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Motivational Climate Measures in Sport: A Systematic Review

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Abstract. Motivational climate can be defined as the environmental status of sport that influences motivation levels. The present study aimed to systematically identify the most widely used measures examining motivational climate. The databases for searching were *PsycNET, PubMed* and *ScienceDirect.* The search returned a total of 378 studies of which 8 met the inclusion criteria for analysis. The results show that the most used instruments for evaluation of motivational climate have good psychometric characteristics of reliability, validity and factorial structure. On the other hand, there was a lack of studies that analyzed invariance of measures, which may be a critical consideration. Finally, the review points out the need for development of new theoretical perspectives, potential new instruments that extend beyond the socio-cognitive approach and instruments that allow the measurement of other environmental, personal and structural variables other than parents, coaches and athletes.

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The study of motivation raises significant interest among researchers from sport, exercise, health and occupational sciences (Clancy et al., 2017; Ennis, 2017; Keegan et al., 2016; Ntoumanis et al., 2017; Venhorst et al., 2017). Motivation typically refers to the reasons underlying whether, and how, an activity is pursued. The amount of energy one spends in a task and the direction of his or her effort are the main characteristics of this psychological construct (Sage, 1977).

Motivation, in general, has been studied in many areas related to sport and physical activity, especially psychology and physical education (Clancy et al., 2017; Ennis, 2017; Keegan et al., 2016; Ntoumanis et al., 2017; Venhorst et al., 2017). Knowing where motivation comes from -why it takes those forms that it does, and the factors or situations that increases or decreases- it has generated an estimated number of twenty-four different theories (Lacerda, 2010; Reeve, 2006).

Theories of motivation applied to sport typically guide researchers to look upon cognitive, affective and behavioral variables *as perceived by the participants* (Roberts, 2001). Scientists have noted that this approach poses some difficulties, mainly because participants with the same coach have distinct perceptions of the psychosocial variables entailed in motivation and subjective ratings of motivation often demonstrate little or no relation to objectively observed behaviors (Smith et al., 2007; Papaioannou & Kouli, 1999; Morgan et al., 2005). Motivational climate is assessed and measured in line with two predominant theoretical paradigms that define motivation, and what constitutes the 'climate' that influences athletes' motivation. There are basically two main foundational 'socio-cognitive' theories used to understand and discuss the phenomenon of motivational climate (Lacerda, 2010; Reeve, 2006) – although in recent years both theories continue to be evolve and be refined. The 'foundational' theories are the Achievement Goal Theory (AGT; Nicholls, 1989) and the Self-Determination Theory (SDT; Deci & Ryan, 2000, 2002). Those theories are important in the field of motivational climate research and it is fundamental to understand them for further discussion.

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The SDT was developed by Deci and Ryan (2000) to explain how internal psychological values, environmental variables and social interaction can influence one's own motivation. This theory categorizes motivation as intrinsic and extrinsic: The first is that which satisfies the subject by their own participation in the activity, often divided into motivation by the ego (personal overcoming) and by the pleasure of the task (Harwood et al., 2015). Intrinsically motivated people aim at competence, mastery of the task, competition, action, fun, and skill acquisition, and their level of expectation usually rises steadily (Deci & Ryan, 2002). Extrinsic motivation, on the other hand, is related to rewards or punishments from other people. Examples of rewards include compliments, applause, awards, trophies, medals, money, travels, grades and school scholarships. As punishments, deprivation of privileges, criticism, ridicule, booing, exercises, extra work and salary discounts (Roberts, 2001; Skinner, 1968). According to the authors of this theoretical framework (Deci & Ryan, 2000, 2002), the intrinsic motives are more adaptive, compared to the extrinsic ones among children and young people with regard to the sport practice (Feliu, 1997; Franco, 2000).

In the sport environment, studies related to the motivational climate highlight possible coexisting factors influencing extrinsic motivation such as: Behavior of parents and coaches, structure and support for training, interpersonal relationship between athletes and socio-environmental determinants (Cervelló & Santos-Rosa, 2001; Harwood et al., 2015; Laparidis et al., 2003; Salselas & Márquez, 2009; Ruiz et al., 2016; Keegan et al., 2016). LaVoi and Stellino (2008) found positive linear relationship between sport climate perceived regarding parents and the good sporting behaviors during competition among young hockey players. Salselas and Márquez (2009) also found a positive correlation between perception of the motivational climate of young swimmers and the use of rewards and feedbacks from parents.

Achievement-Goal Theory (Nicholls, 1989) separates the underlying goals that regulate the pursuit of achievement, or competence, based in their orientation towards either normative success or mastery, in terms of skill execution, improvement and effort-investment. A task-oriented goal refers to a clear objective that can be reached by executing a task or a group of tasks. On the other hand, an ego-oriented goal entails an objective related to a person in an individual level of self-fulfillment, so, it is something important to someone to accomplish, whereas others may or may not share the same feeling. Task and ego orientation in AGT are important to understand the direction of the effort and the will to persevere until that goal is reached.

Beyond the individual factor, the social and environmental dimensions of motivation show central role to understand multiple layers of this phenomenon. Among athletes, recent data show that parents, peers and coaches are of great importance to explain motivational climate (Keegan et al., 2016). Climate refers to the social environment shared by athletes with peers, coaches, families and other possible actors such as media and managers, thus, motivational climate entails the close relationship between psychosocial environment of practice and competition in a given sport that influences motivation of an athlete (Keegan et al., 2010, 2011, 2014)

Recent attempts to develop instrument measures of the observed behaviors or more objective motivational climate variables have demonstrated low correlation between the observer ratings and the participants' perceptions of social climate (Smith et al., 2015), this difference in perspective remains a significant limitation to research that examines motivational climate in sport. Nevertheless, there is important value in attempting to understand how the objectively observable behaviors of coaches and teammates are perceived, experienced and translated into climate perceptions (Keegan et al., 2010, 2011, 2014). To increase understanding on motivational climate may allow more sophisticated management of athletes' perception, improvement of strategies and systems for the optimization of motivational climate that leads to improved experiences, learning, persistence and performance (Harwood et al., 2015).

A person rarely persists in learning or training behaviors long enough to succeed when surrounded by a negative or unfavorable environment (Bandura, 1971). Beyond the basic understanding of overall principles of socio-cognitive theories (Ames, 1992; Epstein, 1989), and the demonstration of associations between climate perceptions and their correlates (Harwood et al., 2015), the relationship between individual differences/traits and specific situations/context – perceived or actual – in determining motivation remains to be understood. In other words, one cannot understand the set of behaviors of an athlete by rigidly adhering to abstract theoretical concepts, since it varies according to the athlete's traits and life history, and the contingencies of the environment (Figueiredo, 2000; Keegan et al., 2009; Winterstein, 2002).

Keegan et al. (2016) suggested an alternative framework: To develop research on motivational climate from a data-driven and less theoretically prescribed perspective, by collecting and interpreting data from a *theoretically agnostic* point of view (Harwood et al., 2008; Keegan et al., 2016). Accordingly, Keegan et al. (2011) proposed the explanation of the motivational climate in a sport environment based on the analysis of the interactions and influences of its social agents without the

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adoption of a prescriptive 'guiding' theoretical framework or model *a priori* – i.e., beforehand, in a way that controls and dictates what is measured and how. This proposal followed reflections on the progress of motivational climate research, and followed a series of qualitative studies demonstrating the motivational climate is much more complex than simple, broad characterizations offered by some theories (Keegan et al., 2011; Keegan et al., 2014).

Measurement in psychology is an endeavor led by researchers to assess a latent construct (REFS). In order to build an instrument of measurement, psychometrics scientists are recommended to select and faithfully embody a foundational theory to build its items. It means that, the first step to create a new assessment tool is to dive deep into a theory and develop items from this specific theoretical approach according to the International Test Commission (ITC, 2001). However, recent and innovative research in motivational climate has argued that too few theoretical models have directed the development of measures for motivational climate, and instead researchers might benefit from being less dogmatically 'wedded' to guiding theories:, i.e., not preemptively selecting a theory beforehand to guide item and factor development, but rather adopting more of an *agnostic* framework instead (Keegan et al., 2009, 2011, 2016). Even though there are guidelines for test development and use (Bartram, 2001; ITC, 2001) it is not rare to find instrument measures developed without such strict guidance by a foundational theoretical model (e.g., Filgueiras et al., 2014).

In a recent systematic review, Clancy et al. (2017) emphasized the existence of a large number of instruments to assess motivation in sport, but very few measures were intended to link perceived motivational climate and motivation. Reliable and objective observational systems used by coaching staff rather than self-reported measures can contribute to the development of intervention programs that aims to changing the motivational climate (Clancy et al., 2017). In order to have good third-person observational systems, the psychometric characteristics of a measure should be investigated to guarantee validity and reliability (Filgueiras & Hall, 2017; Filgueiras, 2017).

Accordingly, Keegan et al. (2014) study suggested that a wider, and fuller, consideration of the motivational 'atmosphere' should contemplate the understanding of specific behaviors of social actors in the sport context (parents, coach, managers, media and peers), their interactions patterns and potential combinations at specific moments. Thus, a multidimensional and multi-level instrument measure would be the most efficient assessment model in motivational climate (Harwood et al., 2015; Keegan et al., 2016). The present article intends to investigate the most widely used measures examining motivational climates. Two central questions will be addressed: (a) The main underpinning theoretical models used to build and develop instruments; and (b) the psychometric properties of those measures. Thus, to inform the potential implications of diversifying the suite of theoretical models that guide measure development, this paper sought to overview and characterize the existing, discrete, instruments and compare their foundations, compositions and psychometric properties.

Underpinning Theories of Motivation

Two predominant theories - i.e., AGT, SDT - were reported in most of the studies that Harwood et al. (2015) reviewed. Although those theoretical models can be applied in diverse context, they lack observation systems in the sporting context, the majority of grounded theory instrument measures are surveys or questionnaires based on the athletes' self-reports about their perceptions of the environment (Duda & Balaguer, 2007; Ntoumanis, 2017). According to Ames (1992a) and Keegan et al. (2011) the motivational climate is multidimensional, which would suggest that diverse factors and dimensions should be identifiable, beyond the two-to-three commonly suggested by measures grounded in AGT or SDT. Not only might more diverse conceptualizations be required, but drawing from multiple sources (coaches, parents, peers, etc.) and potentially observing different factor structures from these different protagonists. The main purpose of the current study was to identify the most used instruments for climate measurement in sport: their underpinning models and factor compositions. From her ewe sought to enable to construction of more holistic, and this more informative scales in future research, in response to the call for less constraint from 'guiding' theoretical models: i.e., to be a little more *theoretically agnostic.*

Method

To address the above question we used the systematic review inspired by the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes method PRISMA (Moher et al., 2009).

Three databases were used separately for article search on April 12, 2017. They were: (a) APA PsyNet-PsycInfo, (b) PubMed and (c) Oxford. Those databases were chosen because of limitations posed by the Pontifical Catholic University of Rio de Janeiro, Brazil, library search system. The keywords used for the research were: (i) Instrument; (ii) sport; (iii) motivational climate; (iv) athlete; (v) assessment; (vi) psychometrics; and (vii) measure and were combined in the following algorithms: [(i) + (ii) or (iii)] + [(iv) or (v) or (vi) + (vii)].

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Inclusion Criteria

The criteria for inclusion of the articles were: (a) Double-blind peer-reviewed articles; (b) studies that address the theme of motivational climate in sport; (c) papers with clear theoretical background or an assumed empirical foundation with no grounded-theory; (d) published articles that developed a measure of motivational climates have been published since of January 1, 1997. Articles that were considered important, although not retrieved from the systematic search were included, such as: White et al. (1992) and Seifriz et al. (1992) due to its importance in the field.

Exclusion Criteria

The criteria for excluding retrieved articles were: (a) Repeated in databases; (b) case studies; (c) meta-analysis; (d) systematic reviews; (e) absence of a validated instrument measure; (f) qualitative research; (g) unpublished material; and (h) monographs, thesis or dissertations. Indeed, since the inclusion criteria considered only double-blind peer reviewed articles, then, it would not be necessary the exclusion criteria #7 and #8; nonetheless, some of the papers that the search yielded needed a closer look and some of them, although appeared to be regular peer-reviewed articles, came out to be opinion texts or editorial requests. Those exclusion criteria were added later to the procedure.

Procedure

Initially, keywords were developed during discussions among authors to reach a consensus. Then, rules for inclusion and exclusion criteria were debated and established. Considering the limitations of databases above mentioned, one of the authors who is expert in the field of motivational climate provided some necessary articles that were later included in the results. Those papers were used as reference to decide inclusion of articles based on criteria #2 and #3. In the next step, two of the authors were responsible to make the search in the databases independently. Each one decided which papers to include and exclude with no communication between each other. Then, four of the authors gathered both results and discussed which articles should be included and which should be excluded. Final results were reported according to the systematic review.

Results

The initial searches with the keywords resulted in 378 articles, three articles from other sources. Figure 1 describes in detail the results of the systematic search in accordance with the PRISMA guidelines (Moher et al., 2009). First, 203 duplicate articles were excluded, leaving 177 articles. After applying the inclusion and exclusion criteria, 138 articles were excluded, leaving 39. After reading the articles in full, there were 8 that used

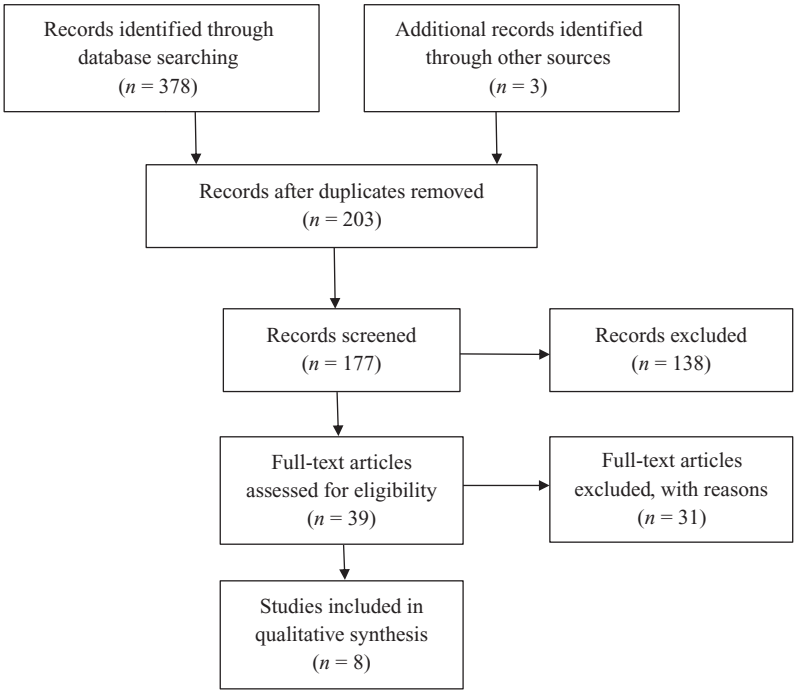

Figure 1. PRISMA Flowchart (Moher et al., 2009) based on the Systematic Search that Yielded the Results of the Present Study.

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some instrument of evaluation of the sports motivational climate according to Figure 1.

General information about the eight selected articles is presented in Table 1. In the first column, the authors' list followed the alphabetical ordering. Regarding the year of publication of the material, one article was published in 2000, one in 2003, one in 2008, one in 2009 and one in 2011. The remaining articles were published in the period of 2014 to 2016. The total number of instruments for evaluation of motivational climate retrieved and included in the final results were four.

Measures in Motivational Climate in the Sport Context

Perceived Motivational Climate in Sport Questionnaire (PMCSQ)—developed by Seifriz et al. (1992), the PMCSQ is grounded in the AGT social-cognitive approach. The original instrument was developed to measure the motivational climate perceived by physical activity and exercise participants. It measures the general motivational climate through 20 items in a 5-point Likert scale ranging from (1) *totally disagree* to (5) *strongly agree* divided in two factors: Mastery—task oriented items, and performance—ego oriented items. The Cronbach's Alpha coefficient was .86 for the mastery subscale and .77 for the performance subscale which were considered acceptable. Even though the instrument showed good psychometric properties, authors agreed that changes in the questionnaire were necessary due its use among individual athletes who competed alone and trained among other athletes of the same sport.

Perceived Motivational Climate in Sport Questionnaire–II (PMCSQ–II)—developed by Newton et al. (2000) it is the second version of the original PMCSQ built by Seifriz et al. (1992), and became one of the most used in research on motivational environment. It kept the original two-factor structure (ego- and task-oriented goals), but increased the focus on orientation of motivation rather than the perceived results of practice itself. Task-oriented items focused in the perceived attempt of improvement rather than the ability in this task. In contrast, the ego-oriented items evaluated perceived success in contrast to peers. The PMCSQ–II is a 33-item self-reported questionnaire with two high-order factors (ego and task) and six lower-order correlated subscales. Responses were scored according to the Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*) and Cronbach's Alpha found for ego- and task-oriented items were .88 and .84 respectively.

Parent-Initiated Motivational Climate–II (PIMCQ–II)—developed by White (1996) it is an altered version of the first PIMCQ created by White et al. (1992). It assesses the perceived role of parents in motivational climate. White (1996) modified second version was created by adding four new items to measure the perception of pleasure. The final version of the PIMCQ–II is a 36-item self-reported questionnaire that assesses three dimensions of children's perception of motivational climate generated by parents under the SDT framework. The three-factor structure entails different levels of extrinsic motivation: (i) Perception of a learning/enjoyment climate, (ii) perceptions of a worry-conducive climate and (iii) perceptions of a success-without-effort climate. Children and adolescents answer to a Likert-type scale ranging from 1 (*totally disagree*) to 5 (*totally agree*). Among the thirty-six items, eighteen refer to the mother and the other eighteen to the father (i.e., three factors for each parent). Cronbach's Alpha for each subscale ranged from .81 to .94 and they were considered acceptable. Because of the complex nature of the perception of parental influence, further study was recommended.

Multidimensional Motivational Climate Observation System: MMCOS—developed by Smith et al. (2015), this instrument combines AGT and SDT theories to assess levels of empowerment of athletes as promoted by coaching staff behaviors. The MMCOS is a third-person observation system that assesses motivational climate according to seven factors (autonomy support, controlling, task involving, ego involving, relatedness supportive, relatedness thwarting, structured) spread through two high-order dimensions: Empowerment and disempowerment. Cronbach's Alpha was high for all scales: Empowerment showed Cronbach's alpha =.94, disempowerment had Cronbach's alpha = .91 and the composite score (algorithm composed by empowerment and disempowerment) presented Cronbach's alpha = .86.

Discussion

The present article set out to investigate through systematic review the theoretical underpinnings and psychometric qualities of the most used motivational climate measures in sport. The results obtained initially point to four different instruments with seemingly different theoretical foundations; however, the theoretical framework regarding the environment that generates motivation sport is quite clear: The social-cognitive approach (Bandura, 1971). All eight studies investigated are based on this perspective and its variations (i.e., AGT, and SDT) to develop and to validate the instruments. The elaboration of a measurement system that aims to assess the influence of different factors in the motivational climate is directed towards one of the already mapped sources: Parents, coaches and/or peers. Since the motivational climate is a multidimensional construct (Ames, 1992a), other environmental actors (such as managers, supervisors, coaching staff, etc.), institutional factors (e.g., facilities, infrastructure and equipment) and other psychological dimensions

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Table 1. *Name of Authors in Alphabetical Order, Year of Study, Instrument Name, Psychometric Characteristics and Correlations Found*

				Psychometric Properties		
Study	Year	Country of study	Instrument	Reliability	Validity type	Factor analysis
Bortoli et al.	2011	Italy	PMCSQ	–	Convergent and divergent	–
Boyd et al.	2014	United States	PMCSQ–II	Task (α = .88) / Ego (α = .84)	Convergent and divergent	–
Laparidis et al.	2003	Greece	PIMCQ–II	Cooperative Learning (α = .80) Punishment for mistakes (α = .61) Unequal Recognition (α = .77) Important role (α = .67) Intrateam rivarly (α = .47) Individual role (α = .69)	Factorial, convergent and divergent	6 factors
LaVoi & Stellino	2008	United States	PMCSQ–II	Task (α = .76) / Ego (α = .79)	Convergent and divergent	2 factors
Salselas & Márquez	2009	Portugal	PIMCQ–II	Father [Learning (α = .70) Worry-conductive (α = .80) Success-without-effort (α = .86)] Mother [Learning (α = .73) Worry-conductive (α = .73) Success-without-effort (α = .82)]	Factorial and interobserver	2 high order factors (mother and father) and 3 minor factors
Pensgaard & Roberts	2000	Norway	PMCSQ	Performance-Oriented Climate (α = .87) Mastery-Oriented Climate (α = .76)	Factorial	2 factors
Ruiz et al.	2016	Finland	PMCSQ–II	Task (α = .88) / Ego (α = .87)	Factorial	2 factors
Harwood et al.	2015	England	MMCOS	Empowerment (α = .94) Disempowerment (α = .91)	Factorial and convergent	2 factors

should also be considered, highlighting the need to assess them in its contexts. Those variables do not seem to appear among the constructs measured by the instruments yielded in the present review. In fact, these findings are coherent to Keegan et al. (2011) who also highlighted the development of motivational climate measurement based on *a priori* theoretical approaches. The same criticism was made then; no instrument was built under an *agnostic* framework, although it is not an impossible endeavor (Filgueiras et al., 2014).

By observing the instruments closely, the PMCSQ evaluates three theoretical dimensions: Individual distractions (which may be of the subject itself, i.e., ego, or can be of the execution of a task, i.e., task), peers and coach (Seifriz et al., 1992). In this case, ego refers to the intrinsic motivation, the will of the individual to practice the sport, whereas the task is associated with the level of difficulty and mastery that can lead to distractions if the challenge is not sufficiently balanced (Newton et al., 2000). In this sense, ego and task were seen as independent of the athlete's relationship with his peers and his coach (Seifriz et al., 1992), but later these dimensions were considered as mediators of the ego and task, alongside the parents, which generated the creation of its second version: PMSCQ–II (Newton et al., 2000). In this sense, both PMSCQ and PMSCQ–II consider parents, coaches and peers as environmental variables that affect ego (intrinsic motivation) and task (difficulty and dominance). Institutional dimensions such as clubs, leaders, fans, confederations, and other elements such as neighborhood, education and culture are not to be mentioned (Ames, 1992b).

The same phenomenon occurs in PIMCQ–II, which focuses exclusively on parents as the source of the motivational climate (White et al., 1992). Although the MMCOS (Smith et al., 2015) seems to be a more complete instrument, it uses two dimensions of two theories to build its motivational climate model: Achievement of goals (ATG) in its social and assignment. The theoretical model proposed by Harwood et al. (2015) to evaluate the motivational climate adds a layer of complexity to the concept of ego and task proposed by Newton et al., 2000). The social context referred to in MMCOS concerns social elements, more specifically parents and coaches (only the two), as well as in ego (which includes peers); on the other hand, when group integration theory is included as a layer, the pairs appear as mediators and result of the motivational climate. The major difference that the MMCOS brings with regard to the PMCSQ–II is the achievement of goals, related to the AGT. Achieving a goal motivates the individual to seek another (Nicholls, 1989; Harwood et al., 2015), which had not been previously considered in measures of motivational climate. Despite of this, however, other environmental variables are not considered (Ames, 1992a) and, therefore, this gap remains in the literature.

The fact that the instruments used for motivational climate assessment are based on pre-determined theoretical constructs, disregarding the use of qualitative data, entails the lack of measurement of motivational climate in its multidimensionality, as the results of the present study show. Even though, the MMCOS is the one that closest come to this endeavor. The theoretical paradigm of the studies can be limiting since there is a tendency to develop such instruments of evaluation based on few and limited strands (Keegan et al., 2011, 2014).

Keegan et al. (2011) show that, beyond what the instruments measures, there are at least ten psychological dimensions correlated with motivation generally neglected by motivational climate instruments: (i) Beliefs about success in sports; (ii) beliefs about the purpose of sport in one's life; (iii) positive affect; (iv) negative affect; (v) self-perceived competence to perform the task; (vi) adoption of the learning perspective over competitiveness; (vii) goal orientation over task; (viii) moral development; (ix) development of motor skill; and (x) experience of the flow state during training. This is a valid hypothesis, that measures in a motivational climate still need to address other theories, or perhaps it should start from an *agnostic* and exploratory view to identify which social, environmental and intrinsic agents modulates the motivational environment (Keegan et al., 2014).

In this paper, it is clear that instruments used for the measurement of motivational climate assess separately the influence of one of the social agents on the motivation of athletes (Deci & Ryan, 2000, 2002; Nicholls, 1989). In fact, five-in-eight studies (62%) refer only to peer influence from the individual perception of the team's motivational climate. One study measures the influence of parents in this environment and another assesses the motivational climate from a method of external observation. The importance of understanding the complexities and interactions of the so-called motivational atmosphere (Keegan et al., 2011) and the ways in which they combine to influence the motivation of athletes was highlighted in this study.

Another limitation found in the results of this review was the divergence of the literature regarding the structure of the questionnaires. For example, the PMCSQ description in one of the articles (Boyd et al., 2014) as containing 18 items, another article cites it with 12 items (Bortoli et al., 2011) and another refers to the first version as containing 21 items (Pensgaard & Roberts, 2000). The same occurs with the second version of this same instrument, the PMCSQ–II is referenced containing 33 items and 2 high order factors in one of the studies (Boyd et al., 2014), on another with 29 items and 6 factors

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(Laparidis et al., 2003), and yet another does not present the instrument's structure (Ruiz et al., 2016).

The PIMCQ–II, which evaluates the influence of parents in the motivational climate, is described in one of the articles as containing 36 items that examine 3 dimensions (LaVoi & Stellino, 2008) and in another it is presented containing 18 items for the 3 dimensions (Salselas & Márquez, 2009). The heterogeneity of the results shows that researchers fail to keep the instruments stable throughout their different studies. This instability can be translated in the lack of reproducibility of statistical indicators derived from factor analyses or the internal consistency as measured by the Cronbach's Alpha. Cross-cultural invariance studies seem to be the next step in the future of research with these instruments, parallel to the construction of a measure that is more stable and contemplates other variables that go beyond the social agents involved in the motivational environment.

Regarding the psychometric qualities of the investigated instruments, the strength is the internal consistency values measured by Cronbach's Alpha. This statistical indicator is generated by the variance of the data in relation to the homogeneity of the items and the responses of the sample, its value varies between 0 and 1, the closer to 1 the better; the literature uses 0.7 as cut-off value. Despite this, it is known that the number of items and the repeatability of these items can positively distort the alpha, in other words, scales with many relatively redundant items tend to increase values (Filgueiras & Hall, 2017). Not knowing the exact number of items of each scale, such as PMSCQ–II and PIMCQ–II, makes it difficult to interpret the values of this internal consistency indicator, but based on the results, the most consistent scale is MMCOS (Harwood et al., 2015) followed by PMSCQ –II (Newton et al., 2000).

All studies presented convergent validity correlating motivational climate with psychological variables such as: performance (Bortoli et al., 2011; Harwood et al., 2015; Pensgaard & Roberts, 2000;), learning (Boyd et al., 2014; Ruiz et al., 2016), quality of life (Laparidis et al., 2003), adherence to goals (LaVoi & Stellino, 2008) and appropriate behaviors (Harwood et al., 2015; Salselas & Márquez, 2009). On the other hand, divergent validity was investigated in four of the eight retrieved articles, indicating low or non-existent correlation with bad behaviors (Boyd et al., 2014; LaVoi & Stellino, 2008), physiological variables (Laparidis et al., 2003) and negative affect (Bortoli et al., 2011). These findings point to the importance of considering the multiplicity of psychological variables in relation to motivation in the sporting context.

The factorial analysis is used as an item grouping technique to confirm the theoretical hypotheses in the development of the scale (Filgueiras, 2017; Filgueiras & Hall, 2017). In fact, if a theory on which a measure was constructed establishes that the construct has two dimensions, then the empirical results must group the items according to these two theoretical dimensions, failure in that undertaking means lack of factorial validity or theoretical validity (Filgueiras, 2017). This is the case of PIMCQ–II (White et al., 1992), which presupposes two high order factors (father and mother) with three underlying factors for each major dimension (learning, worry and success-effortless). The two studies found 6 factors, but one of them (Laparidis et al., 2003) did not find a hierarchical composition as suggested by the original authors. This compromises the organization of scores and the evaluation of the construct as idealized by theory. In this sense, both PMSCQ–II and MMCOS seem to be successful: Its factorability in two dimensions seems to support, but the MMCOS still needs future studies that confirm this factorial organization, since there is only one study (Harwood et al., 2015) that tests its latent structure.

The present systematic review identified the MMCOS as the closest measure with one of the best psychometric properties in the literature. However, the retrieved instruments used in this field of research were developed from a priori theoretical frameworks and to assess certain social agents (coach, parents or peers). Previous qualitative research suggests the need to develop a more comprehensive understanding of the motivational aspects and its relation to the components of sport atmosphere first, because it seems that motivational climate is not limited to those actors (Keegan et al., 2011).

On the other hand, it can be said that the present study is limited due to the bases adopted in this review, since ScienceDirect, Scopus, SportDiscuss, Scielo, Redalyc, among other databases were left out for technical limitations (the databases used were the only ones the authors had open access); which leaves enough space to new review studies. Another limitation is that narrative-based reviews tend to leave behind some important studies that could answer other questions, however, this was authors' choice for a better understanding and higher homogeneity.

Despite the limitations of the present study, the main conclusion is that the MMCOS seems the best instrument in terms of internal consistency to assess motivational climate. However, both MMCOS and PMSCQ–II meet the validity and latent structure criteria established by psychometric researchers. In this sense, the next step of future psychometric research is to identify the cross-cultural latent structure and invariance of these measures.

Based on the theories underlying the instruments used and developed, neither one proposes to identify and correlate the complexities and interactions present

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in the sports environment to favor the emergence of the motivational environment. From a theoretical perspective, the construction of a measure that uses a non-theoretical framework seems plausible, leaving the field for future researches to develop an instrument of motivational climate that undertakes greater complexity than those already built.

References

Bandura, A. (1971). *Psychological modeling: Conflicting theories*. Aldine-Athenon.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of educational psychology*, *84*(3), 261. https://doi.org/10.1037/0022-0663.84.3.261.

Ames, C. (1992a). Motivational climate and achievement-related patterns. In G. Roberts (Ed.), *Motivation in sport and exercise* (pp. 161–176). Human Kinetics.

Ames, C. (1992b).Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*(3), 261–271. https://doi.org/10.1037/0022-0663.84.3.261

Bartram, D. (2001). The development of international guidelines on test use: The International Test Commission Project. *International Journal of Testing*, *1*(1), 33–53. https://doi.org/10.1207/S15327574IJT0101_3

Bortoli, L., Bertollo, M., Comani, S., & Robazza, C. (2011). Competence, achievement goals, motivational climate, and pleasant psychobiosocial states in youth sport. *Journal of Sports Sciences*, *29*(2), 171–180. https://doi.org/10.1080/02640414.2010.530675

Boyd, M., Kim, M.-S., Ensari, N., & Yin, Z. (2014). Perceived motivational team climate in relation to task and social cohesion among male college athletes. *Journal of Applied Social Psychology*, *44*(2), 115–123. https://doi.org/10.1111/jasp.12210

Cervelló, E. M., & Santos-Rosa, F. J. (2001). Motivation in sport: An achievement goal perspective in young Spanish recreational athletes. *Perceptual and Motor Skills*, *92*(2), 527–534. https://doi.org/10.2466/pms.2001.92.2.527

Clancy, R. B., Herring, M. P., & Campbell, M. J. (2017). Motivation measures in sport: A critical review and bibliometric analysis. *Frontiers in Psychology*, *8*, Article e348. https://doi.org/10.3389/fpsyg.2017.00348

Deci, E. L., & Ryan, R. M. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–77.

Deci, E. L., & Ryan, R. M. (2002). Overview of self-determination theory: An organismic dialectical perspective. In E. Deci & R. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). The University of Rochester Press.

Duda, J., L., & Balaguer, I. (2007). Coach-created motivational climate. In S. Jowett & D. Lavallee (Eds.), *Social psychology in sport* (pp. 117–130). Human Kinetics. http://doi.org/10.5040/9781492595878.ch-009

Ennis, C. D. (2017). Educating students for a lifetime of physical activity: Enhancing mindfulness, motivation, and meaning. *Research Quarterly for Exercise and Sport*, *88*(3), 241–250. https://doi.org/10.1080/02701367.2017.1342495

Epstein, J. L. (1989). Family structures and student motivation: A developmental perspective. In C. Ames & R. Ames (Eds.), *Research on motivation in education* (3rd Ed., pp. 259–295). Academic Press.

Feliu, J. C. (1997). *Psicología del deporte: Personalidad, evaluación y tratamiento psicológico*. [Sport psychology: Personality, evaluation and psychological treatment]. Síntesis.

Figueiredo, S., H. (2000). Variáveis que inteferem no desempenho do atleta de alto rendimento. [Variables that interfere in the performance of elite athlete]. In K. Rubio (Coor.), *Psicologia do esporte: Interfaces, pesquisa e intervenção* [Sport psychology: Interfaces, research and intervention]. Casa do Psicólogo.

Filgueiras, A. (2017). Development and psychometric properties of the Sport Imagery Pettlep Inventory (SIPI). *Revista Brasileira de Psicologia do Esporte*, *7*(1), 1–22. http://doi.org/10.31501/rbpe.v7i1.8275

Filgueiras, A., & Hall, C. R. (2017). Psychometric properties of the Brazilian-adapted version of the Sport Imagery Questionnaire. *Psicologia: Reflexão e Crítica*, *30*, Article e22. http://doi.org/10.1186/s41155-017-0075-7

Filgueiras, A., Hora, G., Fioravanti-Bastos, A. C. M., Santana, C. M. T., Pires, P., Galvão, B. d. O., & Landeira-Fernandez, J. (2014). Development and psychometric properties of a novel depression measure. *Trends in Psychology/Temas em Psicologia*, *22*(1), 249–269. http://doi.org/10.9788/TP2014.1-19

Franco, G. S. (2000). *Psicologia no esporte e na atividade física: Uma coletânea sobre a prática com qualidade* [Psychology in sport and physical activity: A collection on quality practice]. Manole.

Harwood, C. G., Keegan, R. J., Smith, J. M. J., & Raine, A. S. (2015). A systematic review of the intrapersonal correlates of motivational climate perceptions in sport and physical activity. *Psychology of Sport and Exercise*, *18*, 9–25. https://doi.org/10.1016/j.psychsport.2014.11.005

Harwood, C., Spray, C. M., & Keegan, R. (2008). Achievement goal theories in sport. In T. S. Horn (Ed.), *Advances in sport psychology* (3rd Ed., pp. 157–185, 448). Human Kinetics.

International Test Commission (2001). International guidelines for test use. *International Journal of Testing*, *1*(2), 93–114. http://doi.org/10.1207/S15327574IJT0102_1

Keegan, R. J., Harwood, C. G., Spray, C. M., & Lavallee, D. E. (2009). A qualitative investigation exploring the motivational climate in early career sports participants: Coach, parent and peer influences on sport motivation. *Psychology of Sport and Exercise*, *10*(3), 361–372 https://doi.org/10.1016/j.psychsport.2008.12.003

Keegan, R., Middleton, G., Henderson, H., & Girling, M. (2016). Auditing the socio-environmental determinants of motivation towards physical activity or sedentariness in work-aged adults: A qualitative study. *BMC Public Health*, *16*, *Article number 438*. https://doi.org/10.1186/s12889-016-3098-6

Keegan, R. J., Spray, C. M., Harwood, C. G., & Lavallee, D. E. (2014). A qualitative synthesis of research into social motivational influences across the athletic career span. *Qualitative Research in Sport, Exercise and Health*, *6*(4), 537–567. https://doi.org/10.1080/2159676X.2013.857710

https://doi.org/10.1017/SJP.2021.13 Published online by Cambridge University Press

Keegan, R., Spray, C., Harwood, C., & Lavallee, D. (2010). The motivational atmosphere in youth sport: Coach, parent, and peer influences on motivation in specializing sport participants, *Journal of Applied Sport Psychology*, *22*, 87–105. https://doi.org/10.1080/10413200903421267

Keegan, R., Spray, C., Harwood, C., & Lavallee, D. (2011). From "motivational climate" to "motivational atmosphere": A review of research examining the social and environmental influences on athlete motivation in sport. In B. D. Geranto (Ed.), *Sport psychology* (pp. 1–52). Nova Science

Lacerda, A. (2010). *Motivation in elite sports athletes in the reference of fair play and sportsmanships* [Unpublished master's thesis]. Castelo Branco University.

Laparidis, K., Papaioannou, A., Vretakou, V., & Morou, A. (2003). Motivational climate, beliefs about the bases of success, and sportsmanship behaviors of professional basketball athletes. *Perceptual and Motor Skills*, *96*, 1141–1151. https://doi.org/10.2466/pms.2003.96.3c.1141

LaVoi, N. M., & Stellino, M. B. (2008). The relation between perceived parent-created sport climate and competitive male youth hockey players' good and poor sport behaviors. *The Journal of Psychology*, *142*(5), 471–495. https://doi.org/10.3200/JRLP.142.5.471-496

Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Harvard University Press.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLOS Medicine, 6*(7), Article e1000097. http://doi.org/10.1371/journal.pmed.1000097

Morgan, K., Sproule, J., Weigand, D., & Carpenter, P. (2005). A computer-based observational assessment of the teaching behaviors that influence motivational climate in physical education. *Physical Education and Sport Pedagogy*, *10*, 83–105. http://doi.org/10.1080/1740898042000334926

Newton, M., Duda, J. L., & Yin, Z. (2000). Examination of the psychometric properties of the Perceived Motivational Climate in Sport Questionnaire–2 in a sample of female athletes. *Journal of Sports Sciences*, *18*, 275–290. http://doi.org/10.1080/026404100365018

Ntoumanis, N., Stenling, A., Thøgersen-Ntoumani, C., Vlachopoulos, S., Lindwall, M., Gucciardi, D. F., & Tsakonitis, C. (2017). Longitudinal associations between exercise identity and exercise motivation: A multilevel growth curve model approach. *Scandinavian Journal of Medicine & Science in Sports*, *28*(2), 746–753 https://doi.org/10.1111/sms.12951

Papaioannou, A., & Kouli, O. (1999). The effect of task structure, perceived motivational climate and goal orientations on students' task involvement and anxiety. *Journal of Applied Sport Psychology*, *11*(1), 51–71. http://doi.org/10.1080/10413209908402950

Pensgaard, A. M., & Roberts, G. C. (2000). The relationship between motivational climate, perceived ability and sources of distress among elite athletes. *Journal of Sports Sciences*, *18* (3), 191–200. https://doi.org/10.1080/026404100365090

Reeve, J. M. (2006). *Motivation and emotion* (4th Ed.). LCT.

Roberts, G. (2001). Understanding the dynamics of motivation in physical activity: The influence of achievement goals on motivational processes. In G. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 1–55). Human Kinetics.

Ruiz, M. C., Haapanen, S., Tolvanen, A., Robazza, C., & Duda, J. L. (2016). Predicting athletes' functional and dysfunctional emotions: The role of the motivational climate and motivation regulations. *Journal of Sports Sciences*, *35*(16), 1598–1606. https://doi.org/10.1080/02640414.2016.1225975

Sage, G. (1977). *Introduction to motor behavior: A neurophysiological approach* (2nd Ed.). Addison-Wesley.

Salselas, V., & Márquez, S. (2009). Perceptions of the motivational climate created by parents of young Portuguese swimmers. *Perceptual and Motor Skills*, *108*(3), 851–861. https://doi.org/10.2466/PMS.108.3.851-861

Seifriz, J. J., Duda, J. L., & Chi, L. (1992). The relationship of perceived motivational climate to intrinsic motivation and beliefs about success in basketball. *Journal of Sport & Exercise Psychology*, *14*(12), 375–391. https://doi.org/10.1123/jsep.14.4.375

Skinner, B. F. (1968). *The technology of teaching*. Appleton-Century-Crofts.

Smith, R.E., Smoll, F.L., & Cumming, S.P. (2007). Effects of a motivational climate intervention for coaches on young athletes' sport performance anxiety. *Journal of Sport & Exercise Psychology*, *29*, 39–59. doi:10.1123/jsep.29.1.39

Smith, N., Tessier, D., Tzioumakis, Y., Quested, E., Appleton, P., Sarrazin, P., Papaioannou, A., & Duda, J. L. (2015). Development and validation of the multidimensional motivational climate observation system. *Journal of Sport and Exercise Psychology*, *37*(1), 4–22. https://doi.org/10.1123/jsep.2014-0059

Venhorst, A., Micklewright, D., & Noakes, T. D. (2017). Towards a three-dimensional framework of centrally regulated and goal-directed exercise behavior: A narrative review. *British Journal of Sports Medicine*, *52*(15), 957–966. https://doi.org/10.1136/bjsports-2016-096907

White, S. A. (1996). Goal orientation and perceptions of the motivational climate initiated by parents. *Pediatric Exercise Science, 8*, 122–129. https://doi.org/10.1123/pes.8.2.122

White, S. A., Duda, J. L., & Hart (1992). An exploratory examination of the parent-initiated motivational climate questionnaire. *Perceptual and Motor Skills, 75*, 875-880. https://doi.org/10.2466/pms.1992.75.3.875

Winterstein, P. (2002). A motivação para a atividade física e para o esporte [Motivation for physical activity and sport]. In D. DeRose. (Org.), *Esporte e atividade física na infância e na adolescência* [Sports and physical activity in childhood and adolescence] (pp. 77–87). Artmed.

https://doi.org/10.1017/SJP.2021.13 Published online by Cambridge University Press