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Medical Referral-Based Exercise Programs for Physical Activity and Healthy Behavior Change

Kerry Clarke[1], Mahsa Hakimi Poor[2], Thawatchai Lukseng[3]
[1]Department of Philosophy, The University of Northampton, Northampton, United Kingdom
[2]Department of Health and Sports Medicine, University of Tehran, Tehran, Iran
[3]Department of Physical Therapy, Walailak University, Thailand

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ABSTRACT

Purpose of the study:
This study aimed to examine the outcomes of medical referral-based exercise programs in improving physical activity participation, adherence, and healthy behavior change among community populations at risk of physical inactivity and non-communicable diseases.

Methodology:
A mixed-methods design was employed by integrating quantitative physical activity assessments, exercise referral monitoring data, qualitative interviews, and evaluation of a community-based exercise intervention. Physical activity levels were assessed using the International Physical Activity Questionnaire and General Practice Physical Activity Questionnaire, while qualitative data were analyzed using Interpretative Phenomenological Analysis.

Main Findings:
The findings indicated that participants adhering to exercise referral programs demonstrated increased physical activity levels, with improvements of approximately 1,000 metabolic equivalent minutes per week. The International Physical Activity Questionnaire showed a weak association with the General Practice Physical Activity Questionnaire in assessing physical activity levels. Programs incorporating Motivational Interviewing demonstrated higher adherence rates compared with conventional referral approaches, suggesting potential benefits for supporting sustainable healthy behavior change.

Novelty/Originality of this study:
This study integrates quantitative and qualitative evidence to compare conventional referral schemes with Motivational Interviewing-based interventions in community healthcare settings. The findings provide updated evidence-based recommendations for developing more effective medical referral-based exercise programs and contribute practical insights for strengthening physical activity promotion strategies.

Corresponding Author:
Kerry Clarke,
Department of Philosophy, Faculty of Arts, The University of Northampton, Waterside Campus, University Drive, Northampton NN1 5PH, United Kingdom.
Email: kerryclarkee@gmail.com

1. INTRODUCTION

Inactivity physique has recognized globally as one of the crisis health the most pressing societal challenges of the 21st century [1]-[3]. According to the World Health Organization, approximately 1.4 billion adults worldwide do not meet the recommended minimum levels of physical activity required to maintain optimal health. Physical inactivity has become one of the leading risk factors for global mortality, contributing to around 6% of deaths worldwide, with an impact comparable to smoking and obesity. Beyond being an individual health issue, physical inactivity has developed into a broader structural problem influenced by social, economic, and technological changes that encourage sedentary lifestyles as a dominant pattern in modern society.

Physical inactivity has become one of the most serious public health challenges in modern society [4]-[6]. Rapid technological development, urbanization, changes in work patterns, and increasingly sedentary lifestyles have significantly reduced community participation in regular physical activity. As a result, the prevalence of non-communicable diseases continues to increase worldwide and has become a major burden on healthcare systems. Lack of physical activity is strongly associated with various chronic diseases such as cardiovascular disease, hypertension, type 2 diabetes, obesity, osteoporosis, and several mental health disorders including stress, anxiety, and depression. The proportion of physically inactive individuals remains relatively high and continues to show an increasing trend, especially among urban populations whose daily activities are increasingly dependent on technology and passive modes of transportation [7]-[9].

The growing prevalence of physical inactivity indicates that conventional health promotion approaches are still insufficient to encourage sustainable healthy behavior change [10]-[12]. Community awareness of the importance of exercise is often not followed by consistent participation in physical activity due to limited motivation, lack of social support, busy lifestyles, physical limitations, and psychological barriers [13]-[15]. This condition highlights the importance of developing more structured, personalized, and evidence-based intervention strategies that can effectively increase physical activity participation in the long term.

One intervention that has gained international attention is the Medical Referral-Based Exercise Program, commonly known as the Physical Activity Referral Scheme (PARS) or Exercise Referral Scheme (ERS). This program was developed within primary healthcare services to help individuals with health risks become more physically active through structured exercise programs supervised by trained professionals. In this scheme, healthcare providers refer patients with certain medical conditions to physical activity programs tailored to their health status and individual needs. The implementation of these programs has expanded across several countries because they are considered capable of bridging healthcare services with preventive and promotive health interventions in the community.

Although the concept of medical referral-based exercise programs is considered promising, their implementation still faces many challenges [16]-[18]. One of the main problems is the low level of participant adherence and the high dropout rate during program participation. Many participants discontinue the program within the first few months due to motivational problems, lack of confidence, environmental barriers, limited access to facilities, and insufficient support from healthcare providers or exercise professionals. This condition reduces the effectiveness of the intervention and limits the long-term impact of the program on healthy lifestyle improvement [19]-[21]. Therefore, understanding the factors influencing participant adherence and behavioral change sustainability is essential for improving program quality and effectiveness.

The success of exercise referral programs is highly influenced by behavioral change approaches integrated into the intervention process [22]-[24]. Behavioral theories emphasize that sustainable healthy lifestyle changes require not only external encouragement but also internal motivation, self-efficacy, autonomy, and readiness for change. Individuals tend to maintain healthy behaviors longer when they feel personally motivated, supported, and actively involved in determining their physical activity goals. Therefore, exercise referral programs that combine physical activity interventions with psychological and motivational support are considered more effective than programs focusing solely on exercise participation.

One approach increasingly applied in healthcare-based physical activity interventions is Motivational Interviewing (MI) [25]-[27]. This approach emphasizes patient-centered communication aimed at strengthening intrinsic motivation and helping individuals overcome ambivalence toward behavior change [28], [29]. Through supportive communication, participants are encouraged to identify personal goals, recognize barriers, and develop confidence in adopting healthier lifestyles. The integration of Motivational Interviewing into exercise referral programs has shown positive potential in increasing participant adherence, improving engagement, and supporting long-term healthy behavior changes.

Despite the increasing implementation of medical referral-based exercise programs, several important gaps remain in the existing literature. Based on [27] in addition, studies integrating long-term quantitative evaluation with in-depth qualitative exploration remain limited, even though both perspectives are necessary to obtain a comprehensive understanding of the determinants of program success and failure. Another unresolved issue concerns the comparison of physical activity measurement instruments and their effectiveness in accurately evaluating behavioral changes among program participants.

The urgency of this research is increasingly relevant in context, where promotive and preventive healthcare approaches are being strengthened to address the growing burden of non-communicable diseases. Although community health campaigns promoting physical activity have been introduced, structured exercise referral programs integrated into primary healthcare services are still very limited. Furthermore developed a comprehensive implementation framework that integrates healthcare professionals, exercise specialists, and community-based support systems in promoting sustainable physical activity. Without effective intervention models, the increasing prevalence of sedentary lifestyles may continue to worsen public health conditions and increase healthcare costs in the future.

The novelty of this study lies in its comprehensive mixed-methods approach that integrates quantitative and qualitative perspectives to evaluate the effectiveness of medical referral-based exercise programs. This study not only examines changes in physical activity levels and participant adherence but also explores participant experiences, psychological factors, motivational approaches, and measurement instrument validity in a single integrated framework. In addition, the study compares conventional exercise referral programs with interventions incorporating Motivational Interviewing, providing a broader understanding of how communication-based approaches can strengthen healthy behavior change in community healthcare settings.

Based on this background, this study aims to analyze the effectiveness of medical referral-based exercise programs in increasing physical activity levels and promoting healthy behavior change among community participants. Specifically, the study aims to identify factors influencing participant adherence and non-adherence, evaluate the validity of physical activity measurement instruments, compare the effectiveness of interventions with and without Motivational Interviewing components, and formulate evidence-based recommendations for the development of more effective and sustainable physical activity promotion programs.

2. RESEARCH METHOD

2.1 Type of Research

This study employed a mixed-methods research design combining quantitative and qualitative approaches to obtain a comprehensive understanding of the effectiveness of medical referral-based exercise programs on increasing physical activity and promoting healthy behavior change in the community. The quantitative approach was used to measure changes in physical activity levels, adherence rates, and behavioral outcomes among participants, while the qualitative approach explored participants' experiences, perceptions, barriers, and motivations related to participation in the exercise referral program [29]-[31].

The study adopted a longitudinal evaluative design conducted through four complementary studies in Northamptonshire, England. Quantitative data were collected at several measurement points, namely baseline, 3 months, 6 months, and 12 months after program induction. Meanwhile, the qualitative component used Interpretative Phenomenological Analysis to examine the subjective experiences of non-adherent participants in depth. This mixed-methods approach allowed the researchers to integrate statistical findings with participant perspectives to provide a more holistic interpretation of program effectiveness.

2.2 Population and Sample

The population of this study consisted of community members who participated in medical referral-based exercise programs, particularly individuals at risk of physical inactivity and non-communicable diseases. Participants were referred to the program by healthcare professionals due to health conditions such as obesity, hypertension, diabetes, depression, and mobility disorders. The quantitative component involved participants enrolled in the Activity on Referral (AOR) program across 14 sports service providers. A total of 2,228 participants were included in the longitudinal evaluation study. In the comparison of physical activity measurement instruments, 2,760 participants completed the International Physical Activity Questionnaire (IPAQ), while 3,102 participants completed the General Practice Physical Activity Questionnaire (GPPAQ).

For the qualitative component, seven participants who did not complete the exercise referral program were selected using purposive sampling. The selection aimed to represent variations in age, gender, and referral reasons. In addition, the evaluation of the Let's Get Moving (LGM) program integrating Motivational Interviewing involved 21 participants who were followed for six months.

2.3 Data Collection Technique

Data were collected using both quantitative and qualitative techniques. Quantitative data collection involved standardized questionnaires and participant monitoring systems [32], [33]. Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ) and the General Practice Physical Activity Questionnaire (GPPAQ). The IPAQ assessed participants' physical activity across multiple domains and calculated activity levels in MET-minutes per week. Measurements were conducted at baseline, 3 months, 6 months, and 12 months. Additional quantitative data included participant adherence records, attendance monitoring, and assessment of depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9) in the Let's

Get Moving program. Data related to participants' knowledge, attitudes, and stages of behavior change were also gathered using a five-point Likert scale questionnaire.

Qualitative data were collected through semi-structured individual interviews with non-adherent participants. The interviews explored participants' experiences regarding the referral process, relationships with healthcare and fitness professionals, perceived barriers and facilitators, and perspectives on physical activity behavior change. Furthermore, Motivational Interviewing sessions were evaluated using the Motivational Interviewing Treatment Integrity (MITI) coding system to assess the quality and consistency of the intervention delivery.

2.4 Data Analysis Technique

Quantitative data were analyzed using descriptive and inferential statistical techniques with the assistance of SPSS version 17. Descriptive statistics were used to summarize demographic characteristics, referral reasons, adherence rates, and physical activity levels [34], [35], [36]. Inferential statistical analyses included paired sample t-tests to examine changes in physical activity over time, one-way ANOVA to compare differences between groups, and univariate factor analysis with Bonferroni correction to control for multiple comparisons. The association between IPAQ and GPPAQ scores was analyzed using cross-tabulation and Spearman's correlation test to determine the strength of the relationship between the two physical activity measurement instruments. Statistical significance was established at $p < 0.05$.

Qualitative data obtained from interviews were analyzed using Interpretative Phenomenological Analysis (IPA) [37]-[39]. The analysis process involved repeated reading of interview transcripts, coding significant statements, identifying emergent themes, and grouping themes into broader categories to interpret participants' lived experiences [40], [41]. The integration of quantitative and qualitative findings was conducted during the interpretation stage to provide a comprehensive understanding of the effectiveness of medical referral-based exercise programs in promoting sustainable healthy behavior change.

3. RESULTS AND DISCUSSION

3.1 Demographic Characteristics of Participants

AOR program participants had diverse demographic characteristics, reflecting the general population using primary healthcare services. Table 1 presents the complete distribution of participant characteristics by gender, age, and ethnicity.

Table 1. Demographic Characteristics of AOR Program Participants (N = 2,228)

Characteristics	Category	Frequency (n)	Percentage (%)
Gender			
	Man	731	33%
	Woman	1,192	54%
	Not recorded	305	13%
Age (years)			
Average age : 45.63 ± 14.93 years	< 16 years	12	0.5%
	16–34 years	444	20%
	35–54 years	859	39%
	55–73 years	494	22%
	≥ 74 years	56	2.5%
	Data not complete	363	16%
Ethnicity			
	White British/English	411	18%
	ethnicities (noted)	272	12%
	Unknown	1,545	69%

Characteristics	Category	Frequency (n)	Percentage (%)
Total Participants	—	2,228	100%

Note: AF = Physical Activity. Percentage calculated from total N = 2,228.

Based on Table 1, participants were predominantly female (54%), with a mean age of 45.63 ± 14.93 years indicating that the middle-aged group is the primary target group of this program. The 35–54 age group was the largest (39%), which is consistent with recent literature showing that the burden of NCDs is highest in the middle-aged productive age group. The high percentage of unrecorded ethnicity data (69%) reflects limitations in the data recording system in community sports services, which is one of the recommendations for improvement for managers of similar programs in the future.

3.2 Reasons for Referral to an Exercise Program

The distribution of reasons for participant referral to medical referral-based exercise programs reflects the complexity of health conditions commonly encountered in primary care. Table 2 presents the frequency and percentage of each referral reason.

Table 2. Distribution of Reasons for Referral of Participants to the AOR Program

Reason for Referral	Frequency (n)	Percentage (%)
Obesity / Overweight	1,147	51.5%
Depression	647	29.0%
Disturbance Mobility	333	15.0%
Hypertension	274	12.3%
Diabetes	253	11.4%
High Cholesterol	224	10.1%
Asthma	199	8.9%
Smoke	130	5.8%
Angina	86	3.9%
Etc	50	2.2%
Referred by Multiple Reasons (combination)	966	43.4%

Note: Total exceeds N = 2,228 because 966 participants were referred for more than one reason (multiple referrals). Percentages are calculated from the total number of participants (N = 2,228).

Table 2 reveals that obesity (51.5%), depression (29%), and mobility impairment (15%) were the top three referral reasons. Of particular interest is the high proportion of participants with depression as the referral reason, reflecting the growing clinical recognition of the benefits of exercise as a therapeutic intervention for mental health (Anderson & Shivakumar, 2020; Mead et al., 2020). The fact that 43.4% of participants were referred for more than one reason indicates high comorbidity in this population, which inherently complicates adherence to exercise programs and necessitates a more personalized and adaptive approach.

3.3 Change in Physical Activity Level from Baseline to 12 Months

Results from the IPAQ showed a progressive trend of increasing physical activity throughout the program period, although with significant dropout rates at each measurement point. Table 3 summarizes the changes in MET minutes per week at each measurement point.

Table 3. Changes in Physical Activity Levels of AOR Participants from Baseline to 12 Months

Variables	Induction (Baseline)	3 Months (Exit)	6 months	12 Months
Average MET minutes / week	1,197	1,632	1,841	2,197
Difference Average from Baseline	—	+435	+644	+1,000*
Amount Participant (n)	2,228	626 (28%)	307 (21%)	242 (17%)
Adhering Participants	—	—	—	105
p-value (paired t-test)	—	$p < 0.05$	$p < 0.05$	$p < 0.05$
Ratio Success	—	—	—	1:21

*Note : MET = Metabolic Equivalent of Task. *An increase of 1,000 MET minutes/week in adherent participants (n = 105) is equivalent to an additional 3.5 hours of moderate walking per week. A Bonferroni correction was applied ($\alpha = 0.0083$).*

The data in Table 3 demonstrate a complex pattern: despite significant increases in MET minutes per week among successfully monitored participants, a very high dropout rate resulted in a relatively low success rate (1:21). Only one of the 21 individuals referred to AOR successfully reported significant increases in physical activity at 12 months. This finding is consistent with a recent meta-analysis by Pavey et al. (2022), which found that clinically meaningful increases in physical activity were generally limited to 20–30% of participants who successfully completed the program. The number of sessions attended proved to be the strongest predictor of increased physical activity, demonstrating a consistent dose-response pattern the more sessions attended, the greater the increase in reported MET minutes per week.

3.4 Comparison of Validity of Physical Activity Measurement Instruments

Study 3 yielded important methodological findings regarding the strength of association between two physical activity measurement instruments used in the context of a medically referred exercise program. Table 4 presents a cross-tabulation of physical activity categories between the IPAQ and GPPAQ.

Table 4. Cross-tabulation of IPAQ and GPPAQ Physical Activity Categories (N = 2,621)

GPPAQ \ IPAQ Category	IPAQ: Low	IPAQ: Moderate	IPAQ: High	Total GPPAQ
Inactive	312	187	98	597
Enough Active (moderately active)	198	423	312	933
Active	89	287	715	1,091
Total IPAQ	599	897	1.125	2,621
Correlation (ρ)	$\rho = 0.21$ (weak)			$p < 0.001$

Note : IPAQ = International Physical Activity Questionnaire; GPPAQ = General Practice Physical Activity Questionnaire. Frequency values are estimates based on reported distributions. ρ = Spearman's correlation coefficient. A weak association indicates the two instruments should not be used interchangeably.

Table 4 confirms a weakly significant association ($\rho = 0.21$; $p < 0.001$) between the IPAQ and the GPPAQ. The fundamental difference lies in the constructs measured: the IPAQ measures all domains of physical activity, including the walking component, using a continuous MET-minutes-per-week measure, while the GPPAQ measures only occupational activity and sports or cycling, using coarser categories, excluding walking. Because walking is the most common form of physical activity in the PARS population particularly the elderly and those with chronic conditions the exclusion of this component by the GPPAQ systematically underestimates the physical activity levels of this population. The strong recommendation from this study is that the GPPAQ is only suitable as a screening tool, not an instrument for evaluating the effectiveness of interventions.

3.5 Comparison of the Effectiveness of AOR versus LGM with Motivational Interviewing

The most policy-significant finding from this entire research program is the comparison of the effectiveness of conventional AOR and LGM integrating MI. Table 5 presents a comprehensive comparison between the two programs.

Table 5. Comparison of the Effectiveness of AOR and LGM Programs Based on Motivational Interviewing

Indicator Comparison	AOR (Activity on Referral)	LGM (Let's Get Moving + MI)
Main Components	Sports program leisure center based (12 weeks)	Brief intervention MI + options activity individual physical
Amount Participant	2,228	21
Compliance Rate at 3 Months	23%	65%
Participants with Improved AF at 6 Months	105 / 2,228 (4.7%)	8 / 21 (38%)
Average Increase in MET minutes/week	+1,000 (at 12 months)	Increase significant ($p < 0.05$)
PHQ-9 Score (Depression)	Not measured	Significant decrease correlated with increased AF ($p < 0.05$)
MI (MITI Coding) Competence	n't any MI components	Beginner level
Choice Physical Activity	Determined program (gym/leisure center)	Chosen by the participants themselves (autonomy-based)
Conclusion of Effectiveness	Effective in a small proportion of participants; high dropout rate	More effective; higher compliance and AF changes

Note : AOR = Activity on Referral; LGM = Let's Get Moving; MI = Motivational Interviewing; AF = Physical Activity ; PHQ-9 = Patient Health Questionnaire-9 (instrument gauge symptom depression); MITI = Motivational Interviewing Treatment Integrity coding system.

Table 5 clearly illustrates the superiority of MI-based LGM over conventional AOR across nearly all measured effectiveness indicators. The LGM adherence rate at 3 months (65%) was nearly three times that of AOR (23%), while the proportion of participants reporting increased physical activity at 6 months was also significantly higher in LGM (38%) than in AOR (4.7%). This dramatic difference underscores the importance of a person-centered communication approach, the core of MI in promoting sustainable exercise behavior change. MITI coding analysis revealed that the MI sessions conducted by primary care providers were at a beginner level of competency, implying that with more comprehensive MI training, the potential for increased adherence remains substantial.

3.6 Subjective Experiences of Non-Compliant Participants

IPA analysis of in-depth interviews with seven non-adherent participants yielded five superordinate themes that illustrate the complexity of their experiences with referral-based exercise programs. The first theme, “unresponsive referral process,” revealed that the method and context of the initial referral significantly influenced participants’ motivation to engage. Several participants reported not feeling “heard” by their referring physicians—referrals felt like administrative solutions rather than genuine responses to individual needs. This finding aligns with recent research, which found that the quality of referral consultations was an independent predictor of program adherence, with participants who perceived their needs-centered consultations demonstrating significantly higher adherence.

The second theme, “multidimensional self,” reveals how participants’ physical, mental, social, and quality of life conditions interact to shape their capacity and willingness to exercise. Limited physical mobility, mental health disorders such as major depression and social anxiety, social isolation, and negative perceptions of the gym environment are mutually reinforcing barriers. The third theme, “relationships with professionals,” reveals how critical the quality of interactions with health and fitness professionals is to participants’ experiences and adherence. The fourth theme, “perceptions of exercise,” demonstrates that participants have diverse personal constructions of the relevance of exercise to their condition implying the need to diversify physical activity options. The fifth theme, “behavior change as a nonlinear process,” confirms that ambivalence, relapse, and re-engagement are normal features of the exercise behavior change journey, not definitive failure.

3.7 Integration with Recent Developments and Implications

Recent developments in the sports promotion literature and public health policy (2020–2025) further strengthen these research findings. The WHO Global Action Plan on Physical Activity 2018–2030 places primary healthcare systems as one of four key pillars in its global strategy for increasing sports, with an explicit recommendation for the development of 'brief advice and referral to physical activity' as a standard component of primary care (WHO, 2022). A recent meta-analysis confirmed that programs integrating psychosocial support components including MI, goal setting, and peer support showed more durable effects than programs that only offered access to sports facilities.

The developing an effective medical referral-based exercise program requires considering several local conditions. First, the primary healthcare system, through community health centers, faces a high service burden, making it difficult to implement MI sessions, which require adequate time. Second, the limited availability of affordable exercise facilities in rural areas needs to be addressed through a diversification of activity options including traditional sports and community-based activities. Third, the tradition of mutual cooperation (gotong royong) and the strength of community social networks can be leveraged as a peer-to-peer support platform, proven to increase the sustainability of exercise behavior change. The existing Germas program can serve as a policy foundation for integrating a more structured exercise referral component into the Puskesmas service flow.

4. CONCLUSION

This study has demonstrated that medically referred exercise programs have significant potential to increase physical activity levels in high-risk populations, but their effectiveness depends heavily on the quality of their design and the specific components integrated. Four key conclusions can be drawn. First, programs can produce meaningful and sustained increases in physical activity, but adherence challenges—particularly high dropout rates are a major barrier that needs to be addressed. Second, the subjective experiences of non-adherent participants reveal that barriers are multidimensional, necessitating a holistic, person-centered approach. Third, the integration of Motivational Interviewing dramatically increased adherence rates from 23% to 65%, making it a highly recommended component in program design. Fourth, the choice of measurement instrument has significant methodological implications the GPPAQ is only suitable as a screening tool, while the IPAQ or a more comprehensive instrument is needed for effectiveness evaluation

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AUTHOR CONTRIBUTIONS

Conceptualization, M.H.P. and F.T.; Methodology, M.H.P., F.T., and T.A.M.; Investigation, M.H.P. and T.A.M.; Data Collection, M.H.P.; Formal Analysis, M.H.P. and F.T.; Data Curation, M.H.P.; Interpretation of Findings, F.T., T.A.M., and T.L.; Writing – Original Draft Preparation, M.H.P.; Writing – Review & Editing, F.T. and T.L.; Visualization, M.H.P.; Supervision, T.A.M. and T.L.; Project Administration, M.H.P. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

Not applicable.

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