`Research article`

Perfectionism Moderates the Effects of Goal-Realization on Post-Competition Mood in Amateur Runners

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Abstract

Perfectionism impacts how athletes evaluate their performance. However, little is known about how perfectionistic strivings and perfectionistic concerns interplay with athletes' anticipated and actual performance in predicting mood after the competition. Thus, we conducted a study with amateur runners [n = 152, (72 female, 80 male); Mean±SD age = 34.71 ± 9.57] taking part in a competitive 10-kilometer street run. Perfectionism was measured before the run, while the measurement of mood was taken during the post-competition week. Mood was operationalized in the 3D model of mood, distinguishing between energetic arousal, tense arousal, and hedonic tone. Regression analysis showed that specific patterns of associations between perfectionism and goal-realization explain 17-21% of variance in the dimensions of mood. Higher pleasure after the run was predicted by lower perfectionistic concerns and better conversion of anticipated performance into actual performance. In predicting energy and tension, moderating effects of perfectionistic strivings, perfectionistic concerns, and conversion rate were observed. Johnson-Neyman technique revealed that only athletes low in perfectionistic concerns were able to benefit from lower tension when they met or exceeded their goals for the run. The higher athletes' perfectionistic strivings and conversion rate the more pronounced effects we observed for affect-energization. Results support the idea of perfectionistic reactivity, where the negative consequences of perfectionism can be observed in a lack of positive reactions to positive events. We also suggest that such a response to meeting or exceeding one's goal may contribute to the development of athlete burnout and hinder the development athlete engagement.

Key words: Performance, perfectionistic strivings, perfectionistic concerns, perfectionistic reactivity, goal-progress.

Introduction

When preparing for competition, both professional and amateur athletes invest their time and effort in training to achieve optimal performance during competitions - under very specific conditions of pressure and accompanying intense emotions (Hanin, 2007). Following the end of a match or a tournament, athletes' mood can reflect various factors, including liberation from pressure, pleasure in their accomplishments, and disappointment in failing to reach personal goals (Gaudreau and Blondin, 2004; Martinent and Nicolas, 2017). Personality traits such as perfectionism may influence how athletes evaluate their performance and regulate their emotional reactions (Kucharski et al., 2018). In the present paper, we investigate the associations between perfectionism, goal-realization and post-competition mood in amateur runners.

Perfectionism

Perfectionism is a personality disposition in which setting exceedingly high standards and striving for flawlessness (perfectionistic strivings) are accompanied by overly critical evaluations of one's behaviors (perfectionistic concerns) (Stoeber, 2018). A large body of research supports the differentiation of perfectionistic strivings and perfectionistic concerns as two higher-order dimensions, emerging across different approaches (Bieling et al., 2004; Hill, 2016). While perfectionistic concerns are clearly and consistently associated with a number of maladaptive and detrimental effects in relation to athletes' emotions, motivation, and well-being (Jowett et al., 2016), perfectionistic strivings show more ambiguous associations with athlete's functioning in sport. Perfectionistic strivings may be predictive of superior performance in sport (Stoeber et al., 2009; Mallinson-Howard et al., 2021; Waleriańczyk and Stolarski, 2021), but their association with performance after failure may be both positive and negative, depending on the level of perfectionistic concerns (Lizmore et. al., 2019). Perfectionistic strivings are also related to a mix of both positive and negative emotional and motivational outcomes (Gotwals et al., 2012; Hill et al., 2018). It is worth highlighting that even though perfectionism is sometimes positioned among the most important characteristics of successful athletes (Gould et al., 2002), the current literature does not offer clear conclusions on whether perfectionism differs depending on athletes' sport level (see Hill et al., 2018). Furthermore, in a long-term perspective, a higher level of perfectionism may even be viewed as a vulnerability factor for athletes (Flett and Hewitt, 2016).

It is also important to underline that perfectionistic strivings and concerns are two aspects of the same phenomenon and should not be regarded as two types of perfectionism. Both perfectionistic strivings and concerns are thought to exist in every person, varying in intensity (Hill, 2020). Furthermore, they manifest in various areas of life for different people - one's perfectionistic strivings and concerns may differ significantly depending on whether they are assessed in regard to work, sport, or life overall (Stoeber and Stoeber, 2009). Finally, presenting the overall impact of the construct is possible only when both dimensions of perfectionism are measured together (Dunn et al., 2020) as different combinations of low/high perfectionistic strivings and concerns may produce various outcomes (Hill, 2021; Waleriańczyk and Stolarski, 2021). In the present study we investigate how perfectionistic strivings and perfectionistic concerns moderate the effects of goal-realization in predicting runners' post-competition mood.

Assessment of post-performance mood

Assessment of the mood-related phenomena accompanying sport performance and physical activity has been conducted using various measures that were developed based on different conceptual approaches. As a result, particular studies may in fact investigate qualitatively distinct, albeit interrelated emotional phenomena. Thus, it is essential to recognize differences between the basic terms in this area, including affect, emotions, and moods (see Boyle et al., 2014). Gray and Watson (2007) emphasize that mood is a broader construct than emotion, as the former term depicts feelings that typically last longer and are less intense than the latter. In the performance context, moods may represent an integration of various cues to personal well-being, including physiological responses, cognitive appraisals, and strategies for self-regulation (Matthews et al., 2002). Both emotions and moods contain so-called core affective feelings (Russell and Barrett, 1999), that is, elementary states such as activation and pleasure. The context of competitive sport naturally can elicit discrete emotions; however, its enduring affective costs and benefits that interact with the athlete's motivations and overall well-being refer to more persistent affective phenomena. Thus, in the present study, we focused on the post-competition mood rather than post-competition emotions.

The great majority of variance in mood states can be attributed to two or three underlying dimensions (see Matthews et al., 1990; Thayer, 1989). One of the most commonly used mood scales, the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), measures two basic mood features - positive and negative affect, comparable with Thayer's (1989) biopsychological dimensions - energetic arousal and tense arousal. However, more differentiated models of mood may be more informative in conducting research within the domain of sport and exercise psychology (Stolarska et al., 2019). Therefore, in the present study, we decided to apply a three-dimensional model of mood (Matthews et al., 1990) which supplements the two aspects of arousal distinguished by Thayer (1989) with a hedonic tone dimension, contrasting pleasure and contentment with sadness and dissatisfaction. Although related to higher energy and lower tension, hedonic tone constitutes a distinct dimension in correlated factor space (see Matthews et al., 1990) and reflects valence from the circumplex model of mood (Feldman, 1995; Russell and Barrett, 1999). Thus, the model distinguishes between two features of positive mood, which seems of particular importance in the field of sport and exercise. Hedonic tone represents satisfaction with personal accomplishment, whereas energetic arousal corresponds to appetitive motivation and the urge to excel (Matthews et al., 2010). From the perspective of self-regulative theory (Carver and Scheier, 2012), energetic arousal signals the need for effort to attain personal goals, while hedonic tone indicates that goal satisfaction requires little investment of effort. These states may diverge in certain circumstances. For example, after a particularly demanding workout, a person might be satisfied but tired (elevated hedonic tone accompanied by lowered energy) and disinclined to repeat the exercise. Conversely, during the deciding tie-break in a tennis championship, with the outcome in the balance, the players might experience high energy but not elevated hedonic tone.

Previous work on perfectionism and mood has tended to use measures based on the two-dimensional model of mood, such as the PANAS (Watson et al., 1988), which do not distinguish different forms of positive affective response. Mallinson-Howard et al. (2019) point out that previous research on the associations between perfectionism and mood has produced mixed findings in regard to positive mood. Distinguishing between contented positive mood (hedonic tone) and effort-engaging positive mood (energetic arousal) may help to clarify the role of perfectionism in positive affective response to competitive sports. Because the pursuit of very high personal performance standards is central to perfectionistic strivings (Gotwals et al., 2012), we expect this dimension to be more strongly associated with energetic arousal than with hedonic tone. Thus, in the present study we utilize the UWIST Mood Adjective Checklist - a psychometric operationalization of the 3D model of mood (Matthews et al., 1990), that has been successfully used in exercise research when, for example, investigating mood consequences of aerobic exercise (Guszkowska and Sionek, 2009; Stolarska et al., 2019) and dancing (Zajenkowski et al., 2014).

Perfectionism, goal-realization, and post-performance mood

It is intuitive to think that athletes' mood after competition depends on their result or performance. However, it is not the objective performance that directly influences the athlete's mood; rather, it is the appraisal of the performance which, to some extent, stems from their habitual attributional styles (Rees et al., 2005) and personality features (Lazarus, 2000; Stolarski et al., 2019). As perfectionism manifests in beliefs, perceptions, and appraisals (Stoeber, 2011), perfectionistic strivings and concerns through their key components, namely overly critical evaluation of performance and pursuit of the highest standards may influence how athletes appraise their results in sport, and, in turn, their post-competition mood.

Several studies investigated the associations between perfectionism and mood. In the case of perfectionistic concerns, the results are straightforward: perfectionistic concerns predict higher negative mood after imagined failure (Sagar and Stoeber, 2009), and post-performance failure feedback (Anshel and Mansouri, 2005), higher disappointment, and more difficulty in getting past one's mistakes (Frost and Henderson, 1991), as well as experiencing anger when performing poorly (Dunn et al., 2006). Furthermore, socially prescribed perfectionism (an indicator of perfectionistic concerns perceived to be imposed by others) predicts a higher level of unpleasant self-conscious emotions, namely shame and guilt after failures (Curran and Hill, 2018). For perfectionistic strivings the evidence is mixed: on the one hand, they predict higher positive mood after imagined success but on the other hand, they also predict greater fear of failure (Sagar and Stoeber, 2009), and higher negative mood after post-performance failure feedback (Anshel and Mansouri, 2005). Furthermore, self-oriented perfectionism (an indicator of perfectionistic strivings directed towards the self) is linked to increasing guilt

and decreasing pride after repeated post-performance fail-ure feedback (Curran and Hill, 2018). Outside sport, self-oriented perfectionism is also associated with negative mood and anxiety after repeated failure (Stoeber et al., 2014), as well as with pride and satisfaction when the per-fection is achieved and dissatisfaction and embarrassment when the perfection is not obtained (Stoeber and Yang, 2010). The latter underscores the importance of investigat-ing perfectionism not only after failure but also after achieving success.

Crocker et al. (2014) proposed that the relationship between perfectionistic concerns and athletes' reactions to performance may depend on goal progress. However, an alternative interpretation is also possible: the relationship between goal progress and athletes' reactions to perfor-mance may depend on the level of perfectionism. Slow pro-gress may be especially concerning to perfectionists. Even if the athlete's performance is improving the perfectionist may appraise the rate of improvement as inadequate. Sup-port for this notion can be found in Pacht's (1984) obser-vation that perfectionists are unable to cherish and savor their accomplishments. The importance of perceptions of goal progress is also supported in the concept of "perfec-tionistic reactivity" (Flett and Hewitt, 2016) - a distinctive pattern of response to adversity and stress shown by people high in perfectionism. Those typical responses may be be-havioral (e.g., compulsive overstriving), cognitive (e.g., failure and mistake rumination, perfectionistic and nega-tive automatic thoughts) but also affective (e.g., frustration, dissatisfaction, shame). Cognitive and affective forms of response in particular could be seen as potential mecha-nisms by which perfectionism may influence post-compe-tition mood. Flett and Hewitt (2016) underline that perfec-tionistic reactivity should not only be observed in negative reactions to negative outcomes but also in the lack of pos-itive reactions in response to positive events. Thus, existing theory provides a solid rationale for investigating the inter-play between goal-realization and perfectionism in predict-ing post-competition mood.

The abovementioned leave several open questions. Firstly, it remains unclear whether the observed effects would be similar in a naturalistic setting of actual compe-tition, where the task is perceived as important and more central to athletes' actual goals. Secondly, in many studies a procedure of giving false negative feedback has been used (e.g., Curran and Hill, 2018); thus, the results might have been affected by participants' beliefs about the truth-fulness of the feedback. Thirdly, a vast majority of re-searchers focused their investigations on the situation of failure. However, the influence of perfectionism is not lim-ited to the situations when individuals fail to achieve their goals. Lastly, to the best of our knowledge, no study inves-tigated how both dimensions of perfectionism interplay with goal-realization in predicting athletes' mood in the post-competition period.

The present study
We planned a natural quasi-experiment with self-report data gathered in two separate points of time: prior to and after a running competition, supplemented with athletes' official results in the run. Conducting a study in this manner provides high ecological validity and an oppor-tunity to measure perfectionism in relation to a situation of great importance to an athlete. Furthermore, athletes' re-sults, when compared with their goals set before the run, can be interpreted as real and reliable feedback about their performance. Finally, as some athletes will be able to meet their goals and others won't, we could analyze the mood both after failure and after meeting personal goals.

Based on theoretical considerations and research re-sults referred above, we hypothesized that perfectionistic strivings and concerns have contrasting associations with all three dimensions of mood. It was expected that perfec-tionistic strivings would be related most strongly to higher energetic arousal, and, more weakly, to higher hedonic tone and lower tense arousal. Perfectionist concerns are as-sociated with a generally maladaptive and unpleasant pat-tern of mood after the competition, involving lower ener-getic arousal and hedonic tone, accompanied by higher tense arousal. Furthermore, we predicted that the interac-tions of perfectionistic strivings and concerns with one's outcome in the competition and their associations with the post-competition mood are pronounced not only in a situa-tion of failure but also in reaction to achieving one's goal: we expected that perfectionistic strivings boost the posi-tive, motivating consequences of success. Adverse effects were predicted for perfectionistic concerns, as this dimen-sion may attenuate affective benefits of successful compe-tition results and amplify loss-related mood deterioration.

Methods

Participants and procedure
The study was conducted during a competitive 10-kilome-ter street run taking place on an IAAF-certified route. The sport level of participants of this event is always highly dif-ferentiated: while a handful of elite runners finishes in less than 30 minutes, the vast majority of athletes are amateur. Results of the runners who took part in both phases of our study ranged between approximately 31 to 84 minutes. In-dividuals included in the present analyses (see below) fin-ished the run between 37 and 72 minutes. We recruited the participants in several ways: leaflets with information about the study (including the link and QR code to the Qualtrics platform) were handed to the athletes at the reg-istration office and included in starter packs. Furthermore, a link to the study was published on the organizer's social media profile and official website.

Our research comprised two phases of psychomet-ric data collection: one before, and one after the race. The first phase begun two days before the run and ended at the very moment the race started. The participants completed a measure of perfectionism and a short form that consisted of questions regarding: best result in the current season, personal best, declared sports level, and anticipated result in the upcoming race. After the run, the link to the second part of the study was sent to all the participants that com-pleted the first part. During the second phase taking place from the fourth to the sixth day after the race participants completed a measure of mood. Participants were asked to rate their feelings about the race to assess mood responses that persisted after the immediate post-race period. Lastly,

we imported the final results of all participants from the race organizer's official website.

Prior to conducting the study, ethical approval was granted by the ethics board at the institution to which the first two authors were affiliated. Appropriate approval was also provided by the event's organizer. All participants consented to take part in a confidential study regarding 'personality and performance' without remuneration. Runners who took part in both phases of the psychometric data collection had an opportunity to win one of two sport watches equipped with GPS and pulse meter. Furthermore, they were informed that they would be asked to provide their email address, start number, and/or name and surname to enable linking the data from both points of measurement with their final result in the run. After this procedure, we erased their names, surnames, and start numbers from the database.

A total of 188 athletes (86 female; 102 male; Mean age = 34.31 SD age = 9.53) completed both parts of the online questionnaire using the Qualtrics platform and finished the race. Among them, 71 participants described themselves as 'recreational', 109 as 'amateur', and 8 as 'professional' athletes. 152 athletes (72 female; 80 male; Mean age = 34.71 SD age = 9.57) met all the criteria for inclusion in the study (see the preliminary analyses section for more detail).

Measures
Perfectionism was measured with a short version of the Perfectionism in Sport Questionnaire (PSQ) - a domain-specific psychometric tool (Waleriańczyk and Stolarski, 2016, 2019) that captures the two higher-order dimensions of perfectionism: perfectionistic strivings (high personal standards and self-oriented expectations; e.g., "I have very high expectations for myself") and perfectionistic concerns (doubts about actions, as well as concerns and rumination over mistakes; e.g., "Even small mistakes can undermine my self-confidence"). Respondents rated the degree to which each of the items is characteristic of them in the context of running, using a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). In previous studies the measure showed both excellent internal consistency ($\alpha = 0.89$ for perfectionistic strivings and $\alpha = 0.94$ for perfectionistic concerns) and convergent validity (associations with personality dimensions such as neuroticism and conscientiousness, as well as external indicators of functioning in sport, namely: performance in a running competition, higher result-goals, declared sport level and the time spent in training weekly) (see Waleriańczyk and Stolarski, 2016, 2019, 2021).

We also assessed the structure of the scale in the present sample using a confirmatory factor analysis (CFA) with maximum likelihood estimation and conventional criteria as benchmarks of good model fit (CFI > 0.95, TLI > 0.95, SRMR < .08, RMSEA < 0.08; Marsh et al., 2009). CFA yielded the following fit indices, χ^2/df = 1.37, RMSEA = 0.05, CFI = 0.97, TLI = 0.96, SRMR = 0.09, indicating good fit and supporting the two-factor solution (with the exception of SRMR which slightly exceeded the benchmark and indicated acceptable fit).

Mood was assessed using the UWIST Mood Adjec-tive Check List (UMACL, Matthews et al. 1990), in the Polish adaptation by Goryńska (2005). The measure consists of three subscales: Energetic Arousal (e.g., "Active"), Tense Arousal (e.g., "Anxious"), and Hedonic Tone (e.g., "Happy"). Participants rated the degree to which the items described their current mood on a four-point-Likert-type scale ranging from 1 (strongly agree) to 4 (strongly disagree). Previous studies report high internal consistency of the Polish version of the scale ($\alpha = 0.75$ for EA, $\alpha = 0.88$ for TA and $\alpha = 0.83$ for HT) and convergent validity similar to the original version (Goryńska, 2005). The scale's instruction was modified to better suit the aim of the study and read: "When I think about how I performed in the run, I feel:"

Data analytical strategies
To investigate our hypotheses, we first calculated correlations between the variables used in the study with gender and age controlled. Next, independently for each of three mood dimensions, we constructed and calculated a three-step hierarchical regression model with a moderated moderation of both perfectionism dimensions and Conversion Rate (an indicator of how well participants' anticipated performance translated into their actual performance, calculated by dividing anticipated result by the actual result multiplied by 100; see the preliminary analyses section for more detailed description). Age, gender, and personal best were included in all models as covariates. Finally, following Hill's (2021) recommendation, we used Johnson-Neyman (J-N) technique to identify the regions of significance for the observed interactions. A power analysis showed that we needed a minimum N of approximately 90 to obtain a power of .80 ($\alpha = 0.05$) for a medium-magnitude Pearson correlation coefficient ($r = 0.30$). However, we aimed to recruit as many participants as possible before the run as previous research showed that the interaction effects of perfectionism account for ΔR^2 of approximately .01 to .05 (e.g., Crocker et al., 2014; Madigan et al., 2016). Furthermore, we could not predict how many participants would finish the run and complete the second part of the study. The final sample size is adequate for research in this area and allows detection of ΔR^2 equal to and higher than .05 with a power of .80 ($\alpha = 0.05$; Faul et al., 2009).

All statistical analyses described in the later parts of the present article were conducted using IBM SPSS 26.0.0.1 for Windows, except the identification of J-N regions of significance, where PROCESS macro version 3.5 for Windows was used (Hayes, 2017) and the confirmatory factor analysis for the Perfectionism in Sport Questionnaire, where AMOS 26.0.0.1 for Windows was used. All the figures were created using Python 3.9.1 software, based on the output from PROCESS.

Results

Preliminary analyses
Before the main analyses, we screened the data for missing values and none were found. To minimize the impact of outliers on data analysis, and to ensure the interpretability of results in a specific and well-defined group of amateur athletes, we removed data from participants who did not

meet the inclusion criteria defined before the study. First, we excluded all data from thirteen participants who did not finish the race and/or completed the last part of the survey later than on the sixth day after the race. Next, we excluded six participants who declared competing on a 'professional' level, as their motives, preparation, mood, and performance may deviate strongly from those declared by amateur athletes, both in terms of qualitative differences in their approach to running (e.g., competing to win money), and quantitative differences in measured variables (for instance, their mean perfectionistic strivings score, anticipated result, and actual result were almost 2SDs higher than the means in the rest of the sample).

Furthermore, we considered excluding data from athletes whose actual results in the run exceeded the mean for all competitors by more than 2.24 SDs (as advocated by Aguinis et al., 2013). However, in the case of running performance, such an approach does not take into account other important variables that may possibly affect one's potential performance, namely: age and gender. Thus, instead, we opted for a more sophisticated approach. Using a voluminous online database of results from multiple running competitions (enduhub.com), for each participant, we calculated the percentile in which their actual result of the run was situated, based on athletes' gender and age. Eleven participants outside the 3rd and 97th percentiles were excluded. The latter cut-off point overlapped with the 'professional' criterion. In the final sample, athletes' results ranged from 6th to 96th percentile. Finally, six participants were identified as multivariate outliers and removed from the analyses based on Mahalanobis distance exceeding the critical value of $\chi^2 (6) = 22.46$, p < .001.

All result-related variables (anticipated and actual result, as well as personal best) were converted to seconds, reversed, and labelled as "performance" variables (i.e., anticipated result equal to 3193 seconds after being reversed reads as "anticipated performance" and is equal to -3193 seconds). The same procedure was used in other studies in this area (see Stoeber et al., 2009, Waleriańczyk and Stolarski, 2021). It aids understanding of the results as higher values correspond to better performance. Furthermore, the season's best was excluded from further analyses as for many participants it was the first start in the season; thus, they were unable to provide an answer.

Next, to create an indicator reflecting an extent to which each runner's expectations regarding their perfor-

mance in the run converted into the actual result in the race, we divided the anticipated time by the actual result and multiplied the outcome by 100. By doing so, we created a Conversion Rate (CR) variable allowing us to neatly estimate: if the expectations (goals) for the run were met by the athletes (CR = 100%), if athletes exceeded their expectations (CR > 100%) or if they did not succeed in meeting their goals for the run (CR < 100%). For example, if a runner's goal before the race was to achieve a final time of exactly 42 minutes, but they ran faster than expected and finished the race in 40 minutes, their CR = 105%. Similarly, if they wanted to achieve a goal of 42 minutes but finished the race in 44 minutes, their CR = 95.46%. In the sample included in the analysis, CR scores ranged between 85% and 123%, with a mean of 101.5% and a median of 100.9%.

It is important to note that creating a performance indicator linking the anticipated and the actual results can be approached in several ways. Nevertheless, the above-mentioned equation allows us to avoid the pitfalls of simpler approaches. In example: a dichotomous 'win/lose' variable would ignore the effect of the discrepancy between both results. On the other hand, simply calculating the difference between anticipated and actual results would not account for the various weight and meaning of the same differences depending on the value of the anticipated result (a 1-minute difference in actual performance might have a completely different significance for a runner with a goal of 50 minutes, compared to a runner with a goal of 35 minutes, as its proportion to the goal changes). The above-mentioned problems are solved by the CR equation we use in the analyses.

Correlational analyses

We conducted a correlational analysis to provide initial insight into the nature of the association between the variables in the study: both dimensions of perfectionism, dimensions of mood, and running performance-related variables, namely: anticipated and actual performance in the run, the personal best performance in a 10 km run, as well as CR, controlling for age and gender. The results of the analysis are presented in Table 1.

In accordance with our predictions, perfectionistic concerns were correlated with all three dimensions of mood (positively with tense arousal, negatively with energetic arousal and hedonic tone), while perfectionistic

Table 1. Means (M), standard deviations (SD), MacDonald's omegas, and correlations (with gender and age controlled for).

Variable	M (SD)	ω	1	2	3	4	5	6	7	8
1. Perfectionistic strivings	18.43 (3.31)	.71	-							
2. Perfectionistic concerns	13.73 (4.95)	.83	.11	-						
3. Energetic Arousal	30.61 (3.20)	.74	.23*	-.22*	-					
4. Tense Arousal	9.97 (2.12)	.70	-.10	.33**	-.62**	-				
5. Hedonic Tone	29.42 (3.20)	.88	.02	-.30**	.56**	-.56**	-			
6. Personal best performance	3129.56 (445.05)	-	.24*	.17*	-.11	-.03	-.14	-		
7. Anticipated performance	3193.25 (445.91)	-	.32**	.14	-.13	.05	-.11	.83**	-	
8. Performance in the race	3147.76 (418.55)	-	32**	.12	-.10	-.02	-.02	.81**	.90**	-
9. Conversion Rate (CR)	101.50 (5.42)	-	-.05	-.04	.10	-.09	.22*	-.19*	-.39**	.04

All result-related variables (6, 7, and 8) were converted to seconds and reversed so that higher values are indicative of better performance (i.e., anticipated result equal to 3193 seconds after being reversed is equal to -3193 seconds and reads as "anticipated performance"). Absolute values of means are shown for result-related variables. Conversion rate (CR) was calculated by dividing the anticipated time by the final result and multiplying the outcome by 100. ** $p < 0.001$, * $p < 0.05$

strivings showed only one significant, positive correlation with energetic arousal. On the other hand, consistent with previous studies (Waleriańczyk and Stolarski, 2021), perfectionistic strivings were significantly and positively correlated with all the performance-related variables (personal best, anticipated, and actual performance), while perfectionistic concerns showed a significant correlation only with personal best. Going further, even though the CR is a product of two variables that proved positively and significantly associated with perfectionistic strivings - it was correlated neither with perfectionistic strivings nor with perfectionistic concerns. CR proved significantly related with only one dimension of mood: positively with hedonic tone. Its associations with energetic arousal and tense arousal, although in hypothesized directions, did not reach statistical significance. Lastly, CR was negatively correlated with the personal best performance and anticipated performance, which suggests that the magnitude by which one exceeds their own expectations is higher among runners with slower personal best and anticipated result but showed no significant association with actual performance in the race.

Regression models (OLS)
Aiming to investigate the interplay between both dimensions of perfectionism and CR in predicting the mood in the week following the race and, more specifically test if both dimensions of perfectionism and CR interact, we conducted a series of regression analyses (with age, gender, and personal best controlled for). The results of analyses for all three dimensions of mood are presented in Table 2.

For all the three mood dimensions, we followed the same path: in the first step, age, gender, and personal best were introduced to the model, together with both dimensions of perfectionism. Next, three two-way interaction terms were entered to investigate the potential moderating role of perfectionistic strivings and concerns in the association between CR and mood. Finally, to examine a potential moderated moderation, a three-way interaction of both dimensions of perfectionism and CR was introduced to the model. As advocated by Hayes (2017), interaction terms remained in the model even if they did not reach statistical significance to ensure that the results are comparable and interpretable. Furthermore, to aid interpretation of coefficients all variables that defined interaction effects were centered prior to being introduced into the model.

Energetic arousal
Perfectionistic strivings were a positive predictor of energetic arousal, while perfectionistic concerns were a negative predictor in all three models. Introduction of the interaction terms in the second step explained further 4.8% of the variance and revealed a significant moderating effect of perfectionistic strivings and CR. Further exploration with the J-N technique showed that CR was significantly associated with energetic arousal but only for higher levels of perfectionistic strivings (when perfectionistic strivings exceeded the value of 19.93, which accounts for the 62nd percentile). The interaction is presented in Figure 1, panel A, whereas the J-N regions illustrating the threshold of significance for CR depending on values of perfectionistic strivings are provided in Figure 1, panel B.

Table 2. Hierarchical linear regression models predicting the affective states after the 10-kilometer race.

Dependent variable		Energetic Arousal				Tense Arousal				Hedonic Tone			
Model	Predictors	B (SE B)	β	p	F (R²)	B (SE B)	β	p	F (R²)	B (SE B)	β	p	F (R²)
I	Gender	-.16 (.55)	-.03	.767	4.18 (.148)	-.10 (.37)	-.02	.791	4.13 (.146)	-.46 (.55)	-.07	.401	4.50 (.157)
	Age	-.03 (.03)	-.10	.212		.01 (.02)	.05	.506		-.04 (.03)	-.12	.144	
	Personal best	-.00 (.00)	-.14	.118		-.00 (.00)	-.02	.858		-.00 (.00)	-.08	.378	
	CR	.05 (.05)	.08	.319		-.04 (.03)	-.09	.257		.12 (.05)	.21	.011	
	PS	.28 (.08)	.29	<0.001		-.09 (.05)	-.14	.078		.07 (.08)	.07	.356	
	PC	-.15 (.05)	-.23	.004		.15 (.03)	.35	<0.001		-.19 (.05)	-.29	<0.001	
II	Gender	-.21 (.55)	-.03	.697	3.85 (.196)	-.09 (.37)	-.02	.808	3.41 (.178)	-.47 (.55)	-.07	.395	3.28 (.172)
	Age	-.03 (.03)	-.09	.278		.01 (.02)	.06	.492		-.04 (.03)	-.11	.163	
	Personal best	-.00 (.00)	-.14	.123		-.00 (.00)	-.01	.931		-.00 (.00)	-.08	.362	
	CR	.08 (.05)	.13	.124		-.05 (.03	-.12	.161		.13 (.05)	.23	.007	
	PS	.23 (.08)	.23	.004		-.07 (.05)	-.11	.177		.04 (.08)	.05	.586	
	PC	-.13 (.05)	-.20	.012		.15 (.03)	.34	<0.001		-.18 (.05)	-.28	<0.001	
	CR x PS	.03 (.01)	.19	.019a		-.02 (.01)	-.18	.028		.02 (.01)	.12	.147	
	CR x PC	-.02 (.01)	-.14	.092b		.00 (.01)	-.00	.960		-.00 (.01)	-.03	.732	
	PS x PC	-.03 (.02)	-.12	.131		.01 (.01)	.04	.596		-.01 (.02)	-.06	.458	
III	Gender	-.27 (.54)	-.04	.622	3.79 (.212)	-.04 (.36)	-.01	.921	3.75 (.210)	-.49 (.56)	-.08	.385	2.94 (.173)
	Age	-.04 (.03)	-.11	.179		.02 (.02)	.09	.285		-.04 (.03)	-.12	.152	
	Personal best	-.00 (.00)	-.12	.177		.00 (.00)	-.03	.714		-.00 (.00)	-.08	.390	
	CR	.10 (.05)	.17	.052		-.07 (.03)	-.17	.043		.14 (.05)	.24	.007	
	PS	.23 (.08)	.23	.004		-.07 (.05)	-.11	.176		.04 (.08)	.04	.589	
	PC	-.14 (.05)	-.22	.007		.16 (.03)	.37	<0.001		-.18 (.05)	-.28	<0.001	
	CR x PS	.03 (.01)	.16	.048		-.02 (.01)	-.14	.088		.02 (.01)	.11	.181	
	CR x PC	-.02 (.01)	-.19	.027		.01 (.01)	.08	.363		-.01 (.01)	-.04	.643	
	PS x PC	-.03 (.02)	-.15	.065		.01 (.01)	.09	.291		-.01 (.02)	-.07	.420	
	CR x PS x PC	-.01 (.01)	-.15	.095		.01 (.00)	.22	.018c		-.00 (.00)	-.04	.706	

Significant predictors, as well as significant changes in models (p < 0.05) are marked in bold. CR = Conversion rate, PS = Perfectionistic strivings, PC = Perfectionistic concerns, x = interaction between variables, B = unstandardized regression coefficient, *SE* B = Standard Error of B, β = standardized regression coefficient. [a] For a graphical illustration of the interaction effect see Figure 1, panel A, and panel B for Johnson-Neyman regions of significance. [b] For a graphical illustration of the interaction effect see Figure 2, panel A, and panel B for Johnson-Neyman regions of significance. [c] For a graphical illustration of the effect of the three-way interaction see Figure 3, panel A, and panel B for Johnson-Neyman regions of significance.
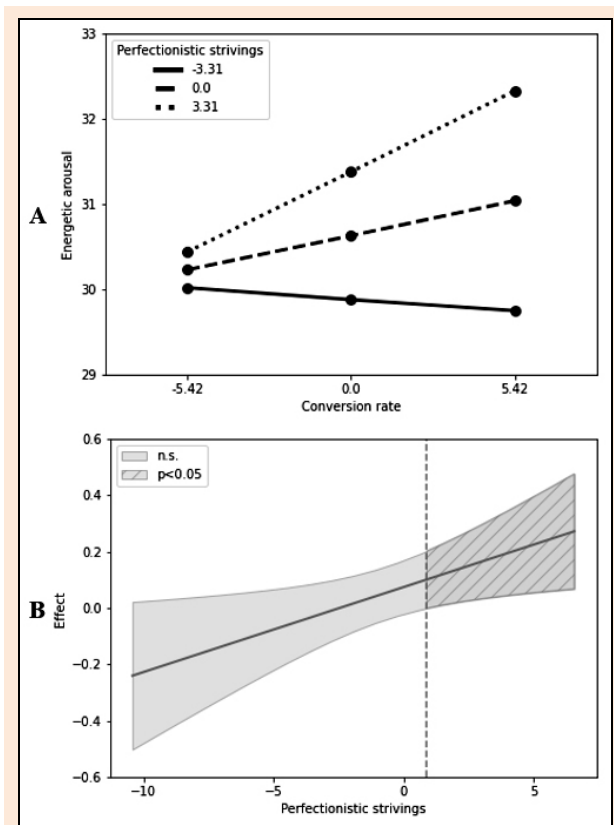
Figure 1. The interaction between perfectionistic strivings and conversion rate in predicting energetic arousal (panel A) and Johnson-Neyman regions representing the threshold of significance for the interaction (panel B). All variables are presented after mean-centering at values of -1SD, mean and +1SD.

The interaction of perfectionistic concerns and CR did not reach $p = .05$ threshold; however, it was still below .10. Thus, we further explored the effect, following the recommendation of Hayes (2017), who endorses presenting the interactions including significant shifts in the J-N regions, even if the effect does not reach statistical significance. It was revealed that CR was significantly associated with energetic arousal only for lower values of perfectionistic concerns (until perfectionistic concerns exceeded the value of 11.33, which accounts for the 38th percentile) (see Figure 2, panel A for a visual illustration of the effect and Figure 2, panel B, for the illustration of J-N regions of significance). The addition of a three-way interaction term in the third step explained further 1.6% of the variance; however, the R^2 change was not significant. Even though we do not attempt to interpret the third step, it is worth noting, that both interaction terms of CR and perfectionistic concerns, as well CR and perfectionistic strivings reached statistical significance, while the three-way interaction of CR, strivings and perfectionistic concerns was not significant. It may signal a potential suppressive effect that perfectionistic concerns may exert on the perfectionistic strivings in predicting energetic arousal.

Tense arousal
Perfectionistic concerns were a significant positive predictor of tense arousal, while perfectionistic strivings were insignificant in all steps. Entering the three interaction terms

in the second step explained an additional 3.2% of the variance in the dependent variable, with the interaction between CR and perfectionistic strivings being a significant negative predictor. The introduction of a three-way interaction of CR, perfectionistic strivings, and perfectionistic concerns in the third step explained a further 3.2% of the variance. The three-way interaction was a significant positive predictor of tense arousal, CR was a significant negative predictor, while the interaction between CR and perfectionistic strivings did not remain significant. Further exploration with the use of the J-N technique revealed that the interaction of CR and perfectionistic strivings was significantly associated with tense arousal only when perfectionistic concerns were below the mean (until perfectionistic concerns exceeded the value of 13.40, which reflects the 54th percentile (see Figure 3, panel A, for a visual representation of the three-way interaction effect and panel B for a visual representation of the J-N regions of significance).
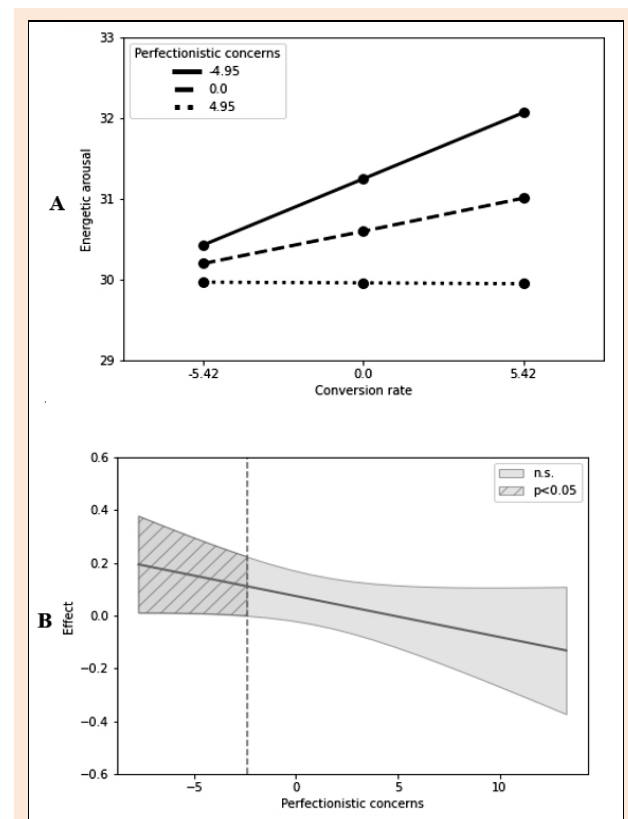

Figure 2. The interaction between perfectionistic concerns and conversion rate in predicting energetic arousal (panel A) and Johnson-Neyman regions representing the threshold of significance for the interaction (panel B). All variables are presented after mean-centering at values of -1SD, mean and +1SD.

Hedonic tone
Perfectionistic concerns were a significant negative predictor of hedonic tone, CR was a significant positive predictor, while perfectionistic strivings were insignificant. This pattern of results remained stable in all three steps. The introduction of interaction terms in the second step, as well as the three-way interaction in the third step, did not significantly improve the predictive power of the model.
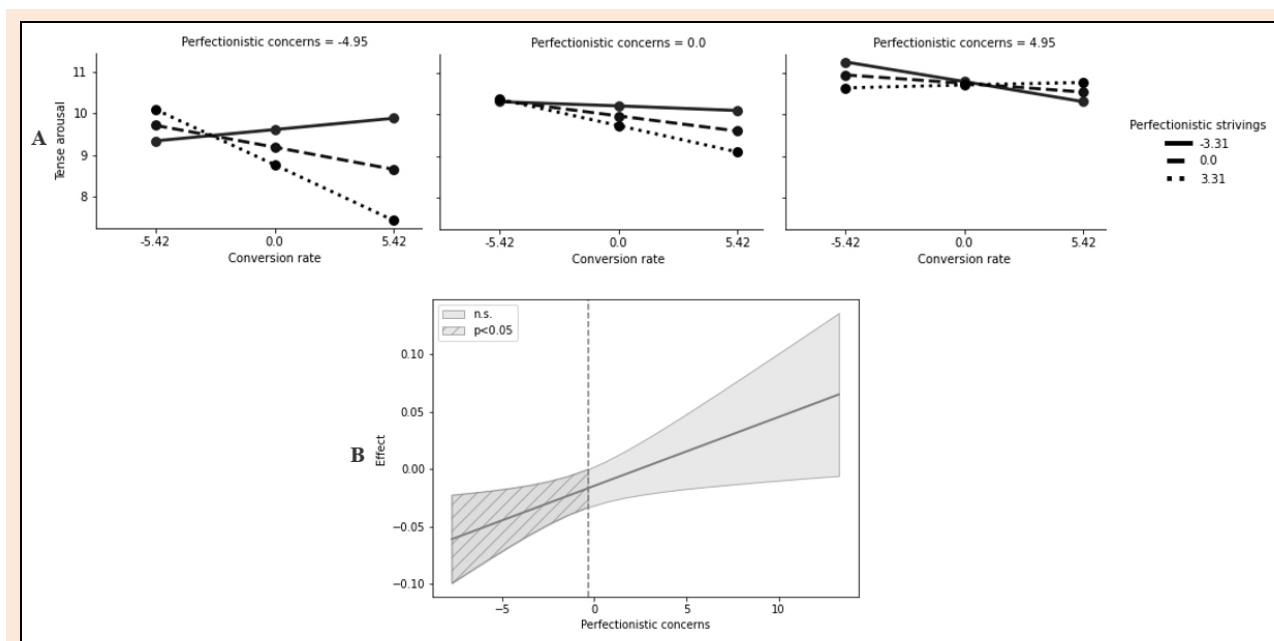
Figure 3. **Three-way interaction between conversion rate, perfectionistic strivings, and perfectionistic concerns in predicting tense arousal (panel A) and Johnson-Neyman regions representing the threshold of significance for the interaction (panel B).** All variables are presented after mean-centering at values of -1SD, mean and +1SD.

Furthermore, neither of the interaction terms was statistically significant.

Discussion

The main aim of the present study was to examine whether perfectionistic strivings and perfectionistic concerns moderate the link between goal-realization and amateur runners' mood during the post-competition week. The measure of how well athletes realized their time-goals for the run had a direct effect only on one dimension of mood - hedonic tone. The better the CR, the higher pleasure declared by athletes after the run. For both energetic and tense arousal, CR showed no significant effect. The hedonic tone response reflects satisfaction with goal accomplishment (Matthews et al., 2010). In the case of declared pleasure after the run, apart from the abovementioned and intuitive goal-realization effect, we observed a significant, negative impact of perfectionistic concerns - the higher the perfectionistic concerns, the lower the pleasure reported by the athletes in the week following the run. Both effects were of similar magnitude.

Energetic arousal was predicted by both dimensions of perfectionism: positively by perfectionistic strivings and negatively by perfectionistic concerns. The dissociation between energetic arousal as a correlate of strivings but not CR, versus hedonic tone as a correlate of CR but not strivings, supports the utility of the three-dimensional model for distinguishing different positive affective reactions in sport (Matthews et al., 1990; Stolarska et al., 2019). Energetic arousal captures approach motivation whereas hedonic tone represents goal satisfaction, consistent with the neurological distinction between brain circuits for appetitive energization, on the one hand, and consummatory pleasure and hedonic reward on the other (Burgdorf and Panksepp, 2006; Matthews et al., 2010). Furthermore, the introduce-

tion of interaction terms revealed that the observed associations are more complex (and are probably easiest to untangle using a visual representation; see Figures 1 and 2). Perfectionistic strivings moderate the effect of goal-realization on the energetic arousal after the run. This effect reaches significance when perfectionistic strivings slightly exceed the mean (see Figure 1, panel B) and it seems to be most profound when athletes surpass their expectations for the run – in this scenario perfectionistic strivings offer the highest potential of promoting the desirable, motivating and highly functional state of energized affect. The changes in predictors of energy following the introduction of the three-way interaction signal that perfectionistic concerns may inhibit the positive effect of perfectionistic strivings or produce inverse effects for energetic arousal; however, this hypothesis requires further research.

Tense arousal was impacted directly by perfectionistic concerns. However, a more in-depth investigation of the three-way interaction effect revealed effects of CR, perfectionistic strivings, and perfectionistic concerns to be intertwined and complex (see Figure 3). The interaction of CR and perfectionistic strivings had a significant effect on tense arousal only if perfectionistic concerns were below the mean. In athletes with higher levels of perfectionistic concerns, tension level during the week after the run was high, regardless of goal-realization and perfectionistic strivings. However, if perfectionistic concerns were lower, perfectionistic strivings boosted the magnitude of relief experienced after meeting one's own expectations or, in particular, after exceeding them. Again, the effect could be viewed in terms of a desirable, and motivating role of perfectionistic strivings manifested in a situation that we can label as 'winning'.

Gathered together, the results we acquired for all three dimensions of mood paint a consistent picture of how the goal-realization interplays with both higher-order

dimensions of perfectionism in predicting mood. During the week following the competition, amateur runners high in perfectionistic concerns experience higher tension, not only if they failed to meet their goal but even after exceeding their expectations. Higher tension is accompanied by lower pleasure and energy – showing clearly that perfectionistic concerns are predictive of a less desirable profile of mood, which, we argue, is not adaptive after the run. Broadly, the interactive effects on mood suggest that the combination of high strivings and low concerns maximizes the affective benefits of successful performance. Perfectionistic strivings show no association with the pleasure experienced after the run but they have a tension-lowering potential for athletes with perfectionistic concerns below the mean. Furthermore, throughout the week following the run, runners high in perfectionistic strivings benefit from higher mood energization, both directly and through the interaction with the CR – with runners who exceed their expectations benefiting the most.

The obtained results offer new insights and empirical evidence for several areas of research in perfectionism and sports psychology. They shed some light onto the previously reported mixed findings regarding the associations between perfectionistic strivings and positive mood (Mallinson-Howard et al., 2019). In line with our expectations, the differentiation between effort-engaging (energetic arousal) and contended (hedonic tone) positive mood showed that perfectionistic strivings are positively associated with the former and unrelated to the latter. The pursuit of highest personal performance standards may offer higher mood energization but does not provide higher pleasure or satisfaction with goal-accomplishment in the week following the competition. This supports the usefulness of the 3D model of mood in studying perfectionism.

The fact that the interplay of goal-realization, perfectionistic concerns, and perfectionistic strivings still affected runners' mood even several days after competition may be treated as evidence for the robustness and perseverance of the reported effects. These mood-related consequences of meeting one's own expectations may impact motivations to continue training and competing, even in amateur runners. Speculatively, congruence between personality, post-competition mood and personal motivations may influence future participation. For example, the combination of high perfectionistic strivings, competitive goals, and post-competition energetic arousal might be especially motivating when accompanied by low perfectionistic concerns. However, further research is necessary to assess longer-term impacts of personality and mood.

The results we observed for athletes who met or exceeded their goals support Pacht's (1984) reflection that it is difficult for perfectionists (or more specifically: for athletes with high perfectionistic concerns) to savor and cherish their accomplishments. They are also in line with Flett and Hewitt's (2016) observation that perfectionistic reactivity does not manifest only in negative reactions to disappointing outcomes but also in the lack of positive reactions in response to positive events. However, quite paradoxically, the profile of mood we observed in runners with high perfectionistic concerns who met or exceeded their goals may even be described as perfectionistic unreactivity, to emphasize the lack or attenuation of what could be regarded as a natural and functional positive reaction to meeting or exceeding one's goals. Such enjoyment-inhibiting and tension-persevering pattern of post-competition mood may possibly lead to negative motivational outcomes.

Previous research has shown that perfectionistic concerns are linked with higher burnout and lower engagement, while perfectionistic strivings promote developing higher engagement (Jowett et al., 2016) and predict a decrease in burnout in a one-year period (Květon et al., 2021). And even though researchers tended to focus on stress and negative mood as outcomes of perfectionism (e.g., Garinger et al., 2018), the present findings suggest that lack of positive, pleasurable, and, in turn, motivating reactions after successful performances might also contribute to higher athlete burnout and lower athlete engagement. If future studies support this notion, coaches (Donachie and Hill, 2020) and sport psychologists (Gustafsson and Lundqvist, 2016) who work with athletes high in perfectionistic concerns should address not only athletes' reactions to not meeting their standards but also support shaping an adaptive pattern of post-competition mood when they meet their goals and win.

Limitations and future directions

The study was planned and conducted with the goal of achieving the highest possible level of ecological validity. Having said that, it would be beneficial to replicate the findings using other more widely used measures of perfectionism or by combining multiple indicators of perfectionistic strivings and concerns to fully capture the complexity of both dimensions (Stoeber and Madigan, 2016), as well as test if the 2x2 model of perfectionism yields the same pattern of support for hypotheses in the groups of participants that met and did not meet their goals. Adding baseline measurements of mood for all the participants in the weeks before the run would allow better estimation of the magnitude of mood change in response to one's own performance and its appraisal. Furthermore, the delay following the competition before the mood was assessed may have allowed reappraisal processes (Lazarus, 2000; Stolarski et al., 2019) to influence response. Athletes with high perfectionistic concerns may ruminate about their performance (cf., Lizmore et al., 2017) which may depress mood. Thus, a shorter interval between finishing the race and mood measurement would be beneficial. Furthermore, additional measurement points throughout the week following the competition would shed more light onto the dynamics of mood after performing in the competition. Mood scales such as the UMACL can be used to rate mood response during events differing in timespan (Boyle et al., 2014; Gray and Watson, 2007). However, longitudinal assessment of immediate mood would provide a more accurate picture of post-competition mood change; experience-sampling methods could also be used in future research (e.g., Kanning et al., 2013).

Finally, it is important to underline that all of the participants included in the study declared they competed on the recreational or amateur level. Thus, a study similar in the design should be conducted with the participation of

professional athletes to give sound foundations for generalizing the findings to different levels of sport advancement, as different effects and/or magnitude may be observed. The same argument applies to generalizing the results of the present study to other sports, especially if they are different in nature (e.g., skill-based sports such as shooting and archery or team sports). In future studies of similar design conducted in different sports or with athletes whose performance level is more diversified, a careful rethink of CR calculation would be recommended. In example, in a sample of only professional runners, performance metrics could be developed that take into account relevant external standards such as national and world records, or the best result in specific competition. Lastly, it might be beneficial to include a question about the subjective importance of the competitions perceived by the athlete.

Conclusion

The present study demonstrated how both perfectionistic strivings and concerns interplay with the conversion of anticipated to actual performance in predicting amateur athletes' mood in the post-competition week. The results support the notion that including both dimensions of perfectionism and testing for both linear and interactive effects is critical for identifying the actual impact of the construct (Dunn et al., 2020; Hill, 2021), as both dimensions of perfectionism interacted with goal-realization explaining 17-21% of variance in the dimensions of mood. Perfectionistic concerns showed clear associations with a maladaptive pattern of mood, while perfectionistic strivings offered potential mood-energizing and tension-lowering benefits when athletes realized their goals for the run.

These results corroborate the observation that perfectionistic reactivity can be observed not only in failure - it can also manifest after accomplishing success (Flett and Hewitt, 2016). Furthermore, the conducted analyses show that limiting the research on perfectionism to the situation of failure might lead to missing crucial information about athletes' psychological functioning. In particular, the profile of post-competition mood, observed among runners reporting elevated perfectionistic concerns, may hinder their motivation and engagement, making them prone to developing burnout. If future studies corroborate these findings, it would imply that monitoring athletes' affective response to their own performance might become a valuable indicator of whether an athlete would benefit from psychological interventions aiming to reduce their perfectionistic concerns.

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Key points

- Perfectionism and goal-realization predicted athletes' post-run mood.
- Perfectionistic concerns predicted a maladaptive pattern of post-run mood.
- Perfectionistic concerns and goal-realization predicted higher post-run pleasure.
- Perfectionistic strivings boosted positive mood change after meeting one's goal.
- Perfectionistic concerns inhibited positive mood change after meeting one's goal.