences in how individuals access and respond to schemes, with some concerns evidenced about groups experiencing health inequalities. Some good practices regarding inclusion are emerging.	<p>We echo NICE's research recommendations^{3, 4} that work should aim to identify differences in scheme effectiveness based on socioeconomic status, age, gender and ethnicity. We call for enhanced data collection and reporting regarding other characteristics linked to health inequalities, and at the intersections of these identities.</p> <p>Reporting is not enough. In addition, commissioners and researchers should design and develop new methods of delivery to support those who evidence suggests do not engage with or benefit from traditional</p>

	<p>schemes. These underserved and/or underrepresented groups include: people from black and minority ethnic groups, people with multiple co-morbidities, and people with a mental health condition.</p> <p>Monitoring, evaluation, and commissioning frameworks should capture, recognise, and reward the impact of schemes on these and other underserved groups.</p>
The impact of operational context on scheme delivery, performance, and sustainability is potent.	<p>Consideration needs to be given to how behaviour change can best be supported within complex operational systems. Behaviour change principles can be integrated on multiple levels within schemes (e.g., within the scheme design, training for staff, integration of behaviour change techniques and via education for service users within service delivery).</p> <p>Evaluation approaches should appropriately capture and report relevant contextual details (e.g., staffing capacity, resources, funding and commissioning structures) as standard. This should be complemented by work understanding the nuances of complex delivery systems involved in physical activity prescription.</p> <p>Work that shares and contrasts both intra- and inter-national data is particularly required, to amalgamate learning from different policy, funding, political, and structural contexts.</p>

<p>Standardised evaluation is an established monitoring and evaluation approach within the public health landscape, but has not consistently been applied within the exercise referral field.</p>	<p>Variability between schemes represents opportunities for natural experiments; however, subsequent collation of evidence for comparative trials requires better quality minimum datasets. We echo NICE's³ recommendations that data is collected as standard concerning: programme and evaluation details, participant demographics, baseline and follow up data, and process evaluation.</p> <p>Recognising that data collection and evaluation is often underfunded and/or time-pressed, researchers, commissioners, and service providers should work together to design, adopt, and share viable data collection approaches. Emerging examples³⁵ are promising but require wider implementation.</p> <p>Regional, national, and international systems for sharing evidence and good practice across and between schemes are needed. The 2018 removal⁴ of NICE's recommendation to develop a centralised system for collating local data was unhelpful in this regard. Some systems exist (e.g., the UK's National Refer-All Database), but wider scheme engagement is unlikely without changes to access and/or commissioning requirements.</p>
<p>The evidence base concerning exercise referral is still fragmented; wider perceptions of exercise referral need addressing.</p>	<p>Community-based physical activity prescription needs to continue to develop from its reputation and practices as gym-based “exercise referral” to reflect the diversity of needs, preferences, and opportunities for supporting activity uptake available.</p>

	<p>Framing evidence, and communicating the benefits of the evidence, clearly to policy makers and commissioners, is vital for expanding its use and impact. Researchers should ensure they communicate the importance and relevance of findings to those in wider system roles.</p> <p>Stakeholders concerned with exercise or physical activity prescription, or similar models (e.g., social prescribing), should be receptive to the complexities of service delivery, and recognise the need for diverse research designs to capture learning.</p>
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