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Life satisfaction in young footballers: The contribution of basic needs satisfaction and passion

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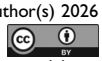

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Abstract

The present study was grounded in Self-Determination Theory and the Dualistic Model of Passion. The objective of the study was to examine the relationships between basic psychological need satisfaction, passion (harmonious and obsessive), and life satisfaction in youth football players. The sample comprised 403 male youth football players aged 13 to 17 years who completed validated self-report measures assessing autonomy, competence, relatedness, passion for football, and global life satisfaction. The structural equation modeling approach was employed to assess direct and indirect associations among variables, as well as to ascertain invariance of the model across age groups. The results of the study indicated that the satisfaction of basic psychological needs was associated with a propensity toward harmonious passion, while concurrently demonstrating an inverse relationship with obsessive passion. The harmonious passion–life satisfaction relationship was found to be positive, while the obsessive passion–life satisfaction relationship was found to be negative. The present study examined the relationship between need satisfaction and life satisfaction, with the hypothesis that passion would mediate this relationship. It was predicted that the way players internalize their motivation would play a central role in translating sport experiences into broader well-being. The structural model demonstrated invariance across age groups, thereby suggesting developmental robustness of these motivational processes throughout adolescence. These findings underscore the significance of need-supportive environments in youth football, which are instrumental in fostering adaptive forms of passion and promoting long-term psychological well-being.

Keywords

Adolescence, motivation, psychological wellbeing, self-determination theory, soccer

Reviewer: Carolina Sanchez (University of Atlántico Medio, Spain)

Introduction

Performance and progression in youth soccer transcend physical and tactical attributes, depending critically on psychological factors such as motivation, resilience, self-regulation, and coping strategies.[1,2] Within elite talent pathways, psychological characteristics, including hope for success, competitiveness, and the management of fear of failure, have been identified as key predictors of future professional status.[2] When these psychological skills and support systems are intentionally developed, academies can simultaneously enhance athletic performance and prepare players for a successful life beyond the pitch.[1,3]

However, the journey through youth soccer is often marked by significant pressure and uncertainty. While many twelve-year-old boys dream of joining top-tier clubs, most are eventually forced to adjust their expectations as they confront the low probability of

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professionalization, plateaued development, or injuries.[4,5] This competitive environment, often exacerbated by controlling or ego-focused parental behaviors centered on results and criticism, is associated with controlled motivation, emotional exhaustion, and a heightened fear of failure.[6] Younger and U23 players, in particular, frequently display higher levels of negative perfectionism and obsessive passion, driven by the perceived necessity to "succeed now",[7,8] which can lead to increased anxiety and depressive symptoms.[9]

In this high-pressure context, life satisfaction serves as a vital indicator of an athlete's psychological health. Within sport psychology, life satisfaction is recognized as the cognitive and judgmental component of subjective well-being, representing the global evaluation individuals make regarding their lives.[10,11] Youth players with fewer psychological resources, characterized by lower life satisfaction and poorer general health, often exhibit greater psychological difficulties, including impaired self-regulation and impulsive behaviors.[12] Conversely, high life satisfaction acts as a buffer; when a player is dissatisfied with life, they are more likely to experience emotional overload, making it harder to make thoughtful, long-term decisions regarding their development.[9,13]

According to Self-Determination Theory (SDT), the foundation of such well-being lies in the satisfaction of basic psychological needs: autonomy, competence, and relatedness. When coaches, parents, and peers provide autonomy-supportive environments, young athletes report higher need satisfaction, which translates into increased happiness, excitement, and pleasant emotions.[12,14,15] Feeling skilled and connected to teammates is essential for sustaining subjective happiness.[16,17] Conversely, when these needs are frustrated by controlling environments, athletes show higher risks of burnout, anxiety, and dejection.[6,18–20]

The relationship between need satisfaction and well-being is further illuminated by the Dualistic Model of Passion. Harmonious passion (HP) emerges from autonomous motives where the activity is freely chosen and well-integrated into the player's life, allowing for a healthy balance between soccer and other life domains.[21] HP is associated with adaptive perfectionism, positive affect, and sustainable engagement.[22,23] In contrast, obsessive passion (OP) stems from controlled motives and the need to prove self-worth, leading to conflict, stress, and maladaptive behaviors such as playing through injury.[24,25] While elite athletes often display mixed profiles of both HP and OP due to high-stakes environments, a dominance of HP is typical among those who function well and remain within the sport system.[26,27]

Despite the established links between these constructs, several gaps remain in the literature. Most current evidence treats the associations between basic needs and passion as static or cross-sectional, leaving it unclear how they mutually shape each other over time.[28,29] Furthermore, few studies examine the individual contributions of each separate need (autonomy, competence, relatedness) to different passion profiles, or how these interactions specifically predict global life satisfaction in the unique cultural context of youth soccer.[29,30]

It is important to note that even within the same developmental stage and competitive context, youth footballers do not experience well-being uniformly. Research indicates that athletes within the same age group and training environment can exhibit significantly different levels of life satisfaction, indicative of substantial inter-individual variability.[12,31] These differences underscore the notion that exposure to analogous structural and environmental conditions does not necessarily guarantee equivalent psychological outcomes. Instead, individual perceptions of need satisfaction, motivational regulation, and personal experiences within the sport context appear to shape how young athletes evaluate their lives. This variability underscores the necessity of examining not only general trends but also the nuanced, individual pathways through which basic psychological needs and passion interact to influence life satisfaction.

A critical factor in understanding these motivational processes is the athlete's developmental stage. According to the Developmental Model of Sport Participation (DMSP),[32] youth soccer involves a transition from the Specializing years (13–15 years) to the Investment years (16 + years). During this transition, competitive pressure and professionalization intensify.[33] This environmental shift gives rise to a fundamental question: does the "motivational engine" remain stable despite these increasing demands? Consequently, establishing measurement and structural invariance is not merely a statistical requirement but a substantive necessity to determine if the mechanisms of Self-Determination Theory and the Dualistic Model of Passion operate consistently across the adolescent pathway, or if the transition to elite-level investment warrants a differentiated approach to protecting athlete well-being.

This study aimed to examine the stability of the motivational processes underlying harmonious passion across two distinct developmental stages within a high-performance youth football academy: the Specializing years (13–15 years) and the Investment years (16 + years). Specifically, we sought to test the measurement and structural invariance of a model linking basic psychological need satisfaction to harmonious passion and, subsequently, to life satisfaction across these two age groups. By doing so, we intended to determine whether the psychological architecture of well-being remains consistent throughout this critical developmental transition, despite the increased competitive demands and shifting priorities characteristic of the Investment stage (Figure 1).

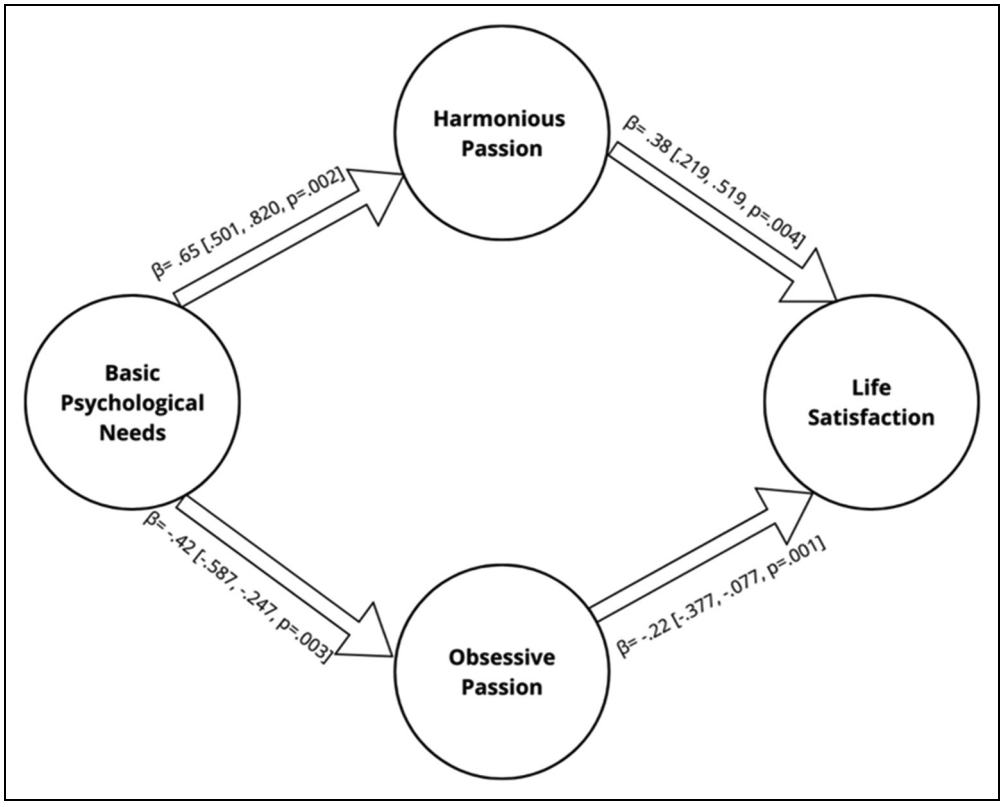

Figure 1. Design.

Method

Participants

The sample comprised 403 male youth football players aged 13 to 17 years (M = 14.27, SD = 1.47). Their sport experience varied from 4 to 10 years (M = 6.42, SD = 1.16). On average, they trained 2–4 times per week (M = 3.11, SD = 1.15), with each session lasting 60–120 min (M = 86.80, SD = 12.91).

In accordance with the theoretical framework of the Developmental Model of Sport Participation (DMSP),[32] participants were categorized into two distinct groups representing developmental stages: The Specializing years, encompasses athletes between the ages of 13 and 15 years (n = 208). This stage is marked by a gradual decline in sport diversification and an increase in sport-specific skill development. The subsequent stage, termed the Investment years, involves athletes aged 16 years and older (n = 195). In this stage, athletes typically commit to a single sport, engaging in deliberate practice and setting performance goals. This division facilitates the examination of how psychological variables manifest as competitive demands and commitment levels intensify.

Procedures: data collection

This study was reviewed and approved by the Ethics Committee of the University of Lisbon – Faculty of Human Kinetics (CEIFMH N° - 34/2021). After obtaining ethical clearance, the research team contacted youth football clubs to secure institutional authorization for athlete recruitment. Once approved, players were invited to participate voluntarily by completing self-report questionnaires.

Data collection occurred collectively in the clubs' meeting rooms before training sessions, under the supervision of the research team, and lasted approximately 15 min. Parental consent was not required, as participation was covered by the collaboration agreement between the University of Coimbra and the clubs. No financial or material incentives were provided. Inclusion criteria included: (a) male youth players registered with a federated football club; (b) at least one full season of prior organized football experience; and (c) availability to complete all study materials. Exclusion criteria were: (a) injury or illness preventing full participation; (b) concurrent involvement in another competitive sport; and (c) incomplete or invalid questionnaire responses

Instruments

Needs Satisfaction. Athletes' satisfaction of basic psychological needs was assessed using the Basic Psychological Needs in Sport Scale (BPSS).[34] The scale consists of 12 items rated on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Items are grouped

into three subscales corresponding to the core needs outlined by Self-Determination Theory[35]: autonomy (e.g., "I feel that the way I training is the way I want to"), competence (e.g., "I feel I have made a lot of progress toward the goals I want to achieve"), and relatedness (e.g., "My relationships with the people I train with are close"). In the present study, a composite score representing global basic psychological need satisfaction was calculated by averaging the three subscales. While the theoretical contributions of autonomy, competence, and relatedness as proposed by Self-Determination Theory[36] are recognized, the choice to use a global index was a deliberate analytical strategy aimed at capturing the overall "psychological nutrients" provided by the sporting environment across different DMSP stages. This approach, which is supported by prior validation studies of the Portuguese BPSS,[34] prioritizes parsimony in the structural model while focusing on the cumulative impact of need satisfaction on athletes' passion and life satisfaction. The scale demonstrated satisfactory internal consistency ($\alpha = .76$).

Athletes' levels of Harmonious and Obsessive Passion were assessed using the Portuguese version of the 8-item Passion Scale.[37] The instrument includes four items measuring Harmonious Passion (e.g., "*This sport allows me to live a variety of experiences*") and four items assessing Obsessive Passion (e.g., "*I cannot live without it*"). Responses were recorded on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). In the present study, composite reliability values were as follows: Harmonious Passion (.88) and Obsessive Passion (.90).

Life Satisfaction. Overall life satisfaction was measured using the Portuguese version of the Satisfaction with Life Scale.[38] The instrument comprises five items (e.g., "So far I have gotten the important things I want in life"), rated on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). Higher scores indicate greater levels of perceived life satisfaction.

Data analysis procedures

Structural equation modeling

Descriptive statistics and bivariate correlations were computed for all study variables. The hypothesized model was tested using AMOS v.29, following a two-step maximum likelihood approach.[39] In the first step, a confirmatory factor analysis (CFA) was conducted to evaluate the model's psychometric adequacy. Internal consistency was examined using composite reliability ($CR \geq .70$), convergent validity through the average variance extracted ($AVE \geq .50$), and discriminant validity by comparing the squared inter-factor correlations with the AVE of each construct.[40] In the second step, structural equation modeling (SEM) was applied to test the proposed associations. Standardized direct and indirect effects were estimated, and their significance was determined via bootstrap resampling (1000 samples) using bias-corrected 95% confidence intervals (CIs); effects were considered significant when zero was not included in the CI.[41] Model fit was evaluated using conventional absolute and incremental indices: Comparative Fit Index ($CFI \geq .90$), Tucker–Lewis Index ($TLI \geq .90$), Standardized Root Mean Square Residual ($SRMR \leq .08$), and Root Mean Square Error of Approximation ($RMSEA \leq .08$, 90% CI), as recommended by several authors.[40,42] To ensure adequate statistical power, an a priori sample size estimation was conducted using the Soper Calculator,[43] considering an anticipated medium effect size of 0.30, desired power of 0.80, $\alpha = .05$, four latent variables, and sixteen observed indicators. The suggested effect size was defined according to similar studies.[44] The required minimum sample size ($n = 137$) was met in each group supporting the robustness and interpretability of the SEM results.

Multigroup structural equation modeling

A multigroup analysis was conducted to examine whether the hypothesized model could be replicated across different subgroups (i.e., football players aged 13–15 years and 16 years or older). Following procedure, structural invariance was tested across age groups, gender, and years of experience.[45] The analysis involved two main steps: (1) evaluating the fit indices of the baseline models for each subgroup, and (2) assessing invariance by comparing unconstrained models with models imposing constraints on measurement weights, structural weights, measurement intercepts, structural residuals, and measurement residuals. Following,[46] invariance was considered supported when differences in CFI (ΔCFI) were $\leq .01$.

Results

Preliminary analysis

Missing data (<4%) were imputed using the regression imputation procedure available in AMOS 29. Descriptive statistics indicated that the assumptions of univariate normality were satisfied, with Skewness and Kurtosis values falling within the recommended limits of -2 to $+2$ and -7 to $+7$, respectively. No univariate or multivariate outliers were detected. Given that Mardia's coefficient for multivariate kurtosis exceeded the recommended cut-off value (>5) across all samples, the Bollen–Stine bootstrap procedure (2000 samples) was employed to adjust model estimates for non-normality, in accordance with the guidelines proposed by.[47] In addition, variance inflation factors (VIF) were inspected to examine potential multicollinearity among the predictors. VIF were less than to 10, which is considered acceptable for regression-based analyses.[48]

Table 1. Descriptive statistics, correlations, and psychometric properties.

Constructs	BPN	HP	OP	LS
BPN	I	-	-	-
HP	.44**	I	-	-
OP	-.29**	-.43**	I	-
LS	.39**	.33**	-.33**	I
Mean	4.10	5.61	2.08	4.32
SD	.47	.90	1.50	.58
CR	.75	.91	.84	.88
AVE	.62	.55	.64	.75

Note. BPN = basic psychological needs; HP = = harmonious passion; OP = obsessive passion; LS = life satisfaction; SD = standard deviation; CR = composite reliability; AVE = average variance extracted; **p < .001.

Descriptive statistics, bivariate correlations, and psychometric properties for all study variables are presented in Table 1. Participants reported relatively high levels of basic psychological needs satisfaction (BPN; M = 4.10, SD = 0.47) and harmonious passion (HP; M = 5.61, SD = 0.90), moderate life satisfaction (LS; M = 4.32, SD = 0.58), and low levels of obsessive passion (OP; M = 2.08, SD = 1.50). Bivariate correlations indicated that BPN was positively correlated with HP (r = .44, p < .01) and LS (r = .39, p < .01) and negatively correlated with OP (r = −.29, p < .01). HP was negatively associated with OP (r = −.43, p < .01) and positively associated with LS (r = .33, p < .01). OP was negatively correlated with LS (r = −.33, p < .01). Internal consistency was adequate, with composite reliability coefficients ranging from .75 (BPN) to .91 (HP). Convergent validity, assessed via average variance extracted (AVE), was satisfactory for all constructs (AVE = .55–.75). Discriminant validity was supported, as the squared correlations between constructs were lower than the AVE of each factor, indicating no issues with overlap between the measures. The measurement model comprised four interrelated latent constructs: basic psychological needs, harmonious and obsessive passion, and life satisfaction. Moreover, the model demonstrated an adequate overall fit to the data: χ^2/df = 1.86 (73), B-S p = .011 TLI = .937, CFI = .951, SRMR = .054, RMSEA = 062. (90% CI = .051, .073). Collectively, these results confirm that the model meets the necessary conditions for proceeding with the structural model and assessing the direct effects among the variables of interest.

The goodness-of-fit indexes (Table 2) results indicated an acceptable fit for all three structural equation models. For the whole sample (M1), the model yielded $\chi^2 = 250.76$, df = 75, χ^2/df = 3.43, Bollen–Stine p < .001, CFI = .920, TLI = .909, SRMR = .062, and RMSEA = .078 (90% CI [.067, .088]). For the specialization years group (M2), fit indices were $\chi^2 = 186.63$, df = 75, χ^2/df = 2.48, Bollen–Stine p < .001, CFI = .912, TLI = .903, SRMR = .073, and RMSEA = .079 (90% CI [.069, .096]). For the investment years group (M3), the model produced $\chi^2 = 158.62$, df = 75, χ^2/df = 2.11, Bollen–Stine p = .002, CFI = .922, TLI = .911, SRMR = .071, and RMSEA = .077 (90% CI [.061, .094]).

The multigroup invariance results (Table 3) showed that the difference in CFI (ΔCFI) between the unconstrained model and the constrained models for measurement weights (MW; ΔCFI = .000), structural weights (SM; ΔCFI = .001), structural covariances (SC; ΔCFI = .001), and structural residuals (SR; ΔCFI = .005) remained below the recommended .01 cutoff.[46] These results indicate acceptable levels of invariance across the specialization years and investment years groups for these model constraints. However, the measurement residuals model (MR) exceeded the threshold, with ΔCFI = .024, indicating lack of invariance at this level.

The results indicated that Basic Psychological Needs (BPN) were positively associated with Harmonious Passion (β = .65, 95% CI [.501, .820], p = .002) and negatively associated with Obsessive Passion (β = −.42, 95% CI [−.587, −.247], p = .003). Harmonious Passion showed a positive association with Life Satisfaction (β = .38, 95% CI [.219, .519], p = .004), whereas Obsessive Passion demonstrated a negative association with Life Satisfaction (β = −.22, 95% CI [−.377, −.077], p = .001). The standardized indirect effect showed that basic psychological needs positively predicted life satisfaction (β = .49, 90% CI [.223, .468], p = .001) through the combined mediating effects of harmonious and obsessive passion. In total, the model explains 31% of the variance in life satisfaction.

Discussion

The present study examined the contribution of basic psychological needs (BPN) satisfaction and passion

Table 2. Goodness-of-fit indexes.

Model	χ^2	DF	χ^2/df	B-Sp	CFI	TLI	SRMR	RMSEA	CI90%
M1. SEM –Whole Sample	250.76	75	3.43	<.001	.920	.909	.062	.078	.067 - .088
M2. SEM – SY Sample	186.63	75	2.48	<.001	.912	.903	.073	.079	.069 - .096
M3. SEM – IY Sample	158.62	75	2.11	.002	.922	.911	.071	.077	.061 - .094

Note. SEM = structural equation model; SY = specialization years; IY = investment years; χ^2 = Chi-square; DF = degress of freedom; χ^2/df = normalized chi-square; B-Sp = Bollen-Stine bootstrapp level of significance; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CI90% = Confidence Interval at 90% for RMSEA.

Table 3. Goodness-of-fit indexes for the invariance of the structural model across age-groups.

Model SY-IY	χ^2	df	$\Delta\chi^2$	Δdf	p	CFI	ΔCFI
UM	354.254	146	-	-	-	.910	-
MW	355.473	156	10.218	10	.422	.910	.000
SM	361.629	160	16.374	14	.291	.909	.001
SC	363.173	161	17.919	15	.267	.909	.001
SR	374.657	164	29.402	18	.044	.905	.005
MR	430.642	178	85.388	32	<.001	.886	.024

Note SY = specialization years; IY = investment years χ^2= Chi-square; $\Delta\chi^2$= differences in value of chi-square; Δdf = differences in degrees of freedom; p = level of significance; CFI = comparative fit index; ΔCFI = differences in the value of the comparative fit index; UM: unconstrained model ; MW: measurement weights; SM: structural weights; SC: structural covariance's; SR: structural residuals; MR: measurement residuals.

(harmonious and obsessive) in predicting life satisfaction among young footballers. The findings offer substantial empirical validation for both Self-Determination Theory (SDT)[35] and the Dualistic Model of Passion,[49] underscoring the pivotal role of internalized motivation in adolescents' overall well-being.

The robust positive association from BPN to harmonious passion (β = .65) and the moderate negative association to obsessive passion (β = −.42) are theoretically congruent with the SDT. When autonomy, competence, and relatedness are satisfied, engagement in sport is typically internalized as autonomous motivation, which forms the psychological core of harmonious passion.[50,51] In this condition, football assumes a significant role while maintaining equilibrium with other life domains, thereby promoting positive affect and overall well-being.

It is important to acknowledge that, while Self-Determination Theory underscores the functional uniqueness of autonomy, competence, and relatedness 35, the present study employed a composite score to represent global need satisfaction. This deliberate analytical choice is also supported on conceptual grounds, as the theory's proponents posit that the satisfaction of one or two basic psychological needs is insufficient to achieve high levels of well-being; rather, all three needs must be satisfied simultaneously 35, 51. Thus, the use of a global score captures the synergy among the three components, reflecting the overall psychological nutrients available to the athlete and providing a more appropriate assessment of their combined contribution to positive outcomes.

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The need for satisfaction has been demonstrated to be associated with intrinsic motivation, reduced burnout, and enhanced life satisfaction.[51,53] Therefore, a robust positive correlation between BPN and harmonious passion is theoretically anticipated. Conversely, obsessive passion tends to manifest when identity and self-worth become contingent on external validation (e.g., approval, status) and when needs, particularly autonomy, are frustrated.[29] Empirical evidence indicates that need frustration predicts maladaptive outcomes, anxiety, and burnout,[54] while harmonious passion aligns with need satisfaction and obsessive passion with need frustration and negative affect.[22]

These findings underscore the notion that need satisfaction does not merely represent a peripheral factor but rather constitutes the fundamental psychological underpinning through which passion profiles are shaped. Coaches and training environments function as "designers" of athletes' motivational experiences. Autonomy-supportive and democratic coaching behaviors have been shown to increase BPN satisfaction, autonomous motivation, and life satisfaction,[55] while perceived coach support has been found to predict higher need satisfaction and mitigate negative coaching behaviors.[56] In a similar vein, mastery-oriented climates that prioritize effort and learning have been linked to increased BPN and reduced fear of failure.[54] At the team level, the presence of need-supportive environments has been shown to foster engagement and protect against burnout.[18,51]

Consequently, when young footballers experience a sense of competence, connection, and autonomy, the sport transitions from being a externally imposed obligation to a voluntarily chosen pursuit that fosters psychological well-being.

The harmonious passion variable demonstrated a positive association with life satisfaction, with a beta coefficient of .38. In contrast, the obsessive passion variable exhibited a negative correlation with life satisfaction, with a beta coefficient of −.22. These findings align with prior research demonstrating that harmonious passion generates positive affect, vitality, and meaning in life, which translate into higher global life satisfaction.[29,57] A moderate effect size (.38) is consistent with the extant evidence demonstrating that harmonious passion robustly contributes to well-being through balanced engagement and positive emotional experiences.[21]

Conversely, obsessive passion has been linked to stress, anxiety, conflict with other life domains, and an increased risk of burnout and maladaptive behaviors.[29,58] Research with ultra-endurance athletes indicates that

exclusive athletic identity strongly predicts obsessive passion, which in turn predicts lower happiness.[57] When an individual's sense of self becomes inextricably linked to a particular sport, setbacks can potentially lead to a heightened sense of distress, as evidenced by research conducted by.[29]

In the present sample, mean levels of obsessive passion were relatively low, suggesting a generally healthy motivational environment. This phenomenon aligns with research indicating that obsessive passion is associated with compulsive engagement and reduced well-being.[22,59] However, even minor subgroups characterized by obsessive passion may encounter elevated psychological vulnerabilities,[57,60] underscoring the necessity for sustained observation of perfectionism, pressure, and identity exclusivity.

The indirect effect ($\beta = .49$) indicates that a substantial portion of BPN's impact on life satisfaction is transmitted through passion. This phenomenon aligns with a well-established motivational sequence, wherein the satisfaction of needs fosters vitality and autonomous motivation.[52] Passion, in this context, signifies the enduring, identity-based structuring of this motivational energy.[61]

Needs function as the psychological "nutrients," and passion determines how those nutrients are structured in daily life. According to[61] and,[21] harmonious passion organizes engagement in a flexible and restorative manner, thereby supporting global well-being. However, an obsessive passion may channel need-related energy into a rigid and conflict-prone engagement, thereby undermining well-being.[62]

Research consistently demonstrates that the satisfaction of needs and the engagement in autonomous activities serve as mediators in the relationship between supportive contexts and well-being.[53,63] Additionally, studies indicate that passion mediates associations between personality traits and well-being outcomes in athletes.[21] The present findings extend this literature by demonstrating that passion is the principal psychological mechanism through which need satisfaction "shows up" as life satisfaction in youth footballers.

The model demonstrated a noteworthy degree of explanatory power, with 31% of the observed variance in life satisfaction being attributed to its single-domain motivational framework. However, it is important to note that adolescents' life satisfaction is influenced by a multitude of factors that extend beyond the realm of sports. According to the findings of,[64] family support is among the strongest predictors of adolescent life satisfaction. Furthermore,[65] have demonstrated that cohesive family structures relate to higher well-being and lower distress. Psychological distress and depressive symptoms have been demonstrated to serve as robust negative predictors.[66]

The literature suggests that peer relationships, school experiences, socioeconomic context, and stable traits also contribute to life satisfaction.[64,65,67] The impact of sport participation on life satisfaction may be further mediated by emotional intelligence, self-esteem, and positive affect.[31] Consequently, while passion and the satisfaction of needs constitute a fundamental motivational force within the domain of sports, they function within a more extensive developmental ecosystem.

The invariance analysis demonstrated structural stability across age groups (13–15 vs. 16 + years), thereby supporting the developmental robustness of SDT-based processes. The constructs demonstrated analogous meanings, and the structural paths exhibited stability across groups. This finding aligns with the results of previous research in the field of adolescent sport studies, which demonstrated the absence of change in motivational models across different school stages.[68–70]

While older athletes may exhibit variations in mean levels of specific psychological resources,[71] the underlying mechanism, the satisfaction of needs that fosters passion, which predicts life satisfaction, appears to remain consistent from early to late adolescence. This finding indicates that the motivational "engine" that underlies well-being in football is established early and operates consistently despite increasing competitive demands.

Regarding the invariance analysis, as highlighted in the specialized literature,[39,45,48] residual invariance is considered the most rigorous level and is often the last to be tested in the hierarchical process of measurement invariance assessment. When the preceding levels are established, the absence of residual invariance does not necessarily compromise the validity of cross-group comparisons, as this criterion is particularly difficult to satisfy, especially in models with latent variables and in samples drawn from distinct age groups, where idiosyncratic differences in measurement errors may emerge even when the factor structure and core parameters remain stable.

Thus, although residual invariance was not achieved, it does not invalidate the structural comparisons conducted, given that the preceding criteria, which are fundamental for construct comparability, were fully met. The invariance analysis demonstrated structural stability across age groups, suggesting that the psychological "architecture" of well-being is robust throughout adolescence. This finding is substantively significant in the sense that it suggests that, despite the shift from the multi-faceted Specialization stage to the high-stakes Investment stage 32, the fundamental path to life satisfaction remains the same. Despite the escalating demands of a competitive environment and the shift in focus toward elite performance, the satisfaction of fundamental psychological needs remains the predominant catalyst for harmonious passion. This stability suggests that the "internalization" process of sport into one's identity follows a consistent psychological logic, regardless of the athlete's chronological age or years of deliberate practice.

Practical applications

These findings provide an evidence-based roadmap for the professionalization of the psychological development of youth footballers. The roadmap prioritizes the satisfaction of basic psychological needs as the primary driver of harmonious passion and life satisfaction. It is imperative for sports clubs to implement formal autonomy-supportive coaching programs, wherein coaches adopt democratic leadership styles, providing athletes with choices and clear rationales for training tasks. By engaging players in the decision-making process, coaches can foster autonomy and facilitate the internalization of the significance of their efforts by athletes, thereby counteracting the perception of these efforts as mere external obligations. It is imperative that training environments maintain an emphasis on mastery, prioritizing individual progress and personal growth over social comparison or performance pressure. This approach is crucial in mitigating the risks associated with obsessive passion and the fear of failure. To fortify the sense of relatedness, it is imperative that athletic clubs cultivate an environment characterized by support, where players are recognized as individuals through the facilitation of open communication and the establishment of collaborative team objectives. Moreover, the promotion of identity diversification through the encouragement of academic balance and interests that extend beyond football prevents the development of a self-worth that is exclusively contingent on athletic success. It has been demonstrated that these motivational mechanisms exhibit developmental robustness across age groups. Consequently, these interventions can be consistently applied throughout the entire talent pathway to ensure long-term psychological flourishing.

Suggestions for interventions

The findings of this study underscore the notion that catering to the fundamental psychological needs of young athletes is of paramount importance for fostering a healthy and sustainable enthusiasm for football. The role of the coach in this process is foundational. In high-performance academy settings, where competitive pressure is intrinsic, the translation of theory into practice necessitates the implementation of autonomy-supportive strategies by coaching staff. These strategies may include the involvement of players in tactical decision-making or the provision of choices within the warm-up structure. The implementation of these strategies serves to strengthen players' perception of self-determination. Furthermore, the cultivation of competence should be operationalized through feedback that is predominantly focused on the process and individual technical evolution rather than constant social comparisons. This approach enables the athlete to consolidate a harmonious passion that enhances overall life satisfaction.

Concurrently, club leadership must cultivate training environments oriented toward mastery, where effort and personal growth take precedence over immediate performance or scoreboard results. This approach is imperative for mitigating the risk of obsessive passion, particularly in players subject to elevated expectations, and institutions should implement systematic psychological well-being monitoring to promptly detect indications of burnout or a rigid identification with the athletic role. It is imperative for development programs to adopt a holistic perspective by actively encouraging academic balance and the maintenance of a multidimensional identity outside of football. This approach has been shown to reduce psychological vulnerability in the face of sporting setbacks or injuries.

The observed stability in motivational processes throughout adolescence indicates that these interventions should not be fragmented by age groups but rather integrated transversally into the club's methodological curriculum. The consistent implementation of strategies that fortify social bonds within the team and cultivate transparent communication with families serves to ensure that the elite environment functions as a catalyst for mental well-being. By structuring training around personal growth and autonomous regulation, youth academies can reconcile the demands of high performance with the preservation of the psychological integrity of young players across all stages of their development.

Study limitations

The present study is not without its limitations. Firstly, the cross-sectional design precludes the drawing of causal conclusions; longitudinal research is necessary to examine how these developmental processes evolve throughout the different DMSP stages. Secondly, the data were collected through self-report measures, which have been shown to introduce social desirability or response bias. In elite academies, players might respond under the fear that their perceptions could affect their status or projection within the club, despite guarantees of anonymity. Thirdly, the sample exclusively comprised male youth football players, thereby constraining the generalizability of the findings to female athletes or individual sports. Fourthly, sample asymmetry should be acknowledged. The mean for obsessive passion was notably low ($M = 2.08$) compared to harmonious passion ($M = 5.61$). This asymmetry suggests that the sample originated from particularly healthy developmental environments, which may underrepresent the negative effects of obsessive passion in high-pressure contexts. While this reflects the reality of the participating academies and lends ecological validity to the findings regarding well-structured settings with good developmental practices, it limits representativeness with respect to contexts where obsessive passion may be more prevalent. Moreover, it must be acknowledged that a particular analytical decision has

been made in the research design. This decision involves the aggregation of fundamental psychological needs into a composite construct. While this approach yielded a parsimonious model of global need satisfaction, it represents a trade-off, as it precludes the examination of the distinct and non-substitutable contributions of autonomy, competence, and relatedness. Future studies should consider a more differentiated analysis to determine if certain needs (e.g., competence) become more prominent as athletes transition from the Specialization to the Investment stage of their careers.

Conclusion

This study underscores the pivotal function of basic psychological need satisfaction in shaping young footballers' passion and overall life satisfaction. The fulfillment of autonomy, competence, and relatedness has been demonstrated to foster the development of harmonious passion, which, in turn, has been shown to positively contribute to well-being. Conversely, lower need satisfaction has been linked to obsessive passion, a phenomenon that has the potential to erode life satisfaction.

Passion emerged as the pivotal mechanism linking motivation in sport to global well-being, demonstrating that motivation is not the sole factor determining outcomes. The way motivation is internalized and integrated into an individual's identity is also crucial. The findings of this study underscore the significance of need-supportive environments in youth football, emphasizing their role in promoting both performance and long-term psychological flourishing.

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Ethical considerations

This study was reviewed and approved by the Ethics Committee of the University of Lisbon – Faculty of Human Kinetics (CEIFMH N° - 34/2021).

Consent to participate

The study participants filled out and signed an informed consent form at the club after reading an information sheet provided for participants.

Consent for publication

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Data availability

The data that support the findings of this study are available on request from the corresponding author.

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