Using a MOTIFS Intervention to Influence Patient-Reported Outcomes: A Randomized Cross-Over Plausibility Study

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Conclusions

The MOTIFS model represents a clinically plausible method of integrating mental training into injury prevention or rehabilitation training in order to improve psychological outcomes while maintaining proper execution.

Aim and Hypotheses

To evaluate enjoyment of a training intervention using the MOTIFS model. We hypothesize that participants would score higher on the Physical Activity Enjoyment Scale (PACES), have better psychological responses, and higher perceived exertion and pulse following the MOTIFS training, and maintain movement quality.

Background

Current injury prevention and rehabilitation training programs focus on functional movements, with little attention on psychological aspects. We have developed the novel Motor Imagery to Facilitate Sensorimotor Re-Learning (MOTIFS) model, which integrates mental training into physical training.

Methods

In a 2x2 randomized cross-over design, 30 participants (50% female) 18 to 35 years that were currently or previously active in soccer, handball, basketball, or floorball, with no injury preventing jumping or directional change movements completed two training conditions:

MOTIFS Condition - Participants used their own prior experiences to create a realistic and sport-specific imagery scenario. The mental simulation and physical exercise were integrated to create an individualized and sport-relevant exercise.

Physical Exercise (PE) Condition - Exercises based on commonly used knee injury prevention and rehabilitation practices

Primary Outcomes

Physical Activity Enjoyment Scale (PACES) – An 18-item self-report scale of enjoyment on a scale of 7 (worst) to 126 (best)

Secondary Outcomes

Self Assessment Manikin (SAM) – A 3-item scale measuring psychological states: Valence (positive or negative), arousal (high or low) and Dominance (high or low feelings of control)

Borgs Scale of Perceived Exertion (RPE) – Self-reported exertion on a scale from 6 (lowest) to 20 (highest)

Mean Heart Rate – Beats per minute measured using a heart rate monitor for the duration of each training

Movement Quality (MQ) – Total score of movement quality in a toe-off task from 0 (best) to 8 (worst)

Figure 1. Example of a physical exercise movement performed by a basketball player according to the MOTIFS model to mentally and physically simulate a directional change movement, and according to PE training

The MOTIFS model instructs participants to complete physical exercise movement, with specific focus on sport-specific situations, emotions, and potential opponents, using equipment to increase realism.

The PE training instructs participants to complete a physical exercise movement, focusing on one's own body and movements as reference, with no explicit connection to the sport or activity.

Results

MOTIFS training resulted in:

• Higher PACES scores
• Better psychological responses in all SAM Subscales
• Higher heart rate and RPE
• 35% more time (mean 5.19, SD 5.36 minutes; 95% CI -0.17; -0.73)

Total movement quality was maintained in both conditions (median difference 1, IQR -2;1, p=0.856)

Table 1. Results of PACES, SAM, RPE, and mean heart rate analyses showing individual conditions and differences between conditions

	MOTIFS		PE		Difference (MOTIFS – PE)			
	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	p[¶]	95% CI
PACES	30	102.5 (9.31)	30	77.83 (18.12)	30	23.62 (15.16)	0.000	(-30.34;-19.00)
	n	Median (IQR)	n	Median (IQR)	n	Median (IQR)	p[§]	Fisher's Exact
SAM Valence	30	8 (7-9)	30	6 (5-7)	30	2 (1-3)	<0.000	<0.000
SAM Arousal	30	5 (5-7)	30	5 (3-5)	30	1 (0-2.25)	0.004	0.025
SAM Dominance	30	7 (5-8)	30	5 (3-7)	30	0.50 (0-2)	0.014	0.143
Borgs RPE	30	13 (12-14.25)	30	12.5 (10-13.25)	30	1 (-0.25-2)	0.010	0.027
Mean Heart Rate	28	101.92 (96.06-108.61)	29	98.77 (93.00-109.75)	28	4.32 (0.66-5.61)	0.005	0.006

[¶] Within subjects mean difference calculated using a mixed model (fixed effects = period, treatment; random effects = subject); [§]Within-subjects repeated-measures difference calculated using Wilcoxon Signed-Rank test; p = Exact significance (2 tailed); significance-level set at p=0.05; Fisher's Exact (2 sided) significance level set at p=0.05

IQR = Interquartile Range; PE = Physical Exercise; SAM = Self-Assessment Manikin; RPE = Ratings of Perceived Exertion; HR - mean bpm = Heart rate – mean beats per minute

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