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Beyond Performance: Training Experience Moderates Adolescents' Motivational Responses to Sprint Performance Feedback

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Abstract

Sustained engagement in physical activity during adolescence is a critical determinant of long-term health and well-being. Performance feedback is widely used in youth sport settings, yet its motivational impact may depend on athletes' developmental stage and training experience. This study examined adolescents' motivational responses following individualized sprint performance feedback and investigated whether training experience and sprint performance moderated these responses. Fifty-three adolescent athletes (mean age = 14.86 ± 0.81 years) completed a brief five-item questionnaire assessing commitment, enjoyment, self-determination, intention to continue training, and self-efficacy immediately after receiving individualized sprint performance feedback. Exploratory and confirmatory factor analyses were conducted to evaluate the scale's factorial structure and reliability. A two-way analysis of variance examined the effects of training age (1–6 vs. 7–12 years) and sprint performance (faster vs. slower) on overall motivational response. Factor analyses provided preliminary support for a unidimensional motivational response construct ($\omega = 0.92$; $\alpha = 0.92$). Overall motivational responses following feedback were moderately positive. Sprint performance demonstrated a significant main effect on motivation. Importantly, a significant interaction between training age and performance emerged as the key finding, indicating that less experienced athletes were more sensitive to performance outcomes, whereas motivation among more experienced athletes remained relatively stable. Individualized sprint performance feedback appears to be associated with moderately positive motivational responses in adolescent athletes, particularly during early stages of sport participation. These findings highlight the importance of developmentally appropriate feedback strategies that emphasize progress and competence development to support engagement in youth sport, which may be relevant for sustained participation over time.

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1. Introduction

Sustained engagement in physical activity during adolescence is a key determinant of long-term physical health, psychological well-being, and the establishment of lifelong active lifestyle behaviors. Adolescence is widely recognized as a sensitive developmental period during which patterns of participation, motivation, and potential sport dropout are formed. Although many adolescents participate in organized sport, fluctuations in motivation and commitment frequently occur during this developmental period. Evidence suggests that decisions to continue or withdraw from sport are shaped not only by objective performance outcomes but also by how young athletes interpret evaluative experiences within their training environment (D'Astous et al., 2020; Ryan & Deci, 2017).

Research further indicates that adolescents' participation in physical activity is strongly influenced by the motivational climate and interpersonal support provided in sport and physical education contexts (Abate Daga et al., 2023; Barnett et al., 2008). The behaviors of significant others, particularly coaches and teachers, play a central role in shaping athletes' perceptions of competence and autonomy, which in turn influence engagement, persistence, enjoyment, and long-term participation trajectories (Bartholomew et al., 2011; Vasconcellos et al., 2020).

Self-Determination Theory (SDT) provides a well-established framework for understanding these motivational processes. According to the SDT, the quality and sustainability of motivation depend on the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (D'Astous et al., 2020). When these needs are supported, individuals are more likely to internalize behavioral regulations and develop autonomous forms of motivation associated with persistence, enjoyment, and psychological well-being. Conversely, environments characterized by excessive pressure, controlling practices, or evaluative threat may undermine need satisfaction and shift motivation toward more controlled forms of regulation or amotivation, potentially increasing the risk of disengagement from sport and physical activity (Bhavsar et al., 2019; Jaakkola et al., 2013; Wiersma & Sherman, 2008).

Within youth sport environments, performance feedback represents a particularly influential contextual factor. Adolescents are frequently exposed to objective performance indicators, such as sprint times, fitness assessments, and physical testing outcomes, which are often used to monitor progress and guide training. It is important to distinguish between objective performance outcomes (e.g., sprint times) and the feedback derived from these outcomes. While performance outcomes represent objective indicators of physical ability, feedback constitutes the interpretative information communicated to athletes, which may vary in content, framing, and motivational impact. However, the motivational consequences of such feedback are not inherently positive. Rather, their impact depends on how feedback is communicated and interpreted within the broader motivational climate and developmental context (Barcza-Renner et al., 2016).

Informational feedback that emphasizes progress and provides constructive guidance for improvement can strengthen perceptions of competence and support autonomous motivation. In contrast, feedback framed primarily in comparative or evaluative terms may heighten anxiety and undermine need satisfaction. Consequently, the motivational impact of performance feedback should be considered within the broader interpersonal and pedagogical context in which it is delivered (Calvo et al., 2010; Harwood et al., 2008;

Li & Xing, 2025). Importantly, previous research has shown that the motivational impact of feedback depends not only on the broader motivational climate but also on specific feedback characteristics, such as timing, framing, and informational content.

Empirical research examining fitness testing in physical education illustrates this complexity. While some students perceive performance assessments as motivating and informative, others report emotional discomfort or perceived stigma during evaluative situations (Cheon et al., 2015, 2018; Reynders et al., 2019). Quantitative studies similarly demonstrate considerable variability in motivational responses to fitness testing, suggesting that individual differences play a critical moderating role (Lola et al., 2026; White et al., 2025). Recent evidence further highlights the influence of perceived competence and self-concept in shaping adolescents' emotional responses to such evaluative experiences (Teixeira et al., 2012).

Importantly, adolescents are unlikely to respond uniformly to performance feedback. Individual characteristics, including training experience (often referred to as "training age") and actual performance level, may influence how feedback is interpreted and integrated into self-perceptions of competence. Less experienced athletes may rely more strongly on immediate performance outcomes when evaluating their ability, whereas more experienced athletes may draw on a broader history of training experiences and internalized performance standards. Understanding these developmental differences is essential for designing feedback practices that support sustained engagement in youth sport (Au et al., 2024; Trigonis et al., 2025).

Despite growing research on motivational climates and coaching behaviors, relatively little empirical work has examined adolescents' immediate motivational reactions following individualized performance feedback derived from objective testing procedures. Moreover, the potential moderating roles of training experience and performance outcomes remain insufficiently explored, particularly within ecologically valid sport settings. Therefore, the present study aimed to examine adolescent athletes' motivational responses following individualized sprint performance feedback. Specifically, we assessed key motivational indicators associated with sustained engagement in sport (i.e., commitment, enjoyment, self-determination, intention to continue training, and self-efficacy) immediately after feedback delivery. In addition, we evaluated the factorial structure and internal consistency of a brief composite measure designed to capture overall motivational response. Finally, we investigated the main and interaction effects of training age and sprint performance on motivation. Based on Self-Determination Theory, we formulated the following hypotheses: (H1) Adolescents would report moderately positive motivational responses following performance feedback. (H2) Sprint performance would be associated with motivational responses, with faster athletes reporting higher motivation. (H3) Training experience would moderate this relationship, such that performance-related differences in motivation would be more pronounced among less experienced athletes.

2. Materials and Methods

2.1. Participants

A total of 53 male adolescent athletes participated in the study (mean age = 14.86 years, SD = 0.81). Participants were involved in organized football clubs and were actively training at a competitive club level at the time of data collection. Participants were recruited through local sports clubs and structured training programs. Based on self-reported training experience, participants were categorized into two groups: 1–6 years of training experience (35.8%) and 7–12 years (64.2%). This grouping was intended to reflect meaningful differences in accumulated training experience and developmental stages of sport participation, while also facilitating group-based comparisons within the constraints of

the present sample size. The study was conducted in accordance with the Declaration of Helsinki and approved by the Research Ethics Committee of the School of Physical Education and Sport Science at Aristotle University of Thessaloniki (protocol 257/2025).

2.2. Instrument

The study employed a structured questionnaire designed to assess athletes' behavioral responses following feedback on their performance and measurements. Participants rated each statement on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), indicating the extent to which the statement reflected their reactions to the feedback.

The questionnaire included items targeting key dimensions such as commitment and participation in training, enjoyment and enthusiasm, intrinsic motivation and self-determination, intention to continue exercising, and responsiveness to feedback and self-efficacy.

The items were formulated as follows: Q1: "After receiving my sprint results, I feel motivated to continue training.", Q2: "I enjoyed the training session after receiving my performance feedback.", Q3: "The feedback motivated me to improve and learn new skills.", Q4: "I intend to continue training and monitor my progress.", Q5: "The feedback made me feel more confident in my ability to improve.". The items were specifically developed for the purposes of this study and were informed by key constructs derived from Self-Determination Theory, particularly perceived competence, intrinsic motivation, and behavioral intention.

Although the questionnaire items capture conceptually distinct dimensions (e.g., enjoyment, self-efficacy, intention), they were treated as a composite indicator of overall motivational response. This decision was based not only on empirical findings (i.e., unidimensional factor structure), but also on a theoretical rationale. Specifically, these indicators were conceptualized as complementary cognitive, affective, and behavioral responses that collectively reflect how adolescents interpret and react to performance feedback within a Self-Determination Theory framework. Thus, the composite score is intended to represent a global motivational response rather than a single, narrowly defined construct. Nevertheless, the conceptual heterogeneity of these indicators is acknowledged, and the composite score should be interpreted with appropriate caution.

Sprint performance groups were created using a median split of standardized (z-score) sprint times, with participants classified as faster or slower relative to the sample distribution. This approach was adopted to facilitate group-based comparisons and to allow for the examination of interaction effects using ANOVA within the constraints of a relatively small sample size. However, it is acknowledged that dichotomization may reduce statistical power and obscure continuous relationships, and therefore, results should be interpreted with caution.

2.3. Procedure and Feedback Delivery

The sprint testing procedure was conducted in a standardized field setting. Participants performed two short-distance sprint trials over 10 m, following a standardized warm-up. Sprint times were recorded using three pairs of photocells placed at the starting point, at 5 m, and 10 m (Witty timing system, Microgate®, Bolzano, Italy). The best performance (the fastest time) of the two trials was used for further analysis. To enable comparability across distances, sprint performance was standardized by converting 5 m and 10 m times into z-scores, which were then combined to create an overall sprint performance indicator.

Following completion of the sprint trials, each participant received individualized performance feedback. Feedback was delivered verbally by the researcher/coach in a standardized manner, focusing on the participant's own performance results. Athletes were

informed of their sprint times and general performance level, without providing explicit normative comparisons with other participants, to minimize evaluative pressure.

The content and structure of the feedback were kept as consistent as possible across participants, emphasizing clarity and neutrality in delivery. The questionnaire assessing motivational responses was administered immediately after feedback provision, ensuring that responses reflected participants' immediate reactions to the feedback experience. This procedure was designed to reflect ecologically valid sport practice conditions.

Statistical Analyses

Statistical analyses were conducted using IBM SPSS Statistics for Windows (Version 29.0; IBM Corp., Armonk, NY, USA) and JASP (Version 0.19.3; JASP Team, University of Amsterdam, Amsterdam, The Netherlands). Initially, exploratory factor analysis (EFA) was performed to examine the underlying factor structure of the questionnaire, followed by confirmatory factor analysis (CFA) to validate the factor model. Descriptive statistics, including means, standard deviations, minimum, maximum, and confidence intervals (95% CI), were calculated for all variables. To standardize sprint performance measures, z-scores were computed for 5 m and 10 m sprints, allowing for comparison across participants. Finally, a two-way analysis of variance (ANOVA) was conducted to assess the effects of training age and sprint performance on the total motivation score, including the interaction between these factors. Effect sizes were reported using eta squared (η^2). Statistical significance was set at $p < 0.05$.

3. Results

An exploratory factor analysis (EFA) was conducted on five items (Q1–Q5) using principal axis factoring with Promax rotation. Bartlett's test of sphericity was significant, $\chi^2(5) = 21.35$, $p < 0.001$, indicating that the data were suitable for factor analysis. The analysis revealed a single factor with an eigenvalue of 3.80, accounting for 70.2% of the common variance. All items loaded strongly on the factor, with loadings ranging from 0.75 to 0.89, supporting a unidimensional factor structure. The chi-square test results, factor loadings, and factor characteristics are presented in Table 1a–c.

Table 1. (**a**) Chi-squared Test for exploratory factor analysis. (**b**) Factor Loadings for items in exploratory factor analysis. (**c**) Factor Characteristics for Exploratory Factor Analysis.

(a)

Chi-Squared Test

	Value	df	*p*
Model	21.347	5	<0.001

(b)

Factor Loadings

	Factor 1	Uniqueness
Q3	0.89	0.21
Q2	0.89	0.22
Q1	0.84	0.30
Q5	0.82	0.32
Q4	0.75	0.44

Note. Applied rotation method is promax.

(c)

Factor Characteristics

	Unrotated Solution				Rotated Solution		
	Eigenvalues	SumSq. Loadings	Proportion Var.	Cumulative	SumSq. Loadings	Proportion Var.	Cumulative
Factor 1	3.80	3.51	0.70	0.70	3.51	0.70	0.70

A confirmatory factor analysis (CFA) was conducted to test the one-factor model identified in the exploratory analysis. The model demonstrated a partially acceptable fit according to some indices ($\chi^2(4) = 11.01$, $p < 0.05$; CFI = 0.97, TLI = 0.92, IFI = 0.97, SRMR = 0.03), although the RMSEA value was elevated. Even if RMSEA was elevated, this index is known to overestimate misfit in models with low degrees of freedom. All factor loadings were statistically significant ($p < 0.001$), providing tentative support for a unidimensional structure. Given the small sample size, the elevated RMSEA value, and the use of the same dataset for both exploratory and confirmatory analyses, these findings should be interpreted with caution and considered preliminary. This information is represented in Table 2a–d.

The internal consistency of the scale was excellent. McDonald's omega indicated high reliability ($\omega = 0.92$, 95% CI [0.89, 0.96]), which was consistent with Cronbach's alpha ($\alpha = 0.92$, 95% CI [0.88, 0.95]). These results indicate high internal consistency in this sample, although further validation in larger and independent samples is required. This information is represented in Table 3.

Table 2. (**a**) Factor Loadings for items in confirmatory factor analysis. (**b**) Additional fit measures for confirmatory factor analysis. (**c**) Other fit measures for confirmatory factor analysis. (**d**) Factor loadings for confirmatory factor analysis.

(a)			
Chi-Square Test			
Model	χ^2	df	*p*
Baseline model	215.46	10	
Factor model	11.01	4	0.03
Note. The estimator is ML.			
(b)			
Fit Indices			
Index			Value
Comparative Fit Index (CFI)			0.97
Tucker–Lewis Index (TLI)			0.92
Bentler-Bonett Non-normed Fit Index (NNFI)			0.92
Bentler-Bonett Normed Fit Index (NFI)			0.95
Parsimony Normed Fit Index (PNFI)			0.38
Bollen's Relative Fit Index (RFI)			0.87
Bollen's Incremental Fit Index (IFI)			0.97
Relative Noncentrality Index (RNI)			0.97
(c)			
Other Fit Measures			
Metric			Value
Root mean square error of approximation (RMSEA)			0.18
RMSEA 90% CI lower bound			0.06
RMSEA 90% CI upper bound			0.31
RMSEA *p*-value			0.05
Standardized root means square residual (SRMR)			0.03
Hoelter's critical N ($\alpha = 0.05$)			46.68
Hoelter's critical N ($\alpha = 0.01$)			64.92
Goodness of fit index (GFI)			0.98
McDonald fit index (MFI)			0.94
Expected cross validation index (ECVI)			0.81

Table 2. *Cont.*

(d)							
Factor Loadings							
						95% Confidence Interval	
Factor	Indicator	Estimate	Std. Error	z-Value	*p*	Lower	Upper
Factor 1	Q1	1.27	0.16	8.05	<0.001	0.96	1.58
	Q2	1.17	0.15	7.77	<0.001	0.87	1.46
	Q3	1.31	0.17	7.69	<0.001	0.98	1.65
	Q4	1.09	0.17	6.56	<0.001	0.77	1.42
	Q5	1.35	0.18	7.72	<0.001	1.01	1.69

Table 3. Internal Consistency of the Scale.

Frequentist Scale Reliability Statistics		
Estimate	**McDonald's ω**	**Cronbach's α**
Point estimate	0.92	0.92
95% CI lower bound	0.89	0.88
95% CI upper bound	0.96	0.95

Descriptive statistics were used in order to provide additional information for the variables under investigation. The descriptive statistics indicate that all five questionnaire items (Q1–Q5), each corresponding to a specific dimension of athletes' motivation in response to feedback, show mean values above the midpoint of the scale (1–5), suggesting generally positive motivational responses following feedback. Specifically, Q1 (commitment/engagement) showed a mean score of 3.47 (SD = 1.44), indicating moderate levels of training commitment following feedback, while Q2 (enthusiasm/enjoyment) had a slightly higher mean of 3.60 (SD = 1.36), reflecting greater enjoyment during training. Q3 (self-determination) yielded a mean of 3.45 (SD = 1.54), suggesting moderate levels of athletes' motivation to improve and learn new skills. Q4 (intention to continue) presented the highest mean score (M = 3.81, SD = 1.44), indicating that participants reported a high intention to continue training following feedback and regularly monitor their progress. Finally, Q5 (self-efficacy) had a mean of 3.57 (SD = 1.56), showing that athletes generally attempted to use the feedback to increase effort in subsequent training sessions. The total of the scale had a mean of 3.58 (SD = 1.28), supporting the conclusion that feedback was associated with moderate levels of overall motivation, engagement, and intention to continue exercising. Descriptive statistics for all questionnaire items and the total motivation score are presented in Table 4.

The distribution of participants according to training age and sprint performance is presented in Table 5. Specifically, 19 individuals (35.8%) had a training age of 1–6 years, while the majority, 34 participants (64.2%), had a training age of 7–12 years. Regarding sprint performance, 29 participants (54.7%) demonstrated faster sprint outcomes, whereas 24 participants (45.3%) showed slower sprint outcomes.

Afterwards, a two-way ANOVA was conducted to examine the effects of training age and sprint performance on athletes' overall motivation, as well as to investigate whether the impact of sprint performance on motivation depended on the level of training experience. The main effect of training age was not statistically significant, $F(1, 49) = 1.83$, $p = 0.18$, $\eta^2 = 0.03$, indicating no overall difference in motivation between athletes with 1–6 and 7–12 years of training experience. In contrast, sprint performance showed a significant main effect on motivation, $F(1, 49) = 5.66$, $p < 0.05$, $\eta^2 = 0.09$, suggesting that motivation scores differed between faster and slower sprinters. Importantly, a significant interaction

between training age and sprint performance was observed, $F(1, 49) = 8.26$, $p < 0.01$, $\eta^2 = 0.13$, indicating that the effect of sprint performance on motivation depended on athletes' training experience. Sprint performance significantly influenced motivation, with faster athletes reporting higher motivation levels, while slower athletes exhibited lower motivation. Among athletes with 1–6 years of training experience, those with faster sprint performance exhibited higher motivation (M = 4.29, SD = 1.18) compared to those with slower sprint performance (M = 2.48, SD = 1.20). In contrast, among athletes with 7–12 years of training experience, mean motivation scores were similar for faster (M = 3.76, SD = 0.98) and slower sprinters (M = 3.93, SD = 1.37). This information is represented in Table 6a,b.

Table 4. Means, standard deviations, minimum and maximum values, and 95% confidence intervals.

	Minimum	Maximum	Mean ± SD	95% CI Mean Upper	95% CI Mean Lower
Commitment (Q1)	1	5	3.47 ± 1.44	3.87	3.08
Enjoyment (Q2)	1	5	3.60 ± 1.36	3.98	3.23
Self-determination (Q3)	1	5	3.45 ± 1.54	3.88	3.03
Intention (Q4)	1	5	3.81 ± 1.44	4.21	3.41
Self-efficacy (Q5)	1	5	3.57 ± 1.56	4.00	3.14
Motivation (Total Scale)	1	5	3.58 ± 1.28	3.93	3.23

Table 5. Frequencies for training age and sprint.

Training Age	Frequency	Percent	Valid Percent	Cumulative Percent
1–6	19	35.8	35.8	35.8
7–12	34	64.2	64.2	100
Total	53	100	100	
Sprint				
Faster	29	54.7	54.7	54.7
Slower	24	45.3	45.3	100
Total	53	100	100	

Table 6. (**a**) Two-Way Analysis of Variance (ANOVA) for motivation by Training Age and Sprint Performance. (b) Descriptive Statistics for Motivation by Training Age and Sprint Performance.

(a)

Cases	Sum of Squares	df	Mean Square	F	*p*	η^2
Training Age	2.42	1	2.43	1.83	0.18	0.03
Sprint	7.51	1	7.52	5.66	0.02	0.09
Training Age × Sprint	10.96	1	10.96	8.26	0.01	0.13
Residuals	64.98	49	1.33			

Note. Type III Sum of Squares

(b)

Training Age	Sprint	N	Mean	SD	SE	Coefficient of Variation
1–6	Faster	7	4.29	1.18	0.45	0.28
	Slower	12	2.48	1.20	0.35	0.48
7–12	Faster	22	3.76	0.98	0.21	0.26
	Slower	12	3.93	1.37	0.39	0.35

4. Discussion

The present study examined adolescent athletes' motivational responses following individualized sprint performance feedback and investigated whether training age and sprint

performance influenced these responses. In line with our working hypothesis, feedback was generally associated with positive motivational outcomes, as reflected in moderate mean scores above the midpoint of the scale across commitment, enjoyment, self-determination, intention to continue training, and self-efficacy. Moreover, sprint performance significantly influenced motivation, and a meaningful interaction effect emerged: less experienced athletes were more sensitive to performance outcomes, whereas motivation among more experienced athletes remained relatively stable regardless of sprint result. These findings partially confirm our hypothesis that performance-contingent effects would be more pronounced among athletes at earlier stages of sport participation. Importantly, these findings extend current understanding of how evaluative experiences are related to motivational responses during a critical developmental period in adolescence.

From a theoretical perspective, the results presented here can also be extended and understood in relation to the process of competence development and internalization, as suggested in Self-Determination Theory (Ryan & Deci, 2017). Adolescence represents a key phase in which motivational regulation becomes progressively internalized, and the present findings suggest that the interpretation of performance feedback plays a role in this process. In the initial stages of sports involvement, athletes' perceived competence is generally unstable and heavily dependent on situational and environmental feedback and performance outcomes (D'Astous et al., 2020). In this case, objective aspects, including running speeds, may have a greater impact on the motivational states of younger and less experienced athletes (Abate Daga et al., 2023). However, with the progression of sports-specific training, it is likely that athletes will demonstrate more stable and sophisticated perceived competence, based on self-referential progress and task accomplishment. This suggests a gradual process of internalization, whereby situational and environmental feedback becomes less critical in relation to self-perception and motivation (Barnett et al., 2008). Such developmental shifts may be particularly relevant for understanding long-term engagement trajectories in youth sport.

From the perspective of Self-Determination Theory (Ryan & Deci, 2017), performance feedback primarily functions as a competence-relevant cue. When competence is supported, autonomous motivation tends to increase; when competence is threatened, motivation may decline (Bartholomew et al., 2011; Vasconcellos et al., 2020). The overall positive motivational responses observed in this study suggest that the feedback context was not experienced as controlling or autonomy-thwarting. This aligns with prior research indicating that structured performance testing, when embedded within supportive environments, has been associated with enhanced engagement and perceived competence (Jaakkola et al., 2013; Wiersma & Sherman, 2008). These findings reinforce the importance of autonomy-supportive environments in promoting adaptive motivational patterns among adolescents.

Importantly, research examining interpersonal coaching behaviors demonstrates that autonomy-supportive climates facilitate adaptive motivational patterns, whereas controlling behaviors predict maladaptive outcomes and burnout (Barcza-Renner et al., 2016; Bhavsar et al., 2019; Delrue et al., 2019). Thus, the positive responses observed in the present study may reflect the broader motivational climate within which feedback was delivered. In any case, the interaction effect provides a more nuanced interpretation. Among athletes with 1–6 years of training experience, sprint performance was strongly associated with motivation, whereas among those with 7–12 years of experience, motivation appeared relatively independent of immediate performance outcomes. This pattern is consistent with developmental evidence suggesting that early-stage athletes often rely more heavily on external evaluative signals when forming competence judgments (Calvo et al., 2010). In contrast, more experienced athletes may have developed more stable self-perceptions and internalized mastery orientations, reducing their dependence on single performance

episodes (Barnett et al., 2008). This differentiation highlights the need to consider the developmental stage when interpreting motivational responses to evaluative feedback in youth populations. It is also aligned with the achievement goal theories (Harwood et al., 2008) that suggest a developmental shift to more stable frameworks of evaluation. More experienced athletes may use more stable frameworks of evaluation that focus on improvement over time, thereby buffering the effects of performance outcomes on motivation (Li & Xing, 2025). Intervention studies further demonstrate that autonomy-supportive climates promote resilient motivational profiles that are less contingent on short-term results (Cheon et al., 2015, 2018; Reynders et al., 2019). Thus, training age may operate as a moderating factor that shapes how competence information is processed.

The findings also resonate with research emphasizing the role of maturation and accumulated experience in youth sport performance. Lola et al. (2026) showed that biological maturity and training experience significantly predict sprint and jump performance, whereas chronological age does not. When considered alongside the present results, this suggests that objective performance outcomes during adolescence are partly shaped by developmental timing. Consequently, feedback based solely on performance metrics may unintentionally reinforce maturity-related advantages, particularly among less experienced athletes whose motivational regulation is still consolidating. This has important implications for equity and inclusion in youth sport environments, as feedback practices may differentially affect athletes depending on their developmental status.

Furthermore, evidence indicates that adolescents' self-concept and perceived competence significantly influence how evaluative situations such as fitness testing are experienced (White et al., 2025). Interpreting performance feedback within a broader psychosocial and developmental framework is therefore essential, particularly in adolescence, where identity and self-perceptions are still forming.

In the broader context of youth physical activity promotion, the present findings highlight the dual nature of performance feedback. On one hand, structured feedback appears to be associated with higher engagement and intention to continue training—a factor that may be relevant for long-term physical activity participation (Ryan & Deci, 2017; Teixeira et al., 2012). On the other hand, the differential sensitivity observed among less experienced athletes underscores the importance of developmentally tailored communication strategies. Given that adolescence is a critical window for establishing lifelong physical activity habits, optimizing feedback practices may be associated with improved engagement and may potentially contribute to longer-term participation, although this remains to be empirically tested in future research (Trigonis et al., 2025).

Additionally, contemporary sport and school settings increasingly incorporate technology-based performance monitoring systems (e.g., wearable activity trackers) to provide individualized feedback. Meta-analytic evidence suggests that such tools can enhance physical activity participation among youth (Au et al., 2024; Chen et al., 2025). However, the present findings imply that even objective, technology-mediated feedback should be delivered within autonomy-supportive and developmentally sensitive frameworks. Without such considerations, feedback may inadvertently undermine motivation in more vulnerable or less experienced youth populations.

The psychometric findings further provide preliminary support for the practical relevance of this work. The strong internal consistency and unidimensional structure of the motivational response scale indicate that brief post-feedback assessments may provide a useful preliminary indication of athletes' immediate motivational reactions. In applied sport environments, such tools may assist practitioners in monitoring the psychological impact of evaluative practices and adjusting feedback delivery accordingly. This may be particularly valuable for early identification of disengagement risk among adolescents.

Practically, the results suggest that coaches should differentiate feedback strategies based on training age. For less experienced athletes, emphasizing progress, effort, and skill acquisition—rather than absolute comparisons—may help stabilize competence perceptions. For more experienced athletes, objective metrics may be integrated into advanced self-regulation processes without destabilizing motivation. Incorporating maturity-sensitive frameworks, as recommended in youth sport development literature (Lola et al., 2026), may further enhance fairness and motivational sustainability. Overall, these findings support the design of developmentally appropriate feedback strategies that promote sustained engagement and may help reduce the risk of dropout in youth sport, although this was not directly examined in the present study.

Nevertheless, several limitations should be acknowledged. First, the relatively small sample size (N = 53), while sufficient for exploratory analyses, limits the robustness of the factor analytic procedures. In particular, conducting both exploratory and confirmatory factor analyses on the same sample may introduce bias and inflate model fit. In addition, the elevated RMSEA value suggests that model fit is not optimal and should be interpreted with caution. Therefore, the psychometric findings should be considered preliminary, and further validation using larger and independent samples is required. Additionally, the use of a composite motivational score combining conceptually distinct constructs should be interpreted with caution, as well as the use of median splits for performance classification, which may reduce statistical sensitivity. Moreover, this approach may obscure underlying continuous relationships between variables, and alternative analytic strategies, such as regression-based moderation using continuous predictors, would provide a more precise estimation of these effects. Future studies should consider using multidimensional measures and continuous analytic approaches. Second, while this study was cross-sectional in nature, this limits our ability to make causal claims regarding the relationship between performance feedback and motivational responses. Therefore, the present study does not allow causal conclusions regarding the effect of feedback on motivation, but rather captures participants' immediate self-reported responses following feedback. Third, a key limitation of the present study is the absence of biological maturation measures. Given the substantial variability in maturation status during adolescence, this factor may have influenced both sprint performance and motivational responses. In particular, more biologically mature athletes may demonstrate performance advantages that could affect how feedback is interpreted, especially among less experienced participants. Therefore, the findings should be interpreted with caution, and future research should incorporate objective measures of biological maturation to better disentangle these effects. Fourth, this study was conducted in one context of testing, specifically sprint performance, and thus may not generalize to other sport contexts or performance domains. These limitations emphasize the importance of interpreting and replicating these results across different samples and sport contexts, while, in parallel, underscore the importance of tailoring feedback strategies to athletes' developmental stage in applied coaching and physical education settings.

5. Conclusions

This study examined adolescents' motivational responses following individualized sprint performance feedback and investigated the moderating role of training experience. Overall, athletes reported positive motivational reactions, suggesting that structured performance feedback may function as a competence-relevant stimulus without undermining motivation. However, the interaction between training age and sprint performance indicates that motivational responses are not uniform across developmental stages. Less experienced athletes appeared more sensitive to performance outcomes, whereas motivation among more experienced athletes remained relatively stable regardless of sprint

results. These findings highlight the importance of developmentally sensitive feedback practices in youth sport. Coaches and practitioners should emphasize progress, effort, and skill development, particularly for athletes in the early stages of sport participation, to support stable competence perceptions and engagement in youth sport. Importantly, these findings underline the need to align feedback practices with adolescents' developmental characteristics to foster adaptive motivational patterns. Given the central role of motivation, self-efficacy, and training commitment in long-term physical activity participation, implementing psychologically informed feedback strategies may have implications for supporting healthier and more sustainable sport participation trajectories, although these potential effects require confirmation through longitudinal research. Future longitudinal studies are needed to examine whether these immediate motivational responses translate into sustained behavioral outcomes over time.

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Abbreviations

The following abbreviations are used in this manuscript:

ANOVA	Analysis of Variance
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
IFI	Incremental Fit Index
ML	Maximum Likelihood
NFI	Normed Fit Index
NNFI	Non-Normed Fit Index
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SDT	Self-Determination Theory

SRMR	Standardized Root Mean Square Residual
TLI	Tucker–Lewis Index

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