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

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28           **Abstract**

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

36           Community-based physical activity prescription, most commonly known as  
37 exercise referral, is widespread globally. Such schemes typically involve referral via  
38 primary care and are targeted at those who are inactive and have, or are at risk of,  
39 chronic health conditions. First introduced in the 1990s, exercise referral schemes  
40 expanded internationally, initially without a substantial evidence base.<sup>1</sup> Subsequent  
41 policy has attempted to enhance practice; for example, in the UK a national quality  
42 assurance framework<sup>2</sup> and national clinical guidance,<sup>3, 4</sup> however, implementation has  
43 been challenging. Emerging from a symposium considering the future of exercise  
44 referral within the UK, this piece amalgamates reflections from researchers working on  
45 physical activity prescription within that context. We hope that this learning may  
46 stimulate reflection on and comparison with practices in international systems.

47           Common to other health interventions which vary across service providers, there  
48 have been challenges in terms of conducting rigorous yet ecologically-valid evaluations.  
49 Data sharing to compare schemes has been particularly problematic. As a result, policy  
50 for exercise referral schemes has been ambiguous.<sup>5</sup> Evidence reviews<sup>6-9</sup> have had to  
51 synthesise findings from schemes employing heterogenous practices which are often not  
52 underpinned by evidence-based designs, behaviour change theory, nor include long-  
53 term follow up. Consequently, there remains outstanding questions regarding what  
54 works, for whom, in what circumstances and why. Recent policy reflects this; for  
55 example, the UK's National Institute of Clinical Excellence's 2018 guidance review  
56 reiterated the paucity of the evidence base and consequently made only conservative  
57 recommendations for ongoing commissioning.

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

### 73 **1. Design**

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

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

89         Crucially, when reflecting on the improved outcomes compared to usual care  
90 exercise referral and between pilot<sup>12</sup> and trial<sup>14</sup> phases, the authors concluded that the  
91 iterative, participatory development process may be as important for effective and  
92 sustainable community-based physical activity prescription as the content of the  
93 intervention itself. Indeed, the former should inform the latter. This is consistent with  
94 wider design-focused work demonstrating how prototyping (iterative refining to  
95 delivery context while a programme is ‘live’) can offer a time-efficient alternative to  
96 full co-production.<sup>17</sup> These developing strands of work highlight a need for policy-  
97 driving evidence syntheses to look beyond standardised trial designs and positivist  
98 research paradigms. In doing so, policy-makers might seek good practices rather than  
99 best practice, and replace the quest for “off the shelf” content with sustainable models  
100 that allow context-driven adaptation.

## 101 **2. Delivery**

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

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

### 124 **3. Evaluation**

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

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

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

161 Another final key shift in evaluation focused work has responded to calls<sup>27</sup> for more  
162 consideration of the impact of schemes on health inequalities. While schemes target  
163 those with poorer health or risk of poor health, emerging work highlights a mixed  
164 picture as to the success of supporting these groups. Data has demonstrated widening  
165 inequalities in recruitment to a national scheme, over time,<sup>32</sup> and also, that although a  
166 regional exercise referral programme largely did not increase inequalities in patients



167 referred for weight reasons, it did not reduce them either.<sup>34</sup> The publication of a new  
168 Physical Activity Referral Scheme taxonomy<sup>35</sup> is likely to support consistent reporting  
169 and classification of schemes, enabling more informed interpretation of differences in  
170 outcomes. Relatedly, while the breadth of outcomes impacted by schemes is  
171 encouraging, both the case for their use, and evaluation of their effectiveness, are  
172 altered depending on how their stated purpose is framed. Examples of primary  
173 outcomes vary, including: demonstrating a clinically-meaningful change (e.g., in  
174 physical or mental health indices), achieving a guideline-based physical activity level  
175 (potentially important in some clinical populations, e.g., cancer pre-habilitation),<sup>36</sup> or  
176 demonstrating readiness for, or engagement in, sustainable independent activity.  
177 Transparency in purpose at commissioning stages, and selecting outcomes both  
178 appropriate to the population and realistic given the scheme, are vital for meaningful  
179 design, delivery, and evaluation.

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## 181 **Conclusions**

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

189 approaches, to facilitate robust understanding of effective practices. We argue that this  
190 must take place alongside evaluation approaches that appropriately capture relevant  
191 contextual details, factors that influence and impact on inequalities, and the nuances of  
192 complex delivery systems. Third, the projects discussed demonstrate that it is vital to  
193 continue to work with stakeholders to enhance the quality, awareness, and impact of  
194 emerging evidence. Whilst individual tailoring, standardised evaluation and stakeholder  
195 engagement have been established within the public health landscape for some time,  
196 they have not consistently been applied within the exercise referral field. With the  
197 expansion of social prescribing, and political focus on physical activity in COVID-19-  
198 related discourse, this presents a key ‘policy window’<sup>37</sup> to enable a change in agenda  
199 and messaging relating to physical activity prescription. To ensure we take advantage of  
200 this opportunity, we must continue to strengthen the evidence base to earn a seat at the  
201 policy table<sup>38</sup> and extend our engagement with the service users, practitioners and  
202 policy-makers who use it.

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

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

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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
<p>Outcomes can be enhanced by co-designed schemes and through processes that enable iterative refinement of delivery.</p>	<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>
<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>	<p>We echo NICE's research recommendations<sup>3, 4</sup> 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 has 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>
<p>The impact of operational context on scheme delivery, performance, and sustainability is potent.</p>	<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 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’s<sup>3</sup> 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-pressured, researchers, commissioners, and service providers should work together to design, adopt, and share viable data collection approaches. Emerging examples 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 removal<sup>4</sup> 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>

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<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>
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<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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