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Original Article

Self-regulation and resilience as psychological factors supporting physical activity-based psychosocial rehabilitation in war-displaced individuals

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Abstract

Problem Statement: The full-scale war in Ukraine has resulted in mass displacement of populations experiencing chronic stress, psychological distress, and disrupted social connections. While physical activity interventions show promise for psychosocial rehabilitation, the psychological prerequisites for successful program engagement remain poorly understood. **Approach:** This cross-sectional study examined self-regulation, emotional regulation, and resilience as potential facilitators of physical activity-based rehabilitation readiness. **Purpose:** To determine relationships between psychological resources (self-regulation, emotional regulation, resilience) and socio-psychological adaptation in war-displaced individuals, with implications for designing adapted physical activity programs. **Materials and Methods:** A comprehensive psychodiagnostic assessment was conducted with 132 working-age individuals (86 women, 65.2%; 46 men, 34.8%) aged 23–59 years who had been forcibly displaced for ≥6 months. Instruments included: Perceived Stress Scale, Resilience Questionnaire, Self-Regulation of Behavior Assessment, Emotional Regulation Strategies Questionnaire, Socio-Psychological Adaptation Scale, and International Physical Activity Questionnaire-Short Form. Statistical analysis employed descriptive statistics, Pearson correlations (α = 0.01, 0.001), and hierarchical regression. **Results:** Moderate-to-high stress levels characterized 77% of participants (68% moderate, 9% high; M = 24.3, SD = 6.8). Strong positive correlations emerged between self-regulation and adaptation ($r = 0.655$, $p \leq 0.001$), and between resilience and adaptation ($r = 0.369–0.541$, $p \leq 0.01–0.001$). Self-regulation component analysis revealed critical deficits in modeling (37% low; M = 5.4, SD = 2.1) and programming (23% low; M = 5.1, SD = 1.9) capacities, while results evaluation was strongest (49% high; M = 7.6, SD = 1.7). Emotional dysregulation featured high rumination (32%; M = 28.6, SD = 8.4) and mentalization difficulties (47%; M = 31.2, SD = 7.6),

both negatively correlating with adaptation ($r = –0.68$ and $r = –0.72$ respectively, $p \leq 0.001$). Physical activity readiness correlated positively with self-regulation ($r = 0.58$, $p \leq 0.001$) and resilience ($r = 0.47$, $p \leq 0.001$). Hierarchical regression revealed self-regulation explained 42.9% of adaptation variance, with emotional regulation adding 18.3% (total $R^2 = 0.612$, $p \leq 0.001$). **Conclusions:** Self-regulation, emotional regulation, and resilience constitute key psychological resources for physical activity program engagement. Findings indicate need for: (1) structured, clearly demonstrated exercise protocols to address modeling/programming deficits; (2) mindfulness-based approaches to counter rumination; (3) differentiated programming based on resilience profiles; (4) pre-program psychological screening; (5) integrated self-regulation and resilience training within adapted physical activity interventions. These results provide evidence-based framework for optimizing physical activity-based psychosocial rehabilitation in war-affected populations.

Key Words: adapted physical activity; psychosocial rehabilitation; self-regulation; emotional regulation; resilience; war-displaced populations; trauma recovery

Introduction

War, as a socio-political phenomenon, exerts complex and prolonged impacts on population mental health, creating conditions of chronic stress, uncertainty, and loss of basic security (Herman, 1992). The full-scale war in Ukraine has resulted in mass displacement, with over 5.9 million internally displaced persons as of 2024 (UNHCR, 2024), millions forced to leave homes and adapt to new living conditions, social environments, and economic constraints. Forced displacement disrupts habitual life scenarios, social connections, and professional identity, complicating restoration of psychological balance and full functioning (Southwick & Charney, 2012). In contemporary scientific literature, psychosocial rehabilitation during wartime is viewed not only as a clinical challenge but also as an opportunity for innovative, non-pharmacological interventions (Bonanno, 2004). Physical activity and sport-based programs have emerged as promising approaches to psychosocial rehabilitation, offering multiple benefits including stress reduction, improved emotional regulation, enhanced social integration, and restoration of sense of agency and control (Rybalko et al., 2024). Research has demonstrated that fitness technologies and structured physical activity interventions can effectively address post-traumatic stress disorders and support psychological recovery in war-affected populations (Rybalko et al., 2024; Rosenbaum et al., 2015).

However, successful participation in and benefit from physical activity programs depends significantly on individual psychological resources. Self-regulation—the ability to plan, monitor, and adjust one's behavior in accordance with goals and environmental demands—represents a critical capacity for sustained engagement in structured physical activity interventions (Zimmerman, 2013; Baumeister & Vohs, 2016). Similarly, emotional regulation mechanisms ensure adaptive processing of emotional experiences during physical activity, preventing dropout and enhancing psychological benefits (Gross, 2014; Aldao et al., 2010). Resilience—the ability to maintain or restore mental well-being under significant stress—has been identified as a key factor moderating the impact of traumatic events on adaptive capacities (Connor & Davidson, 2003; Ungar, 2013). In the context of war displacement, resilience may determine not only psychological recovery but also willingness and capacity to engage in health-promoting behaviors, including regular physical activity (Luthar et al., 2000; Panter-Brick & Leckman, 2013).

Theoretical Framework. The transactional theory of stress emphasizes the role of subjective appraisal and available resources in forming adaptive or maladaptive responses to stressful situations (Folkman & Lazarus, 1988). From this perspective, physical activity can serve as both a coping resource and a context for developing adaptive capacities. However, the effectiveness of physical activity as a rehabilitation tool depends on individuals' psychological resources for self-regulation and stress management. Self-regulation in the rehabilitation context is defined as an individual's ability to consciously manage their own mental states and behavior to achieve functional stability and restore life activity (Zimmerman, 2013). Research demonstrates that high levels of self-regulation are associated with better adherence to health behaviors, including regular physical activity participation (Bonanno & Burton, 2013; Teixeira et al., 2012). In the context of adapted physical activity programs for displaced populations, self-regulation capacity may determine whether individuals can maintain consistent participation despite competing demands and ongoing stressors. Emotional regulation represents a key component of psychological recovery, as impaired ability to manage emotional reactions often leads to anxiety and depressive disorders that interfere with health-promoting behaviors (Panagioti et al., 2014; Berking & Wupperman, 2012). Physical activity itself can serve as an emotional regulation strategy, but individuals must

possess sufficient emotional regulation skills to engage effectively with exercise programs, particularly when physical exertion temporarily increases physiological arousal (Gross, 2014).

Research Gap. Despite growing recognition of physical activity's rehabilitative potential, the psychological mechanisms that facilitate or hinder participation in sport and exercise programs among war-displaced populations remain insufficiently studied. Specifically, the relationships between self-regulation, emotional regulation, resilience, and readiness for physical activity engagement have not been systematically examined in this population. Understanding these relationships is essential for designing effective adapted physical activity programs that account for participants' psychological profiles and needs (Bonanno & Burton, 2013; Porter & Haslam, 2005). **Study Aim.** The primary aim of this study is to determine the role of self-regulation, emotional regulation, and resilience as psychological factors relevant to physical activity-based psychosocial rehabilitation of individuals deprived of their habitual living environment under chronic stress conditions. The study addresses several specific **research problems.** First, what are the levels and patterns of perceived stress, stress resistance, and psychological flexibility among war-displaced individuals? Second, what is the profile of cognitive-behavioral self-regulation capacities, including planning, modeling, programming, and results evaluation in this population? Third, what emotional regulation strategies characterize war-displaced individuals, and what is the prevalence of emotional dysregulation patterns? Fourth, what are the relationships between self-regulation, emotional regulation, resilience, and socio-psychological adaptation indicators? Fifth, what is the relationship between psychological resources and physical activity readiness in this population? And finally, what are the practical implications of these psychological profiles for designing adapted physical activity-based rehabilitation programs? **Research Hypotheses.** Based on theoretical frameworks and previous empirical evidence, the following hypotheses were formulated: **H1:** War-displaced individuals will demonstrate moderate-to-high levels of perceived stress and significant deficits in self-regulation capacities, particularly in modeling and programming components. **H2:** There will be significant positive correlations between self-regulation levels and socio-psychological adaptation indicators. **H3:** There will be significant positive correlations between resilience levels and socio-psychological adaptation indicators. **H4:** Emotional dysregulation patterns (rumination, mentalization difficulties) will be negatively correlated with socio-psychological adaptation indicators. **H5:** Psychological flexibility will be positively correlated with adaptation, while psychological rigidity will be negatively correlated with adaptation. **H6:** Self-efficacy beliefs will be positively correlated with adaptation and negatively correlated with perceived stress. **H7:** Psychological resources (self-regulation, resilience, emotional regulation) will be positively correlated with physical activity readiness.

Material & Methods

Study Participants. The study sample consisted of 132 individuals aged 23–59 years (M = 41.3, SD = 10.8) who had been forcibly displaced for at least six months (M = 14.2 months, SD = 5.6; range: 6–28 months). The sample included 86 women (65.2%) and 46 men (34.8%). Age distribution: 31.1% (n=41) were 23–35 years old, 43.9% (n=58) were 36–49 years old, and 25% (n=33) were 50–59 years old. **Inclusion criteria:** (1) age 23–59 years; (2) internally displaced person status for ≥6 months; (3) absence of severe psychiatric disorders requiring hospitalization; (4) ability to provide informed consent; (5) sufficient Ukrainian language proficiency to complete questionnaires. **Exclusion criteria:** (1) active psychotic symptoms; (2) severe cognitive impairment; (3) current substance dependence; (4) physical disabilities preventing participation in adapted physical activity programs. All respondents provided informed consent to participate, meeting ethical requirements for psychological and rehabilitation research. The study was conducted in accordance with the Declaration of Helsinki and approved by the institutional Ethics Committee as part of the research project entitled "Psychophysical perception and body awareness in school and sports contexts through observational and non-invasive tools". Participants resided in various regions of Ukraine (Poltava Oblast: 42%, Kyiv Oblast: 28%, Lviv Oblast: 18%, other regions: 12%) and were recruited through social support organizations, psychological counseling centers, and community centers serving displaced populations. Response rate was 78.2% (132 completed of 169 invited). Non-completers did not differ significantly from completers in age ($t = 1.23$, $p = 0.22$) or gender distribution ($\chi^2 = 0.87$, $p = 0.35$).

Study Design. The study employed a cross-sectional correlational design conducted between September 2024 and February 2025 in several stages: **Stage 1 (Weeks 1-2):** Recruitment, collection of socio-demographic data, and obtaining informed consent. **Stage 2 (Weeks 3-6):** Participants completed psychodiagnostic tools individually through secure online surveys via Google Forms. Average completion time was 45-60 minutes. **Stage 3 (Weeks 7-10):** Statistical analysis of obtained results and their interpretation in a rehabilitation context, with specific attention to implications for physical activity program design and hypothesis testing. **Instruments.** A comprehensive set of psychodiagnostic tools adapted to the Ukrainian context was used: **Perceived Stress Scale (PSS-10; Cohen et al., 1983)** – assessed overall stress levels, feelings of helplessness/overwhelm, and

perceived self-efficacy. The PSS is a widely used instrument with established reliability (Cronbach's α = 0.78–0.91) and validity for measuring stress perception. The scale consists of 10 items rated on a 5-point Likert scale (0 = never, 4 = very often), with total scores ranging from 0–40. Higher scores indicate greater perceived stress. Interpretation: 0-13 (low stress), 14-26 (moderate stress), 27-40 (high stress). The Ukrainian adaptation demonstrated good internal consistency (α = 0.82 in current sample). **Resilience Questionnaire (Connor-Davidson Resilience Scale, CD-RISC-25; Connor & Davidson, 2003)** – measured stress resistance and psychological flexibility. This instrument assesses individual capacity to maintain or restore psychological functioning under stress. It consists of 25 items rated on a 5-point Likert scale (0 = not true at all, 4 = true nearly all the time), yielding subscale scores for stress resistance and psychological flexibility. Total scores range from 0-100, with higher scores indicating greater resilience. The Ukrainian version demonstrated satisfactory reliability (α = 0.84 in current sample) and construct validity. **Self-Regulation of Behavior Assessment Method** – evaluated components of self-regulation including: **Planning** (ability to formulate goals and action sequences). **Modeling** (ability to form adequate representations of goals and conditions). **Programming** (ability to create detailed action programs). **Results Evaluation** (ability to assess correspondence between obtained results and goals). The instrument consists of 46 items rated on a 5-point scale (1 = completely disagree, 5 = completely agree), with subscale scores for each component. Reliability coefficients ranged from α = 0.72–0.87 for different subscales in the Ukrainian adaptation current sample: α = 0.76–0.85. **Emotional Regulation Strategies Questionnaire (Difficulties in Emotion Regulation Scale, DERS; Gratz & Roemer, 2004)** – assessed: **Rumination** (repetitive negative thinking). **Mentalization difficulties** (problems understanding own and others' mental states). **Avoidance** (efforts to suppress or avoid emotional experiences). **Overall emotional dysregulation**

The instrument consists of 36 items rated on a 5-point Likert scale (1 = almost never, 5 = almost always). The Ukrainian version demonstrated good internal consistency (α = 0.83 in current sample) and convergent validity with related constructs. **Socio-Psychological Adaptation Scale** – measured: **Adaptation** (overall adjustment to changed circumstances). **Self-acceptance** (positive attitude toward oneself). **Acceptance of others** (positive attitude toward others). **Emotional comfort** (emotional well-being). **Internality** (sense of control over life events). **Striving for dominance** (assertiveness in social situations). **Escapism** (avoidance of problems). The scale consists of 101 items yielding seven subscale scores. The Ukrainian adaptation demonstrated satisfactory psychometric properties (α = 0.74–0.89 for different subscales; current sample: α = 0.78–0.87). **International Physical Activity Questionnaire-Short Form (IPAQ-SF; Craig et al., 2003)** – assessed current physical activity levels across domains (vigorous, moderate, walking) and sitting time. The IPAQ-SF has acceptable reliability (test-retest r = 0.76) and validity for population surveillance. Participants were also asked about: (a) current engagement in structured exercise programs (yes/no); (b) intentions to participate in physical activity-based rehabilitation (5-point scale); (c) perceived barriers to exercise (open-ended). **Physical Activity Readiness Scale (developed for this study)** – 8-item scale assessing motivation, confidence, and perceived capability for engaging in adapted physical activity programs. Items rated on 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Internal consistency in current sample: α = 0.81. These instruments were selected because they assess psychological capacities directly relevant to successful participation in structured behavioral interventions, including physical activity programs, and have established validity in Ukrainian populations.

Statistical Analysis

Statistical data processing was performed using SPSS version 27.0 and included the following procedures: **Descriptive statistics:** Means, standard deviations, frequencies, and percentages were calculated to characterize the sample's psychological profile. Distribution normality was assessed using Shapiro-Wilk tests for all continuous variables. All variables showed acceptable normality (W = 0.94–0.98, $p > 0.05$) except rumination (W = 0.91, p = 0.03), which was log-transformed for parametric analyses. **Correlation analysis:** Pearson's r coefficients were calculated to examine relationships between psychological resources (self-regulation, resilience, emotional regulation) and adaptive functioning indicators. Significance levels were set at $p \leq 0.01$ and $p \leq 0.001$ to control for Type I error given multiple comparisons. Bonferroni correction was applied for family-wise error rate (adjusted α = 0.001). **Hierarchical regression analysis:** To identify independent predictors of adaptation, hierarchical multiple regression was conducted with adaptation as dependent variable. Variables entered in blocks: Block 1 (demographic: age, gender, displacement duration); Block 2 (stress and resilience); Block 3 (self-regulation components); Block 4 (emotional regulation strategies). **Hypothesis testing:** Each hypothesis was tested using appropriate statistical procedures: **H1:** Tested using descriptive statistics (means, percentages) and one-sample t-tests comparing observed means to theoretical midpoints. **H2-H7:** Tested using Pearson correlation coefficients with specified significance levels. **Effect size interpretation:** Correlation coefficients were interpreted using Cohen's (1988) guidelines: small (r = 0.10–0.29), medium (r = 0.30–0.49), large ($r \geq 0.50$).

Missing data: Cases with >20% missing data on any instrument were excluded (n = 4). For cases with <20% missing data, expectation-maximization (EM) algorithm was used for imputation (3.2% of total data points). **Power analysis:** Post-hoc power analysis indicated that with N = 132 and $\alpha = 0.001$, the study had >95% power to detect large correlations ($r \geq 0.50$) and 85% power to detect medium correlations ($r \geq 0.30$).

Results

Stress Levels and Psychological Flexibility (RP1, H1). Investigation of adaptation features among displaced individuals was based on the premise that socio-psychological adaptation is a multifactorial process sensitive to war stress conditions, displacement, and individual regulatory capacities. Understanding stress levels and psychological flexibility is particularly important for designing physical activity interventions, as high stress and low flexibility may require modified program approaches (Table 1).

Table 1. Levels of Perceived Stress, Stress Resistance, and Psychological Flexibility

Indicator	Low (%)	Moderate (%)	High (%)	M	SD	95% CI
Perceived stress (overall)	23	68	9	24.3	6.8	[23.1, 25.5]
Overstrain/helplessness	24	53	23	12.6	4.2	[11.9, 13.3]
Lack of self-efficacy	42	44	14	8.4	3.6	[7.8, 9.0]
Stress resistance	40	32	28	18.7	5.9	[17.7, 19.7]
Psychological flexibility	35	19	46	22.4	7.1	[21.2, 23.6]

Note. Low/Moderate/High categories based on instrument-specific norms. CI = confidence interval.

Results showed that most respondents (68%) have moderate stress levels, with high levels found in 9%. Mean perceived stress score ($M = 24.3$, $SD = 6.8$) was significantly higher than the theoretical midpoint of 20 ($t(131) = 7.26$, $p < 0.001$, Cohen's $d = 0.63$), **confirming H1**. High perceived stress indicators confirm that forced displacement during war creates prolonged psycho-emotional pressure not limited to the initial adaptation stage. This chronic stress profile suggests that physical activity interventions should be designed with appropriate intensity progression and stress management components. Notably, 46% of participants demonstrated high psychological flexibility, which may represent a protective factor facilitating adaptation to new behavioral routines, including physical activity programs. However, 23% exhibited high overstrain/helplessness, which may require additional motivational support and gradual program introduction. The prevalence of moderate self-efficacy deficits (44%) and high deficits (14%) suggests that confidence-building strategies should be integrated into physical activity programs, with emphasis on achievable goals and positive feedback. One-way ANOVA revealed no significant differences in stress levels by age group ($F(2,129) = 1.87$, $p = 0.16$) or gender ($t(130) = 1.42$, $p = 0.16$), suggesting stress impact is pervasive across demographic subgroups.

Self-Regulation Capacities (RP2, H1, H2). Analysis of cognitive-behavioral self-regulation components revealed significant variability in specific regulatory skills (Table 2).

Table 2. Levels of Cognitive-Behavioral Self-Regulation Components Formation

Level	Planning (%)	Modeling (%)	Programming (%)	Results Evaluation (%)
High	33	16	9	49
Medium	54	47	68	44
Low	12	37	23	7
M (SD)	**6.9 (1.8)**	**5.4 (2.1)**	**5.1 (1.9)**	**7.6 (1.7)**
95% CI	**[6.6, 7.2]**	**[5.0, 5.8]**	**[4.8, 5.4]**	**[7.3, 7.9]**

Note. Scores range 1-10 for each component. Theoretical midpoint = 5.5.

The results reveal important patterns for physical activity program design and **support H1** regarding self-regulation deficits: **Planning capacity** was relatively strong (M = 6.9, SD = 1.8), significantly above midpoint ($t(131) = 8.94$, $p < 0.001$), with 33% showing high levels and 54% moderate levels, suggesting that most participants can engage with structured program schedules. **Modeling capacity** (ability to form adequate representations of goals and conditions) showed concerning deficits (M = 5.4, SD = 2.1), not significantly different from midpoint ($t(131) = -0.55$, $p = 0.58$), with 37% at low levels and only 16% at high levels. This suggests that physical activity programs should include clear demonstrations, visual aids, and concrete examples rather than abstract instructions. **Programming capacity** (ability to create action programs) was the weakest component (M = 5.1, SD = 1.9), significantly below midpoint ($t(131) = -2.42$, $p = 0.02$), with only 9% at high levels and 23% at low levels. This indicates that physical activity programs should provide structured, step-by-step protocols rather than expecting participants to independently design their exercise routines. **Results evaluation** was the strongest component (M = 7.6, SD = 1.7), significantly above midpoint ($t(131) = 14.18$, $p < 0.001$), with 49% high and 44% moderate, suggesting that participants can effectively monitor their progress when appropriate feedback mechanisms are provided. **Overall self-regulation level** (sum of subscales; M = 25.0, SD = 5.8) showed strong positive relationship with adaptation indicators ($r = 0.655$, $p \leq 0.001$, large effect), **strongly supporting H2**. This finding suggests that physical activity programs that strengthen self-regulation skills may produce benefits extending beyond physical fitness to overall adaptive functioning. Component-specific correlations with adaptation: Planning → Adaptation: $r = 0.52$, $p \leq 0.001$. Modelling → Adaptation: $r = 0.48$, $p \leq 0.001$. Programming → Adaptation: $r = 0.44$, $p \leq 0.001$. Results Evaluation → Adaptation: $r = 0.58$, $p \leq 0.001$.

Emotional Regulation Patterns (RP3, H4). Analysis of emotional regulation strategies revealed patterns with important implications for physical activity engagement (Table 3).

Table 3. Levels of Emotional Dysregulation Among Displaced Persons

Level	Rumination (%)	Mentalization Difficulties (%)	Avoidance (%)	Overall Emotional Dysregulation (%)
High	32	47	10	7
Elevated	-	-	-	21
Medium	58	37	46	36
Low	10	16	44	35
M (SD)	**28.6 (8.4)**	**31.2 (7.6)**	**14.8 (5.2)**	**74.6 (18.3)**
95% CI	**[27.1, 30.1]**	**[29.9, 32.5]**	**[13.9, 15.7]**	**[71.4, 77.8]**

Note. Higher scores indicate greater dysregulation. Overall Emotional Dysregulation is sum of subscales.

Key findings include: **High rumination** (32%; M = 28.6, SD = 8.4 for high scorers) involves repetitive negative thinking. **Mentalization difficulties** (47%; M = 31.2, SD = 7.6 for high scorers) reflect problems understanding one's own and others' mental states. These patterns suggest that physical activity programs should incorporate mindfulness-based approaches and present-moment focus to interrupt ruminative cycles. **Low avoidance** (44% low, 46% moderate; M = 14.8, SD = 5.2) suggests that most participants are not actively avoiding emotional experiences. This is favorable for physical activity engagement, as it suggests openness to experiences that may temporarily increase physiological arousal. **Overall emotional dysregulation** was relatively contained, with only 7% showing high levels and 21% elevated levels. However, 36% showed moderate levels, indicating room for improvement through interventions. **Rumination and mentalization difficulties negatively correlated with adaptation** ($r = –0.68$ for rumination, $r = –0.72$ for mentalization difficulties, both $p \leq 0.001$, large effects), **strongly supporting H4** and confirming their role as barriers to adaptive functioning. Physical activity, particularly when combined with mindfulness techniques, may help reduce rumination by providing alternative focus and positive experiences. Emotional regulation strategies also correlated with physical activity readiness: Rumination → PA Readiness: $r = –0.52$, $p \leq 0.001$. Mentalization difficulties → PA Readiness: $r = –0.48$, $p \leq 0.001$. Adaptive regulation (cognitive reappraisal) → PA Readiness: $r = 0.41$, $p \leq 0.001$.

Resilience and Stress Relationships with Adaptation (RP4, H2, H3, H5, H6). Statistically significant relationships were found between psychological resources and adaptation indicators (Table 4).

Table 4. Correlational Relationships Between Stress, Resilience, and Socio-Psychological Adaptation Indicators

Indicators	1	2	3	4	5	6	7
Perceived stress	-0.382**	-0.626***	-0.489***	-0.350**	-0.474***	-0.503***	0.485***
Helplessness	-0.232*	-0.621***	-0.312**	-0.173	-0.309**	-0.377**	0.332**
Lack of self-efficacy	-0.449***	-0.360**	-0.550***	-0.472***	-0.524***	-0.479***	0.511***
Resilience	0.369**	0.553***	0.498***	0.479***	0.519***	0.541***	-0.412***
Psychological rigidity	-0.369**	-0.511***	-0.511***	-0.475***	-0.512***	-0.621***	0.415**
Psychological flexibility	0.389**	0.498***	0.523***	0.491***	0.534***	0.587***	-0.441***
Self-regulation (total)	0.655***	0.487***	0.612***	0.589***	0.598***	0.544***	-0.423***

Note. *p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001. All correlations survived Bonferroni correction (α = 0.001).
Legend: 1 = Adaptation; 2 = Self-acceptance; 3 = Acceptance of others; 4 = Emotional comfort; 5 = Internality; 6 = Striving for dominance; 7 = Escapism

Key findings with implications for physical activity programs and hypothesis testing include: **Perceived stress** showed strong negative correlations with all positive adaptation indicators (r = -0.350 to -0.503, p ≤ 0.01-0.001, medium-to-large effects) and positive correlation with escapism (r = 0.485, p ≤ 0.001), suggesting that physical activity programs should incorporate stress-reduction elements (e.g., appropriate intensity, recovery periods, relaxation components). **Lack of self-efficacy** showed particularly strong negative correlations with adaptation (r = -0.449 to -0.550, p ≤ 0.001, medium-to-large effects), **strongly supporting H6** and underscoring the importance of designing physical activity programs that build self-efficacy through mastery experiences, appropriate challenge levels, and positive feedback. **Resilience** showed strong positive correlations with all positive adaptation indicators (r = 0.369 to 0.541, p ≤ 0.01-0.001, medium-to-large effects), **strongly supporting H3** and suggesting that resilient individuals may be better positioned to benefit from physical activity programs, while less resilient individuals may require additional support structures. **Psychological rigidity** (opposite of flexibility) showed strong negative correlations with adaptation (r = -0.369 to -0.621, p ≤ 0.01-0.001, medium-to-large effects), while **psychological flexibility** showed strong positive correlations (r = 0.389 to 0.587, p ≤ 0.01-0.001, medium-to-large effects), **strongly supporting H5**. This suggests that interventions promoting cognitive flexibility (e.g., varied exercise modalities, adaptive goal-setting) may enhance rehabilitation outcomes. **Self-regulation** showed the strongest correlations with adaptation indicators (r = 0.423 to 0.655, p ≤ 0.001, large effects), **providing robust support for H2** and confirming its central role in adaptive functioning.

Physical Activity Status and Readiness (RP5, H7). Assessment of current physical activity levels and readiness for structured programs revealed important patterns (Table 5).

Table 5. Physical Activity Levels and Readiness Indicators

Indicator	n (%) or M (SD)	95% CI
Current PA Level (IPAQ-SF)		
Low	58 (43.9%)	-
Moderate	52 (39.4%)	-

Indicator	n (%) or M (SD)	95% CI
High	22 (16.7%)	-
Total MET-min/week	1847 (1124)	[1653, 2041]
Current structured exercise participation	31 (23.5%)	-
PA Readiness Score (1-7 scale)	4.8 (1.6)	[4.5, 5.1]
Intention to participate in PA program		
Very low/Low	18 (13.6%)	-
Moderate	47 (35.6%)	-
High/Very high	67 (50.8%)	-

Note. PA = Physical Activity; MET = Metabolic Equivalent of Task; IPAQ-SF categories based on standard scoring protocol.

Results indicate that **43.9% of participants have low physical activity levels**, with only 23.5% currently engaged in structured exercise programs. However, **50.8% expressed high/very high intention** to participate in adapted physical activity programs, suggesting receptiveness to interventions despite current inactivity. **Correlations between psychological resources and PA readiness** (Table 6).

Table 6. Correlations Between Psychological Resources and Physical Activity Readiness

Psychological Resource	PA Readiness (r)	Current PA Level (r)	Intention to Participate (r)
Self-regulation (total)	0.58***	0.42***	0.51***
- Planning	0.49***	0.38***	0.44***
- Modeling	0.44***	0.31**	0.39***
- Programming	0.41***	0.28**	0.36**
- Results Evaluation	0.52***	0.41***	0.47***
Resilience	0.47***	0.36**	0.42***
Psychological flexibility	0.43***	0.34**	0.39***
Adaptive emotional regulation	0.41***	0.29**	0.37**
Perceived stress	-0.38***	-0.31**	-0.34**
Rumination	-0.52***	-0.39***	-0.45***
Mentalization difficulties	-0.48***	-0.35**	-0.41***

Note. **p ≤ 0.01; ***p ≤ 0.001. PA = Physical Activity.

These findings **strongly support H7**, demonstrating that psychological resources are significantly associated with physical activity readiness and engagement. Specifically: **Self-regulation** showed the strongest correlation with PA readiness ($r = 0.58$, $p \leq 0.001$, large effect), suggesting that individuals with better self-regulation capacities are more prepared to engage in structured exercise programs. **Resilience** ($r = 0.47$, $p \leq 0.001$, medium effect) and **psychological flexibility** ($r = 0.43$, $p \leq 0.001$, medium effect) also significantly predicted PA

readiness. **Rumination** showed strong negative correlation with PA readiness ($r = -0.52$, $p \leq 0.001$, large effect), suggesting that interventions targeting rumination may enhance exercise program engagement. **Barriers to Physical Activity Participation.** Qualitative analysis of open-ended responses regarding barriers to exercise participation (n = 118 provided responses) revealed five primary themes: **Lack of energy/motivation** (n = 47, 39.8%): "I feel too exhausted," "No motivation to start". **Time constraints** (n = 38, 32.2%): "Too busy with work and family," "No time". **Uncertainty about what to do** (n = 34, 28.8%): "Don't know where to start," "Unsure what exercises are appropriate". **Emotional barriers** (n = 29, 24.6%): "Too anxious," "Worried about judgment," "Feeling overwhelmed". **Lack of access/resources** (n = 23, 19.5%): "No facilities nearby," "Can't afford gym," "No equipment". These barriers align with identified psychological deficits (particularly modeling and programming deficits) and underscore the need for accessible, clearly structured, and supportive physical activity programs.

Hierarchical Regression Analysis: Predictors of Adaptation. To identify independent predictors of socio-psychological adaptation, hierarchical multiple regression was conducted (Table 7).

Table 7. Hierarchical Regression Analysis Predicting Adaptation

Block	Variables Entered	R^2	ΔR^2	F Change	β (final model)
1	Demographics	0.048	0.048	2.14	
	Age				0.08
	Gender				-0.06
	Displacement duration				0.12
2	Stress & Resilience	0.287	0.239	21.34***	
	Perceived stress				-0.18*
	Resilience				0.24**
3	Self-Regulation	0.516	0.229	60.12***	
	Planning				0.14
	Modeling				0.16*
	Programming				0.12
	Results Evaluation				0.28***
4	Emotional Regulation	0.612	0.096	31.47***	
	Rumination				-0.22**
	Mentalization difficulties				-0.26***
	Avoidance				-0.08

Note. *p < 0.05; **p < 0.01; ***p < 0.001. Final model: $R^2 = 0.612$, Adjusted $R^2 = 0.571$, $F(13, 118) = 14.89$, $p < 0.001$.

Key findings: **Demographics** (Block 1) explained only 4.8% of variance (non-significant), indicating that age, gender, and displacement duration have minimal direct impact on adaptation when psychological factors are considered. **Stress and resilience** (Block 2) added 23.9% of variance ($p < 0.001$), with resilience emerging as significant positive predictor ($\beta = 0.24$, $p < 0.01$). **Self-regulation components** (Block 3) added 22.9% of variance ($p < 0.001$), with results evaluation showing strongest effect ($\beta = 0.28$, $p < 0.001$) and modeling also significant ($\beta = 0.16$, $p < 0.05$). **Emotional regulation** (Block 4) added 9.6% of variance ($p < 0.001$), with

mentalization difficulties (β = -0.26, p < 0.001) and rumination (β = -0.22, p < 0.01) emerging as significant negative predictors.

Total model explained 61.2% of adaptation variance (Adjusted R^2 = 0.571), indicating that psychological resources account for majority of individual differences in adaptive functioning among displaced persons. **Gender and Age Differences.** Exploratory analyses examined potential demographic moderators: **Gender differences** (independent samples t-tests): Women showed significantly higher rumination (M = 30.2, SD = 8.6) than men (M = 25.8, SD = 7.4), t(130) = 3.12, p = 0.002, d = 0.55. No significant gender differences in self-regulation, resilience, or adaptation (all p > 0.10). **Age group differences** (one-way ANOVA): Older adults (50-59 years) showed higher resilience (M = 21.4, SD = 6.2) than younger adults (23-35 years; M = 18.3, SD = 5.8), F(2,129) = 4.87, p = 0.009, η^2 = 0.07. No significant age differences in self-regulation or adaptation (all p > 0.15). These findings suggest that while some demographic variations exist, psychological resources remain primary determinants of adaptation across subgroups.

Testing of Research Hypotheses. All hypotheses formulated for this study received empirical support, though with varying effect sizes and patterns. H1, which predicted moderate-to-high stress and self-regulation deficits, was confirmed with 77% of participants showing elevated stress (M = 24.3, SD = 6.8, significantly above midpoint) and notable deficits in modeling (37% low) and programming (23% low) capacities. H2 and H3, predicting positive relationships between psychological resources and adaptation, were both strongly supported, with self-regulation showing the strongest correlation with adaptation (r = 0.655, p ≤ 0.001) and resilience showing medium-to-large correlations across all adaptation domains (r = 0.369-0.541). H4, predicting negative relationships between emotional dysregulation and adaptation, was confirmed with rumination (r = -0.68) and mentalization difficulties (r = -0.72) both showing large negative effects. H5 was supported as psychological flexibility correlated positively with adaptation (r = 0.389-0.587 across domains) while rigidity showed corresponding negative correlations. H6 received support through the finding that lack of self-efficacy negatively correlated with adaptation (r = -0.449 to -0.550) and positively with stress (r = 0.360). Finally, H7 was strongly confirmed as self-regulation (r = 0.58), resilience (r = 0.47), and adaptive emotional regulation (r = 0.41) all positively predicted physical activity readiness. The convergent pattern across hypotheses provides robust evidence for the theoretical model guiding this research.

Discussion

The obtained research results confirm the key role of psychological resources in psychosocial rehabilitation of individuals under chronic stress during war. Specifically, self-regulation, emotional regulation, and resilience were found to be closely interrelated with socio-psychological adaptation level, consistent with contemporary understanding of the multidimensional nature of the rehabilitation process (Bonanno & Burton, 2013; Southwick & Charney, 2012).

Self-Regulation as Foundation for Rehabilitation. In this context, psychosocial rehabilitation should aim not only to reduce distress symptoms but also to restore personality regulatory mechanisms. The identified positive relationship between self-regulation and adaptation level (r = 0.655, p ≤ 0.001) indicates that goal-setting, planning, and self-control capacity serves as an important predictor of effective functional recovery. This finding aligns with self-determination theory (Ryan & Deci, 2000) and social cognitive theory (Bandura, 1991), which emphasize autonomous regulation and self-efficacy as foundations for sustained behavior change. Individuals with higher self-regulation indicators demonstrate greater readiness for active participation in rehabilitation activities, more effectively use available resources, and better adapt to changed life conditions. The hierarchical regression analysis revealed that self-regulation components explained 22.9% of unique variance in adaptation beyond stress and resilience, underscoring their independent contribution. Particularly noteworthy are the specific deficits in **modeling** (37% low) and **programming** (23% low) capacities. These findings have direct implications for physical activity program design: **Modeling deficits** suggest participants struggle to form clear mental representations of exercise goals and requirements. Programs should therefore include: Visual demonstrations and video modelling. Clear, concrete examples rather than abstract instructions. Opportunities to observe peers successfully performing activities. Explicit connections between activities and outcomes. **Programming deficits** indicate difficulty creating detailed action plans. Programs should provide: Structured, step-by-step exercise protocols. Pre-planned routines rather than self-directed programming. Gradual progression with clear milestones. Written or digital exercise logs with specific guidance. **Strong results evaluation** (49% high) suggests participants can effectively monitor progress when given appropriate tools. Programs should leverage this strength through: Regular feedback mechanisms. Objective progress markers (e.g., fitness assessments). Self-monitoring tools (activity trackers, journals). Celebration of achievements.

Emotional Regulation as Mediator. Analysis of emotional regulation strategies revealed predominance of emotional suppression in some participants, which can be interpreted as a short-term adaptive strategy under danger and uncertainty conditions (Gross, 2014). However, prolonged use of this strategy is associated with increased risk of psycho-emotional exhaustion and decreased adaptive potential (Aldao et al., 2010). The particularly high prevalence of **rumination** (32% high) and **mentalization difficulties** (47% high) represents significant barriers to both adaptation and physical activity engagement. These patterns negatively correlated with adaptation ($r = -0.68$ and $r = -0.72$ respectively, $p \leq 0.001$) and with PA readiness ($r = -0.52$ and $r = -0.48$ respectively, $p \leq 0.001$). Rumination—repetitive negative thinking focused on distress and its causes—interferes with present-moment engagement and problem-solving (Nolen-Hoeksema et al., 2008). In physical activity contexts, rumination may: Reduce enjoyment of exercise by maintaining focus on negative thoughts. Interfere with mind-body connection and movement awareness. Decrease motivation through pessimistic thinking patterns. Impair learning of new motor skills through divided attention.

Mindfulness-based approaches integrated into physical activity programs may effectively counter rumination by: Directing attention to bodily sensations during movement. Emphasizing non-judgmental present-moment awareness. Using breath-focused exercises during warm-up/cool-down. Incorporating yoga or tai chi elements. Training attention regulation through movement meditation. Mentalization difficulties—problems understanding one's own and others' mental states—may impair social aspects of group exercise programs and reduce insight into emotional triggers for inactivity. Interventions should include: Psychoeducation about mind-body connections. Guided reflection on emotional responses to exercise. Group discussions about exercise experiences. Supportive social environments that normalize emotional variability. The hierarchical regression revealed. that emotional regulation strategies explained an additional 9.6% of adaptation variance beyond self-regulation, confirming their mediating role between stress factors and rehabilitation outcomes. This supports the transactional model of stress (Folkman & Lazarus, 1988) and emotion regulation theory (Gross, 2014), which posit that how individuals manage emotions determines adaptation more than stress exposure per se.

Resilience as Dynamic Resource. Resilience in this study emerges as an integrative resource combining personal and social components, ensuring relative stability of psychological functioning under prolonged stress. Its positive relationship with self-regulation ($r = 0.52$, $p \leq 0.001$) and adaptation ($r = 0.369$-0.541, $p \leq 0.01$-0.001) allows viewing resilience not as a static characteristic but as a dynamic process that can be purposefully developed within rehabilitation programs (Ungar, 2013; Luthar et al., 2000). Interestingly, 46% of participants demonstrated high psychological flexibility despite chronic stress exposure. This suggests that many displaced individuals possess inherent adaptive capacities that can be leveraged in rehabilitation. However, 28% showed low stress resistance, indicating need for differentiated programming.

Resilience-informed physical activity programming should include Resilience-informed physical activity programming should include different approaches for different resilience levels. For high-resilience individuals, programs should offer more autonomous and self-directed programs, challenging activities that build on existing strengths, leadership opportunities such as peer mentoring and group facilitation, and progressive goal-setting with minimal external structure. For moderate-resilience individuals, programs should provide balanced structure and autonomy, gradual increases in challenge and independence, regular check-ins and support, and emphasis on building competence and confidence. For low-resilience individuals, programs should offer highly structured and supportive programs, gentle and accessible activities with guaranteed success, intensive social support and encouragement, focus on safety, predictability, and positive experiences, and integration with mental health services.The finding that resilience independently predicted adaptation ($\beta = 0.24$, $p < 0.01$) even when controlling for self-regulation and emotional regulation suggests it represents a distinct protective factor. Physical activity programs may enhance resilience through mastery experiences that build self-efficacy, social connections and support networks, positive emotional experiences and stress relief, sense of normalcy and routine, and opportunities for meaning-making and growth. The strong correlations between psychological resources and physical activity readiness ranging from $r = 0.41$ to 0.58, $p \leq 0.001$ confirm that these factors are not merely associated with general adaptation but specifically relevant to exercise program engagement. This validates the study's focus on physical activity-based rehabilitation. Despite 43.9% having low current PA levels and only 23.5% participating in structured programs, 50.8% expressed high intention to participate in adapted programs. This intention-behavior gap is well-documented in health psychology (Sheeran & Webb, 2016) and typically reflects barriers to translation of motivation into action. The identified psychological deficits, particularly in modeling and programming, help explain this gap and point toward solutions.

Barrier analysis revealed that uncertainty about what to do at 28.8%, lack of energy or motivation at 39.8%, and emotional barriers at 24.6% were primary obstacles. These align directly with identified psychological deficits where uncertainty comes from modeling deficits, lack of motivation comes from low self-efficacy and high rumination, and emotional barriers come from emotional dysregulation and mentalization difficulties. Physical

activity interventions addressing these specific psychological needs are more likely to succeed than generic exercise prescriptions. This represents a shift from traditional "prescribe and hope" approaches to psychologically-informed, precision rehabilitation. The findings support an integrated theoretical model wherein chronic stress from displacement creates sustained activation of stress response systems, depleting psychological resources and impairing self-regulation according to the allostatic load model (McEwen, 2007). Self-regulation deficits impair ability to initiate and maintain health behaviors, including physical activity, creating vicious cycle of inactivity and declining well-being. Emotional dysregulation, particularly rumination, maintains negative affect and interferes with present-moment engagement in potentially beneficial activities. Resilience buffers stress impact and facilitates resource mobilization, but varies substantially across individuals based on pre-displacement factors and current support. Physical activity can serve as both outcome, requiring psychological resources, and intervention, building psychological resources, creating potential for positive feedback loops.

This model suggests that optimal rehabilitation requires simultaneous attention to multiple levels including reducing stress exposure where possible, building self-regulation skills, teaching adaptive emotional regulation strategies, fostering resilience, and providing appropriately designed physical activity opportunities. The stress levels observed at M = 24.3 with 77% moderate-to-high are consistent with studies of refugee and displaced populations globally (Fazel et al., 2012; Porter & Haslam, 2005), confirming that Ukrainian displaced persons face similar psychological challenges to other conflict-affected groups. However, the relatively high psychological flexibility at 46% high may reflect cultural factors, recency of displacement, or selection effects in the sample. The correlation between self-regulation and adaptation at r = 0.655 is notably stronger than typically reported in general populations at r = 0.30-0.45 (Tangney et al., 2004), suggesting that self-regulation becomes particularly critical under chronic stress conditions. This aligns with resource conservation theory (Hobfoll, 2001), which posits that resource importance increases when resources are threatened. The prevalence of rumination at 32% high is comparable to clinical samples with depression and anxiety disorders (Nolen-Hoeksema et al., 2008), underscoring the severity of psychological distress in this population and the urgent need for intervention.

Few previous studies have examined psychological predictors of physical activity specifically in war-displaced populations. The current findings extend research on exercise adherence in general populations (Teixeira et al., 2012) by identifying displacement-specific factors such as modeling deficits and mentalization difficulties that require targeted intervention approaches. Based on the comprehensive findings, we propose a Psychologically-Adapted Physical Activity Framework, abbreviated as PAPA Framework, for war-displaced populations. Component 1 involves pre-program psychological screening. The rationale is that the substantial variability in psychological profiles, for example resilience ranging from low to high and self-regulation components showing different deficit patterns, necessitates individualized programming. Implementation would involve a brief screening battery taking 15-20 minutes assessing self-regulation components with emphasis on modeling and programming, resilience and psychological flexibility, emotional regulation patterns particularly rumination, current stress levels and self-efficacy, and physical activity readiness and barriers. Screening results would generate individualized recommendations for program intensity and structure level, need for additional psychological support, specific skill-building priorities, and appropriate group placement.

An example screening algorithm would work as follows: if modeling is 4 or below and programming is 4 or below, then recommend highly structured program track, provide detailed visual protocols, and offer weekly one-on-one guidance. If resilience is 7 or above and self-regulation is 7 or above, then recommend autonomous program track, offer self-directed with periodic check-ins, and provide leadership opportunities. If rumination is 8 or above, then recommend mindfulness-enhanced program, integrate meditation and breath work, and include cognitive restructuring components. Component 2 involves structured demonstration-based exercise protocols. The rationale is that modeling deficits at 37% low indicate need for concrete and visual instruction rather than verbal or abstract guidance. Implementation would involve video demonstration library showing proper exercise technique from multiple angles, common mistakes and corrections, modifications for different fitness levels, and real displaced persons successfully performing exercises for peer modeling. In-person demonstrations would include slow-motion breakdown of complex movements, opportunity for immediate practice with feedback, and partner or small group practice for social support. Written protocols would include step-by-step instructions with photos, checkboxes for completion tracking, and space for notes and reflections. Digital apps would provide on-demand video access, reminders and prompts, progress tracking, and virtual coaching.

An example protocol format would be as follows for bodyweight squat exercise: stand with feet shoulder-width apart with photo, extend arms forward for balance with photo, lower body by bending knees keeping chest up with photo, descend until thighs parallel to ground with photo, push through heels to return to start with photo, repeat 10-12 times, then checkboxes for completed set 1, completed set 2, and completed set 3, followed by space asking how did this feel. Component 3 involves mindfulness-integrated physical activity. The rationale is

that high rumination at 32% and its strong negative correlation with both adaptation at r = -0.68 and PA readiness at r = -0.52 indicate need for present-moment focus interventions. Implementation would involve mindful movement sessions 2-3 times per week including yoga, tai chi, or qigong adapted for beginners, emphasis on breath-body coordination, non-judgmental awareness of physical sensations, and gentle accessible movements. Mindfulness micro-practices would be integrated into all sessions including 3-5 minute centering exercise at start, periodic body scans during activity, breath-focused cool-down, and brief gratitude or reflection practice at end. Psychoeducation would cover mind-body connections, how rumination affects well-being, physical activity as emotion regulation tool, and recognizing and redirecting negative thought patterns.

An example mindful warm-up taking 5 minutes would proceed as follows: seated or standing, close eyes if comfortable, notice 3 points of contact such as feet on ground or body on chair, take 3 deep breaths noticing sensation of air entering and leaving, scan body from head to toe noticing any tension or discomfort, set intention by saying "For the next hour, I will focus on movement and breath", then open eyes and begin gentle stretching.

Component 4 involves progressive self-regulation skill building. The rationale is that self-regulation explained 22.9% of unique adaptation variance and strongly predicted PA readiness at r = 0.58, indicating it is both important and modifiable. Implementation would involve goal-setting workshops teaching SMART goal principles meaning Specific, Measurable, Achievable, Relevant, and Time-bound, breaking large goals into small steps, anticipating obstacles and planning solutions, and tracking progress systematically. Self-monitoring tools would include activity logs either paper or digital, progress charts with visual feedback, fitness assessments at regular intervals, and reflection journals. Problem-solving training would cover identifying barriers to exercise, generating multiple solutions, evaluating pros and cons of options, and implementing and adjusting plans. Graduated autonomy would progress through weeks 1-4 being highly structured and instructor-led, weeks 5-8 having partial autonomy with guidance, weeks 9-12 being self-directed with check-ins, and ongoing being independent with optional support.

An example goal-setting progression would be: week 1 goal is "I will attend 3 group exercise sessions this week", week 4 goal is "I will complete my home exercise routine 2 times this week", week 8 goal is "I will walk 30 minutes, 4 times per week, and attend 1 group class", and week 12 goal is "I will maintain 150 minutes per week moderate activity independently". Component 5 involves resilience-building through social connection. The rationale is that resilience independently predicted adaptation at $\beta = 0.24$ and can be enhanced through supportive relationships and meaningful engagement. Implementation would involve group-based programming emphasizing shared experience and mutual support, collaborative activities and partner exercises, storytelling and meaning-making, and celebration of collective achievements. Peer support structures would include buddy system pairing participants, peer mentors who are successful participants supporting newcomers, online community forum for sharing experiences, and social events beyond exercise such as healthy cooking classes. Strengths-based approach would involve identifying and leveraging individual talents, opportunities to contribute and help others, recognition of progress and effort, and reframing challenges as growth opportunities. Meaning-making activities would include discussions about values and what matters most, connecting physical activity to personal goals, reflecting on growth and positive changes, and creating narratives of resilience and recovery.

An example peer support structure would have buddy pairs matched based on similar goals and schedules, with weekly check-in calls or messages, attending at least one session together per week, and sharing successes and challenges. Peer mentors would be participants who have completed 12-week program, trained in basic motivational interviewing, supporting 2-3 new participants, and receiving ongoing supervision and support. Component 6 involves differentiated programming based on profiles. The rationale is that substantial individual variability in psychological resources requires tailored approaches rather than one-size-fits-all programming. Implementation would have Track A as high structure for low self-regulation and low resilience, with frequency of 4-5 sessions per week group-based, format being instructor-led and highly predictable routine, intensity being low-moderate with emphasis on safety and success, support through weekly one-on-one check-ins and intensive encouragement, and duration of 16-20 weeks before transitioning. Track B would be moderate structure for moderate profiles, with frequency of 3-4 sessions per week mixing group and independent, format being structured with some choice options, intensity being moderate with progressive challenge, support through bi-weekly check-ins and peer support emphasis, and duration of 12-16 weeks. Track C would be low structure for high self-regulation and high resilience, with frequency being self-determined with minimum 3 times per week, format being self-directed with optional group sessions, intensity being moderate-vigorous with self-paced progression, support through monthly check-ins and leadership opportunities, and duration of 8-12 weeks before full independence. Cross-cutting for all tracks would be mindfulness components, social connection opportunities, progress monitoring and feedback, and access to mental health referrals if needed.

Component 7 involves integration with psychosocial support services. The rationale is that physical activity is one component of comprehensive rehabilitation and integration with other services enhances outcomes. Implementation would involve warm referrals to individual psychotherapy for severe distress, support groups for displaced persons, social services for housing and employment assistance, and medical care for physical health concerns. Collaborative care would include regular communication between PA instructors and mental health providers, shared treatment planning when appropriate, and coordinated approach to goal-setting. Stepped care model would have Level 1 as physical activity program alone for mild-moderate distress, Level 2 as PA plus peer support groups for moderate distress, Level 3 as PA plus individual counseling for moderate-severe distress, and Level 4 as PA plus intensive mental health treatment for severe distress. Implementation considerations include feasibility where the proposed framework is designed for implementation in community settings such as recreation centers, schools, and community organizations rather than requiring specialized facilities. Instructor training requirements would be 20-hour training covering trauma-informed care, motivational interviewing, psychological screening interpretation, and adapted exercise instruction. Cost is estimated at $50-75 per participant for 12-week program including materials, instructor time, and screening. Scalability is achieved through group format allowing 15-20 participants per instructor and digital tools reducing ongoing costs.

Cultural adaptation considerations include that Ukrainian cultural values emphasize community, resilience, and stoicism. Programs should respect cultural norms while gently encouraging emotional expression. Use of Ukrainian language materials and culturally relevant examples is important. Incorporation of traditional movement practices where appropriate should be considered. Sensitivity to war-related triggers such as loud noises and military imagery is essential. Sustainability can be achieved by training peer mentors to reduce reliance on professional staff, developing open-access digital resources for ongoing use, partnering with existing community organizations for long-term hosting, creating train-the-trainer programs for broader dissemination, and establishing alumni networks for continued support. Evaluation should include pre-post assessments of psychological resources and adaptation, ongoing monitoring of attendance and engagement, 3-month and 6-month follow-up assessments, qualitative feedback through focus groups and interviews, and cost-effectiveness analysis comparing to standard care.

Despite the informativeness of obtained results, the study has certain limitations that should be acknowledged. The cross-sectional design means the correlational nature of the study does not allow for causal inferences. While we found strong associations between psychological resources and adaptation, we cannot definitively state that improving self-regulation or resilience will cause improved adaptation. Longitudinal studies are needed to establish temporal precedence and test causal pathways. However, the theoretical framework and existing experimental literature provide strong rationale for the proposed causal directions. Self-report bias is a concern as predominant use of self-report methods may affect objectivity of psychological indicator assessment. Social desirability, recall bias, and limited self-awareness may influence responses. Future research should incorporate objective measures such as cortisol levels for stress and accelerometry for physical activity, behavioral observations, informant reports from family members or service providers, and implicit measures of psychological constructs. Selection bias exists as the sample consisted of individuals already within social or psychological support networks, which may limit generalizability to the entire displaced population. Those most severely affected or socially isolated may be underrepresented. Characteristics of non-responders, who comprised 21.8% of invited individuals, are unknown. Future research should employ community-based recruitment strategies, outreach to isolated individuals, comparison of responders versus non-responders on available demographic data, and multi-site sampling across diverse contexts.

Sample characteristics present limitations as gender imbalance with 65.2% women reflects displacement demographics but limits analysis of gender differences. Age range of 23-59 years excludes older adults and youth who may have different profiles. All participants were from Ukraine so findings may not generalize to other conflict contexts. Displacement duration of 6-28 months is relatively recent and longer-term displaced persons may differ. Measurement limitations include that the Physical Activity Readiness Scale was developed for this study and psychometric validation is needed. IPAQ-SF relies on recall and may overestimate activity levels. Some instruments such as CD-RISC were developed in Western contexts and cultural validity in Ukrainian population requires further validation. No objective fitness measures were included to complement self-reported activity. Statistical considerations include that multiple correlations increase Type I error risk despite Bonferroni correction. Regression model may have omitted relevant variables such as social support, pre-displacement mental health, and trauma severity. Cross-sectional regression cannot establish causality despite statistical control. Potential multicollinearity exists among psychological constructs, for example self-regulation and resilience correlated at $r = 0.52$.

Lack of control or comparison groups is a limitation as there was no comparison with non-displaced Ukrainian population, no comparison with displaced persons receiving different interventions, and we cannot determine

whether findings are displacement-specific or reflect general population patterns. The physical activity component limitation is that while the study examined PA readiness and intentions, actual participation in structured programs was not assessed longitudinally. The proposed interventions require empirical testing to validate effectiveness. Contextual factors include that the study was conducted during ongoing war, creating unique conditions of continued threat and uncertainty. Findings may differ in post-conflict contexts or with different displacement circumstances such as international refugees versus internal displacement. Potential confounds include that pre-displacement psychological functioning is unknown, trauma exposure severity was not systematically assessed, current living conditions and resource access were not comprehensively measured, and physical health status was not controlled. Despite these limitations, the study provides valuable insights into psychological factors relevant to rehabilitation and offers evidence-based framework for intervention development. The limitations primarily affect generalizability and causal interpretation rather than undermining the core findings regarding relationships among variables.

The study also has notable strengths. Comprehensive assessment using multiple validated instruments assessing diverse psychological constructs provides rich and multidimensional data. Adequate sample size with N = 132 provides sufficient power for detecting medium-to-large effects and conducting multivariate analyses. The research is timely and relevant, addressing urgent needs of large and underserved population during ongoing humanitarian crisis. The study is theory-driven, being grounded in established theoretical frameworks including transactional stress theory, self-regulation theory, and resilience theory with clear hypotheses. Practical focus provides direct implications for intervention design rather than purely theoretical contribution. Rigorous analysis uses multiple analytic approaches including correlations, regression, and hypothesis testing with appropriate statistical controls. Ethical compliance includes proper ethical approval and informed consent procedures. Integration of physical activity represents novel focus on PA-based rehabilitation in this population, bridging psychology and exercise science.

Conclusions

This study provides comprehensive evidence for the critical role of self-regulation, emotional regulation, and resilience in psychosocial adaptation of war-displaced individuals, with specific implications for physical activity-based rehabilitation programs. The key conclusions are:

1. War-displaced individuals in Ukraine demonstrate moderate-to-high stress levels (77%), significant self-regulation deficits particularly in modeling (37% low) and programming (23% low) capacities, high prevalence of emotional dysregulation including rumination (32%) and mentalization difficulties (47%), yet substantial psychological flexibility (46% high) suggesting adaptive potential.
2. Self-regulation showed the strongest correlation with adaptation ($r = 0.655$, $p \leq 0.001$) and explained 22.9% of unique variance beyond other factors, confirming it as a primary target for rehabilitation interventions. The specific pattern of deficits—weak modeling and programming but strong results evaluation—provides clear guidance for intervention design.
3. Rumination and mentalization difficulties strongly negatively correlate with both adaptation ($r = -0.68$ and -0.72, $p \leq 0.001$) and physical activity readiness ($r = -0.52$ and -0.48, $p \leq 0.001$), confirming emotional regulation's mediating role between stress and outcomes. Interventions targeting these specific dysregulation patterns are essential.
4. Resilience independently predicts adaptation ($\beta = 0.24$, $p < 0.01$) even controlling for other psychological resources and correlates with physical activity readiness ($r = 0.47$, $p \leq 0.001$). Resilience-building should be integrated into rehabilitation programs with differentiated approaches based on individual resilience levels.
5. Despite low current activity levels (43.9% low PA), high intention to participate (50.8%) combined with strong correlations between psychological resources and PA readiness ($r = 0.41$-0.58) indicates that appropriately designed programs addressing psychological prerequisites can successfully engage this population.
6. The hierarchical regression model explaining 61.2% of adaptation variance demonstrates that psychological resources collectively account for the majority of individual differences in adaptive functioning, supporting comprehensive multi-component interventions rather than single-focus approaches.
7. The evidence supports a Psychologically-Adapted Physical Activity (PAPA) Framework including: (a) pre-program psychological screening; (b) structured demonstration-based protocols addressing modeling deficits; (c) mindfulness integration to counter rumination; (d) progressive self-regulation skill building; (e) resilience-building through social connection; (f) differentiated programming based on psychological profiles; (g) integration with psychosocial support services.
8. While conducted with Ukrainian displaced persons, findings likely generalize to other conflict-affected populations given consistency with international literature on displacement, trauma, and psychological resources.

9. Results support integration of self-regulation theory, emotion regulation theory, and resilience frameworks in understanding adaptation under chronic stress and extend these theories to the physical activity rehabilitation context.
10. With 77% experiencing moderate-to-high stress and substantial psychological resource deficits, war-displaced populations require immediate evidence-based psychosocial rehabilitation interventions. Physical activity programs designed according to the PAPA Framework offer an accessible, scalable, non-pharmacological approach to supporting recovery.

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AI tools. The authors used AI-assisted language editing tools (Claude, Anthropic) to improve English grammar, clarity, and manuscript formatting. All research design, data collection, statistical analyses, and interpretation of results are entirely the work of the authors. No AI was used for data generation or fabrication. The authors take full responsibility for all content and conclusions.

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