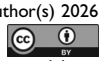
Review

International Journal of Sports Science & Coaching

Application of hierarchical model of intrinsic and extrinsic motivation in sports: A systematic review

International Journal of Sports Science & Coaching
1–18



DOI: 10.1177/17479541261455244
journals.sagepub.com/home/spo


Bernardo Viveiros[1,2], Miguel Jacinto[1,2], Nuno Couto[2,3], Luís Cid[2,3], Rui Matos[1,2], Nuno Amaro[1,2], Raúl Antunes[1,2], and Diogo Monteiro[1,2]

Abstract

Motivation is central to understanding athletes' engagement, performance, and persistence in sport. Coaches play a crucial part in the physical and psychological development of athletes and are central figures in maintaining their motivation levels. This systematic review synthesizes and explores the associations between the variables that make up the motivational sequence proposed by the Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM): motivational climate, basic psychological needs (BPN), motivational regulation and behavioral outcomes. Following PRISMA guidelines, searches were conducted in Web of Science, PubMed, Scopus, and SPORTDiscus databases for studies published between January 1997 and May 2025, involving athletes aged 12 and older. Twenty-two studies met inclusion criteria, predominantly employing cross-sectional designs (86%), encompassing 10367 athletes. Findings revealed that task-involving motivational climates were positively associated with autonomous motivation and negatively related to controlled motivation. Basic psychological need satisfaction was positively linked to more autonomous forms of motivation, while autonomous motivation demonstrated positive associations with favorable behavioral, emotional, and cognitive outcomes. Conversely, ego-involving climates correlated negatively with autonomous motivation and positively with controlled motivation. These findings underscore the critical importance of coach-created motivational climates and psychosocial alignment within HMIEM for optimizing athletes' motivational experiences and well-being.

Keywords

Achievement goal theory, basic psychological needs, motivational climate, self-determination theory, wellbeing

Reviewer: Teresa Bento (Polytechnic Institute of Santarém, Portugal)

Introduction

Motivation is a central construct in understanding athletes' engagement, performance, and persistence in sport.[1–3] Despite the fundamental role of motivation, coaches also play a crucial part in the physical and psychological development of athletes and are central figures in maintaining their motivation levels. Through interpersonal relationships,[4] leadership styles,[5] and feedback, coaches can create motivational climates that can satisfy or frustrate the basic psychological needs and consequent motivation of their players.[6] Understanding how coaches can structure motivational environments to optimize athletes' psychological needs, motivational quality, and behavioral outcomes is fundamental and has direct practical implications (i.e., athlete retention and dropout prevention.[7] In this field of research, self-determination theory (SDT)[8,9] and achievement goal theory (AGT)[10] are considered theoretical reference frameworks for understanding the cognitive, behavioral, and emotional patterns associated with practitioners' goals in sporting contexts).[11]

Theoretical **frameworks**

Achievement goal theory (AGT)

Achievement Goal Theory (AGT)[10] explains how individuals pursue goals and develop motivation across contexts, emphasizing the influence of the social environment on motivational regulation and behavior.[12,13] This theory

[1]Department of Sport, Exercise and Health, ESECS —Polytechnic University of Leiria, Leiria, Portugal
[2]CIDESD, Research Center in Sport Sciences, Health Sciences and Human Development, Leiria, Portugal
[3]Sport Sciences School of Rio Maior, Santarém Polytechnic University, Rio Maior, Portugal

Corresponding author:
Bernardo Viveiros, ESECS —Polytechnic University of Leiria, Leiria, 2411-901, Portugal.
Email: bernardoviveiros16@gmail.com

encompasses two complementary dimensions that explain motivational processes in achievement contexts. The first-dimension concerns goal orientations, which represent relatively stable individual differences (dispositional perspective) in how people define success and competence. Athletes may be predominantly task-oriented (defining success through self-improvement and mastery) or ego-oriented (defining success through outperforming others.[14,15]

The second-dimension concerns perceived motivational climates, which reflect the situational characteristics of the performance environment (situational perspective) created by significant people, particularly coaches, in sporting contexts. While goal orientations represent what athletes bring to the situation, motivational climates represent what the situation provides to athletes.[15,16] The coach-created motivational climate is a multidimensional construct. It may be empowering—characterized by task involvement, autonomy support, and social support—or disempowering, marked by ego involvement and controlling behaviors.[17,18] Empowering climates foster the satisfaction of basic psychological needs (BPN), while disempowering climates are associated with BPN frustration.[11] This systematic review focuses on the situational dimensions, specifically, how coach-created motivational climates influence athletes' psychological needs and motivational regulation.

Self-determination theory

SDT provides a comprehensive socio-cognitive framework for examining the psychosocial factors that underpin human behavior.[19,20] SDT is organized into six interrelated mini theories, each addressing distinct motivational dimensions along a continuum of self-determination. Given the focus of this systematic review on each level of the Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM) in sport, two mini theories are specifically emphasized: Basic Psychological Needs Theory (BPNT) and Organismic Integration Theory (OIT).

According to BPNT, human development and well-being are deeply influenced by the quality of the social context.[20] This mini-theory identifies three universal, innate needs—autonomy, competence, and relatedness.[21] Though conceptually distinct, these three needs are strongly interconnected in their effects on motivation and well-being. In sport contexts, coaches play a crucial role in supporting or thwarting athletes' autonomy, competence, and relatedness through their interpersonal style and the motivational climate they create.[6,22] Need satisfaction predicts more self-determined motivation[23,24] and is linked to better psychological health, including quality of life and reduced depression and anxiety.[8,25,26] Conversely, need frustration, distinct from low satisfaction, predicts maladaptive outcomes such as burnout and depression, and is negatively associated with self-determined motivation.[24,27–29]

OIT[19,30] examines different forms of motivation and how environmental factors facilitate or hinder the internalization and integration of behavioral regulation.[8] Motivation types vary in their degree of autonomy, distinguishing extrinsic motivation forms based on internalization levels.[30] Some motivations are more internalized (autonomous), while others are controlled, influenced by external pressures. According to SDT,[8,19,20] motivation exists along a continuum from amotivation (lack of intention) through controlled regulations (external, introjected) to autonomous regulations (identified, integrated, intrinsic), setting SDT apart from earlier theories.[9,31,32] Theoretically and empirically, autonomous motivation is positively correlated with behavioral outcomes, while controlled motivation is negatively correlated.[19,31,33–35] In sport, autonomous motivation is linked to greater effort,[11,36] reduced burnout[37] increased enjoyment,[38] and better mental health.[39]

HMIEM: A link between theories

AGT and SDT have been widely applied in the sport context, where athletes are central to coaches' motivational interventions that can influence health and well-being in both positive and negative ways.[18] Within the HMIEM,[40] both AGT and SDT operate at the same level of generality, the contextual level, which is mediated by the satisfaction or frustration BPN.

The HMIEM proposes that motivation operates at three hierarchical levels. The global level represents stable motivational orientations across life domains, reflecting personality-like individual differences.[41] The contextual level represents motivation within specific life domains (e.g., sport, education, relationships), which is the focus of this review.[42] The situational level represents momentary motivation during specific activities or situations.[43] These levels are reciprocally related: situational experiences accumulate to shape contextual motivation, which in turn influences global motivational orientation.

At each level, motivation follows a social factor → psychological mediators → types of motivation → consequences sequence.[40,44] Social factors include environmental influences created by significant others (in sport, this includes the motivational climate established by coaches). Findings consistently indicate that controlling coaching behaviors—characterized by pressure, conditional regard, and excessive regulation—tend to undermine athletes' self-determined motivation. In contrast, autonomy-supportive behaviors, which emphasize choice, empathy, and meaningful rationale, are associated with greater satisfaction of the basic psychological needs and, consequently, more self-determined forms of motivation.[1] These findings underscore the pivotal role of the coach–athlete relationship within the motivational process, underscoring the importance of studying such interpersonal dynamics to inform

evidence-based interventions that promote optimal motivation and well-being in sport settings.

Statement of the problem and purpose

Researchers consistently highlight the importance of understanding how the motivational climate created by the coach influences the regulation of athletes' motivation.[18,45,46] While individual studies[47,48] have examined portions of this motivational sequence, the literature remains fragmented, and the overall evidence has not yet been integrated into a unified framework. The general propositions of AGT and SDT are well-established, important gaps remain in our understanding of the HMIEM model, specifically in sport contexts.

First, a narrative review was conducted with a view to identifying future research directions in the field of motivation, considering the HMIEM.[49] This study establishes that the motivational sequence (Social Factors → BPN → Motivation → Consequences) has attracted the attention of various researchers, but that much research remains to be carried out in this field, namely: a) the integration of theories other than SDT (e.g., AGT, Theory of Planned Behavior), b) research into theoretical advances regarding a better understanding of the contribution and limitations of each theory, as well as a better prediction of the outcomes promoted in sporting contexts. Given the type of study conducted by the author, we consider that our systematic review is a more robust type of study that will enable us to contribute findings to the literature by integrating empirical studies, thereby allowing us to understand what has been achieved to date and where we might go from here; for example, as is the case with further research into the relationship between the motivational climate created by the coach and the processes of motivational regulation.

For instance, Alkasasbeh & Akroush[50] examined the impact of intrinsic and extrinsic motivation on performance, but their framework omitted the social factors (antecedents) and psychological mediators (BPN) that are foundational to the HMIEM. Consequently, the authors failed to consider a key aspect of the motivational process: the integration of social factors into the motivational sequence. This is one of the most important variables to understand, as it is through these factors that individuals can perceive satisfaction and/or frustration with BPNs and thus regulate their motivation. In short, existing reviews have either been unsystematic and theoretical (narrative) or focused on isolated bivariate relationships, leaving the entire chain "from antecedents to outcomes" to be synthesized.

Secondly, while the authors identified primary studies,[11,39,46,51,52] that have begun to test this holistic perspective, the increasing frequency of these publications in recent years signals a clear "massa crítica" (critical mass) and interest in the field. For example, Alesi et al.[51] examine the entire motivational sequence, demonstrating that positive self-concepts act as mediators between the link established between a task-oriented climate and self-determination, leading to greater commitment. In the studies by Monteiro et al.[11,53] the results demonstrated that when the coach tends to create a task-oriented climate, their athletes tend to satisfy their needs, which results in greater regulation of autonomous motivation, leading to greater perceived effort and an intention to continue swimming. However, to the best of our knowledge, no systematic review has yet been conducted to consolidate these findings. It is therefore essential at this stage to consolidate this growing body of evidence through a systematic review, so that new directions and future studies on this topic can be identified.

Therefore, the purpose of this systematic review is to: examine the associations among variables that constitute the motivational sequence, specifically, motivational climate → BPN → motivational regulation → behavioral outcomes—in sport athletes. The contributions of this review are to: (1) identify the associations between the different components of the HMIEM model, (2) provide the first comprehensive synthesis of the complete HMIEM sequence in sport.

Methods

Search strategy

The systematic review was built following the items proposed by the PRISMA 2020 protocol,[54] PECOS strategy[55] (Table 1) and the methodology described by Bento.[56] After conceptualizing the systematic review, it was registered on the PROSPERO portal and assigned the registration number CRD420250644059 in 2025.

To initiate the review, we sourced relevant records from four electronic databases: Web of Science (All Fields), PubMed (All Fields), Scopus (Tittle, Abstract and

Table 1. PECOS strategy.

PECOS acronyms	Description of each parameter
"P" (Patiens)	Corresponded to athletes, aged 12 and over, of any gender, ethnicity, or race
"E" (Exposure)	Corresponded to participation in sport contexts
"C" (Comparison)	Not applicable
"O" (Outcome)	Analyzes the associations between motivational variables (motivational climate, BPN satisfaction and frustration and motivational regulations) and behavioral outcomes (i.e., enjoyment, intention, persistence and adherence)
"S" (Study Design)	Corresponds to experimental and non-experimental (i.e., observational, cross-sectional, longitudinal) study designs

Table 2. Research strategy.

Investigator number	Search phrase basics	Descriptors
I	Theoretical Frameworks	("Hierarchical Model of Intrinsic and Extrinsic Motivation"OR "HMIEM" OR "behaviour regulation" OR "behaviour motivation" OR " basic psychological needs" OR " needs satisfaction" OR " needs frustration" OR "motivational climate" OR "achievement goal theory" OR "interpersonal behaviour"
	Field	(sport*)
	Consequences	(enjoyment OR effort OR persistence OR adherence OR frequency OR intention)

Keywords), and SPORTDiscus (Tittle, Abstract and Keywords), encompassing articles published from 1997 to May 2025. The keywords used in the database search were "Hierarchical Model of Intrinsic and Extrinsic Motivation," "HMIEM," "behaviour regulation" "behaviour motivation," "basic psychological needs," "needs satisfaction," "needs frustration," "motivational climate," "achievement goal theory," "interpersonal behaviour," "sport* (MESH Term)" "enjoyment (MESH Term)" "effort," "persistence," "adherence," "frequency," "intention (MESH Term)". All procedures relating to research sources and research strategy are available and described in Tables 2 and 3.

The relevant studies were downloaded from the databases into EndNote X7 software, and duplicate articles were removed. At Level 1, titles and abstracts of all identified records from the database search were manually screened, analyzed, and checked against eligibility criteria by BV and MJ, discrepancies between the researchers were resolved by a third researcher (DM). At Level 2, full-text publications of every study not eliminated in the previous screening were retrieved for complete review.

Eligibility criteria

Studies were included if they:

1. involved male and/or female athletes aged 12 years or older (the age at which young people acquire the ability to assess the difficulty of a task in relative terms)[49] with no reported disabilities or illnesses.
2. were published in English between January 1997 (corresponding to the year Vallerand published the HMIEM model) and May 2025.
3. were explicitly based on the HMIEM, considering the integration of SDT and AGT.
4. examined at least three components of the HMIEM, or the complete sequence linking motivational climate, basic psychological need satisfaction/frustration, motivational regulations, and behavioral outcomes (emotional, cognitive, and behavior).
5. were conducted in sport-specific contexts (e.g., competitive, recreational, or organized sport).
6. used validated sport-specific measures, such as the Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2), Motivational Climate Sport Youth Scale (MCSYS), Sport Motivation Scale (SMS-I or SMS-II), Behavioral Regulation in Sport Questionnaire (BRSQ), or other theoretically consistent instruments.
7. employed experimental or non-experimental designs.

Studies were excluded if they:

1. We're not based on SDT, AGT, or HMIEM.
2. Studies that are not written or published in English will be excluded
3. Did not analyze associations among the key motivational constructs.
4. Used non-validated or non-sport-specific instruments.
5. They were conducted in non-sport contexts (e.g., physical education, exercise, leisure, or work).
6. Were reviews (with a different purpose), theoretical papers, dissertations, or other gray literature.

Results

Selection of studies

After searching various databases, 1032 studies were identified. In the first phase, duplicate articles were identified by reviewing titles and abstracts (i.e., articles that did not correspond to scientific publications and lacked a well-established, objective experimental design). After this stage, 87 studies with relevant potential for the study were identified and moved on to the next stage. Considering the established eligibility criteria and the reading of the articles, a sample of 22 studies (21 studies via databases and registers, plus 1 study via other methods) was drawn up for analysis. For further details on the selection process, refer to the PRISMA flow diagram in Figure 1.

Quality assessment

The Downs and Black checklist were designed to evaluate the methodological quality of both randomized and nonrandomized comparative studies. The checklist consists of 27 questions that seek to determine the quality of the study, considering various parameters, namely the study's design,

Table 3. Research in databases.

Databases	Research
Web of Science (WOS)	(“Hierarchical Model of Intrinsic and Extrinsic Motivation“ OR “HMIEM” OR “behaviour regulation” OR “behaviour motivation” OR “ basic psychological needs” OR “ needs satisfaction” OR “ needs frustration” OR “motivational climate” OR “achievement goal theory” OR “interpersonal behaviour”) AND (sport) AND (enjoyment OR effort OR persistence OR adherence OR frequency OR intention) (All Fields)
PubMed	((“Hierarchical Model of Intrinsic and Extrinsic Motivation"[All Fields] OR “HMIEM"[All Fields] OR “behaviour regulation"[All Fields] OR “behaviour motivation"[All Fields] OR “basic psychological needs"[All Fields] OR “needs satisfaction"[All Fields] OR “needs frustration"[All Fields] OR “motivational climate"[All Fields] OR “achievement goal theory"[All Fields] OR “interpersonal behaviour"[All Fields]) AND (“sport s"[All Fields] OR “sports"[MeSH Terms] OR “sports"[All Fields] OR “sport"[All Fields] OR “sporting"[All Fields]) AND (“enjoyability"[All Fields] OR “enjoyable"[All Fields] OR “pleasure"[MeSH Terms] OR “pleasure"[All Fields] OR “enjoyment"[All Fields] OR “happiness"[MeSH Terms] OR “happiness"[All Fields] OR (“effort"[All Fields] OR “efforts"[All Fields]) OR (“persist"[All Fields] OR “persistance"[All Fields] OR “persistant"[All Fields] OR “persisted"[All Fields] OR “persistence"[All Fields] OR “persistences"[All Fields] OR “persistencies"[All Fields] OR “persistency"[All Fields] OR “persistent"[All Fields] OR “persistently"[All Fields] OR “persistents"[All Fields] OR “persister"[All Fields] OR “persisters"[All Fields] OR “persisting"[All Fields] OR “persists"[All Fields]) OR (“adherance"[All Fields] OR “adhere"[All Fields] OR “adhered"[All Fields] OR “adherence"[All Fields] OR “adherences"[All Fields] OR “adherent"[All Fields] OR “adherents"[All Fields] OR “adherer"[All Fields] OR “adherers"[All Fields] OR “adheres"[All Fields] OR “adhering"[All Fields]) OR (“epidemiology"[MeSH Subheading] OR “epidemiology"[All Fields] OR “frequency"[All Fields] OR “epidemiology"[MeSH Terms] OR “frequence"[All Fields] OR “frequences"[All Fields] OR “frequencies"[All Fields]) OR (“intention"[MeSH Terms] OR “intention"[All Fields] OR “intent"[All Fields] OR “intentions"[All Fields] OR “intentional"[All Fields] OR “intentioned"[All Fields] OR “intents"[All Fields]))) AND (“field"[All Fields] OR “field s"[All Fields] OR “fields"[All Fields])
Scopus	TITLE-ABS-KEY ((“Hierarchical Model of Intrinsic and Extrinsic Motivation” OR “HMIEM” OR “behaviour regulation” OR “behaviour motivation” OR “ basic psychological needs” OR “ needs satisfaction” OR “ needs frustration” OR “motivational climate” OR “achievement goal theory” OR “interpersonal behaviour”) AND (sport) AND (enjoyment OR effort OR persistence OR adherence OR frequency OR intention))
ESBCO	(“Hierarchical Model of Intrinsic and Extrinsic Motivation“ OR “HMIEM” OR “behaviour regulation” OR “behaviour motivation” OR “ basic psychological needs” OR “ needs satisfaction” OR “ needs frustration” OR “motivational climate” OR “achievement goal theory” OR “interpersonal behaviour”) AND (sport) AND (enjoyment OR effort OR persistence OR adherence OR frequency OR intention) (All Fields)

the adequacy of the statistical procedures, the clarity of the description, and the main conclusions. The scale’s score ranges were given corresponding quality levels: excellent (26–28); good (20–25); fair (15–19); and poor (≤14). No items were removed from the scale, leaving the 28 possible points.

The methodological quality of the studies was between fair and poor. Of the 26 existing criteria, the study with the highest corresponding number of criteria (17) was written by Monteiro et al.[53] On the other hand, the article with the lowest criteria score (11) was published by Almagro et al.[52] Specific methodological weaknesses consistently identified across studies included: (1) lack of power calculations or justification of sample size (absent of item 27 in 18/22 studies); (2) insufficient reporting of participant recruitment procedures and potential selection bias (problematic in item 11 (10/22 studies)); (3) failure to report or adjust for potential confounding variables such as prior sport experience, competitive level, or other psychological factors (inadequate in item 5 (22/22 studies)); (4) probability values been reported properly (item 10: 13/22 studies); (5) blinding measures of the main outcomes of the studies (22/22 studies).

Despite this limitation, the review retains value in a) documenting consistent patterns of associations that align with theoretical predictions; b) identifying gaps in the literature that future research should address; c) providing preliminary evidence that can guide hypothesis generation for more rigorous studies; and d) offering tentative practical implications that warrant testing in intervention research.

Studies and participant characteristics

As shown in Table 4, the sample (N = 22) exhibits a strong European predominance (n = 18; 82%), with Spain (n = 10)[47,51,52,57–63] and Portugal (n = 5),[11,13,53,64,65] contributing most of the studies. Additional research originated from France,[46] Norway,[66] Denmark,[67] Ecuador,[42,68] Mexico,[69] and Canada.[70] Methodologically, cross-sectional designs prevailed (n = 19; 86%), followed by prospective (n = 2) and longitudinal (n = 1) approaches. Statistical analyses focused on testing the HMIEM sequence, primarily through Bivariate Correlations (n = 19), SEM (n = 14), and Mediation Analyses (n = 14). Advanced modeling included Multi-Group Analysis (n = 4) for invariance

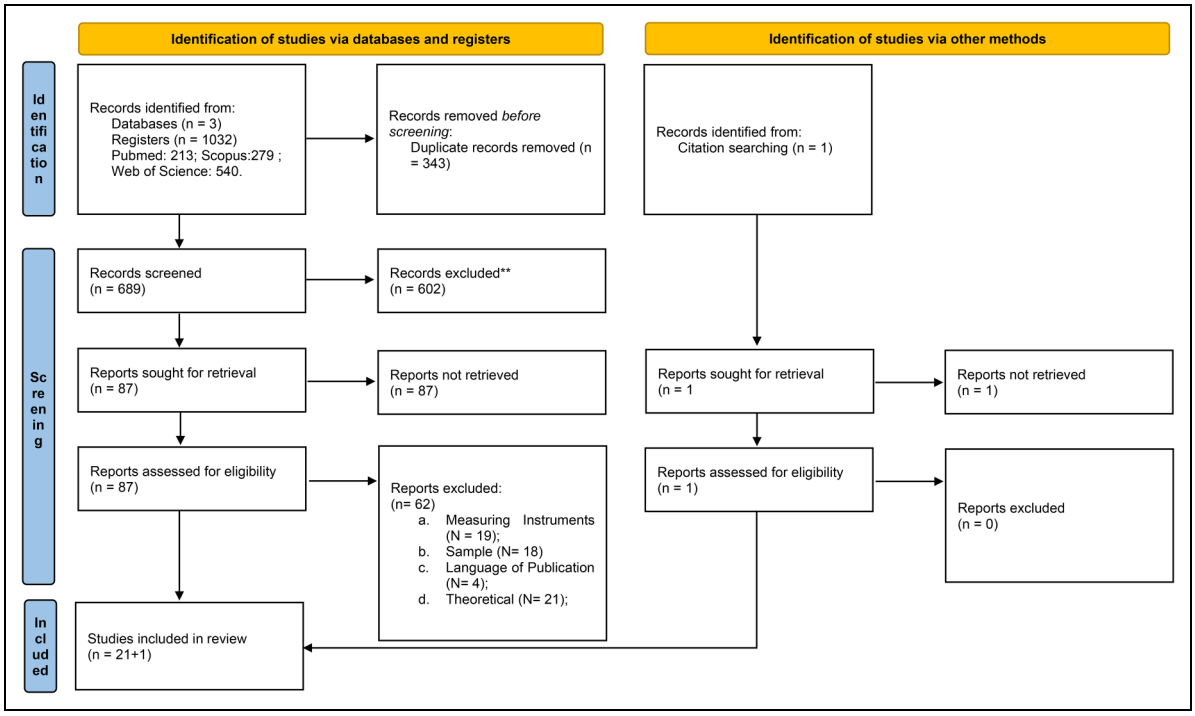


Figure 1. PRISMA flow-chart describing the selection process in the systematic review.

testing and Cluster Analysis (n = 3) for athlete profiling. The total population comprised 10,367 athletes (6818 males; 3549 females), predominantly aged between 12 and 20 years, though the full range spanned 12 to 60. Practice frequency varied from 1 to 11 sessions per week (60–180 min per session). Notably, the largest study (Elsborg et al., 2023; n = 2150) captured a diverse competitive spectrum, including recreational (43.3%), intermediate (35.9%), and elite (20.8%) levels.

Study results

The main findings indicate that a task-involving motivational climate is positively associated with autonomous motivation and negatively associated with controlled.[5,11,47,51–53,60,61,64,65,67,69,71] In contrast, an ego-involving motivational climate is negatively related to autonomous motivation and positively related to controlled motivation.[46,51,58,60] Furthermore, BPN satisfaction was positively linked to more autonomous forms of motivation and negatively associated with more controlled forms.[5,46,47,51,52,58,60,61,69] Lastly, autonomous motivation was positively related to higher levels of emotional, cognitive, and behavioral outcomes (e.g., enjoyment, intention, perceived effort, persistence), whereas controlled motivation showed negative associations with these outcomes.[11,46,51,53,61,64–67,69] In addition to these findings, around 12 studies[11,42,46,47,51,53,60,61,65,66,68,69] managed to incorporate the entire motivational sequence into their research, whilst 10 studies[13,46,52,57–59,64,67,70,72] analyzed only three parts.

Discussion

The purpose of this systematic review was to examine the associations between the variables that make up the motivational sequence (horizontal level/sequence): motivational climate → BPN → motivational regulation → behavioral outcomes in athletes. To fulfill this purpose, two objectives were defined for this literature review: (1) identify the different associations within the HMIEM model and (2) to synthesize the HMIEM motivational sequence.

This review was able to analyze the horizontal level in its entirety, in which the task-oriented climate correlated positively with autonomous motivation, by mediating the satisfaction of basic psychological needs, leading to more positive behavioral consequences. The ego-oriented climate was positively associated with more controlled forms of motivation, leading to negative consequences. These theoretical assumptions are empirically supported by various studies carried out in the field of sport.[11,18,65,73,74]

Associations between components of HMIEM

The synthesis of this systematic review established clear associations between variables of the HMIEM model, specifically at the contextual model. The evidence gathered from the analyzed studies[11,13,46,51–53,57,61,65–67,69,72] consistently demonstrates a negative association between ego-oriented and task-oriented climates: These studies have also shown that there is a tendency for ego-oriented work climates to be negatively associated with BPN

Table 4. Characteristics of the selected studies for analysis.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
Alesi et al.[55]	Examine the effects of the motivational climate created by the coach and perceived by a group of young high-performance handball players on their motivation, psychological needs, and sports commitment.	The sample consisted of 479 youth-category handball players (G = 229; B = 250) (M = 17.69, SD = 4.06). The age range was 16–17 (M = 16.60; SD = 0.50).	Cross-Sectional	PMCSQ-2; BPNES; SMS; SCQ	This study psychological showed needs that mediated basic the association between a task-involving climate and self-determination. Self determination mediated the association between BPN commitment.	Task/Ego involving climate; BPN; self-determination index (SDI) and commitment
Almagro et al.[60]	Analyze the motivation of adolescent basketball and football players from the perspectives of AGT and SDT	The sample comprised 248 athletes (G = 20; B = 228) between the ages of 12 and 17 years (M = 14.56; SD = 0.95).	Cross-Sectional	PMSCQ-2; SMS and IPAS	Correlations were established between the variables under study, namely between forms of motivation, motivational climate, and intention. The results showed differences in some of the variables studied between football and basketball. There were higher values for SDI, task involvement, and intrinsic motivation.	Task/Ego involving climate; motivation and intention
Almagro et al.[56]	Test a motivational model of the coach-athlete relationship, based on self-determination theory and the hierarchical model of intrinsic and extrinsic motivation.	The sample consisted of 608 athletes (G = 109; B = 499) aged between 12 and 17 (M = 14.43, SD = 1.04).	Cross-Sectional	ASCQ; SMS and IPAS	This study showed the climate of autonomy support created by the coach can predict the autonomy perceived by the athletes which predicts the intrinsic motivation experienced by the athletes, and therefore, their adherence to athletic practice.	Autonomy, intrinsic motivation, and intention to be physically active
Almagro et al.[57]	Analyze the predictive power of BPN, IM, and perceived performance on athletes' intention to be physically active.	The sample consisted of a total of 339 athletes (G = 139; B = 200) (M = 17.69, SD = 4.06). These sample trained for an average 5.39 h (SD = 3.52)	Cross-Sectional	BPNES; BRSQ; Perceived Performance in Sport Questionnaire and Measure to be Physically Active	This study showed that the satisfaction of BPN (autonomy and relatedness) positively predicted intrinsic motivation (IM). Competence satisfaction and IM predicted the athlete's perceived performance. For its part, IM and perceived performance predicted the athlete's intention to be physically active in the future.	BPN, IM, perceived performance, intention to be physically active in the future
Amaro et al.[64]	This study aimed to examine the mediating role of self-determined motivation in the association between task-involving climate and enjoyment among male youth football athletes.	The sample was composed of a total of 109 young male football players aged between 12 and 18 years old (M = 14.38, SD = 1.55). Frequency of the practice 2–4 times per week (M = 3.24, SD = 0.54)	Cross-Sectional	MCSYS; PACES BRSQ	This research found that a task-involving climate significantly and positively predicts both integrated and intrinsic motivation. In turn, these types of motivation are strong predictors of enjoyment. Furthermore, the mediation analysis indicated that self-determination motivation partially mediates the link between task-involving climate and enjoyment.	Task involving climate; self-determination motivation and enjoyment
Alvarez et al.[48]	This study tested a model of the assumed sequential relationships between perceived autonomy support, psychological satisfaction, need self-determined motivation, and enjoyment/boredom	The sample was composed of a total of 370 male football players aged between 12 and 16 years old (M = 14.77, SD = 0.72).	Cross-Sectional	Sport Climate Questionnaire; Intrinsic Motivation Questionnaire (IMI for Perceived Competence); Perceived Sport Autonomy Scale; Acceptance subscale of the Need Relatedness for Scale (NRS); SMS; Sport Satisfaction Instrument	Total mediation was supported in the case of the psychological need satisfaction in the relationship between autonomy support and self-determined motivation, and partial mediation for self-determined motivation in the links between psychological need satisfaction and	Coach autonomy support, psychological need satisfaction, self-determined motivation, enjoyment and boredom

(continued)

Table 4. Continued.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
					enjoyment (positive) and boredom (negative)	
Alvarez et al.[61]	This study aimed to test a motivational model (HMIEM) in the sport context via structural equation modeling (SEM).	The sample was composed of a total of 370 male football players aged between 12 and 16 years old (M = 14.77, SD = 0.72).	Cross-Sectional	PMCSQ-2; IMI for Perceived Competence; Perceived Sport Autonomy Scale; NRS; SMS; Subjective Vitality Scale (SVS) and Intention (Chatzisarantis, Biddle, and Meek, 1997)	A perceived task-involving climate emerged as a positive predictor of the satisfaction of the three psychological needs, while a perceived ego-involving climate was a negative predictor of relatedness satisfaction. The results also support positive paths between satisfaction of the three psychological needs and intrinsic motivation, while intrinsic motivation was positively linked to subjective vitality and future intention to participate.	Task/Ego involving climate; perceived competence; perceived autonomy; perceived relatedness; IM; subjective vitality and future intention to play soccer
Calvo et al.[62]	This study aimed to verify the predictive power of the self determination theory in relation to sport abandonment in adolescent athletes. In addition, the authors investigated the independent effects of the three basic psychological needs on sport continuance discontinuance.	he sample was comprised of 492 male youth soccer players aged between 13 and 17 years old (M = 14.3, SD = 1.6).	Cross-Sectional	SMS; Enviroment Questionnaire (Relatdness); Group General perceived competence measure; Autonomy; Sport Persistence and Dropout	This research found that sport dropout was explained by higher levels of amotivation, external regulation, and introjected regulation and by lower satisfaction of relatedness and autonomy needs.	Motivation, competence; autonomy; perceived perceived perceived relatedness; persistence and dropout
Castillo-Jimenez et al.[70]	This study tested two main objectives: first, an empowering climate enhances psychological needs satisfaction, which positively affects self-determined motivation. Conversely, a disempowering climate thwarts psychological needs, negatively impacting self-determined motivation. The second model examined the relationship between empowering/ disempowering climates and intentions to continue/drop out, along with the direct link between psychological needs satisfaction/ thwarting and dropout intentions.	The sample was composed of a total of 381 young male football players aged between 12 and 14 years old (M = 12.41, SD = 0.89) with two hours of daily training (SD = 1.9).	Cross-Sectional	Empowering Disempowering Motivational and Climate Questionnaire-Coach, (EDMCQ-C); Perceived Autonomy in Sport Scale (PASS); IMI (Competence); Need for Relatedness Scale (NRS); Psychological Need Thwarting Scale; BRSQ-6; Intention	The results of the partial mediation model were satisfactory (2 = 120.92; df = 68; RMSEA = 0.045; CFI = 0.968; TLI = 0.957) and showed that need satis faction and self-determined motivation partially mediated the relationship between the perception of the empowering climate and the intention to continue. Moreover, need satisfaction showed a positive and significant relationship with the intention to continue sports participation. Additionally, need thwarting and self determined motivation totally mediated the relationship between the perception of the disempowering climate and the intention to dropout. Furthermore, needs thwarting was positively and significantly related to the intention to dropout of sports participation	Empowering and disempowering motivational climate; satisfaction/thwarting of basic psychological needs, self-determined motivation and the intention to continue/ dropout sports participation
Elsborg et al.[68]	This study aimed to investigate the importance of motivational climate for the satisfaction of psychological needs and dropouts in recreational, intermediate, and elite volleyball.	The sample was composed of a total of 2150 Danish volleyball players (G = 1107; B = 1038) aged between 16 and 60 years old (M = 33.70, SD = 11.87).	Cross-Sectional	MCSYS; BPNES; Dropout; Age Groups and Sporting level	This research found volleyball players of all levels, the degree of mastery climate predicted the satisfaction of the players' basic psychological needs satisfaction which was, in turn, associated with lower dropout rates. Performance climate had a weak negative association with the	Task/Ego involving climate; BPN and dropout

(continued)

Table 4. Continued.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
					satisfaction of psychological needs on the intermediate level only	
Gomez-Lopez et al.[73]	The aims of this study were: Uncover the different motivational climate profiles to differences implicit compare in beliefs sports their of ability, motivational orientation, intention physically active. Analyze and to be the relationship of gender with motivational climate profiles, in a large sample of high performance handball players in Spain.	The sample consisted of a total of 444 high performance handball players (G = 211, B = 233) aged between 16 and 17 years old (M = 16.60, SD = 0.50).	Cross-Sectional	PMCSQ-2, CNAAQ-2, SMS, Intention to be Physically Active Questionnaire	The mastery climate profile is characterized by lower levels of amotivation, higher scores in incremental ability beliefs, and a greater intention to engage in physical activity, with a predominance of female participants. In contrast, the performance climate profile exhibits higher levels of extrinsic motivation and amotivation, higher scores in entity ability beliefs, and lower intentions for physical activity, with a predominance of male participants.	Task/Ego involving climate, Motivation, Entity Stable/Gift, Incremental, Improvement/ Learning and Intention
Gómez-López et al.[58]	This study aimed to identify distinctive profiles of fear of failure and basic psychological needs in young handball players according to perceived motivational climate (mastery vs. performance).	The sample consisted of a total of 681 team sports players (G = 290, B = 391) with average age of 16.16 years (SD = 0.92). Most of the participants stated more than 5 years of experience (N = 514) and spent more than two training/week (N = 656) with more than 3 h/ week (N = 615).	Cross-Sectional	PMCSQ-2; Performance failure appraisal inventory; BPNES	The results of the descriptive analysis showed that most of the players were characterized by perceiving a climate of mastery in training and competitions, by feeling their basic psychological needs satisfied, especially that of social relationships, and by showing that shame is the main aversive cause of fear of failure	Task/Ego involving climate, fear of failure; BPN
Heredia-León et al.[43]	The main objective of this study was to identify the profiles of support for autonomy perceived by athletes and compare them with motivation, BPN and intention	The sample consisted of 301 Ecuadorian athletes (G = 127, B = 153) aged between 12 and 20 (M = 15.28; SD = 1.71).	Cross-Sectional	Scale of Support of Autonomy; PNSE; BRSQ and IPA	The findings indicate two distinct profiles based on the perception of support for autonomy: a "High perception of support for autonomy" profile (group 1, n = 190, M = 4.38, SD = 0.32) and a "Low support for autonomy" profile (group 2, n = 90, M = 3.40, SD = 0.86). The analysis demonstrates statistically significant differences favoring group 1, as reflected in higher values on the Self-Determination Index (p = 0.009) and three basic psychological needs assessed through the Index of Psychological Mediators (p = 0.000). However, differences were no found significant regarding intentions to engage in physical activity.	Autonomy Support; BPN; Motivation and Intention
Heredia-Léon et al.[69]	This study aimed to evaluate a model concerning Ecuadorian athletes through the application of structural equation modeling. The analysis emphasized the predictive influence of the coach's interpersonal style on supporting autonomy, particularly concerning fundamental personal needs and autonomous motivation, ultimately	The sample consisted of 301 Ecuadorian athletes (G = 127, B = 153) aged between 12 and 20 (M = 15.28; SD = 1.71).	Cross-Sectional	Scale of Support of Autonomy; PNSE; BRSQ and IPA	A structural equation analysis revealed that perceived autonomy support positively predicted basic psychological needs, which in turn positively predicted autonomous motivation and, as a result, the athletes' intentions to be physically	Autonomy Support; BPN; Autonomous Motivation and Intention

(continued)

Table 4. Continued.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
	fostering a sustained commitment to physical activity in the future.					
Monteiro et al.[11]	This study aimed to examine the motivational determinants athletes' of perceived effort in football considering the four stage motivational sequence at the contextual level proposed by HMIEM: task-involving climate, basic psychological needs, self determined motivation (SDM), and perceived effort.	Two samples sample independent (calibration (CS) and validation sample (VS)) of male football athletes (N = 403, N = 403) aged 13–20 years old (CS: M = 16.59; SD = 2.23/ VS: M = 16.51; SD = 2.32) 1–15 training experience (CS: M = 8.01; SD = 3.52/ VS: M = 7.78; SD = 3.64) 2–6 training sessions (CS: M = 3.68; SD = 0.887/ VS: M = 3.56; SD = 0.845)	Cross-Sectional	MCSYSp, BPNESp, BRSQ, IMI	The results show that when coaches promote a task-involving climate, the BPN satisfaction of athletes improves. This climate will facilitate the regulation of their behavior toward more autonomous forms of motivation, with positive outcomes in the athleteś perceived effort.	Task/Ego involvement climate, BPN, Motivation and Perceived Effort
Monteiro et al.[65]	This study investigated whether motivational climate, satisfaction psychological of needs, the basic self- determined motivation, and enjoyment account for swimmers' persistence over six years and predict their intentions to continue swimming for an additional year.	The sample included 799 federated swimmers (G = 349; B = 450) aged 12 to 22 years (M = 16.65, SD = 2.83). They practiced 4 to 11 times per week (M = 6.69, SD = 1.72), with session durations of 60 to 180 min (M = 133.08, SD = 34.87).	Cross-Sectional	MCYS, BPNES, BRSQ, PACES, and Intention to continue swimming	When coaches foster a task-oriented climate, it facilitates the satisfaction of basic psychological needs. This environment subsequently contributes to enhanced self-determined motivation, increased enjoyment, and a stronger intention to persist in sport participation, regardless of gender, age group, or years of experience.	Task/Ego involvement climate, BPN, Motivation, Enjoyment and Intention
Murillo et al.[59]	This study aimed to examine how players' perceptions of need supportive and controlling styles from their coaches are related to the reported satisfaction and frustration of their BPN, quality of motivation and sport commitment.	The sample consisted of 633 young water polo players (G = 215; B = 418) aged between 13 and 18 years old (M = 14.76; SD = 1.36) having an average of playing experience in this sport of 4.85 seasons (SD = 2.09)	Cross-Sectional	Basic Need Psychological Support Questionnaire; Controlling Behaviours Coach Scale; Motivational Mediators in Sport Psychological Scale; Need Thwarting Scale; SMS and Sport Commitment Questionnaire	Structural equation modeling revealed that players who perceived their coaches as supportive experienced greater need satisfaction, autonomous motivation, and sport commitment. Conversely, those who viewed their coaches as controlling reported higher levels of need frustration, controlled motivation, and amotivation. Additionally, players who perceived their coaches as need-supportive displayed lower levels of need frustration, while those with higher amotivation reported lower sport commitment.	Need-suportive/Controlling coaching style; Need satisfaction/frustration; Motivation and Commitment
Ommundsen et al.[67]	This study aimed to examine the mediating role of young soccer playerś satisfaction of their BPN between coach-created motivational climate and the players' motivational regulation. After that, was examined the combined effect of climate, mediators and motivational regulation on subjective vitality	The sample consisted of 283 young soccer players (G = 66; B = 130) aged between 12 and 16 years old (M = 13.09; SD = 0.78) having an average of playing experience in this sport of 4.67 seasons (SD = 0.67)	Cross-Sectional	Perceived motivational climate; Situation Motivation (SIMS); Scale Perceived Autonomy in Sport; NRS; IMI; SVS	The results indicate that the satisfaction of the needs for competence, autonomy, and relatedness significantly and partially mediates the relationship between a mastery climate and intrinsically regulated motivation. Furthermore, a mastery climate and the satisfaction of BPN positively contribute to an increase in intrinsically regulated motivation. Additionally, the satisfaction of autonomy within a mastery climate and intrinsically regulated motivation	Task/Ego involvement climate, BPN, Motivation and subjective vitality

(continued)

Table 4. Continued.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
					independently predicts subjective vitality in soccer.	
Pelletier et al.[71]	This study aimed to incorporate a model of coaches' interpersonal behaviors (autonomy support vs. control), five forms of regulation (intrinsic motivation, identified, introjected, and external regulation, and amotivation), and persistence, using a prospective three-wave design.	The sample consisted of 369 competitive swimmers (G = 195; B = 174) aged between 13 and 22 years old (M = 15.9).	Prospective	Perceived Interpersonal Behaviors Scale; SMS; Persistence	Structural equation modeling showed that controlling relationships promoted external regulation and amotivation, which are non-self-determined forms of regulation. Self-determined motivation increased when relationships supported autonomy. Those with self-determined regulation at Time 1 persisted more at Time 2 (10 months) and Time 3 (22 months). Amotivated individuals at Time 1 had the highest attrition rates at both follow-ups. Introjected regulation predicted persistence at Time 2 but was nonsignificant at Time 3. External regulation was not linked to persistence at Time 2 but became negatively associated at Time 3.	Autonomy/Control Behaviors; Motivation; Persistence
Rodrigues et al.[13]	This study aimed to explore a short period enjoyment between and longitudinal athletes' their self-determined motivation and motivational climate in youth football.	The sample included 109 athletes (G = 30; B = 79) aged between 12 and 17 years old (M = 14.31; SD = 1.46) having an average of playing experience in this sport of 47.07 seasons (SD = 2.45)	Longitudinal	MCSYS; PACES; BRSQ	Hierarchical multiple regression analyses were conducted and discovered that enjoyment during the pre-season assessment (T1) and self-determined motivation, along with a task-involving sport climate at mid-season (T2), served as significant predictors of mid-season enjoyment (at T2). However, self determined motivation and task-involving climate at T1 did not significantly contribute to the outcome model.	Task/Ego Climate; Motivation; Enjoyment
Sarrazin et al.[47]	The purpose of this study was to test a motivational model of sport dropout that integrates the four stage causal sequence proposed by the Hierarchical Model of Vallerand (1997) and elements from achievement goal theory (Nicholls, 1989).	The sample included 335 French handball females aged between 13 and 15 years old (M = 14.07; SD = 0.79)	Prospective	PMCSQ; PALDS; Intentions; PCLDS; FRS;	This study suggests that the coach's behavior toward female handball players influences their perceptions of competence, relatedness, and autonomy. Specifically, the more ego-involving the coach's behavior, the less positive the perceptions of handball among females. Conversely, the more task-involving the coach's behavior, the more positive their perceptions. Additionally, when athletes have less positive perceptions of competence, relatedness, and autonomy, their levels of self-determined motivation decrease. Ultimately, low levels of self determined motivation are expected to cause students to develop	Task/Ego Climate, BPN; Motivation; Intentions; Dropout

(continued)

Table 4. Continued.

Studies	Aims	Participants/Age	Study design	Assessment instruments/technique	Main conclusions	Variables in study
					intentions to quit handball, which are then acted upon.	
Teixeira et al.[66]	This study associations examines between the coach-created task-involving climate and athletes' intentions to continue practicing sports, through a serial mediation analysis that included satisfaction of BPN, motivation enjoyment. self-determined (SDM) and	The sample included 799 elite swimmers (G = 349; B = 450) aged 12 to 22 years (M = 16.65, SD = 2.83). They practiced 4 to 11 times per week (M = 6.69, SD = 1.72), with session durations of 60 to 180 min (M = 133.08, SD = 34.87).	Cross-Sectional	MCYS, BPNES, BRSQ, and PACES	Enjoyment emerges as the most significant predictor of persistence intentions and functions as a critical mediator in the relationship among task-involving climate, basic psychological needs, self-determined motivation, and long-term sports engagement. Specifically, the task involving climate established by coaches initiates a process in which the fulfillment of basic needs and enhanced self determined motivation foster increased enjoyment, ultimately promoting sustained participation among young athletes.	Task/Ego involvement climate, BPN, Motivation, and Enjoyment

Note: B: Boys; G: Girls; PMCSQ-2: Perceived Motivational Climate in Sport Questionnaire; SMS: Sport Motivation Scale; SCQ: Sport Commitment Questionnaire; ASCQ: Autonomy-Supportive Coaching Questionnaire; IPAS: Intention to be Physically Active Scale; BPNES: Basic Psychological Needs in Exercise Scale; BSRQ: Behavioral Regulation in Sport Questionnaire; MCSYS: Motivational Climate Sport Youth Scale; PACES: Physical Activity Enjoyment Scale; CNAAQ-2: Conceptions of the Nature of Athletic Ability Questionnaire-2.

satisfaction. Conversely, task-oriented work climates were found to correlate positively and significantly with BPN.

These results suggest that the perception of the motivational climate—primarily shaped by the coach—acts as a decisive precursor to the athletes' psychological state. AGT emphasizes athletes' perceptions of the motivational climate shaped by significant others (e.g., coaches) and its influence on behavioral outcomes,[53] while SDT focuses on the role of psychosocial determinants in shaping motivation through the mediation of basic psychological.[8,19,75,76] In this regard, if SDT suggests that social context influences levels of self-determination by facilitating/inhibiting the satisfaction of BPN,[8,9,17] then the motivational climate can have an impact on regulating athletes' motivation,[71] and this aspect is very important in maintaining behavior over time.[11,13,46,51–53,59,63,67–69,71,74]

Regarding the internal dynamics of the motivational sequence, the data reported across several studies[11,47,51,53,58–62,65,67,69] indicate that the greater the satisfaction of BPN, the greater the regulation of motivation in more autonomous forms. In some studies, the mediating role that BPN has on the relationship between the motivational climate and motivation regulation was demonstrated, with the support strategies adopted by the coach being the three important psychological needs for more autonomous motivation regulation. According to the BPNT, all human beings have three BPN essential in transmitting better feelings of well-being and more autonomous forms of motivation.[8] In short, SDT states that when practitioners tend to have internalized the reasons for practicing a certain type of sport, they will experience an autonomous motivation in which they value and/or enjoy the sport they are practicing. This psychological dynamic will result in more positive outcomes, such as greater interest, concentration, and enjoyment.[11,47,51,53,60–64,67,69,71]

The behavioral consequences identified in this systematic review further validate the impact of the motivational continuum. In general, autonomous forms of motivation were positively and significantly associated with behavioral consequences (enjoyment, perceived effort, intention, commitment, persistence, subjective vitality).[11,13,42,47,51–53,57–62,64–72,77] On the other hand, controlled motivation was systematically linked to maladaptive consequences (boredom and dropout). One of the fundamental assumptions of SDT is that individuals tend to incline and self-restructure throughout their lives. They are active organisms whose functioning can be facilitated or inhibited by the social context.[78] When these mechanisms work optimally, the process of internalizing behavior can transform itself from external to internal regulation, integrating these rules into itself. Thus, more internal regulation tends to lead to more positive behavior, while external regulation tends to lead to more negative behavior.[11,13,43,47,51–53,59–64,66–74,79]

HMIEM sequence in sport

The integration of different SDT micro-theories into a sequential chain provides a holistic understanding of motivational processes in this review.[75] The synthesized data provides strong empirical evidence to support the causal chain linking motivational antecedents to behavioral consequences.[11,42,46,51,53,59,60,64,65,68,71,72,77] Specifically, our results demonstrate that the coach-created climate (AGT) significantly how athletes' basic psychological needs are either satisfied or frustrated (BPNT), which subsequently dictates the quality of motivational regulation (OIT) and the persistence of the behavior.[20,40,49]

Regarding the hierarchical structure of the HMIEM, all studies analyzed focused on the contextual level (sport/ leisure domains) and the interpersonal relationships between coach and athlete.[6,18,40,49] Within this level, our synthesis successfully mapped the entire horizontal sequence.[40] Thus, as conceptualized by Ryan,[20] we can see that the satisfaction and/or frustration of BPNs tends to be the result of how everyone perceives the contextual circumstances. In a practical sense, when an individual sees the coach as a supportive figure, providing support, positive feedback and creating a climate where learning and personal progress are emphasized, task effort is rewarded and mistakes are part of learning progress they are more likely to fulfill their BPNs.[11] Consequently, when the environment created by the coach is more ego-centered, characterized by neglect and marked by constant comparisons between participants, where the demonstration of competence is highlighted, results are rewarded and mistakes are emphasized, the greater the likelihood that the latter will experience frustration related to BPN.

The final segments of the sequence further clarify how these psychological states translate into action. Our analysis found a consistent and significant positive association between BPN satisfaction and autonomous motivation.[11,47,51,53,58–62,65,67,69] However, according to Deci & Ryan[9,19,79] a positive and significant relationship can be expected between BPN frustration and more controlled forms of motivation. Our data also aligns with this theoretical framework, in that, in the studies analyzed, BPN frustration was positively associated with more controlled forms of motivation.[11,47,51,53,60–64,67,69,71]

Finally, the motivational sequence recognizes that the regulation of motivation can be related to different behavioral consequences, be they more behavioral, cognitive or emotional.[6,19,20,40] Autonomous motivation, driven by the satisfaction of BPNs, tends to be associated with positive behavioral consequences, as presented in the results section of this systematic review. Controlled motivation, on the other hand, is negatively related to positive behavioral consequences, leading to behaviors such as dropping out.[11,47,51,58,60–64,67,69,71]

In conclusion, the studies identified in this systematic review provide a comprehensive empirical validation of the HMIEM as a sequential chain.[40] This model appears to be a sequential chain that provides us with a holistic understanding of the motivational process in exercise and sport. The evidence confirms that the motivational process

begins with social factors (coach-created climate), which trigger a psychological cascade through BPN and motivational regulation, ultimately determining the quality of the athletic experience and behavioral persistence.

Limitations and future directions

This systematic review identifies several limitations that warrant consideration in future research concerning sports motivation. As evidenced by our quality assessment, the predominance of cross-sectional designs—coupled with methodological quality scores ranging from "fair" to "poor"—is largely attributable to the constraints of the assessment tool employed. The Downs and Black checklist, while validated for various study designs, includes criteria tailored for interventional research that are often inapplicable to cross-sectional data (e.g., Item 15 regarding the blinding of outcome assessors for interventions).

To address these evaluative challenges, future systematic reviews should consider either: (a) the exclusion of checklist items that are consistently non-applicable to the study designs under review, or (b) the adoption of a mixed-methods qualitative assessment for methodological quality. Furthermore, to enhance the robustness of cross-sectional research, future studies must adhere to more rigorous reporting standards. These include performing power analyses to justify sample sizes, providing detailed recruitment protocols, identifying and controlling for potential confounding variables, and ensuring the transparent reporting of all statistical analyses conducted.

A further limitation of the current review concerns the linguistic restrictions applied during the search and filtering process. Although a significant number of relevant studies were identified in Spanish and Portuguese, our analysis was constrained by language-based exclusion criteria. To mitigate language bias and ensure a more comprehensive synthesis of the global evidence base, we recommend that future systematic reviews expand their inclusion criteria to encompass non-English publications. This is particularly relevant in the field of sports motivation, where a substantial body of literature is produced in Ibero-American contexts.

Thirdly, one major limitation is that, in empirical terms, researchers have only studied the dark side of needs in two studies, examining how these can be associated with climates, motivation regulation, and behavioral consequences. This topic has already been investigated in the context of exercise by Rodrigues et al.[24] and has not been very explored in the context of sport. Therefore, future studies should continue to understand the links between variables using a more cross-sectional approach and then transpose their research to longitudinal methods, allowing coaches to understand how these variables behave over time.

Finally, we observed that all included studies operated exclusively at the contextual level of the HMIEM. Future research should therefore expand into the situational level, using experience sampling or daily diary methods to capture motivational fluctuations within sessions; the global level, to explore how sport-specific motivation integrates with general life well-being; and cross-level effects, to examine how global orientations moderate responses to contextual climates or how accumulated experiences reshape an athlete's global motivational personality.

Practical implications

Despite the practical limitations presented, the results of this systematic review allow us to draw important conclusions on the practical component of coaches in different sports. Our recommendations for sports organizations and coach education programs are to invest in training sessions and skill development that make the entire coaching staff aware of the need to update their knowledge and the potential that this topic can have for the health of their teams, especially the players.

For coaches, consistent evidence supporting the HMIEM sequence provides a clear roadmap for motivational intervention. Coaches should prioritize creating task-involving motivational climates characterized by: (a) emphasis on effort, improvement, and skill mastery rather than normative comparison; (b) provision of meaningful choices and athlete input in training decisions to support autonomy; (c) constructive, informational feedback that enhances perceived competence; and (d) inclusive team dynamics that foster relatedness. Therefore, training should focus on the task (self-referenced criteria) rather than solely on the result, creating dynamics that give players greater autonomy (guided discovery), so they recognize their competence and improve their relationship. Planning the training session with consideration of the athletes available is crucial for maintaining motivation levels.

In conclusion, HMIEM-based interventions should adopt a sequential approach, beginning with modification of coach behaviors to enhance task-involving climate features, monitoring changes in athletes' BPN satisfaction, assessing shifts in motivational regulation, and finally evaluating behavioral outcomes. Assessing psychological issues should be part of an early-season evaluation, so that we establish a baseline to compare with future measurements taken during the season. This information can be invaluable, as it enables the coach to reflect on their planning and approach during training sessions and adjust as needed.

Conclusion

This systematic review explores the motivational climate created by coaches and examines both the positive and negative dimensions of SDT, highlighting that a positive alignment among the psychosocial determinants along the horizontal axis of the HMIEM is crucial for behavioral

outcomes—such as enjoyment, perceived effort, fear of failure, intention, commitment, persistence, dropout rates, and subjective vitality.

The analysis further confirms that when the motivational climate associates positively with the satisfaction of athletes' BPN, facilitates the autonomous regulation of motivation. Specifically, satisfaction of BPN is positively and significantly associated with autonomous forms of motivational regulation, which in turn is significantly associated with positive behavioral outcomes. Conversely, the presence of BPN frustration correlates negatively with autonomous motivation and positively with controlled motivation, thereby increasing athletes' intention to dropping out.

In conclusion, the positive alignment of HMIEM variables, underpinned by a supportive motivational climate, is fundamental to eliciting beneficial behavioral consequences. These findings offer valuable insights for coaches in designing training sessions that foster a task-involving motivational environment, thereby promoting BPN satisfaction and increased autonomous motivation, which ultimately contribute to more favorable behavioral outcomes among athletes.

Acknowledgements

We would like to thank all the authors for their contribution in writing and revising the manuscript.

ORCID iDs

Bernardo Viveiros https://orcid.org/0000-0002-8271-2591
Miguel Jacinto https://orcid.org/0000-0002-1727-3537
Rui Matos https://orcid.org/0000-0002-2034-0585
Diogo Monteiro https://orcid.org/0000-0002-7179-6814

Ethical considerations

Ethical approval was not required for this study as it is a systematic review of publicly available published literature and did not involve human participants or primary data collection.

Consent to participate

Not applicable

Author contributions

BV: Writing—review & editing, Conceptualization, Methodology, Project administration; BV, MJ and DM: Writing—review & editing, Conceptualization, Methodology; BV: Writing—original draft, Conceptualization, Methodology; MJ, RA, RM, NA, LC, NC and DM: Writing—review & editing, Formal Analysis; MJ, RA, RM, NA, LC, NC and DM: Writing—review & editing.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by National Funds by FCT - Foundation for Science and Technology, under the projects UID/04045/2025 (https://doi.org/10.54499/UID/04045/2025), UID/PRR/04045/2025 (https://doi.org/10.54499/UID/PRR/04045/2025) and UID/PRR2/04045/2025 (https://doi.org/10.54499/UID/PRR2/04045/2025).

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability

No primary data was collected or generated in this study. All sources analyzed are cited within the review

Supplemental material

Supplemental material for this article is available online.

References

1. Gillet N, Vallerand RJ, Amoura S, et al. Influence of coaches' autonomy support on athletes' motivation and sport performance: a test of the hierarchical model of intrinsic and extrinsic motivation. *Psychol Sport Exerc* 2010; 11: 155–161.
2. Jõesaar H, Hein V and Hagger MS. Peer influence on young athletes' need satisfaction, intrinsic motivation and persistence in sport: a 12-month prospective study. *Psychol Sport Exerc* 2011; 12: 500–508.
3. Longakit J, Toring-Aque L, Aque F Jr, et al. The role of coach-athlete relationship on motivation and sports engagement. *Physical Education of Students* 2024; 28: 268–278.
4. Harwood CG, Keegan RJ, Smith JMJ, et al. A systematic review of the intrapersonal correlates of motivational climate perceptions in sport and physical activity. *Psychol Sport Exerc* 2015; 18: 9–25.
5. Calvo C and Topa G. Leadership and motivational climate: the relationship with objectives, commitment, and satisfaction in base soccer players. *Behav Sci* 2019; 9: 29.
6. Mageau GA and Vallerand RJ. The coach–athlete relationship: a motivational model. *J Sports Sci* 2003; 21: 883–904.
7. Nielsen G, Wikman JM, Appleton PR, et al. Predicting adolescents' continuation in club sports: a prospective cohort study of the importance of personal and contextual motivational factors in five sports in Denmark. *Scand J Med Sci Sports* 2024; 34: e14616.
8. Ryan RM and Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol* 2000; 55: 68–78.
9. Deci EL and Ryan RM. Facilitating optimal motivation and psychological well-being across life's domains. *Can Psychol* 2008; 49: 14–23.
10. Nicholls JG. Achievement motivation: conceptions of ability, subjective experience, task choice, and performance. *Psychol Rev* 1984; 91: 28.
11. Monteiro D, Teixeira DS, Travassos B, et al. Perceived effort in football athletes: the role of achievement goal theory and self-determination theory. *Front Psychol* 2018; 9: 1575.

12. Rodrigues F, Monteiro D, Teixeira DS, et al. The relationship between teachers and Peers' motivational climates, needs satisfaction, and physical education grades: an AGT and SDT approach. *Int J Environ Res Public Health* 2020; 17: 6145.
13. Rodrigues F, Monteiro D, Matos R, et al. Exploring the dynamics of Athletes' enjoyment and self-determined motivation, and of the motivational climate in youth football: a longitudinal perspective. *Percept Mot Skills* 2024; 131: 551–567.
14. Lochbaum M, Kazak Çetinkalp Z, Graham K-A, et al. Task and ego goal orientations in competitive sport. *Kinesiology* 2016; 48: 3–29.
15. Moore EWG and Weiller-Abels K. Psychosocial climates differentially predict 12- to 14-year-old competitive soccer Players' goal orientations. *Women Sport Phys Act J* 2020; 28: 111–118.
16. Elliot AJ and Conroy DE. Beyond the dichotomous model of achievement goals in sport and exercise psychology. *Sport & Exercise Psychology Review* 2005; 1: 17–25.
17. Duda JL and Appleton PR. Empowering and disempowering coaching climates: conceptualization, measurement considerations, and intervention implications. In: *Sport and Exercise Psychology Research*. Cambridge: Academic Press, Elsevier, 2016, pp.373–388.
18. Duda JL. The conceptual and empirical foundations of empowering Coaching™: setting the stage for the PAPA project. *Int J Sport Exerc Psychol* 2013; 11: 311–318.
19. Deci EL and Ryan RM. Conceptualizations of intrinsic motivation and self-determination. In: *Intrinsic motivation and self-determination in human behavior*. Boston, MA: Springer US, 1985, pp.11–40.
20. Ryan RM. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York, NY: Guilford Press, 2017. DOI: 10.1521/978.14625/28806.
21. Chen B, Vansteenkiste M, Beyers W, et al. Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motiv Emot* 2015; 39: 216–236.
22. Adie JW, Duda JL and Ntoumanis N. Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: a test of basic needs theory. *Motiv Emot* 2008; 32: 189–199.
23. Vallerand JR and Young BW. Are adult sportspersons and exercisers that different? Exploring how motives predict commitment and lapses. *Int J Sport Exerc Psychol* 2014; 12: 339–356.
24. Rodrigues F, Teixeira DS, Neiva HP, et al. The bright and dark sides of motivation as predictors of enjoyment, intention, and exercise persistence. *Scand J Med Sci Sports* 2020; 30: 787–800.
25. Edmunds J, Ntoumanis N and Duda JL. A test of self-determination theory in the exercise domain. *J Appl Soc Psychol* 2006; 36: 2240–2265.
26. Ntoumanis N, Ng JYY, Prestwich A, et al. A meta-analysis of self-determination theory-informed intervention studies in the health domain: effects on motivation, health behavior, physical, and psychological health. *Health Psychol Rev* 2021; 15: 214–244.
27. Bartholomew KJ, Ntoumanis N, Ryan RM, et al. Psychological need thwarting in the sport context: assessing the darker Side of athletic experience. *J Sport Exerc Psychol* 2011; 33: 75–102.
28. Vansteenkiste M and Ryan RM. On psychological growth and vulnerability: basic psychological need satisfaction and need frustration as a unifying principle. *J Psychother Integr* 2013; 23: 263–280.
29. Rodrigues F, Macedo R, Teixeira DS, et al. The co-occurrence of satisfaction and frustration of basic psychological needs and its relationship with exercisers' motivation. *J Psychol* 2021; 155: 165–185.
30. Ryan RM and Deci EL. Overview of self-determination theory: An organismic dialectical perspective. In: *Handbook of self-determination research*. Rochester: University of Rochester Press, 2002, pp.3–33.
31. Cid L, Moutão J, Leitão J, et al. Behavioral regulation assessment in exercise: exploring an autonomous and controlled motivation Index. *Span J Psychol* 2012; 15: 1520–1528.
32. Howard JL, Gagné M and Bureau JS. Testing a continuum structure of self-determined motivation: a meta-analysis. *Psychol Bull* 2017; 143: 1346–1377.
33. Hagger MS, Hardcastle SJ, Chater A, et al. Autonomous and controlled motivational regulations for multiple health-related behaviors: between- and within-participants analyses. *Health Psychol Behav Med* 2014; 2: 565–601.
34. Heiestad H, Rustaden AM, Bø K, et al. Effect of regular resistance training on motivation, self-perceived health, and quality of life in previously inactive overweight women: a randomized, controlled trial. *Biomed Res Int* 2016; 2016: 1–9. doi:10.1155/2016/3815976.
35. Ntoumanis N, Thøgersen-Ntoumani C, Quested E, et al. The effects of training group exercise class instructors to adopt a motivationally adaptive communication style. *Scand J Med Sci Sports* 2017; 27: 1026–1034.
36. Pope JP and Wilson PM. Understanding motivational processes in university rugby players: a preliminary test of the hierarchical model of intrinsic and extrinsic motivation at the contextual level. *Int J Sports Sci Coach* 2012; 7: 89–107.
37. Isoard-Gautheur S, Guillet-Descas E and Lemyre P-N. A prospective study of the influence of perceived coaching style on burnout propensity in high level young athletes: using a self-determination theory perspective. *Sport Psychol* 2012; 26: 282–298.
38. Rottensteiner C, Happonen L and Konttinen N. The interplay of autonomous and controlled motivation in youth team sports. *Int J Sport Psychol* 2015; 46: 225–243.
39. Sheehan RB, Herring MP and Campbell MJ. Associations between motivation and mental health in sport: a test of the hierarchical model of intrinsic and extrinsic motivation. *Front Psychol* 2018; 9: 07.
40. Vallerand RJ. Toward A hierarchical model of intrinsic and extrinsic motivation. In: *Advances in experimental social psychology*. San Diego: Academic Press, 1997, pp.271–360.

41. Vallerand RJ. Deci and Ryan's self-determination theory: a view from the hierarchical model of intrinsic and extrinsic motivation. *Psychol Inq* 2000; 11: 312–318.
42. Heredia-León DA, Manzano-Sánchez D, Gómez-Mármol A, et al. Contributing to SDG 3 through support for trainer autonomy: relationship with motivation, basic psychological needs and the intention to be physically active. *Int J Environ Res Public Health* 2022; 19: 12327.
43. Paumier D and Chanal J. The antecedents and consequences of autonomous and controlled motivation: domain specificity and motivational sequence at the situational level. *Front Psychol* 2022; 13: 987582.
44. Vallerand RJ and Ratelle CF. *Intrinsic and extrinsic motivation: a hierarchical model*. Rochester: University of Rochester Press, 2002, pp.37–63.
45. Quested E, Ntoumanis N, Viladrich C, et al. Intentions to drop-out of youth soccer: a test of the basic needs theory among European youth from five countries. *Int J Sport Exerc Psychol* 2013; 11: 395–407.
46. Sarrazin P, Valler and R, Guillet E, et al. Motivation and dropout in female handballers: a 21-month prospective study. *Eur J Soc Psychol* 2002; 32: 395–418.
47. Álvarez MS, Balaguer I, Castillo I, et al. Coach autonomy support and quality of sport engagement in young soccer players. *Span J Psychol* 2009; 12: 138–148.
48. Reinboth M and Duda JL. Perceived motivational climate, need satisfaction and indices of well-being in team sports: a longitudinal perspective. *Psychol Sport Exerc* 2006; 7: 269–286.
49. Vallerand RJ. Intrinsic and extrinsic motivation in sport and physical activity: a review and a Look at the future. In: *Handbook of sport psychology*. 3rd ed. Hoboken: Wiley, 2007, pp.59–83.
50. Alkasasbeh WJ and Akroush SH. Sports motivation: a narrative review of psychological approaches to enhance athletic performance. *Front Psychol* 2025; 16: 1645274.
51. Alesi M, Gómez-López M, Chicau Borrego C, et al. Effects of a motivational climate on psychological needs satisfaction, motivation and commitment in teen handball players. *Int J Environ Res Public Health* 2019; 16: 2702.
52. Almagro BJ, Conde C, Moreno JA, et al. Analysis and comparison of adolescent athletes'motivation: basketball players vs. Football players. *Revista de psicología del deporte* 2009; 18: 353–356.
53. Monteiro D, Pelletier LG, Moutão J, et al. Examining the motivational determinants of enjoyment and the intention to continue of persistent competitive swimmers. *Int J Sport Psychol* 2018; 49: 484–504.
54. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Br Med J* 2021; 372: 71.
55. Morgan RL, Whaley P, Thayer KA, et al. Identifying the PECO: a framework for formulating good questions to explore the association of environmental and other exposures with health outcomes. *Environ Int* 2018; 121: 1027–1031.
56. Bento T. Revisões sistemáticas em desporto e saúde: orientações para o planeamento, elaboração, redação e avaliação. *Motricidade* 2014; 10: 107–123.
57. Almagro BJ, Sáenz-López P and Moreno JA. Prediction of sport adherence through the influence of autonomy-supportive coaching among Spanish adolescent athletes. *J Sports Sci Med* 2010; 9(1): 8–14.
58. Almagro BJ, Sáenz-López P, Fierro-Suero S, et al. Perceived performance, intrinsic motivation and adherence in athletes. *Int J Environ Res Public Health* 2020; 17: 9441.
59. Gómez-López M, Valero-Valenzuela A, Manzano-Sánchez D, et al. Fear of failure and perception of the motivational climate under the coach pressure. *Int J Sports Sci Coach* 2024; 19: 933–943.
60. Murillo M, Abós Á, Sevil-Serrano J, et al. Influence of coaches' motivating style on motivation, and sport commitment of young water polo players. *Int J Sports Sci Coach* 2022; 17: 1283–1294.
61. Alvarez MS, Balaguer I, Castillo I, et al. The coach-created motivational climate, young Athletes' well-being, and intentions to continue participation. *J Clin Sport Psychol* 2012; 6: 166–179.
62. Calvo TG, Cervelló E, Jiménez R, et al. Using self-determination theory to explain sport persistence and dropout in adolescent athletes. *Span J Psychol* 2010; 13: 677–684.
63. Abraldes JA, Granero-Gallegos A and Baena-Extremera A. Orientaciones de meta, satisfacción, creencias de éxito y clima motivacional en nadadores / Goal Orientations, Satisfaction, Beliefs in Sport Success and Motivational Climate in Swimmers. *Rev Int Med Cienc Act Fis Deporte* 2016; 16(63): 583–599. https://doi.org/10.15366/rimcafd2016.63.011
64. Amaro N, Monteiro D, Rodrigues F, et al. Task-Involving motivational climate and enjoyment in youth male football athletes: the mediation role of self-determined motivation. *Int J Environ Res Public Health* 2023; 20: 3044.
65. Teixeira DS, Pelletier LG, Monteiro D, et al. Motivational patterns in persistent swimmers: a serial mediation analysis. *Eur J Sport Sci* 2020; 20: 660–669.
66. Ommundsen Y, Lemyre P-N, Abrahamsen F, et al. Motivational climate, need satisfaction, regulation of motivation and subjective vitality: a study of young soccer players. *Int J Sport Psychol* 2010; 41: 216–242.
67. Elsborg P, Appleton P, Wikman JM, et al. The associations between motivational climate, basic psychological needs and dropout in volleyball – A comparison across competitive levels. *Eur J Sport Sci* 2023; 23: 393–403.
68. Heredia-León DA, Manzano-Sánchez D, Gómez-Mármol A, et al. Prediction of the adherence to sports practice of young Ecuadorians based on the perception of the coach's interpersonal style. *Front Psychol* 2023; 14: 1133583.
69. Castillo-Jiménez N, López-Walle JM, Tomás I, et al. Empowering and disempowering motivational climates, mediating psychological processes, and future intentions of sport participation. *Int J Environ Res Public Health* 2022; 19: 96.

70. Pelletier LG, Fortier MS, Vallerand RJ, et al. Associations among perceived autonomy support, forms of self-regulation, and persistence: a prospective study. *Motiv Emot* 2001; 25: 279–306.
71. Sarrazin P, Boiché JCS and Pelletier LG. A self-determination theory approach to dropout in athletes. In: *Intrinsic motivation and self-determination in exercise and sport*. Champaign: Human Kinetics, 2007, pp.229–242.
72. Gómez-López M, Merino-Barrero JA, Manzano-Sánchez D, et al. A cluster analysis of high-performance handball players' perceived motivational climate: implications on motivation, implicit beliefs of ability and intention to be physically active. *Int J Sports Sci Coach* 2019; 14: 541–551.
73. Appleton PR, Ntoumanis N, Quested E, et al. Initial validation of the coach-created empowering and disempowering motivational climate questionnaire (EDMCQ-C). *Psychol Sport Exerc* 2016; 22: 53–65.
74. Jowett S. The coach-athlete partnership. *Psychologist* 2005; 18: 412–415.
75. Viveiros B, Jacinto M, Antunes R, et al. Application of the hierarchical model of intrinsic and extrinsic motivation in the context of exercise: a systematic review. *Front Psychol* 2025; 16: 1512270. DOI: 10.3389/fpsyg.2025.1512270
76. Ntoumanis N. Empirical links between achievement goal theory and self-determination theory in sport. *J Sports Sci* 2001; 19: 397–409.
77. Rodrigues F, Monteiro D, Matos R, et al. Exploring the dynamics of Athletes' enjoyment and self-determined motivation, and of the motivational climate in youth football: a longitudinal perspective. *Percept Mot Skills* 2024; 131: 551–567.
78. Rodrigues F, Figueiredo N, Jacinto M, et al. Social-Cognitive theories to explain physical activity. *Educ Sci (Basel)* 2023; 13: 22.
79. Deci EL and Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New York: Springer Science & Business Media, 2013.