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RELATIONSHIP BETWEEN EXERCISE MOTIVATION, PERCEIVED BENEFITS AND BARRIERS, AND EXERCISE ADHERENCE IN COMMUNITY-DWELLING PRE-FRAIL OLDER ADULTS

A Cross-Sectional Study

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Abstract : *Background:* Pre-frailty is a transitional stage between robust ageing and frailty, and regular exercise is one of the main ways to slow the progression. Whether older adults actually exercise may depend on how motivated they are and on how they weigh the benefits and barriers of exercise. *Aim:* To examine the relationship between exercise motivation, perceived benefits and barriers, and exercise adherence in community-dwelling pre-frail older adults. *Methods:* In this observational cross-sectional study, 110 community-dwelling adults aged 60–70 years who screened as pre-frail on the FRAIL Scale were recruited by purposive sampling over six months. Exercise motivation was measured with the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2), perceived benefits and barriers with the Exercise Benefits/Barriers Scale (EBBS), and adherence with the Exercise Adherence Rating Scale (EARS). Data were analysed using descriptive statistics, the Shapiro–Wilk test, independent-samples t-tests and Pearson's correlation, with significance set at $p < 0.05$. *Results:* The mean age was 64.71 ± 3.10 years and 56 participants (50.9%) were men. The mean Relative Autonomy Index (RAI) was −1.48 ± 3.67, the mean EBBS total score was 108.37 ± 10.55, and the mean EARS score was 12.04 ± 3.03 (maximum 24). Adherence correlated weakly with motivation ($r = 0.109$, $p = 0.257$) and negligibly with the EBBS total score ($r = 0.011$, $p = 0.909$); motivation and the EBBS total score were also unrelated ($r = 0.068$, $p = 0.479$). No gender differences were found. *Conclusion:* No statistically significant relationship was found among exercise motivation, perceived benefits and barriers, and exercise adherence in this sample, which suggests that adherence in pre-frail older adults is shaped by additional factors that should be examined in larger, multivariable studies.

IndexTerms **-** Pre-frailty, exercise motivation, perceived benefits, perceived barriers, exercise adherence, older adults.

I. INTRODUCTION

Populations are ageing quickly, and a growing share of older adults now sit in the intermediate zone between robust health and frailty. Frailty is a geriatric syndrome in which physiological reserve is reduced and the person becomes more vulnerable to falls, disability, hospital admission and death; pre-frailty is the stage that precedes it. A pooled analysis of studies from low- and middle-income countries estimated that about 49.3% of community-dwelling older adults are pre-frail and 17.4% are frail [1]. Data from the first wave of the Longitudinal Ageing Study in India also describe regional variation in frailty among older Indians [2]. Gains in life expectancy have not been matched by equal gains in healthy life, so many people live their later years with diminished function; healthy ageing is accordingly described as the preservation of the functional ability that supports wellbeing [3].

Exercise is among the most practical ways to counter this decline, and reviews of exercise programmes support their use in the management of frailty [4, 5]. A meta-analysis of 22 randomised trials of community-based exercise in pre-frail older adults found significant gains in lower-limb strength (SMD 0.67) and in lower-limb function on the Short Physical Performance Battery (SMD 0.27), together with higher odds of returning from pre-frailty to a robust state (OR 2.74); effects on grip strength, balance, cognition and quality of life were inconsistent [6]. Such benefits, however, depend on people actually taking part and continuing to do so.

Exercise motivation covers the psychological processes that start, steer and sustain exercise behaviour. Self-determination theory distinguishes autonomous forms of motivation, where exercise is enjoyed or valued, from controlled forms driven by external pressure or reward, and holds that autonomous motivation supports more consistent participation [7]. The theory of planned behaviour adds that favourable attitudes, perceived behavioural control and subjective norms shape the intention to be active [8]. Perceived benefits are the positive outcomes people expect from exercise, such as better physical performance, psychological wellbeing, life enhancement and social contact, whereas perceived barriers are the obstacles that discourage it, including fear of falling, pain, fatigue, chronic illness, lack of time, transport difficulties and limited social support [9, 10].

Exercise adherence is the degree to which a person follows a recommended exercise regimen in terms of frequency, duration and intensity. Adherence among older adults has been reported to range from roughly 58% to 86%, and it tends to be higher in supervised than in unsupervised programmes [11]. Because the advantages of exercise are realised only when the regimen is followed, understanding what drives adherence is central to preventing the progression from pre-frailty to frailty.

A. Need of the Study

Pre-frailty is common in community-dwelling older adults and is associated with falls, disability and poorer quality of life, yet participation in exercise remains below what is desirable. Motivation, perceived benefits and barriers, and adherence have each been studied, but research that examines the three together in pre-frail older adults is scarce. Clarifying how they relate can help clinicians plan exercise programmes that keep this population active and delay the onset of frailty.

B. Aim and Objectives

The aim was to determine the relationship between exercise motivation, perceived benefits and barriers, and exercise adherence in community-dwelling pre-frail older adults. The objectives were (i) to identify pre-frailty using the FRAIL Scale, (ii) to assess exercise motivation using the Behavioural Regulation in Exercise Questionnaire-2, (iii) to assess perceived benefits and barriers using the Exercise Benefits/Barriers Scale, (iv) to assess exercise adherence using the Exercise Adherence Rating Scale, and (v) to examine the relationships among these variables.

C. Hypothesis

The null hypothesis (H_0) stated that there is no significant relationship between exercise motivation, perceived benefits and barriers, and exercise adherence in community-dwelling pre-frail older adults. The alternative hypothesis (H_1) stated that such a relationship exists.

II. Review of Literature

Evidence on exercise in pre-frailty shows that motivation-focused programmes can work. In a randomised trial of 144 pre-frail adults aged 60–85 years, a 24-week exercise programme built on Wellness Motivation Theory left 31.8% of the intervention group still pre-frail compared with 74.6% of controls ($p < 0.001$), an absolute risk reduction of 42.8%, and also improved exercise self-efficacy and quality of life [12]. A qualitative study of older adults with frailty preparing for cancer surgery found that a home-based exercise programme was manageable and acceptable, that participants valued support from the research team, and that they reported perceived health benefits and a sense of control [13].

On motivation, O'Neil-Pirozzi et al. reviewed the role of motivation, exercise self-efficacy, individualised planning and positive reinforcement in starting and sustaining exercise in later life [14]. A review of systematic reviews concluded that the link between self-determined motivation and physical activity is not consistently conclusive [15]. In a Taiwanese sample of 101 adults aged 50 years and above, perceived behavioural control and attitude strongly shaped the intention to take part in fitness activities, yet intention did not significantly predict actual behaviour [8]. Validation work supports the use of the Behavioural Regulation in Exercise Questionnaire in older people, including confirmation of a six-factor structure in 383 older adults, and the questionnaire's reliability and validity have been tested in nursing-home residents in China [16, 17].

Work on barriers and benefits points the same way. Six focus groups with 66 community-dwelling adults aged 65 years and above identified twelve barriers; fear of falling, inertia and negative affect dominated among non-exercisers, whereas exercisers mostly cited inertia, lack of time and physical ailments [9]. A systematic review likewise found numerous barriers and facilitators of physical activity in community-dwelling older adults [10]. Lack of time, tiredness, cost and pain during exercise were reported in another study, which also found that women preferred instructor-guided exercise [18], while concerns about safety shortened activity time among 268 older adults in Singapore [19]. Community-based work in Ahmedabad, India, and a study of older adults' attitudes have likewise examined the levels of, motives for and obstacles to physical activity [20, 21].

Research on adherence stresses its many determinants. Barriers to and facilitators of adherence to home exercise in older adults at risk of falling included motivation, individualisation and environmental and social support [22], and walking-programme adherence in retirement communities depended on factors that sustain engagement over time [23]. In 1,984 adults aged 60–65 years followed for nine years, physical-activity-specific social support was positively associated with activity, each unit of support corresponding to about 11 additional minutes per week [24]. A mixed-methods review organised around the COM-B model listed physical capability, motivation, social support, environment, self-efficacy and individualised prescription as influences on adherence [25], and a randomised trial showed that nurse-led motivational interviewing can promote physical activity in healthy older adults [26]. Among 225 older adults in different exercise settings, longer weekly exercise time went with higher motivation, while less frequent exercisers reported more motivational and external barriers [27].

III. Materials and Methods

A. Study Design and Participants

This observational cross-sectional study was conducted over six months among community-dwelling older adults aged 60–70 years. A sample of 110 participants was recruited by purposive sampling. Approval was obtained from the institutional ethics committee, the aims and procedures were explained to every participant, and written informed consent was taken before data collection.

B. Selection Criteria

Adults aged 60–70 years who lived in the community, were classified as pre-frail on the FRAIL Scale, could understand and answer the questionnaires, and gave informed consent were included. Individuals who were robust or frail, those with severe cognitive impairment, those with severe neurological, musculoskeletal or cardiopulmonary conditions limiting exercise, bedridden or institutionalised persons, and those unwilling to participate were excluded.

C. Outcome Measures

FRAIL Scale. The FRAIL Scale is a five-item self-report screening tool covering fatigue, resistance, ambulation, illnesses and loss of weight, each answered yes or no. A score of 0 denotes a robust person, 1–2 pre-frailty and 3–5 frailty [28]. Participants scoring 1–2 were classed as pre-frail.

Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2). The BREQ-2 assesses the regulation of exercise behaviour on a five-point Likert scale through five subscales: amotivation, external, introjected, identified and intrinsic regulation [29]. Reported subscale reliability (Cronbach's α) ranges from 0.73 to 0.86. Weighting the subscales yields the Relative Autonomy Index (RAI), where higher values indicate more self-determined motivation and lower values more controlled motivation.

Exercise Benefits/Barriers Scale (EBBS). The EBBS is a 43-item self-report questionnaire rated on a four-point Likert scale, with 29 items on perceived benefits and 14 on perceived barriers [30]. Reported reliability is good (α = 0.76–0.95). Higher benefit scores indicate greater perceived benefits, and higher barrier scores indicate greater perceived obstacles. The total score was computed with the barrier items reverse-scored.

Exercise Adherence Rating Scale (EARS). The EARS is a self-report instrument that measures adherence to prescribed exercise [31]. Its internal consistency is reported as α = 0.81–0.85, with good test–retest reliability and construct validity. Higher scores indicate better adherence, and the total score was out of a maximum of 24.

D. Procedure

After ethical clearance, community-dwelling older adults were approached and informed about the purpose of the study. Those who met the inclusion criteria and consented were screened with the FRAIL Scale, and those meeting one or two criteria were classified as pre-frail and enrolled. Demographic details were recorded, and participants then completed the BREQ-2, the EBBS and the EARS, either on paper or through a Google form.

E. Statistical Analysis

Data were entered in Microsoft Excel 2021 and analysed with IBM SPSS version 27. Means, standard deviations and ranges described the variables, and the Shapiro–Wilk test assessed normality. Men and women were compared using independent-samples t-tests, and relationships among the RAI, the EBBS total score and the EARS total score were examined with Pearson's correlation coefficient. A *p* value below 0.05 was taken as statistically significant.

IV. RESULTS

A. Normality of the Data

Table 1 shows the Shapiro–Wilk results. Amotivation, external regulation, the RAI, the EBBS total score and the EARS total score were normally distributed ($p > 0.05$), whereas age, introjected, identified and intrinsic regulation, and the EBBS benefits and barriers scores departed significantly from normality ($p < 0.05$). The three composite scores used in the correlation analysis (RAI, EBBS total and EARS total) were all normally distributed, so Pearson's correlation was appropriate.

Table 1: Shapiro–Wilk test of normality

Variable	W statistic	p value	Distribution
Age (years)	0.941	0.0001	Not normal
BREQ-2 amotivation	0.983	0.1605	Normal
BREQ-2 external regulation	0.983	0.1616	Normal
BREQ-2 introjected regulation	0.975	0.0354	Not normal
BREQ-2 identified regulation	0.965	0.0054	Not normal
BREQ-2 intrinsic regulation	0.976	0.0456	Not normal
BREQ-2 Relative Autonomy Index	0.991	0.6541	Normal
EBBS benefits total	0.940	0.0001	Not normal
EBBS barriers total	0.972	0.0218	Not normal
EBBS total score	0.978	0.0686	Normal
EARS total score	0.985	0.2398	Normal

B. Demographic Characteristics

The 110 participants had a mean age of 64.71 years (range 60–70 years). Table 2 gives the age and gender distribution: 56 participants (50.9%) were aged 60–64 years and 54 (49.1%) were aged 65–70 years, and there were 56 men (50.9%) and 54 women (49.1%).

Table 2: Age and gender distribution of participants (N = 110)

Characteristic	Category	n	Percentage (%)
Age	60–64 years	56	50.9
	65–70 years	54	49.1
Gender	Male	56	50.9
	Female	54	49.1

C. Descriptive Statistics

Table 3 summarises the study variables. Mean BREQ-2 subscale scores were 1.92 ± 0.71 for amotivation, 2.02 ± 0.72 for external regulation, 1.96 ± 0.93 for introjected regulation, 2.10 ± 0.65 for identified regulation and 2.02 ± 0.67 for intrinsic regulation, giving a mean RAI of −1.48 ± 3.67. On the EBBS, the mean benefits score was 74.01 ± 9.14, the mean barriers score was 35.64 ± 5.18 and the mean total score was 108.37 ± 10.55. The mean EARS score was 12.04 ± 3.03 out of 24.

Table 3: Descriptive statistics of the study variables (n = 110)

Variable	n	Mean	SD	Minimum	Maximum
Age (years)	110	64.71	3.10	60.00	70.00
BREQ-2 amotivation	110	1.92	0.71	0.00	3.75
BREQ-2 external regulation	110	2.02	0.72	0.00	3.75
BREQ-2 introjected regulation	110	1.96	0.93	0.00	4.00
BREQ-2 identified regulation	110	2.10	0.65	0.50	3.25
BREQ-2 intrinsic regulation	110	2.02	0.67	0.50	4.00
BREQ-2 Relative Autonomy Index	110	−1.48	3.67	−10.58	6.92
EBBS benefits total	110	74.01	9.14	57.00	95.00
EBBS barriers total	110	35.64	5.18	25.00	46.00
EBBS total score	110	108.37	10.55	89.00	131.00
EARS total score	110	12.04	3.03	5.00	19.00

D. Comparison Between Men and Women

As Table 4 shows, men and women did not differ significantly in motivation (RAI), perceived benefits and barriers (EBBS total) or adherence (EARS total).

Table 4: Comparison of study variables between men (n = 56) and women (n = 54)

Variable	Men, mean ± SD	Women, mean ± SD	t value	p value	Significance
BREQ-2 RAI	−1.32 ± 3.82	−1.64 ± 3.54	0.452	0.652	Not significant
EBBS total	108.82 ± 10.81	107.91 ± 10.35	0.443	0.659	Not significant
EARS total	12.18 ± 3.08	11.89 ± 2.99	0.493	0.623	Not significant

E. Relationship Among Motivation, Perceived Benefits and Barriers, and Adherence

Pearson's correlation results are shown in Table 5. Exercise adherence showed a weak positive correlation with motivation (r = 0.109, p = 0.257) and a negligible correlation with the EBBS total score (r = 0.011, p = 0.909). Motivation and the EBBS total score were also weakly and non-significantly correlated (r = 0.068, p = 0.479). None of the three relationships reached statistical significance, so the null hypothesis could not be rejected.

Table 5: Pearson correlation among the study variables

Variable pair	r	p value	Significance
EARS vs BREQ-2 RAI	0.109	0.257	Not significant
EARS vs EBBS total	0.011	0.909	Not significant
BREQ-2 RAI vs EBBS total	0.068	0.479	Not significant

V. Discussion

This study examined how exercise motivation, perceived benefits and barriers, and exercise adherence relate to one another in 110 community-dwelling pre-frail older adults aged 60–70 years. The mean RAI was negative (−1.48 ± 3.67), which indicates a slight predominance of controlled over autonomous motivation, and the mean EARS score of 12.04 out of 24 sits at about the midpoint of the scale. Despite these moderate levels, none of the relationships tested was statistically significant.

The absence of a significant link between motivation and adherence (r = 0.109, p = 0.257) fits the cautious picture in the literature. Motivation, self-efficacy, individualised planning and reinforcement are widely regarded as important for sustaining exercise [14], but a review of systematic reviews found the association between self-determined motivation and physical activity to be inconclusive [15]. Similarly, intention did not significantly predict behaviour in older adults in Taiwan [8]. Together, these findings suggest that motivation alone may be insufficient to produce regular exercise in pre-frail older adults.

The overall EBBS score was also unrelated to adherence (r = 0.011, p = 0.909). Participants reported both benefits and barriers, and combining them into one total may have hidden opposing effects. Barriers reported in other settings, including lack of time, tiredness, cost, pain and concerns about safety [18, 19], may exert their influence through specific practical constraints that a composite score cannot capture. Evidence from India, where physical activity, motives and barriers were studied in an urban geriatric population [20], likewise underlines the value of understanding local motivational and environmental circumstances. The lack of gender differences in motivation, perceived benefits and barriers, and adherence (p = 0.652, 0.659 and 0.623) contrasts with reports of differing preferences between men and women [18] and with findings that barriers vary across exercise settings [27]; differences in participants, settings and instruments may explain this.

Adherence is clearly multifactorial. Reviews and qualitative studies point to physical capability, social support, the exercise environment, self-efficacy and individualised prescription [22, 25], and long-term social support was associated with more weekly physical activity in adults followed for nine years [24]. Social support was not measured here and may help to explain the weak motivation–adherence link. Adherence in the present study was also self-reported rather than monitored, which limits comparison with intervention studies that track attendance or duration [23]. Finally, the cross-sectional design could not test whether improving motivation, for example through counselling [26], would improve adherence.

A non-significant result does not show that motivation or perceived barriers are unimportant. It shows only that the overall scores used here were not linearly related to one another in this sample.

VI. Conclusion

Among 110 community-dwelling pre-frail older adults, no statistically significant correlation was found between exercise adherence and exercise motivation (r = 0.109, p = 0.257), between adherence and perceived benefits and barriers (r = 0.011, p = 0.909), or between motivation and perceived benefits and barriers (r = 0.068, p = 0.479). The study therefore did not establish a significant relationship among the three variables in this population, and larger, more diverse samples are needed to clarify the factors that drive adherence.

VII. Clinical Implications

Although no significant associations emerged, motivation, perceived benefits and barriers, and adherence remain relevant when planning exercise for pre-frail older adults. Physiotherapists can identify each person's individual barriers, explain the benefits of regular exercise, and design programmes matched to functional ability and preference. Motivational counselling, realistic goal setting, regular follow-up, positive reinforcement and family or group support may help people start and maintain exercise, and can be built into community-based physiotherapy programmes that promote healthy ageing.

VIII. Limitations and Future Scope

The cross-sectional design prevents causal inference, and the sample of 110 pre-frail adults aged 60–70 years, selected purposively, may be affected by selection bias and limits generalisability to other ages and frailty categories. All measures were self-reported and therefore open to recall and response bias, and adherence was not objectively monitored. Social support, socioeconomic status, physical activity level and access to exercise facilities were not fully assessed, and bivariate Pearson correlation could not adjust for confounders.

Future studies should recruit larger samples from several community settings and regions, compare age groups, genders and socioeconomic backgrounds, and follow participants longitudinally to see how changes in motivation, perceived benefits and barriers affect adherence over time. Intervention studies could test motivational interviewing, supervised exercise, goal setting and self-efficacy training. Social support, fear of falling, physical limitations, facility access and family encouragement merit investigation, objective measures such as attendance records, pedometers and activity trackers should complement questionnaires, and multivariable regression should be used to identify independent predictors of adherence.

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