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A review of the penetration of Francophone research on intervention in physical education and sport in Anglophone journals since 2010

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Introduction

In Francophone countries, *intervention sciences* are considered as a specific field of research in sport and physical education (eg. Musard, Loquet, and Carlier 2010; Lémonie and Gal-Petitfaux 2014). Since the 1990s, the notion of *intervention* has expanded with growing interest in the analysis of practices. *Intervention* is considered as a cornerstone to cross theory and practice. It is defined as an action aimed at modifying the activity of one or a group of persons engaged in a motor, sporting or artistic practice or in the transmission of this practice in a situated educational context. Thus, Durand (2001) proposes to analyse the activity of interveners (teachers, coaches) in situ, in their context of *intervention*, to understand the meanings that accompany their actions. More broadly, David (2001) considers *intervention* as an analysis of the diversity of professional practices based on physical activity and sport. Francophone research in the field of educational research is produced either in Departments of Education or in Sport or Kinesiology Departments. It is within this framework that many

French-speaking researchers are grouped within an academic association called the Association for Research on Intervention in Sport (ARIS) linked to a French journal '*e journal de la recherche sur l'intervention en éducation physique et sport*' (eJRIEPS, electronic journal of research on intervention in physical education and sport, https://journals.openedition.org/ejrieps/) specialized in the publication of articles in *intervention sciences*.

ARIS brings together various educational research on / for *intervention* such as ecological, psycho-sociological, cognitive anthropology, clinical activity, semiotics, clinical *didactique*, cultural anthropology approaches (Musard, Loquet, and Carlier 2010). The ambition of this diversity of theoretical approaches is to analyse practices in sport and education in order to understand and transform them. A literature review was published in *Physical Education and Sport Pedagogy* by Musard and Poggi (2015) analysing the communications presented during six Francophone congresses from 2000 to 2010 of ARIS. The results show a common object of study centered on pedagogy, and some similar ideas and aims, to develop a shared repertoire of knowledge, theories and methods of *intervention* in physical education and sport. The Francophone research is essentially descriptive using mostly qualitative methods (interviews and observations). This trend is reflected in English-language publications in the field of sport pedagogy. It emerged in Anglophone countries more than 30 years ago and increased drastically. The results highlight the continuing expansion of the field of *intervention* in the Francophone and the Anglophone worlds.

The aim of this literature review is to characterize the Francophone research in the English language literature in physical education and sport concerned with *intervention* since 2010 in the category "Education & Educational Research" of the Journal Citation Reports (2017). More specifically, our work seeks to (a) describe the field of *intervention sciences* specific to Francophone research in their international production, (b) analyse the penetration

of French research trends in English research traditions, by identification of French specificity and continuity.

Method: Identification of Studies

The selection of articles was carried out in three stages: selection of journals, selection of articles manually, second level of selection.

Journals were selected using the Journal Citation Reports (JCR) data base because EBSCO databases did not produce inconsistency results. This inconsistency is certainly due to the term *intervention* which is not listed as central in English-language publications; and the restriction to French-speaking authors is problematic for EBSCO. We therefore had to opt for a manual search by focusing on the Journal Citation Reports (JCR) database in Web of Sciences. In JCR we chose the category "Education & Educational Research" (Journal Citation Reports, 2017). This category "Education & Educational Research" was chosen thanks to the literature review cited in the introduction. On the one hand, we have shown that French-language publications in the field of *intervention sciences* are recognized as belonging to educational research. On the other hand, the literature review by Musard and Poggi (2015, 252) highlights this anchorage: "These papers reflect the multiple facets of educational research and practice on intervention in sport". We therefore had to opt for a manual search by focusing on the Journal Citation Reports database. We have chosen all English-language journals in this category "Education & Educational Research" (JCR, 2017) focusing primarily on sport and physical education. Six journals met these criteria: Physical Education and Sport Pedagogy (PESP), European Physical Education Review (EPER), Journal of Teaching in Physical Education (JTPE), Sport, Education and society (SE&S), Quest, Journal of Hospitality Leisure Sport & Tourism Education (JOHLSTE).

Articles were selected by manually studying all the publications of each journal since 2010 according to three criteria. The inclusion criteria are "sport or physical education", "francophone authors", and "*intervention*" (focus on practice, and contextualized research). Exclusion criteria are literature reviews, reports, comparative studies between different countries, and conference proceedings. On the basis of more than 2000 articles we selected 46 articles: 20 in PESP, 9 in EPER, 7 in Quest, 6 in JTPE, 4 in SE&S, and 0 in JOHLSTE.

Next, each article was classified according to its theoretical framework: *didactique* (6 articles), a technological approach (6 articles), course of action (7), motor learning (4), social psychology approach (9), ecological approach (14).

The last stage of selection corresponded to a qualitative extension of the literature review. The analysis of each category was entrusted to a French-speaking specialist in the theoretical framework. Each specialist manually completed the list of two or three articles based on the analysis of the bibliography of each article and their own scientific knowledge.

Findings: Theoretical Approaches about Francophone Researches on Intervention in Sport and Physical Education

The results show that French-language research is in close connection with the international tradition. Some approaches such as (1) *didactique*, (2) technological approach, and (3) course of action , have a Francophone specificity based on various international theoretical anchors; others such as (4) motor learning, (5) social psychology , (6) ecological approach come from non-French speaking international theoretical frameworks. For each approach, its specific features will be presented with its key concepts and its relationship to *intervention* based on the significant results in sport and in physical activity.

Didactique Approach

The French-speaking *didactique* research program develops its own concepts and analytical categories. It shares with some English-speaking approaches to *intervention* (eg. the Swedish pragmatist approach) some common roots in a socio-interactionist perspective of human actions (Wickman 2012), while distancing itself from Germanic general didactics (*Allgemeine Didaktik*) considered as too normative or not sensitive enough to the knowledge taught. Following the pioneer work of Brousseau (1997) and Chevallard (1992 in English) in mathematics education, the "didactics of physical education (PE)" program was first presented in the English language literature jointly with the French technological approach (David, Bouthier, Marsenach, and Durey, 1999), then on its own, in comparison with North American research on PE teachers' pedagogical content knowledge (Amade-Escot, 2000). This research program is organised around two main orientations: (a) didactic engineering; (b) descriptive research. The first orientation is to develop new approaches and design of content in PE. The methodology of these studies consists in the design, production, trial and internal validation of teaching sequences, through the confrontation of *a priori* and *a posteriori* analyses of the corresponding didactic situations. The second orientation is to study the intertwined teaching and learning processes with a special focus on the knowledge taught (Amade-Escot and Venturini 2015). This one attempts to comprehend how the socio-cultural dimensions of subject matter shape the teacher-student relationship (Leriche, Desbiens, Amade-Escot, and Tinning 2016). Qualitative methods are widely used in this orientation. Data sources include documents (official instructions, lesson plans, etc.) and case studies (interviews, class observations, etc.). One of the central issues dealt with is the knowledge to be taught, i.e. the selection of educational goals, content and teaching methods expressed in

curricula, as studied in physical education (PE) through the concept of *teaching traditions* by Forest, Lenzen, and Öhman (2018).

Another issue is the knowledge actually taught and learnt. French-speaking researchers dealing with this issue most commonly refer to the Joint Action in *Didactique* (JAD) framework (Amade-Escot and Bennour 2017; Amade-Escot, Elandoulsi, and Verscheure 2015; Amade-Escot and Venturini 2015; Barker, Wallhead, Brock, Goodyear, and Amade-Escot 2017; Leriche et al., 2016; Loquet 2011). This framework may be seen as a situated and institutional analysis of the content taught and learnt in the classroom from the perspectives of both the teacher and the students (Ligozat and Almqvist 2018). It takes for granted that the teacher and the students construct knowledge content jointly within an evolving learning environment. The JAD framework attempts to model human transactions as transmission of a socio-historically built culture, namely here the Physical, Sports and Artistic Activities (PSAA). It focuses more specifically on the transactional process that occurs when a piece of knowledge is taught. The JAD framework articulates a set of concepts and analytical tools. The concepts of *didactique milieu* (i.e. the previously mentioned evolving learning environment) and *didactique contract* (i.e. a set of expectations, habits and norms more often implicit between the teacher and the students that specifically concerns the content shaped during transactions) refer to the transactional dynamics of this semiotic process, which is sometimes modelled as a game (Amade-Escot and Venturini 2015; Loquet 2011). These concepts have proved to be compatible with other approaches to *intervention*. As an example, Amade-Escot and Bennour (2017) combined the JAD framework belonging to the French educational research tradition with the productive disciplinary engagement (PDE) framework, which originates in American science education tradition (Engle and Conant, 2002). Their study draws attention to how breaches of the *didactique* contract initiated by students promote knowledge content development and how students contribute to the situated *didactique*

process. Besides, three analytical tools account for the evolving teacher-students' joint actions: *mesogenesis* (i.e., the genesis of the didactic milieu), *chronogenesis* (i.e. the genesis of the didactic time) and *topogenesis* (i.e. the genesis of the epistemological positions of the participants) (Amade-Escot and Bennour 2017; Amade-Escot and Venturini 2015; Barker et al. 2017; Leriche et al. 2016). Loquet and Malini (2010)'s study explains, for example, the characteristics of mesogenesis in the case of an artistic teaching (Indian dance *kathak*) transmitted in out of school situations and outside the learners' usual culture. Four other analytical tools are more specific to the teacher's actions: *definition, devolution, managing uncertainty* and *institutionalization.* (Amade-Escot and Venturini 2015; Leriche et al. 2016). Recently a new research agenda in the field of *didactique* explores gendered student learning in PE (Amade-Escot et al., 2015).

Technological Approach in Sports and Physical Activities

The technological approach in physical education (PE) and sports is rooted in France with propositions from Bouthier and Durey (1994), while Gréhaigne, Bouthier, and David (1997) published the first paper in the English language literature. This approach concerns studies about the transmission and/or appropriation of sport techniques in their sociotechnical system (eg. club). Researchers focus on the technical activity, with its complexity, singularity and subjectivity, through behaviour that can be observed and the tacit dimension of this activity ('cognitive processes, emotions and experiences') to account for the tacit dimension of the activity.

Objectives are as follows: a) to increase knowledge about *intervention* in sport and PE; b) to create knowledge about formalisation and transformation of techniques in sport; c) to optimise the procedures in sport practice, training and PE teaching. We present some key features of the technological approach in sport and some examples of specific studies.

First of all, this approach is a human science of participants' techniques, which is characterized by a project of intervention and transformation of the activity in ecological context in sport training and PE teaching. Then, researchers who use this approach also build a theoretical framework with scientific, professional and intuitive knowledge. Finally, three key points are identified in the methodology. This approach involves a collaboration between researchers and practitioners. It is a systemic approach for studying the complexity of activity in real context. And it requires a creativity in building methods for collecting and processing data, often with a multi-method approach or designing artefacts.

When trying to characterize technological approach in sport and physical activities research, we may identify three main categories of studies. The first is developing and exploiting observational tools, which proposes to the training community some relevant instruments and technical knowledge. This topic provides an external perspective on the practitioner's actions and helps to record their behaviour. For example, Gréhaigne, Caty, and Godbout (2010) have modelled ball circulation in invasion team sports. Gréhaigne and Godbout (2014) applied dynamic systems theory to team sport coaching, while Mouchet, Harvey, and Light (2014) presented original tools such as '*scenario of the match*' for observing and analysing the *rapport de force* between the teams. In such studies, there is some possible connection with Performance Analysis research, as it was suggested by Wright, Carling and Collins (2014) including quantitative data in a wider context for gaining a better understanding of the athletes' behaviour. Thus, Vaz, Mouchet, Carreras, and Morente (2011) have identified game styles in national rugby union teams during the World Cups, allowing to confirm, complete, or modify some intuitive knowledge in coaches' perceptions.

The second category concerns the characterization and understanding of actions and technical activity of participants in real or ecological context. These studies focus on decision-making, on tacit dimensions of competencies in action, and on the participants' 'registers of

technicity'. Thus, Éloi, Langlois, and Jarrett (2015) highlighted the role of the sweeper in volleyball and its influence on the game. Some researchers (eg. Light, Harvey, and Mouchet 2012) studied subjectivity in elite rugby players' decision-making during matches, in complex and evolving game-plays. Moreover, some studies in France have paid attention to expert coaches' behaviours in rugby union games. Its noteworthy that, with respect to the need for a more holistic approach to in-match coaching, some researchers have associated the technological approach and psychophenomenology with the method of the explicitation interview (Vermersch, 2009) in order to capture and understand the subjective lived experience of players during real situations in sport contexts (Mouchet, Morgan, and Thomas 2018). An example of this kind of study is Mouchet, Harvey, and Light (2014) who explored the coaches' lived-experience when communicating with the players during the game.

The third category of research concerns the training field, in sport club or PE, with some interest in teachers' techniques of *intervention* or pupils' technical activity during the lessons in PE. Some studies try to identify the impact of a training program. For example, Gréhaigne, Godbout, and Bouthier (2001) studied the teaching and learning of decision making in team sports. They provided insights into a model for tactical decision-making, which has some proximity to a Game-Sense approach. Lémonie, Light, and Sarremejane (2016) crossed the technological approach and the phenomenological approach for understanding teacher–student interaction during swimming lessons. Mouchet and Maso (2018) also emphasised the inclusion of the coaches' lived-experience within the process of coach development in an elite rugby academy, for improving the half-time talks by the coaches. A 'spiral training approach' was organized, which alternated the analysis of coaches' behaviour within a multi-method approach, and a collective training session within that group of coaches.

Course of Action

The "course of action" is a French research program articulating several international theoretical frameworks. The notion of *intervention* is central in this research that produces results by and for *intervention*.

It was developed in France by Theureau (1992) to study activity and work situations in industry and computer science. It was applied in physical education and sport training by Marc Durand and his collaborators in France, with the pioneer work of Saury, Durand, and Theureau (1997) in sport, and Durand (2001) and Gal-Petitfaux and Durand (2001) in PE. It was presented at the first time in English by Durand (1998), and by Flavier et al. (2002) in a first English paper in PE.

The aim is to analyse the activity of the actors in situ in order to understand how they interact and organize their practice according to the characteristics of the context. *Intervention* is defined as the activity of an individual (teacher or coach) engaged in a given situation to modify the activity of one or more learners. This activity is a course of action which changes continuously and is significant at any moment for the actor.

The course of action theoretical and methodological framework is an anthropological and phenomenological perspective on activity. It is rooted in three central theories which adopt an anthropological view of human activity and cognition: the Anglophone theories of situated action (eg. Suchman 1987), situated cognition (eg. Greeno 1998, Kirshner and Whitson 1997) and the theory of enaction and embodied mind (Varela 1979). Applied to the specific context of PE, this framework joins research conducted in the classroom ecology paradigm (Hastie and Siedentop 1999) and the situated approach (eg. Kirk and Macdonald 1998). It rests on four hypotheses: (a) activity and cognition are situated and emerge from the dynamics of individual-situation interactions; (b) interaction constitutes an asymmetrical structural coupling, in reference to the principle of autonomy or autopoièse (Varela 1979): the

individual interacts with what is relevant for her/him, according to her/his own history; (c) the activity is lived: it is linked to what the actor lives and interprets in the situation, that is, what is meaningful for her/him at every moment. Cognition in action corresponds to meaning in action, i.e. the experience or "pre-reflexive consciousness" of the actor (Theureau 1992), and (d) cognition is enaction: sensory, motor, emotional and cognitive aspects form an inseparable whole. The course of action is defined as

> The activity of a determined actor, engaged in a physically and socially defined environment and to a defined culture, an activity that is significant for this agent, i.e. presentable, accountable and commentable by him/her at any time during its happening to an observer-interlocutor in favourable conditions (Theureau and Jeffroy, 1994, 19).

The methodology of the course of action relies on videotaped recordings collected in real situations, and then self-confrontation interviews. The actors view the videotapes and explain what they were experiencing at that time.

Studies in PE provide descriptions of the typical couplings of actor-situations in classroom, *eg.:* the typical engagements of students in the role of referee (Adé, Ganière, and Louvet 2018); the compromises experienced by a student with a high level in a sport to satisfy two communities of practice, sport and school (Crance, Trohel, and Saury 2013); the construction of interactions between students in orienteering lessons (Jourand et al. 2018); the construction of trust judgments between students in climbing (Evin, Sève, and Saury 2014); the processes of ostentation and masking in the PE teachers' classroom management in middle schools from compensatory education programme (Vors and Gal-Petitfaux 2015; Vors, Gal-Petitfaux, and Potdevin 2015). The studies selected by this literature review concern EP, but the course of action approach also produces heuristic knowledge in sport (eg. Rochat et al. 2018). It provides a holistic understanding of *intervention* in PE and sport since

it allows us to connect behaviors in situ with their meaning embodied for the actors. Then it proposes practical applications for the training of PE teachers and sport coaches.

Social Psychology Approach

The social psychology approach used in the studies selected in this review is not specific to the francophone context. These studies were based on theoretical and methodological frameworks commonly used in the international context by non-francophone authors in the six journals selected in this review and in other journals (eg. Casey and Goodyear, 2015). The majority of the studies were *intervention* research or quasi-experimental research manipulating modalities of *intervention*. Indeed, *intervention* itself was not discussed as the central issue of study. Consequently, other theoretical frameworks and key concepts in social psychology were used to conduct the studies. But the studies often identified the implication for practice of their results (eg. advice for teachers). Francophone studies based on a social psychology approach have already been published before 2010 in the journals selected in the present review (eg. Vincent-Morin and Lafont, 2005).

Most of the selected articles focused on the same topic, namely group work, cooperative learning, or dyadic interactions. Four articles used quasi-experimental designs. Mascret (2011) highlighted that the nature of the relationship between the players and their observers was influencing the students' learning during badminton lessons in PE. The motor and strategical skill acquisition was stronger when the players and the observers were teammates than when they had no particular relationship. Darnis and Lafont (2015) explored the role of verbal exchanges among students in team-sport teaching during PE lessons. They showed that these oral discussions improved the students' motor and tactical skills, especially when a slightly dissymmetric dyadic condition was induced. Lentillon-Kaestner and Patelli (2016) examined the influence of students' characteristics and grouping forms on the pleasure

experienced during PE lessons in endurance and basketball. Pleasure was higher when the PE teacher alternated grouping forms (i.e. ability-based and mixed ability groups) than when the teacher used only a mixed ability grouping form. These results were independent of the students' sex or ability level. While the three previous articles were conducted with students, the study of Legrain et al. (2018) focused on the relevance of cooperative learning as an instructional model for PE pre-service teacher training. They found that cooperative learning induced increases in self-efficacy, pedagogical knowledge, and motor skills, and that the two last increases were significantly higher for the cooperative learning conditions than for the direct instruction condition. Complementing the four studies which have used quasi-experimental designs, two other studies were narrative literature reviews about different theoretical approaches and practices of group work in PE (Barker et al. 2017) and the conditions (training and personal characteristics) for effective peer tutoring in PE (Lafont et al. 2017). Finally, only one study of the present literature review did not investigate group work and cooperative learning. Legrain et al. (2015) showed that the integration of information and communication technology increased students' self-determined motivation in PE context.

As we noted earlier, the majority of the previous studies in the social psychology domain did not focus on *intervention* as a central concept, but most of them used some quasi-experimental designs to manipulate the modalities of *intervention*, essentially the modalities of group work. Consequently, these studies produced indirectly useful knowledge toward a better understanding of *intervention*. In this context, all the studies identified, more or less clearly, the implications for practice of their research, usually in the form of advice for teachers. For example, teachers were encouraged to alternate grouping forms to increase the pleasure of their students during PE lessons (Lentillon-Kaestner and Patelli 2016). Teachers may take into consideration the nature of the relationship between a player and her/his

observer (Mascret 2011). Or, they may consider the individual characteristics of students such as sex and desire for control (Lafont et al. 2017) to maximize chances of success of cooperative learning. All the previous studies are of particular interest in PE because the review of Casey and Goodyear (2015) highlighted that cooperative learning led to learning in the four domains of PE (i.e. physical, cognitive, social, and affective domains). Moreover, cooperative learning is a valuable instruction model to provide a more student-centered curriculum than a teacher-centered curriculum (Dyson, Griffin, and Hastie 2004). The studies selected in this literature review, obviously completed by the studies in this domain in the non-francophone literature, may be an interesting basis to pursue the investigations about the conditions of *intervention* efficacy through a social psychology point of view.

Motor learning

The motor learning field in the "intervention research" has no real francophone specificity. Bridging the gap between intervention strategies and their effects on motor skills is based exclusively on international theoretical and methodological frameworks, widely used in the psychological literature. In the international literature linked to the *intervention sciences*, this type of study also involves the concepts of "motor skill", "motor competence", "motor coordination", "motor performance" or "movement assessment". The methodologies used to measure motor learning are extremely varied and use both traditional tools (observation grids, video analyses, performance and/or error scores) and more complex measurements (kinematics, kinetics actimetry). The principle consists in capturing the signature of the movement studied and detecting variations deemed indicative of a new motor organization. These measurements performed repeatedly during the protocol require in most cases a retention test to reveal the durability of the transformations.

The analysis of the intervention and its effects on motor skills aim to challenge the theoretical models of motor learning in real Physical Education setting, considering the complexity of the teaching conditions. While there are many French researches related to sports motricity in academic journals (behavioral and experimental psychology, sports sciences, medicine sciences), very few studies are carried out in order to optimize intervention strategies in the fields of physical education.

Our analyses of French-speaking researchers investigating the international literature in this context primarily question the key variables to enrich learning experiences leading to new motor skills learning. Lhuisset, Léna and Margnes (2015) tested, in real conditions of Physical Education teaching, two modes of presentation of a technical model in judo (real demonstration *vs* video). Their results showed that the digital environment, by reducing the information to be considered, facilitates the acquisition of a new technique for beginners. In a similar design, Potdevin et al. (2018) assessed the multiple effects of using video feedback in gymnastics on motor skills, self-assessment skills, and motivation. The results showed a positive effect of this technology on each of the variables studied. Komar et al. (2018) showed that the learning of a new coordination in breaststroke can be guided by quantitative task constraints (an auditory metronome) or more implicit goal task ("glide like superman"). The results showed the dynamic dimension of the motor organization and reflected a phenomenon of exploration-stabilization of new spatial and temporal relationships between the limbs in the learner. For these three studies, the theoretical frameworks are relatively common in so far as the reference to the constraint approach ("task", "environment" and "individual", Newell 1986) is widely mobilized. The vision of a teacher-trainer "designer" of environments encouraging the exploration of new motor organizations explains this epistemological consensus to conduct research in ecological conditions of teaching or training. The results were essentially translated into pedagogical recommendations that were directly related to this

theoretical model. The use of common theoretical framework seems to be linked to the success of these theories in many sports sciences publications that question motor control models in complex environments.

Our analyses also revealed another type of intervention research which consists in testing methods to characterize either level of expertise (Schnitzler et al., 2011, 2012) or motor maturation levels (Vandaele et al., 2011). In the first study, authors aimed to characterize finely the motor expertise in crawl in order to better target the relevant arm coordination. In the second one, authors aimed to draw up an inventory of the fundamental motor skills acquired in 6-year-olds and to highlight the intervention paths to increase the probability of a sustainable involvement in physical activities at more advanced ages.

Ecological Approaches

Ecological approaches are international frameworks based on conceptual outlines having no origin in the scientific work carried out by the French-speaking researchers. Ecological approaches refer to interrelations between organisms and their environments. In this conceptual approach, *intervention* is implemented according to a broader perspective and, more recently, to promote the adoption or transformation of individual behaviours. The analysis of the studies carried out by the French-speaking researchers shows a diverse and eclectic use of internationally recognized ecological approaches (eg. body ecology, cognitive ecology, classroom ecology paradigme) (Vors and Kirk, 2016). The theoretical framework of Sallis, Owen, and Fisher (2008) was used to analyse these studies. This framework presents three core principles of an ecological approach of health behavior in the field of physical activity: (1) there are multiple influences on specific behaviours, including factors at the intrapersonal, interpersonal, organizational, community, and public policy levels; (2) influences on behaviours interact across different levels; (3) multi-level interventions should

be most effective and can be used to develop comprehensive *intervention* approaches that systematically target mechanisms of change at each level of influence.

In fact, some studies specifically target one type of factor while others integrate several, to have a better understanding of interactions across different levels. The works of Pasco and Ennis (2015) specifically focus on the intrapersonal factor when they consider that positive changes in students' lifestyles may come from changes in their conceptual understanding of physical education. In the other studies reviewed for this article, it's interesting to note that the main factors come from a combination of the following three: (a) intrapersonal, (b) interpersonal and (c) organizational (Camiré et al. 2014; Leriche et al. 2016, Michaud et al. 2012, Roure and Pasco 2018, Vandercleyen et al. 2014, Wilson et al. 2010).

This multifactorial combination is underlying the search for a deeper understanding of their interrelationships. Most of the reviewed cases mention interrelationships between intrapersonal factors and environmental contexts. In this regard, a variety of models are used by the researchers in sport and physical education in order to link selected factors with various participants, such as the Coaching Model with high-school team sport coaches (Wilson et al. 2010), the classroom ecology paradigm with physical education teachers (Leriche et al. 2016), the transactional model of emotion with pre-service teachers in physical education (Vandercleyen et al. 2014), the situational interest with physical education students (Roure and Pasco 2018) and the character development in sports participation with high school athletes (Camiré and Trudel 2010). These various conceptual perspectives as well as the disruption in the fields of application show the proliferation of ecological approaches in scientific research on *intervention* carried out by the French-speaking researchers for the last ten years.

However, the reviewed scientific literature shows that ecological approaches are sparsely used to develop comprehensive *intervention* approaches systematically targeting mechanisms of change at each level of influence. In these studies, factors targeted by the authors are treated in a specific way and factorial interrelationships are sparingly argued when it comes to orienting possible interventions taking into account factorial interdependence. This situation can be explained by the research design of these studies using a single method of data collection, such as interviews and a predominance of qualitative research design. Mixed methods design could be used to overcome this limit. To improve their *intervention* programme, Michaud et al. (2012) underline the importance of focusing on links between school, family and/or environmental facilitators or constraints in order to better circumscribe the elements promoting an increase of young people's physical activity, which would allow a better integration of mechanisms of change at each level of influence.

Discussion

The objective of this literature review was to characterize French-language research on the physical education and sport *intervention* published in English since 2010. The results lead us to discuss: (1) theoretical anchors in the sciences of *intervention*, (2) the notion of *intervention*.

The Sciences of Intervention*: A Diversity of Theoretical Anchors close to "Sport Pedagogy"*

The results showed the penetration in Anglophones publication of several theoretical approaches which constitute in France an important scientific field of research in physical

education and sport (eg. Musard, Loquet, and Carlier 2010, Lémonie and Gal-Petitfaux 2014). This review of literature focused on: *didactique*, a technological approach, course of action, motor learning, social psychology, ecological approach, whereas in French literature other theoretical frameworks appeared, such as clinical activity, semiotics, and cultural anthropology (Musard, Loquet, and Carlier 2010). This choice is linked to our selection criteria during this literature review. Overall, the number of Francophone publications in English-language journals has been increasing over the past 20 years, but not in all theoretical approaches represented. This development of Francophone publications is paralleled by the expansion of English-language work focusing on practices in situ in physical education and sport (eg. Kulinna et al. 2009).

Our literature review also leads to a discussion of the penetration of Francophone publications in English inside Anglophone traditions. The results showed a close relationship between these two traditions. On the one hand, some theoretical approaches are specifically French-speaking but are related to various international anchors such as: (a) *didactique* based on a socio-interactionist perspective of human actions (Wickman 2012), (b) a technological approach in sports and physical activities based on various frameworks of English-speaking tradition (eg. the Game-Sense approach), (c) course of action based on situated theories of action and cognition (eg. Suchman 1987) and the theory of enaction (Varela 1979). On the other hand, some theoretical approaches to the French speaking field of sciences of *intervention* come from non-French speaking frameworks: motor learning, social psychology, ecological approach. Overall, Francophone publications are more numerous when they come from an Anglophone theoretical framework. This reveals the difficulty of publishing in well-known anglophone journals with French-speaking theoretical frameworks. Physical Education and Sport Pedagogy (PESP) is by far the most represented journal find in our review with 22 out of 48 articles. This shows the opening of PESP and its editorial orientation on *sport*

pedagogy close to the French *intervention sciences*. At the methodological level, the Anglophone / Francophone differences diminish. Between 2000 and 2010, the analysis of Mussard and Poggi (2005, 264) showed a difference: "We observe peculiarities in the Francophone research, with a focus on comprehensive and qualitative studies which require specific methods of data collection. This orientation of Francophone studies towards heuristic research seems to contrast with Anglophone research ". At present, this difference is fading. Firstly, our results showed the use by Francophones of various methodologies with the multiplication of mixed methods combining qualitative and quantitative data or multi-level analysis (eg. Adé, Ganière, and Louvet 2018; Mouchet and Maso 2018). Second, we can see a resurgence of qualitative aspects in international research (eg. Ward and Ko 2006).

The Francophone field of sciences of *intervention* is close to the current "sport pedagogy" of the English-speaking tradition. Indeed, both are characterized by a variety of theoretical approaches based on "human sciences" which analyse practices in physical education and sport with the focus on the interaction interdependent components as : curriculum / knowledge; learners and learning; teachers, teaching and teacher education, and their embedding and enactment in particular environments (Kirk 2010). This definition is close to the definition of *intervention* given by David (2001) corresponding to various processes of transmission / appropriation of knowledge, attitudes and sports techniques in different educational contexts, as already noted by Musard and Poggi (2015).

Intervention*: Towards an Epistemology of Action*

All research focused ‘on’ and / or ‘in’ and / or ‘for’ intervention. They are contextualized and descriptive with a focus on contextualised practices in sport or physical education. This concentration refers to an epistemology of action where the practice is the starting point of research (Lémonie and Gal-Petitfaux 2014). In this approach, there is a desire

for articulation between research and practice. The specificity is to analyse the complexity of the practice in order to understand the interactions at work, in the same logic as that of the reflexive practitioner (Schön 1983). This orientation is in relation with the concept of praxis widely used in Anglophone research.

This epistemology is opposed to an epistemology of knowledge where science and practice are two separate worlds. To control the complexity, the phenomena are apprehended separately in decontextualized situations in a very controlled way.

The purpose of this epistemology of action in PE and sport context is to optimize action starting from practice' analyse. The articles studied address as well the researchers as professional actors (PE teachers, coaches, trainers) and the students. This literature review on *intervention* allows researchers to identify original lines of inquiry and to apprehend different levels of analysis linked with theoretical frameworks chosen to facilitate exchanges with French-speaking scientists. In addition, our work can help practitioners in sport and physical education to understand their own activity in a different way to foster dialogue and to enter into a reflective analysis.

Conclusion

The aim of this literature review was to characterize the Francophone research in the English language literature in physical education and sport concerned with *intervention* since 2010 in the category “Education & Educational Research” of the Journal Citation Reports (2017). This research was in line with the analysis of the papers presented during six Francophone congresses from 2000 to 2010 of ARIS (Musard and Poggi, 2015). This French-speaking research community considers *intervention sciences* as a specific field of research in sport and PE (Musard, Loquet, and Carlier 2010). On the one hand, this community gives

huge importance on the articulation between practice and theory, aiming at a mutual enrichment between practitioners and researchers (Musard and Poggi, 2015). This suggests creating conditions for exchanges and sharing such as workshops or symposia with practitioners.

On the other hand, we saw that this community of *intervention sciences* was characterized by Francophone specificities and similarities with the English-speaking community. In our article, we focus on the penetration of the Francophone publication in English journals, but we must not forget the peculiarities of the English-speaking tradition, which are few in Francophone literature, which impact the "intervention". For example, critical pedagogy is a theoretical framework (Freire 1970-2018) poorly known by Francophones while offering a new vision on the intervention of physical educator (eg. Kirk 2020). According to the critical pedagogy orientation, the knowledge taught is never politically neutral and argue that teaching is an inherently political act. This leads to re-thinking the teaching with a more critical view of the intervention and its effects, which could interest the Francophone *sciences of intervention*. These two communities Anglophone and Francophone can enrich each other and deserve more interaction and exchange. This enrichment can be done by joint projects exchanges finalized by publications in English (eg. Mouchet, Morgan, and Thomas 2018); or in both languages (eg. Vors and Kirk 2016). In addition, this enrichment can be done by more English-speaking communications at Francophone congresses (eg. ARIS 2018 in Lille), or symposia and exchanges of the French-speaking community at Anglophone congresses such as the International Association for Physical Education in Higher Education (AIESEP) ou European Educational Research Association (EERA).

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Declaration of interest statement

None

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