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Research Article

Investigating the Links between Physical Activity, Emotion Regulation, and Mental Health: Comparison in Active, Recreational, and Non-athletes

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ABSTRACT

This research aimed to investigate the relationship between physical activity and mental health, focusing on the potential mediating role of emotional regulation. We investigated whether physical activity predicts the degree of distress and whether this potentially significant relationship can be mediated by two strategies of emotion regulation - cognitive reappraisal and emotional suppression. Then, we tested the mentioned mediation model within three subsamples – active athletes, recreational athletes, and non-athletes. A mediation analysis conducted on the entire sample revealed the existence of partial mediation. In addition to the significant total effect, physical activity had a significant direct effect on distress and a significant indirect effect through both tested emotion regulation strategies. More physical activity predicts more use of cognitive reappraisal, which then predicts lower distress. Also, more physical activity predicts more use of emotional suppression, which predicts higher distress. Such results suggest that engaging in physical activity can lead to a decrease and an increase in distress, depending on which emotion regulation strategy a person relies on. Mediation analyses conducted on subsamples provided arguable confirmation of the mediation model only in the case of recreational athletes. The results obtained within the subsamples are discussed in detail.

Keywords: physical activity, mental health, emotion regulation, distress

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Introduction

Psychologists are particularly interested in how people can actively influence their emotional reactions, believing that people are active in expressing their emotions and not just passive recipients. Emotion regulation can be described as an individual's conscious or automatic effort to influence their subjective experience of emotions and the ways of expressing those (Gross et al., 2006). This process involves changes in various aspects of emotion, such as situation, attention, evaluation, subjective experience, behavior, and physiological processes. The goal of emotion regulation is usually to decrease or increase the emotional response – both in intensity and duration (Gross & Thompson, 2007). Researchers mainly focus on regulating negative emotions because reducing the intensity and duration of negative emotions is particularly important for an individual's well-being. Some research findings indicate that differences in how people regulate their emotions can significantly affect various aspects of their lives, including health (Mauss et al., 2007). At the end of the 20th century, James Gross formulated the most comprehensive theoretical framework of emotion regulation through his Process Model of the Origin of Emotions (Gross, 1998), which became widely accepted in different areas of psychology (Gross et al., 2006). According to this model, the beginning of an emotional process is a situation or a mental representation a person evaluates. This evaluation triggers adaptive responses to that situation, including experiential, behavioral, and physiological aspects. All of these responses can be modulated, which shapes the final expression of emotion. Lazarus provides empirical support for these considerations with a series of studies that show a measurable benefit from specific ways of emotion regulation (Lazarus & Folkman, 1984, according to Gross, 1998). Those studies conclude that emotion regulation causes changes in the dynamics of emotions because it affects the appearance, intensification, maintenance, and mitigation of experiential and behavioral reactions, and physiological processes that underlie them (Ochsner & Gross, 2005).

Forms of emotion regulation are generally divided into antecedent-focused and response-focused strategies. Antecedent-focused strategies refer to the regulation of an activating situation, precisely to our actions,

before an emotional response is fully developed, changing our behavior and peripheral physiological response. On the other hand, response-focused strategies allude to the regulation of emotional reactions that occur later in regulating the activating situation. It refers to an emotional response that has already occurred to reduce a solid physiological and inappropriate behavioral response (Gross & John, 2003). Gross and John (2003) chose one from both general groups of emotion regulation strategies and proposed a distinction between cognitive and behavioral emotion regulation. Cognitive emotion regulation is the reinterpretation of an emotionally arousing situation in a way that changes the emotional response, and this strategy is called cognitive reappraisal. Behavioral emotion regulation suppresses the outwardly visible expression of an emotional response. Hence, the name of this strategy is emotional suppression. Therefore, emotional suppression refers to an emotional response that has already occurred, and cognitive reappraisal occurs before the emotional response occurs, thereby affecting its intensity and quality (Ochsner & Gross, 2005). Previous findings suggest that emotional suppression of positive emotions reduces their subjective experience, but this is not true regarding negative emotions (e.g., Gross, 1999). Additionally, people who use cognitive reappraisal experience more positive and less negative emotions, while those who use emotional suppression experience and express less positive emotions but experience more negative emotions (e.g., Gross & John, 2003).

In previous research, physical activity has been examined as a supplementary activity within the framework of emotion regulation (e.g., Zhang et al., 2019). In general, the significance of the relationship between physical exercise and mental health has grown considerably in contemporary scientific inquiry (e.g., Rebar et al., 2015). Researchers are exploring a spectrum of interests, ranging from its preventive role of physical activity in mental well-being (e.g., Chekroud et al., 2018) to its potential as a therapeutic intervention for mental health disorders (e.g., Zschucke et al., 2013). According to Caspersen et al. (1985), physical activity encompasses any movement initiated by skeletal muscles that necessitates energy consumption. It includes movement in various contexts, such as leisure activities, transportation, or occupational tasks. Both moderate and vigorous physical activities have health-enhancing effects. Although they are synonyms in everyday life, separating the term physical exercise from the

term physical activity is necessary. Physical exercise refers to a segment of physical activity distinguished by its deliberate, organized, and repetitive nature, aiming directly or indirectly at enhancing or preserving physical fitness (Caspersen et al., 1985). This research focuses on the broader term – physical activity and its relationship with emotion regulation and mental health of people from the general population. More specifically, we are interested in whether physical activity significantly predicts the respondents' distress and whether emotion regulation mediates this relationship. Previous research has revealed that emotion regulation is closely related to physical activity (e.g., Neta et al., 2019) and various problems from the domain of psychopathology (e.g., Garnefski et al., 2002). Despite the close association between physical activity and different mental health indicators, it is rare to find studies investigating emotion regulation as a potential mechanism mediating the relationship between these two constructs (e.g., Fuentealba-Urra et al., 2023). Therefore, this study aimed to determine whether emotion regulation is the mechanism by which physical activity is related to the distress of the respondents. Due to the consistent findings of previous studies, showing that different intensity of physical activity has differental connections with mental health indicators (e.g., Wicker & Frick, 2015), we will examine the mentioned relationship separately in active athletes, recreational athletes, and non-athletes.

Method

Participants and Procedure

The sample consisted of 1061 respondents from the general population, comprising 713 females (67.20%) and 348 males (32.80%), aged between 18 and 75 years (M = 26.05, SD = 10.00). In addition, this sample included 184 active athletes (17.34%), 557 recreational athletes (52.50%), and 320 non-athletes (30.16%). The respondents' age is shifted towards younger adulthood, most likely due to how the sample was collected. Respondents filled out an online questionnaire in Google Forms as part of a larger project related to connecting physical activity with mental health between March 2022 and October 2023. The sample is suitable because students collected it as part of their coursework, for which they received

additional course credits. The inclusion criterion for research participation was that the potential respondent was an adult (at least 18 years old); respondents who did not meet this criterion were excluded from the final sample. All respondents consented to voluntary participation by selecting a respective option in the online questionnaire.

Instruments and variables

The Godin Leisure-Time Exercise Questionnaire (GLTEQ)

The Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin, 2011; adapted into Serbian by Popov et al., 2021) is a self-administered assessment tool for weekly physical activity levels. In this context, physical activity refers to activities performed for at least 15 minutes during the week prior to completing the questionnaire. Responses provided by participants allow for the classification of physical activity into three distinct categories: light (e.g., yoga, leisurely walking), moderate (e.g., casual cycling, tennis), and strenuous (e.g., running, roller skating). The total leisure activity score is computed by multiplying the weekly frequencies of activity in each category by their respective metabolic equivalents ([Strenuous x 9] + [Moderate x 5] + [Light x 3]; Godin, 2011).

Self-assessment of Physical Activity

In addition to administering the GLTEQ, participants were questioned regarding their self-perceived physical activity status, delineating between categories such as non-athletes, recreational athletes, or active athletes.

The Depression, Anxiety, Stress Scale (DASS-21)

The Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) is a 21-item instrument comprising three distinct subscales. The Depression subscale gauges manifestations of dysphoria, helplessness, anhedonia, inertia, and diminished self-esteem (α=.90, seven items, e.g., "I felt that I had nothing to look forward to."). The Anxiety subscale quantifies physiological arousal, somatic reactions, and subjective experiences of situational anxiety (α=.90, seven items, e.g., "I felt scared without any good reason."). Lastly, the Stress subscale evaluates chronic, non-specific arousal, incapacity to relax, nervousness, impatience, proneness to

agitation, irritability, and tendencies to over-react (α=.88, seven items, e.g., "I tended to over-react to situations."). The purpose of the DASS-21 is to provide a comprehensive assessment of an individual's emotional state. Responses are elicited using a four-point Likert-type scale ranging from (0) "*not at all*" to (3) "*mostly, almost always*."

Emotion Regulation Questionnaire (ERQ) - The Serbian Adaptation

The Serbian adaptation of the ERQ emotion regulation questionnaire (Popov et al., 2016) contains ten items and measures two distinct emotion regulation strategies. The first strategy is Cognitive Reappraisal (CR), which occurs before the emotional response is completely formed. It involves reinterpretation of an emotionally evoking situation, aiming to change its emotional impact. For example, "When I find myself in a stressful situation, I try to think about it in a way that helps me stay calm." This item reflects the use of cognitive reappraisal to reduce stress. The second strategy is Emotional Suppression (ES), which regulates an already-formed emotional response. It involves inhibiting the outward expression of emotions. For example, "I control my feelings by not showing them." This item reflects the use of emotional suppression to manage emotional reactions. A seven-point Likert-type scale for answering, from (1) "*do not agree at all*" to (7) "*completely agree*," was used as a response format.

Results

Descriptive parameters are shown in Table 1. According to the values of skewness and kurtosis, all variables were normally distributed (skewness < ±2, kurtosis < ±7; Hair et al., 2010).

Table 1

Descriptive parameters of the variables

	Theoretical range	Empirical range	*M*	*SD*	*Sk*	*Ku*
Physical Activity (GLTEQ)	0-119	0-119	34.12	26.72	1.09	.97
Distress (DASS-21)	0-63	0-63	20.84	15.61	.65	-.49

Cognitive Reappraisal (CR)	6-42	6-42	27.66	7.40	-.20	-.33
Emotional Suppression (ER)	4-28	4-28	15.00	5.64	.14	-.56

Intercorrelations among variables are shown in Table 2. The leisure physical activity correlated statistically significantly with all other examined variables. More specifically, leisure physical activity exhibited a low negative correlation with distress and a low positive correlation with cognitive reappraisal. There is also a positive but higher correlation with emotional suppression. Such results suggest that more leisure physical activity was associated with lower distress and more frequent use of both tested emotion regulation strategies, especially emotional suppression. Aside from the correlation with leisure-time physical activity, emotional suppression achieved statistically significant, moderate, and positive correlations with cognitive reappraisal and distress. Therefore, among the respondents who recorded more use of emotional suppression, greater use of cognitive reappraisal was also detected, and so was a higher degree of distress.

Table 2

Intercorrelations among the variables

		1	2	3	4
1	Physical Activity (GLTEQ)	-			
2	Distress (DASS-21)	-.069*	-		
3	Cognitive Reappraisal (CR)	.067*	.002	-	
4	Emotional Suppression (ER)	.105**	.232**	.256**	-

Note. * $p < .05$. ** $p < .01$.

In order to test the differences in all examined variables between groups with various levels of physical activity (non-athletes, recreational athletes, and active athletes), we conducted a one-way analysis of variance. The results revealed small to large statistically significant between-group effects in the case of all examined variables (physical activity, distress,

cognitive reappraisal, and emotional suppression; Table 3). Games-Howell post-hoc test for multiple comparisons (Games & Howell, 1976) found that physically inactive respondents reported significantly higher scores on distress compared to recreational athletes (*Mdif* = 5.16, 95% CI [2.52, 7.80], *p* = .003), as well as compared to active athletes (*Mdif* = 6.98, 95% CI [3.59, 10.37], *p* < .001). At the same time, recreational athletes and active athletes did not significantly differ in their scores on the distress scale (*Mdif* = 1.82, 95% CI [-1.16, 4.80], *p* = .319). Regarding cognitive reappraisal, there was a statistically significant difference only between inactive respondents and recreational athletes (*Mdif* = -1.57, 95% CI [-2.81, -.33], *p* = .007). On the other hand, there were no statistically significant differences between inactive respondents and active athletes (*Mdif* = -.95, 95% CI [-2.62, .71], *p* = .372), and between recreational athletes and active athletes (*Mdif* = .62, 95% CI [-.88, 2.11], *p* = .601). Examining the differences in emotional suppression, a statistically significant difference was obtained only between recreational athletes and active athletes (*Mdif* = -1.22, 95% CI [-2.34, -.10], *p* = .034). Conversely, no statistically significant differences were found between inactive respondents and recreational athletes (*Mdif* = .25, 95% CI [-.71, 1.20], *p* = .822) nor between inactive respondents and active athletes (*Mdif* = -.98, 95% CI [-2.24, .28], *p* = .158).

Table 3

Differences among the variables due to the level of physical activity

Groups 0: non-athletes (n = 320) 1: recreational athletes (n = 557) 2: active athletes (n = 184)		*F* (*df* = 2, 1058)	ω^2	Games-Howell post-hoc test
	M (SD)			
Physical Activity (GLTEQ)	0: 15.33 (15.23) 1: 35.37 (21.18) 2: 63.00 (30.11)	289.121**	.35	2 > 0, 1 1 > 0
Distress (DASS-21)	0: 24.77 (16.66) 1: 19.60 (14.79) 2: 17.78 (14.91)	15.823**	.03	0 > 1, 2
Cognitive Reappraisal (CR)	0: 26.67 (7.77) 1: 28.24 (7.07) 2: 27.63 (7.56)	4.599*	.01	0 < 1

Emotional Suppression (ER)	0: 14.96 (6.02) 1: 14.72 (5.38) 2: 15.94 (5.65)	3.281*	.01	2 > 1

Note. ω^2 of value .01 indicates a small effect, .06 indicates a medium effect, and .14 indicates a large effect (Field, 2013).
* $p < .05$. ** $p < .01$.

In the following step, parallel multiple mediation analysis was applied. Mediation analysis is a statistical method used to test hypotheses about how some causal predictor variable X transmits its effect on a criterion variable Y. In a parallel multiple mediation model, predictor variable X is modeled as influencing criterion variable Y directly and indirectly through two or more mediators (Hayes, 2022). In this research, the predictor variable was physical activity, the criterion variable was distress, and two emotion regulation strategies - cognitive reappraisal and emotional suppression were included as potential mediators.

Table 4

Parameters of tested regression models for the total sample

Model	Path	*R*	R^2	ΔR^2	*F (df1, df2)*	*p*
1	X on Y	.07	.01	.01	5.311 (1, 1059)	.022
2	X on M1	.07	.01	.01	4.768 (1, 1059)	.032
	X on M2	.10	.01	.01	11.790 (1, 1059)	.000
	X, M1 and M2 on Y	.26	.07	.06	24.759 (3, 1057)	.000

Note. X – physical activity as a predictor variable. Y – distress as a criterion variable. M1 – cognitive reappraisal as mediator 1. M2 – emotional suppression as mediator 2.

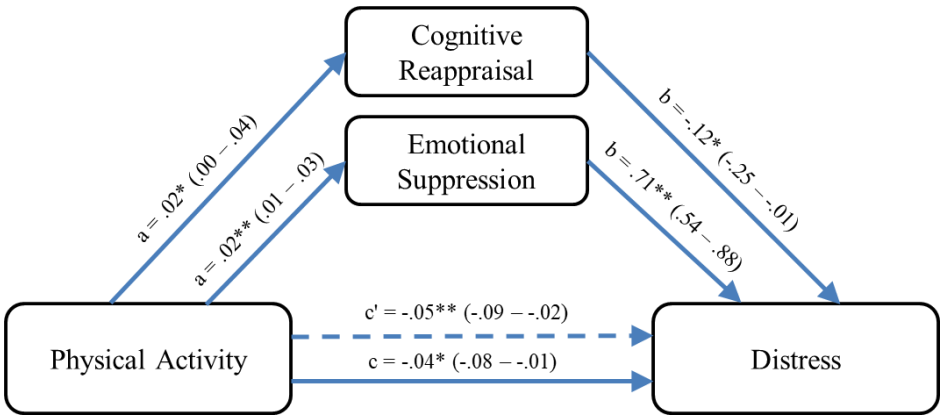
Table 4 shows the results of the simultaneous examination of the mediating role of two emotion regulation strategies in the relationship between physical activity and distress in the entire sample. As shown in the model in Figure 1, the total effect of physical activity on distress was small but statistically significant. When fractioning the total effect, the direct effect was also statistically significant. The same occurs when it comes to the indirect effect. Taking into consideration the previously written, this model

suggests the existence of partial mediation, where some of the effects of physical activity on distress follow a direct pathway. Other portions followed an indirect pathway via both tested strategies of emotion regulation. The explication of the shown model also suggests a conclusion about the opposite regression effect of emotional suppression on both the total and indirect effects. Namely, more physical activity within the total effect predicts lower distress.

Additionally, more physical activity predicts more cognitive reappraisal, which predicts lower distress. On the other hand, more physical activity predicts more emotional suppression and more emotional suppression predicts higher distress, which is statistically the most significant result. It is assumed that they reduce the significance of physical activity's total and indirect effect on the degree of distress.

Figure 1

Mediation model of emotion regulation between physical activity and distress in the total sample



Note. all values are unstandardized regression coefficient values with 95% confidence intervals, bootstrapped on 5000 randomly generated data sets. a – effect of X on M. b – effect of M on Y. ab – indirect effect X through M. c' - direct effect of X on Y. c – total effect of X on Y. * $p < .05$. ** $p < .01$.

After observing the entire sample, the presented interrelationships between the variables were tested within each subsample, with the subsamples being formed based on the respondents' engagement in physical activity. For the subsample of active athletes, the results of simultaneously examining the mediating role of two emotion regulation strategies in the relationship between physical activity and distress are shown in Table 5.

Table 5

Parameters of tested regression models for active athletes

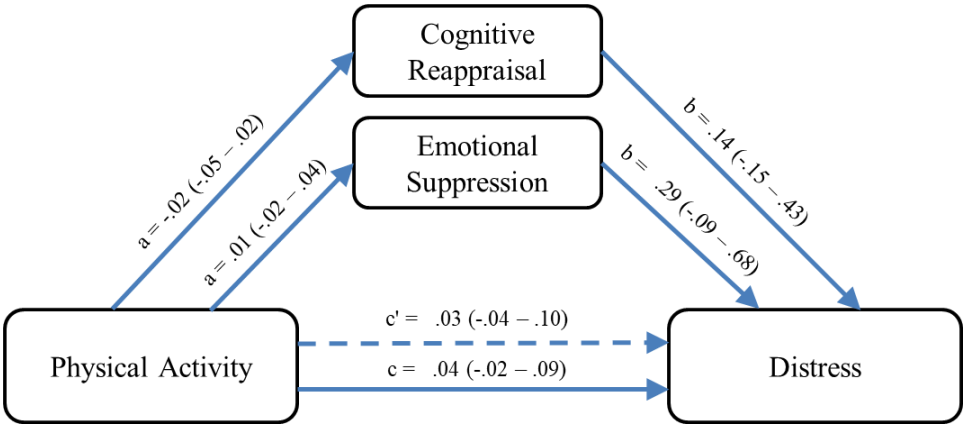
Model	Path	*R*	R^2	ΔR^2	*F (df1, df2)*	*p*
1	X on Y	.05	.01	.01	.609 (1, 182)	.222
2	X on M1	.07	.01	.01	.861 (1, 182)	.351
	X on M2	.05	.00	.00	.503 (1, 182)	.482
	X, M1 and M2 on Y	.15	.02	.01	1.411 (3, 180)	.243

Note. X – physical activity as a predictor variable. Y – distress as a criterion variable. M1 – cognitive reappraisal as mediator 1. M2 – emotional suppression as mediator 2.

As shown in the model in Figure 2, all tested relations are statistically insignificant. In the case of active athletes, more physical activity did not predict lower distress, nor did the use of either tested emotion regulation strategy. Also, the use of the tested strategies did not predict the degree of distress experienced by active athletes. These results strikingly deviate from those obtained on the total sample and justify the examination of the mentioned relations on the remaining subsamples.

Figure 2

Mediation model of emotion regulation between physical activity and distress in the subsample of active athletes



Note. All values are unstandardized regression coefficient values with 95% confidence intervals, bootstrapped on 5000 randomly generated data sets. a – effect of X on M. b – effect of M on Y. ab – indirect effect X through M. c' - direct effect of X on Y. c – total effect of X on Y. * $p < .05$. ** $p < .01$.

Examining whether emotion regulation strategies mediate the relationship between physical activity and distress in a subsample of recreationists indicated the existence of several statistically significant relationships but not the significance of the total effect (Table 6).

Table 6

Parameters of tested regression models for recreational athletes

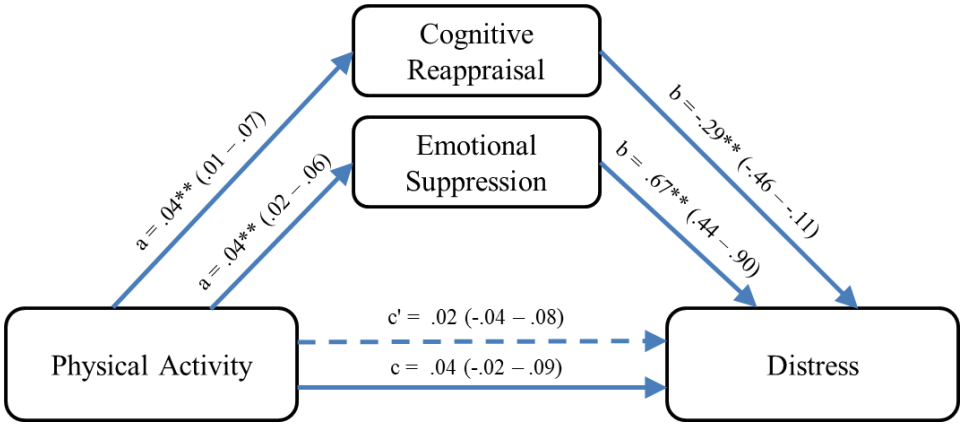
Model	Path	*R*	R^2	ΔR^2	*F (df1, df2)*	*p*
1	X on Y	.05	.01	.01	1.494 (1, 555)	.223
2	X on M1	.12	.01	.01	7.648 (1, 555)	.011
	X on M2	.17	.03	.03	15.991 (1, 555)	.000
	X, M1 and M2 on Y	.26	.07	.06	12.933 (3, 553)	.000

Notes. X – physical activity as a predictor variable. Y – distress as a criterion variable. M1 – cognitive reappraisal as mediator 1. M2 – emotional suppression as mediator 2.

More precisely, the results indicate that more physical activity significantly predicts more cognitive reappraisal, which predicts a lower degree of distress. Also, more physical activity predicts more significant use of emotional suppression, which predicts higher levels of distress. However, the model shown in Figure 3 indicates that physical activity does not predict distress in recreational athletes. In the next section, the absence of a significant total effect will be discussed, as well as whether the assumption of the existing mediation is still acceptable.

Figure 3

Mediation model of emotion regulation between physical activity and distress in the subsample of recreational athletes



Note. All values are unstandardized regression coefficient values with 95% confidence intervals, bootstrapped on 5000 randomly generated data sets. a – effect of X on M. b – effect of M on Y. ab – indirect effect X through M. c' - direct effect of X on Y. c – total effect of X on Y. * $p < .05$. ** $p < .01$.

Table 7 shows the results related to the subsample of the non-athletes, which were obtained when the mediating role of emotion regulation in the relationship between physical activity and distress was examined.

Table 7

Parameters of tested regression models for non-athletes

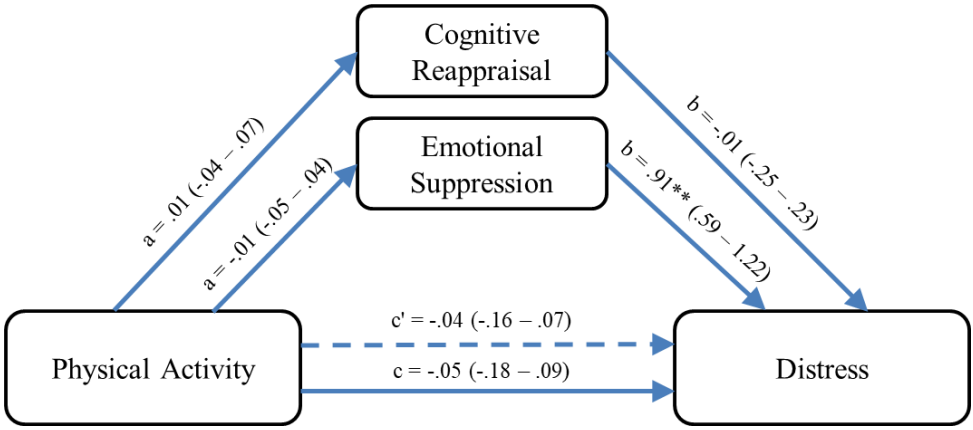
Model	Path	*R*	R^2	ΔR^2	*F (df1, df2)*	*p*
1	X on Y	.05	.01	.01	.680 (1, 318)	.411
2	X on M1	.03	.00	.00	.228 (1, 318)	.633
	X on M2	.02	.00	.00	.091 (1, 318)	.761
	X, M1 and M2 on Y	.33	.11	.10	12.772 (3, 316)	.000

Note. X – physical activity as a predictor variable. Y – distress as a criterion variable. M1 – cognitive reappraisal as mediator 1. M2 – emotional suppression as mediator 2.

As shown in the model in Figure 4, all tested relations were statistically insignificant except one. In the case of non-athletes, more physical activity did not predict lower distress, nor did the use of either tested emotion regulation strategy. The exception of the only significant result suggests that in our non-athlete subsample, more emotional suppression significantly predicts higher levels of distress. However, this is a subsample characterized by a rare or complete absence of physical activity, and the insignificant relationship of this variable with all other tested variables was not surprising.

Figure 4

Mediation model of emotion regulation between physical activity and distress in the subsample of non-athletes



Note. All values are unstandardized regression coefficient values with 95% confidence intervals, bootstrapped on 5000 randomly generated data sets. a – effect of X on M. b – effect of M on Y. ab – indirect effect X through M. c' - direct effect of X on Y. c – total effect of X on Y. * $p < .05$. ** $p < .01$.

Discussion

This research aimed to investigate the relationship between physical activity and mental health, focusing on the potential mediating role of emotional regulation. When focusing solely on the connection between physical activity and mental health, previous research has shown a significant but complex relationship (e.g., Stubbs et al., 2018). The absence of physical activity or very little physical activity can be used as a predictor of the development of mental disorders (e.g., Teychenne et al., 2020) and vice versa – people with diagnosed mental disorders consistently report reduced or no physical activity (e.g., Scheewe et al., 2019). Because of findings like these, physical activity is assumed and proposed in practice as a tool for preventing mental health issues and improving existing mental health challenges (e.g., Mizrahi et al., 2023). In our previous study (Popov et al., 2023), physically inactive individuals scored lower on all measures of

positive mental health indicators and higher on all measures of negative mental health indicators compared with recreational athletes and active athletes. At the same time, there were no significant differences in these measures between recreationists and active athletes. This finding is consistent with the results of numerous studies conducted abroad, according to which frequent moderate to vigorous physical activity is beneficial for people's mental health in general (e.g., Wiese et al., 2017), as well as for reducing psychological distress (e.g., Gucciardi et al., 2019) – an indicator of mental health that we used in this paper. However, as a particular limitation of previous studies, some authors emphasize not dealing with a fundamental conceptual understanding of the relationship between physical exercise and mental health. More specifically, research attention is usually not focused on explaining the underlying processes by which physical activity affects people's mental health (Martin & Wade, 2000). There are several mechanisms by which some authors explain how an increase in physical activity reduces the degree of distress. It is theorized that moderate to strenuous physical activity facilitates the activation of adaptive psychological and social mechanisms – for example, the growth of self-esteem or the reduction of loneliness – which may protect against psychological distress (e.g., Cairney, 2009).

Emotion regulation has been previously suggested as a potential mediator in the relationship between physical activity and overall well-being (e.g., Booker et al., 2014) or with different mental health indicators (e.g., Yang et al., 2024). However, we had difficulties finding a study where distress was selected as such an indicator. We started from the assumption that emotion regulation can mediate the relationship between physical activity and distress, given that emotion regulation strategies and physical activity are related constructs (e.g., Neta et al., 2019). One of the two strategies of emotion regulation included in this paper is cognitive reappraisal, which refers to a reinterpretation of an emotionally arousing situation in a way that changes the emotional response to the situation (e.g., Gross & John, 2003). This emotion regulation strategy is considered to be related to physical activity, given that physical activity can also be used as a form of reassessment. When experiencing distress, physical activation can help redirect attention, allowing a person to reassess the situation more positively – and this change in focus can further help reduce distress (Perchtold-Stefan

et al., 2020). Emotional suppression, another tested strategy, attempts to hide, inhibit, or reduce outwardly visible expression of an emotional response (e.g., Gross & John, 2003). This emotion regulation strategy is also related to physical activity because physical activity can express the emotions a person typically suppresses. Diminishing emotional suppression and physical activity enables individuals to express their emotions, which can reduce acute emotional distress (Edwards et al., 2018).

The obtained results indicate that physically inactive respondents had significantly higher symptoms of distress compared to recreational athletes and active athletes. In contrast, recreational and active athletes did not significantly differ in the scores on the distress scale. This finding completely corresponds to the findings of previously mentioned studies that inactive individuals are more emotionally agitated than those who are physically active. Regarding cognitive reappraisal, the only difference large enough to be declared statistically significant was between physically inactive and recreationally active individuals. More precisely, recreational athletes used cognitive reappraisal significantly more than physically inactive respondents. This corresponds to the previously mentioned finding that people who engage in physical activity are less distressed, whereby a lower degree of distress is also associated with people who perform emotion regulation through cognitive reappraisal. The lack of significance between inactive respondents and active athletes can be explained by the finding that active athletes engage in physical activity for different reasons from recreational athletes. Active athletes engage in physical activity professionally and according to a predetermined schedule rather than following their current psychological needs (which is the feature of recreational athletes). Because of this circumstance, the mechanisms by which physical activity affects mental health can be completely different, even though both groups are physically active. Examining the differences in emotional suppression, the only difference large enough to be declared statistically significant was between recreational and active athletes. Active athletes used significantly more emotional suppression than recreationists, which confirms what was written previously – it is justified to assume that the activation of different psychological mechanisms, such as different

emotion regulation strategies, can accompany different psychological approaches to physical activity.

Examination of the mediating role of emotion regulation strategies in the relationship between physical activity and distress in the entire sample indicates the existence of partial mediation. In addition to the significant total effect, physical activity had a significant direct effect on distress and a significant indirect effect through both tested emotion regulation strategies. Such results suggest that more physical activity predicts lower distress in a general population sample. Additionally, more physical activity predicts more use of cognitive reappraisal, which predicts lower distress. On the other hand, in contrast to our initial expectations, more physical activity predicts more use of emotional suppression. After that, it was to be expected that more use of emotional suppression predicts higher distress. This means that engaging in physical activity can decrease or increase distress, depending on the emotion regulation strategy a person uses. Cognitive reappraisal unambiguously leads to a lower degree of distress. As already stated, if physical activity is defined as an opportunity to ventilate emotional states that a person usually suppresses, physical activity should also lead to a reduction of distress through the reduction of emotional suppression. However, the findings obtained in this study lead to the conclusion that physical activity also distracts from emotional states; for example, it allows the individual to continue suppressing emotions, which is consequently associated with higher distress. This conclusion aligns with studies showing that the suppression of emotions negatively impacts people's mental health, including emotional distress (e.g., Cutuli, 2014).

When observing separate subsamples, the following can be concluded: In the case of active athletes, more physical activity did not predict lower distress, nor did the use of both tested emotion regulation strategies. Furthermore, using the tested strategies also did not predict the degree of distress. The absence of a significant relationship between physical activity and distress may be initially surprising. However, it can be explained by the fact that the practice of physical activity in active athletes drastically differs from that in those who do not engage in it professionally. Unlike recreational athletes, for active athletes, engaging in physical activity brings both pleasure and stress, which arises from competitive experiences or the

complex social and organizational environment in which athletes work (Fletcher & Arnold, 2017). Therefore, it can be assumed that physical activity can have a dual effect on distress; these two effects suppress each other, which is why an insignificant association was obtained. The subsample of non-active individuals shows that almost all tested relationships were insignificant. However, this result is not surprising given that we are talking about individuals who minimally or do not engage in physical activity. Therefore, it is reasonable to conclude that, in their case, the construct of physical activity is insignificantly related to all other variables tested in the mediation model. Lastly, in the case of recreational athletes, more physical activity did not predict lower distress but predicted the use of both tested emotion regulation strategies, and the use of both strategies of emotion regulation predicted the degree of distress. More precisely, more physical activity significantly predicts more cognitive reappraisal, which predicts a lower degree of distress, and more emotional suppression, which predicts higher levels of distress.

Nevertheless, the results indicate that physical activity does not predict distress in recreational athletes, which begs whether the absence of a significant total effect still allows testing the assumption of the existing mediation. Historically, it has been considered justified to conduct a mediation analysis only if three essential criteria are met; the first is that predictor variable and criterion variable are significantly related (Baron & Kenny, 1986). However, in recent years, there has been a growing awareness that such thinking is wrong and outdated and that the lack of correlation does not disprove causation. Mediation analysis no longer imposes evidence of a simple association between predictor variable X and criterion variable Y as a precondition, i.e., the correlation between X and Y is not necessary for testing a mediation between them (Hayes, 2022). Guided by that, we will interpret the obtained results as a confirmation of the mediating role of emotion regulation strategies in the relationship between physical activity and distress in recreational athletes. This means that in a sample of recreational athletes, more physical activity predicts more use of cognitive reappraisal, and more use of this strategy predicts lower distress. Also, more physical activity predicts more use of emotional suppression, and more use of this strategy predicts higher distress. Engaging in physical activity can have

positive and negative effects on the distress of recreationists, depending on which emotion regulation strategy they use. Direct practical implications arise from the mentioned finding, given that it has been identified what should be encouraged and what should be changed in people who engage in recreational physical activity in order for this activity to have a positive impact on people's mental health.

Concerning the practical implications of the results according to subsamples, we can conclude the following: In professional athletes, physical activity alone does not directly lead to distress reduction, nor do the examined emotion regulation strategies. These results indicate that physical activity in a competitive environment has a more complex psychological impact, including positive emotions and stress. Therefore, interventions aimed at reducing distress in active athletes should focus on managing specific stressors (e.g., organizational or competitive) and not only increasing physical activity or changing emotion regulation strategies. On the other hand, supporting more frequent physical activity in recreational athletes might be beneficial to their mental health, but its effectiveness depends on applied emotion regulation strategies. Encouraging cognitive reappraisal (which lowers distress) and discouraging emotional suppression (which increases distress) can help recreational athletes better manage their emotions and improve mental health outcomes. Finally, considering that the level of distress in inactive individuals is the highest, but in the mediation analysis, physical activity is unrelated to the degree of distress or emotional regulation, the proposed interventions would have to be more complex. Encouraging physical exercise alone may not bring immediate mental health benefits, so simultaneously addressing other factors that affect emotional well-being is recommendable.

This study's cross-sectional design limits its ability to establish causality between physical activity, emotion regulation, and distress. The proposed predictive relationships are based on theory and prior findings. In addition, gender and age differences in physical activity, degree of distress, or use of emotion regulation strategies were not taken into account. Overcoming these limitations is recognized as a guideline for future research work. Finally, self-report questionnaires are prone to recall biases (Schuch et al., 2018). Future studies should use objective measures for physical activity

and ensure accurate classification of participants into active, recreational, or inactive categories.

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Conflict of interest

We have no conflicts of interest to disclose.

Data availability statement

Data files are available upon a reasonable request.

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