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Validation of a short questionnaire in French**

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SHORT MOTIVATIONAL CLIMATE QUESTIONNAIRE

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For Peer Review

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Abstract

Physical inactivity in youth is addressed through physical education (PE), where motivational climates impact student engagement. Unfortunately, existing questionnaires often fail to accurately measure motivational climate in PE. This article presents three studies that led to the development and validation of a short French version of motivational climate questionnaire in PE (SFMCQ-PE), tested with pupils from Quebec and France. Study 1 involved creating a pool of 57 items with a group of 8 experts and 10 cognitive interviews with pupils. In Study 2, factor analysis of 402 observations refined the questionnaire from 22 items to a final 12-item version, showing enhanced validity and reliability. Study 3 confirmed the 12-item version's factor structure and assessed measurement invariance across gender and countries through 406 observations. The 12-item SFMCQ-PE produced strong psychometric properties for assessing motivational climates in PE and complements existing observational tools in PE, supporting research and professional development.

Keywords: teaching, self-determination theory, achievement goal theory, scale development, factor analysis

Measuring student perceptions of empowering and disempowering motivational climates in physical education: Validation of a short questionnaire in French

Physical inactivity among youth is a worldwide concern (World Health Organization, 2022), which can be addressed through physical education (PE) classes in elementary and high schools. To provide positive and motivating experiences in PE that can translate to practicing physical activity on a regular basis outside of school (Baena-Extremera et al., 2019), the motivational climate created by PE teachers is a key determinant (Girard & Hogue, 2023). To understand the process underlying the creation of the motivational climate by PE teachers, objective measurement of the observed motivational climate provides useful information with regard to PE teachers’ use of motivational strategies (Smith et al., 2016). Nevertheless, capturing student perception of the motivational climate is also of utmost importance considering that it can be interpreted differently according to their own needs, expectations and experiences (Sarrazin et al., 2006). Indeed, the motivational climate, which refers to teachers’ behaviors, choice of learning activities, psychological and learning climate created, and the nature of feedbacks delivered, can affect students’ goals and motivation (Sarrazin et al., 2006).

Empowering and disempowering dimensions of the motivational climate

The motivational climate is a central concept of two well-known motivational theories in the context of sport and PE. Duda (2013) combined the postulates of both the self-determination (SDT; Ryan & Deci, 2017) and achievement goal (AGT; Roberts & Nerstad, 2020) theories to conceptualize the motivational climate as empowering (i.e., autonomy-supportive, task-involving, socially supportive/warmth) or disempowering (i.e., controlling and ego-involving). Since this initial proposition, many authors (e.g., Appleton et al., 2016; Girard, de Guise, et al., 2023; Girard, Desbiens, et al., 2023; Milton et al., 2018; Smith et al., 2015; Solstad et al., 2020; Vlachos & Papaioannou, 2023) have taken up, and even enhanced, this conceptualization by

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considering up to eight dimensions of the motivational climate. Autonomy support allows individuals to be the instigators of their own actions, to make choices, to have a voice, and to understand imposed constraints. Competence support within a structured motivational climate offers real opportunities for learning and helps to develop competence, as well as provide coherent structure and instructions (i.e., learning objectives and activities, expectations, evaluation criteria, etc.). Competence support with mastery goals focuses on personal progress and improvement according to one's needs and abilities, providing positive feedback, encouragement, and emphasizing effort, while closely adhering to the learning process. Relatedness support, described as warmth, allows to feel important and recognized as a unique individual in the group, supports the development of positive relationships and provide a sense of psychological security. In contrast, autonomy thwarting uses controlling strategies and language. The teacher makes all decisions, and relies on authority. Competence thwarting in a chaotic climate offers little consistency, gives imprecise or incoherent instructions and feedback, is unpredictable and unclear. Competence thwarting with performance goals focuses on superior ability and normative performance, encouraging competition and comparison among students. Relatedness thwarting implies hostile teaching methods involving exclusion or rejection, and restricting opportunities for interaction (Girard, Desbiens, et al., 2023; Girard & Hogue, 2023; Smith et al., 2015).

According to this theoretical model, firstly applied in sport (Smith et al., 2015), creating a mainly empowering motivational climate contributes to the satisfaction of three basic psychological needs – autonomy, competence and relatedness – and encourages the adoption of mastery goals (i.e., emphasizes and encourages making an effort in order to progress and improve according to self-referenced criteria) which, in turn, promotes self-determined

motivation, well-being and optimal functioning. In contrast, creating a predominantly disempowering motivational climate will thwart basic psychological needs satisfaction, and encourages the pursuit of performance goals (i.e., aiming to be the best in comparison with others or a norm) which, in turn, may promote controlled motivation or amotivation, ill-being and compromised functioning (Duda & Appleton, 2016). In recent years, a significant number of researchers have used this multidimensional conceptualization of motivational climate in the context of PE, and results support this theoretical model (e.g., Girard, de Guise, et al., 2023; Girard, Desbiens, et al., 2023; Mastagli et al., 2022; Milton et al., 2018). However, measuring this concept has led to certain conceptual and methodological difficulties that this paper aims to address.

Scales to measure the multidimensional motivational climate in PE

In coherence with the evolution of the theoretical model, measurement instruments were first tested in the sport context, trying to capture the different dimensions of the coach-created empowering and disempowering motivational climate considering athletes' (EDMCQ-C; Appleton et al., 2016) and coaches' (Solstad et al., 2020) points of view. This scale was then adapted to the high school PE context (EDMCQ-PE; Milton et al., 2018), but was exposed to certain limits. From the theoretical perspective, the scale allows the capturing of only five out of eight dimensions with regard to the motivational climate (autonomy support, mastery, warmth, control and performance; Girard, Desbiens, et al., 2023). Missing the structure, control, and relatedness thwarting/hostility dimensions appears as an important limitation while stating that the scale measure students' perception of empowering and disempowering motivational climates, since all dimensions are not represented (Solstad et al., 2020). In other words, with important

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120 theoretical parts of the measurement scale missing, one can expect this might affect the accuracy
121 of results.

122 Moreover, the fact that the items are adapted from sports studies means they are not
123 always representative of the reality of PE in an educational context. For example, two items refer
124 to the teacher (coach) yelling at students (athletes; e.g., “*My teacher yelled at pupils for messing*
125 *up*”; “*My teacher shouted at pupils in front of others to make them do certain things*”). These
126 kinds of items might be considered too challenging for teachers, which therefore makes
127 measuring the disempowering dimensions of the motivational climate more complex. In other
128 words, if teachers are reluctant to have their students answering this kind of questions about
129 them, this might result in a considerable loss of participants and data. To support this point of
130 view, Solstad et al. (2020) observed that even when it was coaches that responded to the
131 EDMCQ-C, “*60% of the deleted item responses belonged to the sub-dimensions of*
132 *disempowering coach behaviour*” (p. 632; e.g., “*I shout at players in front of others to make*
133 *them do certain things*”). For the above reasons, the authors recommended placing the emphasis
134 on question wording during the item generation phase to avoid this kind of reaction from
135 participants in order to facilitate future scale development (Solstad et al., 2020).

136 Lastly, on the practical standpoint, the final version of the EDMCQ-PE captures only five
137 out of the eight dimensions of the empowering and disempowering motivational climates. It
138 consists of 31 items, which is quite long. Indeed, when questioning students during PE lessons
139 about the motivational climate, the questionnaires often include additional scales to measure
140 other relevant variables (e.g., satisfaction of basic needs, motivation, achievement goals, etc.),
141 resulting in questionnaires taking substantial part of the PE class to complete. Considering that
142 students have limited PE time each week, long questionnaires might discourage their

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participation. In fact, the development of any questionnaire must be parsimonious to limit response bias, such as that linked to fatigue. Finally, the concern with keeping questionnaires short due to time constraint can also lead researchers to reduce the number of variables measured, as in the case of Vlachos and Papaioannou (2023). Considering the difficulties and resistances encountered when conducting studies in school contexts (e.g., asking to take time to do “paperwork” instead of being physically active during PE classes, adding to workloads of already overburdened teachers, convincing teachers to accept allowing students to give their opinions on teaching practices, etc.), the choice between collecting all relevant variables for research versus reducing the length of questionnaires in order to recruit a high number of participants and ensure questionnaires are answered in full is crucial for researchers. Therefore, having short and valid versions of questionnaires is becoming a prerequisite for facilitating research in school settings.

In the same line of work, a recent study grounded in Duda’s (2013) framework published a new questionnaire to measure the multidimensional motivational climate in PE entitled *Multidimensional Motivational Climate Questionnaire in PE at the Situational Level of Generality* (MUMOC-PES; Vlachos & Papaioannou, 2023) for elementary and high schools students, and tried to overcome some limits encountered by Milton et al. (2018). Firstly, their questionnaire enables seven (out of eight) dimensions of the empowering (autonomy support, structure, mastery and warmth) and disempowering (control, performance and hostility) motivational climates to be captured using 26 items, which is slightly shorter than the EDMCQ-PE. Even though results of the CFA seem to support the 7-factor structure of the scale, measures of internal consistency for two (out of three) dimensions of the disempowering motivational

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climate (control and performance) were quite low (between .56 and .67; Vlachos & Papaioannou, 2023), suggesting that these subscales need improvement.

In addition, this questionnaire was designed for its concurrent use with the *Multidimensional Motivational Climate Observation System* (MMCOS; Smith et al., 2015). The possibility of combining these two types of measurement in order to capture both subjective and objective points of view is particularly useful, especially for teacher training (Vlachos & Papaioannou, 2023). However, the MMCOS was created for the sports context, and does not capture the chaos dimension. In order to be truly valuable for teacher training, an adaptation for the PE context, as per Girard, Desbiens, et al. (2023), appears mandatory. Furthermore, results provided by Vlachos and Papaioannou (2023) highlighted the importance of taking the structure dimension of the empowering motivational climate into consideration, as it was an indirect determinant of student satisfaction in PE. Therefore, we argue that capturing the chaos dimension should be considered, as it was also referred to by Solstad et al. (2020). Elsewhere, this dimension is already considered in the observational grid used in the study by Girard, Desbiens, et al. (2023), but is not yet available in questionnaires measuring student perceptions.

Lastly, there is no version of these questionnaires available in French, which is an important limitation to conducting studies among the French population. Some researchers have used a French translation (Girard, Desbiens, et al., 2023) of the EDMCQ-PE (Milton et al., 2018) or a combination of different French questionnaires, but without proper validation (Mastagli et al., 2022). Recently, a French validation of this questionnaire was proposed in the scientific literature (Simon et al., 2023), but displays the same limits as the English version. In addition, both Milton et al. (2018) and Vlachos and Papaioannou (2023) mentioned the necessity of

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evaluating the construct validity of student questionnaires across different countries, which would also be necessary to validate a French questionnaire.

The present paper aims to go one step further in measuring French-speaking students' perceptions of empowering and disempowering motivational climates. Firstly, it aims to create a short questionnaire including items representing all dimensions of both types of motivational climates. Secondly, it aims to create items specific to the PE context while ensuring that the disempowering items are not too threatening for PE teachers. Third, it aims to validate the questionnaire in PE in two countries (France and Quebec [Canada]).

Methods

To develop and conduct an initial validation of the Short French Motivational Climate Questionnaire in PE (SFMcq-PE), we followed the validation steps outlined by Boateng et al. (2018) across three studies. In Study 1, in collaboration with an expert committee in motivation and PE, our goal was to craft an initial pool of suitable items that aligned with the theoretical framework of the motivational climate. Then, we assessed the content validity of the items using cognitive interviews, focusing on the scale's discrimination and reliability. This approach helped to control the risks of personal interpretation biases that can arise from unclear items. In Study 2, we explored the factor structure of the questionnaire to determine the optimal number of factors that fit the pool of items and reduce their numbers. In Study 3, we confirmed the factor structure and its reliability, and we examined measurement invariance across gender and country. Additionally, Study 3 investigated the concurrent validity of the scale by examining correlations between the SFMCQ-PE dimensions and other variables theoretically related (basic needs satisfaction and effort). According to the declaration of Helsinki (2013), all participants gave informed consent to their participation and were informed that they could withdraw from the

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study at any time without any consequences. They were clearly informed that anonymity was retained, data remained confidential and intended only for research purposes.

Study 1

This work is grounded in the framework initially developed by Duda (2013) and later enriched by other authors (e.g., Girard, Desbiens, et al., 2023; Girard & Hogue, 2023; Smith et al., 2015), which offers a comprehensive understanding of the motivational climate by combining SDT and AGT. Items were generated using a deductive method, drawing on an analysis of existing instruments (Boateng et al., 2018), by a panel of eight experts, three of whom were French and five were from Quebec (Canada). These experts were drawn from diverse backgrounds in PE, educational sciences, psychology, motivational frameworks, and psychometric questionnaire development. Criteria for item inclusion were: (1) alignment with subdimensions of empowering or disempowering motivational climates, (2) relevance to the context of PE, (3) representation of the reality of PE settings, and (4) non-threatening nature towards PE teachers. Some items from scales developed by Appleton et al. (2016), Milton et al. (2018), Solstad et al. (2020), Mastagli et al. (2022) and the observation grid developed by Girard, Desbiens et al. (2023) were selected and adapted into French. Then, new items were created to encompass the full theoretical spectrum of AGT and SDT, to include items that are a priori non-threatening, to reflect the professional reality of PE, and to ensure cultural appropriateness for both the French and Québec contexts. Following the recommendation of Boateng et al. (2018), the initial item generation aimed for exhaustiveness. This initial pool of items was once more submitted to the panel of experts for evaluation, focusing on eliminating redundancies and refining the form and wording of the items to ensure clarity and simplicity (Boateng et al., 2018). The expert panel discussed any formulation issues to reach a consensus. After this process, the

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pool comprised 57 items (available in supplementary file 1). This initial pool of items presupposed a distribution between five and eight items for each of the eight theoretical dimensions. A content validity assessment was conducted to ensure the intelligibility of the questionnaire items and identify any potential difficulties in its administration. This assessment involved asking participants representative of the target population to indicate the level of clarity and understanding they had for each item. These assessments were complemented by cognitive interviews aimed at identifying and clarifying any terms that were not considered perfectly understandable.

Participants and procedure

Four girls and six boys ($M_{age} = 10.9$ years; $SD_{age} = .32$) participated in this study (France = 5; Quebec = 5). Surveys were distributed and cognitive interviews were conducted by investigators in a quiet environment. Each pupil responded to the 57 items on a seven-point Likert scale ranging from one ("absolutely not clear") to seven ("absolutely clear"). The inventory took approximately ten minutes to complete. For items scored below seven, cognitive interviews were conducted to identify difficulties and ensure participants interpreted the questions as intended. During the cognitive interview, participants verbalized their thought processes and identified any unclear parts of the items.

Results and discussion

This study demonstrated excellent item comprehension ($M = 6.89$; $SD = .28$). Only one item presented an issue for most participants: "*My PE teacher is someone the students can rely on, no matter what happens.*" The expert committee decided to remove this item due to its clarity rating of 5.20 on average. Aside from this item, no other item was rated below 6.10. Concerning items not achieving systematically the maximum score, cognitive interviews revealed that

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participants were only uncertain about the meaning of some terms in the items. After the cognitive interviews, investigators consistently concluded that participants interpreted the questions as intended, reaching agreement on the meanings proposed by the investigator. These findings affirmed the clarity and accurate understanding of the 56 items by pupils from both countries. The panel of experts validated the pool of the 56 items without any modifications.

Study 2

Study 2: Exploration of the factor structure

Participants and Procedure

The study sample comprised 402 adolescents (Mage = 13.55 years, SD = 1.65), including 215 girls, 180 boys, and seven participants who did not disclose their gender. Participants were recruited from two distinct regions: France (n = 140) and Quebec (n = 262). Data collection occurred immediately following a physical education (PE) class, under the direct supervision of a trained research assistant. Each participant completed a 56-item questionnaire, rated on a seven-point Likert scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). The administration process was brief, requiring approximately five minutes per respondent.

Data analysis

The initial phase of analysis involved a thorough inspection of missing data. No item exceeded a 5% threshold for missing responses across either dataset. However, Little’s MCAR test (1988) indicated that the data were not missing completely at random. To address this, a multiple imputation procedure was implemented to estimate and replace missing values, using five imputations, which is considered sufficient under low levels of missing data (Moore, 2025). Given the low proportion of missing data and after meticulous inspection, the influence of missing data on parameter estimates was considered minimal.

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Subsequently, the distributional characteristics of the data were evaluated using the Shapiro-Wilk test (Razali & Wah, 2011), which revealed significant deviations from normality across all 56 items. An exploratory factor analysis (EFA) was conducted using principal axis factoring with direct Oblimin rotation in SPSS v.27. The suitability of the data for factor analysis was confirmed through several diagnostic indices: the determinant (Field, 2013), Bartlett’s test of sphericity (Timmerman & Lorenzo-Seva, 2011), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Bourque et al., 2006).

Following the EFA, a quasi-confirmatory factor analysis (QCFA) was performed using Factor v.12.04.05 (Ferrando & Lorenzo-Seva, 2017). A QCFA is an exploratory factor analysis (EFA) guided by some confirmatory assumptions. Its objective is to test the plausibility of a hypothesized factor structure while retaining the flexibility of EFA, thus serving as a middle ground between EFA and CFA. Given the presence of multivariate skewness and kurtosis, the data were deemed non-normally distributed. Consequently, polychoric correlations were employed in conjunction with the Robust Diagonally Weighted Least Squares (RDWLS) extraction method and direct Oblimin rotation (Baglin, 2014). The Optimal implementation of Parallel Analysis (Timmerman & Lorenzo-Seva, 2011) was used to determine the appropriate number of factors to retain. The adequacy of the polychoric correlation matrix was verified using the determinant ($> .00001$), Bartlett’s test ($p < .05$), and the KMO statistic ($> .600$). To assess model fit, a comprehensive set of indices was employed, following recommendations by Sun (2005) and Schmitt (2011): the Root Mean Square Error of Approximation ($RMSEA < .060$), the Non-Normed Fit Index ($NNFI > .950$; Cangur & Ercan, 2015), the Goodness of Fit

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301 Index (GFI > .900; Hu & Bentler, 1999), the Comparative Fit Index (CFI > .960), and the Root
302 Mean Square of Residuals (RMSR < .080; Browne & Cudeck, 1993).

303 The rule guiding the item reduction process was as follows — when the EFA indicated low
304 factor loadings (< .40), items were removed one by one until a scale was obtained in which all
305 factor loadings were satisfactory and model fit indices were acceptable. This approach was
306 nuanced by the intention not to eliminate all items from any theoretical sub-dimension. Thus,
307 efforts were consistently made to achieve a model that balanced optimal factor loadings while
308 still representing all theoretical sub-dimensions, even if some of these could not be statistically
309 reconstructed due to the small number of items.

310 Reliability was assessed using three complementary indices: ordinal Cronbach's alpha (α),
311 ordinal McDonald's omega (Ω), and the Greater Lower Bound (GLB) (Bourque et al., 2019;
312 Trizano-Hermosilla & Alvarado, 2016). Additionally, composite reliability (CR > .70; Hair et al.,
313 2016) was examined to evaluate the internal consistency of the measurement model. To complete
314 the structural validation, convergent validity was assessed via the Average Variance Extracted
315 (AVE > .50), and discriminant validity was evaluated by comparing the Average Shared
316 Variance (ASV < AVE; Hair et al., 2016).

317

318 ***Results and discussion***

319 Despite extensive efforts, the EFA did not yield a stable eight-factor structure as anticipated
320 based on the theoretical framework. Nevertheless, a two-factor solution comprising 22 items
321 emerged as statistically and conceptually coherent. Of these, 16 items aligned with the
322 empowering dimension, while the remaining 6 were associated with the disempowering
323 dimension. Although the determinant value ($d = .000$) raised potential concerns regarding

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multicollinearity, the solution was deemed acceptable given the communalities ranged from .23 to .54 and the total variance explained reached 38.70%. Factor loadings for the empowering dimension varied between .51 and .73, whereas those for the disempowering dimension ranged from .47 to .68. Importantly, no problematic cross-loadings were observed—defined as high loadings ($\geq .32$) on multiple factors with a difference of $\leq .20$ (Costello & Osborne, 2005; Matsunaga, 2010). Subsequent QCFA substantially refined the initial 22-item structure. The two-factor model—comprising Factor 1 (empowering climate) and Factor 2 (disempowering climate)—accounted for 48.87% of the total variance (see Table 1). Diagnostic indices, including the Kaiser-Meyer-Olkin (KMO) measure, Bartlett’s test of sphericity, and the determinant, confirmed the suitability of the data for factor analysis. Reliability estimates for the empowering climate factor exceeded the .80 benchmark proposed by Bourque et al. (2019), while those for the disempowering climate factor approached or met this threshold, remaining consistently above .70 (Hair et al., 2016). All five selected model fit indices indicated an adequate fit, supporting the robustness of the two-factor structure. Nonetheless, as Schmitt (2011) cautions, fit indices should be interpreted as heuristic tools rather than definitive criteria. Finally, a significant negative correlation was observed between the two factors ($r = -.489, p < .001$), suggesting that students do not tend to perceive their teacher as simultaneously empowering and disempowering. This finding reinforces the conceptual distinction between the two dimensions and supports the validity of the proposed measurement model.

In addition, this moderate correlation, alongside with the absence of conflicting cross-loadings (refer to Table 2), and the observation that the ASV is lower than the AVE for both

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constructs ($F1: .24 < .45$; $F2: .24 < .42$), indicate a good discriminant validity (Sun, 2005; Hair et al., 2016).

Table 2 displays the factor loadings and communalities associated with the two-factor solution derived from the 22-item scale. Within Factor 1 (F1), three of the sixteen items (16.75%) exhibit loadings between .50 and .59, seven items (43.75%) fall within the .60 to .69 range, and six items (37.50%) exceed .70. For Factor 2 (F2), two of the six items (33.33%) fall below the .50 threshold, one item (16.66%) lies between .50 and .59, two items (33.33%) range from .60 to .69, and one item (16.66%) surpasses .70. These distributions suggest a moderate degree of internal consistency among the indicators for each factor, thereby supporting the presence of convergent validity (Sun, 2005). Additionally, the fit indices—RMSEA, NNFI/TLI, and CFI—further reinforce the acceptability of the model's convergent validity.

Nevertheless, according to Hair et al. (2016), convergent validity is substantiated only when three criteria are simultaneously satisfied: (1) Composite Reliability (CR) must be $\geq .70$ for each factor; (2) standardized loadings must be $\geq .50$; and (3) the Average Variance Extracted (AVE) must be $\geq .50$. A more rigorous assessment reveals that neither F1 nor F2 fully meets these standards. Although the lowest loading in both factors is .51 and the CR values are robust—.93 for F1 and .78 for F2—the AVE values fall short of the recommended benchmark, with F1 at .44 and F2 at .38. This suggests that, on average, the proportion of error variance in the items exceeds the variance accounted for by the latent constructs. Addressing this limitation represents a critical avenue for future refinement of the measurement model.

Insert Table 1 here

As mentioned earlier, conducting research in teaching in PE with school-aged children is a complicated enterprise due to the limited time available, and because they may lack

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370 understanding, attention, supervision or even motivation to complete questionnaires properly,
371 which may result in the loss of valuable data. To address this problem encountered by field
372 researchers, it was decided to move a step further to explore the possibility of creating a valid
373 and reliable shorter version than the 22 items instrument already developed.

374 This new exploration phase was conducted using SPSS v.27. Once again, a principal axis
375 extraction method with a direct Oblimin rotation was performed. It started by removing items
376 according to the following constraints: (1) conserving at least one item for each of the eight
377 dimensions of our theoretical model; (2) retaining items with the highest loadings and
378 communalities; (3) avoiding conflicting cross-loadings on the two factors; and (4) obtaining
379 values for the determinant, the Bartlett and the KMO tests that do not pose a threat to the validity
380 of factor analysis. After repeated tests, **by eliminating items one by one based on the rules**
381 **mentioned previously**, a satisfactory 12-item solution emerged. A QCFA using Factor, v.
382 12.04.05 immediately followed using the same pool of data and 12 items identified. This analysis
383 was conducted according to the same parameters described earlier for the first QCFA. The
384 results of the second analysis are presented in Tables 1 and 2.

385 This second QCFA puts forward a robust short version enabling the measurement of
386 motivational climate in PE. However, as showed in Table 1, the factors' identity is reversed: F1
387 corresponds to disempowering while F2 is associated to empowering climate. The proportion of
388 variance explained by the two factors moved from 48.87% in the 22-item version to 55.44% in
389 the 12-item version. The values for the KMO, the Bartlett and the determinant do not pose a
390 threat to the viability of the factor analysis. As for the previous longer version, the estimations of
391 reliability for the first factor are over the .80 threshold established by Bourque et al., (2019), but
392 did not change for the second, since the items remained the same. All the five fit indexes selected

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indicate a satisfactory fit of the model. Finally, as previously reported for the 22-item solution, a negative and significant correlation ($r = -.499, p < .001$) is found between F_1 and F_2 . This moderate correlation, in conjunction with the absence of contradictory cross-loadings (refer to Table 2), and the observation that the ASV is lower than the AVE for both constructs ($F_1: .25 < .42$; $F_2: .25 < .55$), collectively substantiates the presence of a good discriminant validity (Sun, 2005; Hair et al., 2016).

Insert Table 2 here

Table 2 presents loadings and communalities for the two factors of the 12-item solution. For Factor 1 (disempowering), the item loadings surpass those observed in the 22-item version, with none falling below .56. In Factor 2 (empowering), all loadings exceed .64. These loading values, alongside the fit indices (RMSEA, NNFI/TLI, and CFI), collectively indicate a satisfactory level of convergent validity (Sun, 2005). Notably, a more granular examination reveals that all three criteria for convergent validity are fulfilled in F_2 (empowering), marking a clear improvement, whereas F_1 (disempowering) satisfies two of the three conditions. Specifically, for F_2 , the lowest loading is .64, the Composite Reliability (CR) is .78, and the Average Variance Extracted (AVE) is .55. In contrast, F_1 exhibits no loading below .50 and a CR of .809, yet its AVE stands at .42, falling short of the .50 benchmark. Furthermore, the correlations between the long and short versions of the questionnaire—designed to assess empowering and disempowering motivational climates—demonstrate that both versions capture essentially the same constructs. The correlation between $F1_{Long}$ and $F1_{Short}$ is .93 ($p = .000$), corresponding to 85.93% shared variance, while the correlation between $F2_{Long}$ and $F2_{Short}$ reaches 1.0 ($p = .000$). Greater attention should be placed on evaluating the convergent validity of the abbreviated instrument to enhance its scientific robustness. In light of the promising psychometric indicators

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of the 12-item scale and the imperative of parsimony, subsequent analyses will focus exclusively on this shorter version as the definitive form of the instrument. The 22-item version should be considered as a step in the development process rather than as a version whose use is recommended by the authors, because subsequent analyses confirming the factorial structure and testing invariance and concurrent validity have not been conducted.

Study 3

The third study aimed at assessing the structural and the external aspect of the 12-item SFMCQ-PE validity by confirming the factor structure and testing the concurrent validity of the scale on basic psychological needs satisfaction and effort. The second goal of this study was to measure its invariance according to gender and country.

Participants and procedure

Participants were 406 elementary and high schools' pupils ($M_{age} = 12.56$ years; $SD_{age} = 1.83$), including 205 girls and 191 boys (10 participants did not specify), and comprising 206 Québécois students and 200 French students. Questionnaires were filled at the end of a PE lesson under the direct supervision of a research assistant. Questionnaires took approximately five minutes to complete.

Measures

To assess basic psychological needs satisfaction, three sets of items from three distinct and validated inventories were utilized. Competence need satisfaction was measured using a subscale from the Intrinsic Motivation Inventory (6 items, e.g., "I think I am pretty good at PE."; McAuley et al., 1989). Relatedness need satisfaction was measured using the Need for Relatedness Scale (four items, e.g., "I felt supported"; Richer & Vallerand, 1998). Autonomy need satisfaction was captured with five items (e.g., "I feel that I do PE because I want to") used

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by Standage et al. (2005). Concerning effort, participants filled out a scale derived from the Intrinsic Motivation Scale (McAuley et al., 1989) including four items (e.g., “*I put a lot of effort into this*”). Answers were in paper-pencil format on a Likert scale of seven points ranging from one “*absolutely not agree*” to seven “*absolutely agree*.”

Data analysis

Missing values were inspected. Between 0% and 4.1% of missing data per variable were observed and were not MCAR ($p < .05$; Little, 1988). Therefore, a multiple imputation procedure generated values to replace missing ones, **using five imputations (Moore, 2025) and showing minimal influence on the new data set**. Scoring distribution analysis showed that univariate normality was not achieved (skewness: -12.84 to 11.59 ; kurtosis: -5.01 to 7.67), which might induce ceiling and floor effects.

A CFA with maximum likelihood robust estimator was applied using SPSS Amos 23 on the SFMCQ-PE to confirm the structure of the scale. Subsequent adjustments indices were used and their satisfactory cut-off points are mentioned in Study 2. To determine whether the two-factor structure was the same across gender groups (i.e., girls and boys) and country groups (i.e., France and Quebec) configural invariance (i.e., same factor structure across groups), metric invariance (i.e., same factor loadings across groups), and scalar invariance (i.e., same item intercepts across groups) were examined, using multiple-group CFA with 4-group model (gender x country) then with a 2-group model (gender and country). Metric invariance was tested once configural invariance was established, and scalar invariance was tested once metric invariance was established. We compared models by examining CFI, TLI, and RMSEA differences. There was no invariance when changes in CFI and TLI were $< .010$ and increases in RMSEA were $< .015$ (Chen, 2007). Strong measurement invariance was demonstrated when all three tests

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showed invariance. To test the measurement model’s reliability, internal consistency was examined using Cronbach’s Alpha. Concurrent validity of the scale was tested with Spearman’s correlations between the two factor dimensions (empowering and disempowering) and the autonomy, competence and relatedness satisfaction subscales as well as with the effort subscale (coefficients r ranging between .10 – .30 = small effect, .30 – .50 = moderate effect, and $\geq .50$ = large effect; Cohen, 2013). To assess the reliability, both CR and internal consistency with Cronbach’s Alpha were evaluated. For the structural analysis, convergent validity was determined through the AVE, while divergent validity was assessed using the ASV.

Results and discussion

The model fit with two factors, each including six items, was adequate ($\chi^2 = 150.63$, $df = 53$, $p = .00$, $TLI = .91$, $CFI = .93$, $RMSEA = .07$, $LO\ 90\% = .05$, $HI\ 90\% = .08$) and the standardized factor loadings were between .40 and .81 (Table 3). Item S52 (“*Clearly shares the evaluation criteria*”) and Ch49 (“*Contradicts him/herself in the instructions*”) showed standardized factor loadings of .40. These loadings are only marginally acceptable (with the usual threshold for deletion being $< .30$; Boateng et al., 2018). Thus, these results suggest that the items are relatively weak. Users of this questionnaire should pay particular attention to these items and carefully verify, within the factorial structure of the scale, that their contribution is adequate.

Insert Table 3 here

Concerning measurement invariance (Table 4), configural invariance was not achieved in the 4-group model (gender $\times$ country), suggesting that the factorial structure is not identical across the four subgroups (French females, French male, Quebecer females, Quebecer males). However, separate analyses indicated that the structure was stable across gender and across

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culture when considered independently. These findings suggest that cross-classified comparisons should be interpreted with caution. According to gender, CFI, TLI and RMSEA changes were satisfactory in metric and scalar measurement, except for TLI change in metric measurement which was .013 (cutoff = .010). Issues with metric invariance suggest that the relationships between items and latent factors differ across groups. However, we did not identify items with important differences of loadings by gender. Given the slight threshold crossing of the TLI, we therefore concluded that factor structure, factor loadings, and item intercepts remained invariant across gender but we recommend that future users of this scale control for gender effects to ensure absence of bias. Concerning invariance across country, minor issue with regard to metric measurement was identified, with a CFI change of .012 (cutoff = .010) and severe scalar variance was observed with a CFI change of .068 and TLI change of .058 (cutoff = .010). A problem with scalar invariance refers to a situation where the intercepts of items differ significantly between compared groups. While the relationships between items and latent factors (metric invariance) are maintained, the average levels (intercepts) of the items vary between groups. This may indicate that groups interpret or respond differently to the items in the scale. A thorough inspection of the results shows that the item related to the performance (i.e. “*Gives more attention to the top students*”) has the most variable intercept across countries. It suggests that there are intercultural differences in the perception of motivational climate due to the emphasis placed on performance goals and competition climate. To shed light on this result, it is noteworthy that France and Quebec have similar competency frameworks and similar PE programs, yet in practice, French teachers tend to focus more on performance goals, while Quebec leans more towards health-related goals. It should also be emphasized that the final version includes three items related to performance. Given the potential weakness observed in

the invariance of these items, it is recommended that the results specific to these items be interpreted with caution, particularly when comparisons are made between France and Quebec. However, regarding the validity of our scale, we can highlight that the structure remains identical across countries and genders. Therefore, we can conclude that the measures of invariance confirm the validity of this 12-item scale whereas future users should be mindful to control for potential biases related to gender and country for certain items that our analysis identifies as somewhat sensitive.

Insert Table 4 here

Reliability was tested using Cronbach’s alphas of the SFMCQ-PE, which met the requirements for internal consistency (α empowering factor = .90; α disempowering factor = .74). Internal consistency of the competence (α = .82) and relatedness need satisfaction (α = .86) were very good whereas alphas of autonomy need satisfaction (α = .67) and effort (α = .69) were marginal. CR was satisfactory with the empowering factor (CR = .80) and the disempowering factor (CR = .74). However, the AVE was slightly too low for empowering (AVE = .42) and disempowering (AVE = .33). The low convergent validity of these two factors suggests that the items do not load strongly on their latent variables. This can be easily explained by the nature of the tool, which describes motivational strategies that teachers can adopt to varying degrees. Given this characteristic, the result should be interpreted with caution. ASV was well below the AVE for both the empowering factor (ASV = .29) and the disempowering factor (ASV = .29), indicating satisfactory divergent validity.

Concurrent validity was analyzed with Spearman’s correlations confirmed concurrent validity of the SFMCQ-PE. Moderate correlations were observed between empowering motivational climate and autonomy (r = .47; p < .001) and relatedness needs satisfaction (r = .47;

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$p < .001$), which was consistent with a recent meta-analysis (Vasconcellos et al., 2020). Empowering motivational climate was also slightly correlated to competence need satisfaction ($r = .25$; $p < .001$) and effort ($r = .27$; $p < .001$). Low negative correlations were identified between disempowering motivational climate and autonomy ($r = -.23$; $p < .001$), competence ($r = -.10$; $p < .001$) and relatedness satisfaction ($r = -.31$; $p < .001$) and effort ($r = -.19$; $p < .001$). Since our scale captures empowering and disempowering dimensions, it seemed relevant to test the correlations with a composite score of the three psychological needs. Moderate and consistent correlations were found with the empowering factor ($r = .49$; $p < .001$) and the disempowering factor ($r = -.31$; $p < .001$), confirming the good concurrent validity of the tool. Small effects, in particular with disempowering motivational climate may be explained by the fact that the variables tested were positive: “satisfaction” of needs rather than their “frustration” and “making an effort” rather than “giving up”. Therefore, present correlations are consistent with the literature, and future research could test the concurrent validity of the disempowering factor by examining its relationships with basic need frustration and controlled motivation.

General discussion

The present study aimed to create and validate a short questionnaire measuring empowering and disempowering motivational climates in PE in two French-speaking countries. Three studies were conducted in order to provide evidence for the construct reliability of the scale. In Study 1, the pool of experts generated 57 items, which was reduced to 56 items after conducting cognitive interviews. In Study 2, EFA and QCFA provided evidence for a two-factor structure with 22 items, which was then reduced to the final 12-item version of the questionnaire. Study 3 confirmed the factor structure and its reliability, tested measurement invariance across gender and country, and provided evidence for the concurrent validity of the scale. Studies 2 and

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3 confirmed the internal consistency reliability of the 12-item Short French Motivational Climate Questionnaire in PE, which resolves many of the limits encountered in the questionnaires already available on the practical, theoretical, and methodological perspectives.

With regard to the practical perspective, results indicate that it is possible to measure both empowering and disempowering dimensions of the motivational climate with only 12 items, which is a considerable advantage in order to reduce the time dedicated to completing the questionnaire by elementary and high school students during PE classes. Moreover, having a short questionnaire will allow the measurement of other variables (e.g., affective experience, cognitive performance, physical performance) to test various assumptions that could improve the quality of students' experience in PE as well as PE teachers' professional development. Along the same lines, the wording of the final items was carefully designed to minimize the likelihood of being perceived as threatening by PE teachers, which may help reduce their resistance to participating in studies focused on their establishment of the motivational climate. Further research is needed to confirm this assumption.

Regarding the theoretical perspective, this questionnaire fills a gap in the literature on conducting studies into empowering and disempowering motivational climates among French-speaking students in PE. For the first time, each dimension of the empowering (autonomy, structure, mastery, and warmth) and disempowering (control, chaos, performance, and hostility) climates are represented by at least one item in each scale. The consideration of these eight dimensions is also congruent with the observational grid available in PE (Girard, Desbiens, et al., 2023), which together provide two reliable measurement instruments to capture both subjective and objective points of view with regard to the motivational climate according to the same theoretical assumptions. Of course, the inability to capture each dimension separately among the

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577 first pool of 56 items, as attempted in the study by Vlachos and Papaioannou (2023), might
578 appear as a limitation of the present questionnaire. However, in the scientific literature, when
579 trying to capture students' (or athletes') perceptions of motivational strategies employed by their
580 PE teachers (or coaches), it appears to be the norm (Appleton et al., 2016; Milton et al., 2018).
581 Indeed, for students, distinguishing which needs are satisfied by which motivational strategy
582 (which might sustain more than one need at once or satisfy different needs depending on the use
583 of the strategy by the teacher) might simply be neither realistic nor representative of students'
584 experience in PE. In fact, it is the overlapping of items on empowering dimensions (or on
585 disempowering dimensions) that appears to better capture their subjective representation of the
586 motivational climate prevailing in their PE classes. From the theoretical perspective, it would be
587 cross-loadings of items on both empowering and disempowering dimensions, as occurred in
588 Milton et al.'s study (2018), that would be problematic, but this was not the case with our scale.
589 Assessing a construct as complex as the empowering or disempowering climate using a short
590 scale inherently limits the ability to capture the nuanced facets underlying these dimensions.
591 Such granularity would, however, be highly valuable for informing interventions aimed at
592 supporting teachers in enhancing specific components of their motivational climate, as well as
593 for elucidating the distinct effects associated with varying levels of perception of each facet.
594 Nonetheless, it is important to note that, even when employing considerably longer scales, no
595 study to date has successfully addressed this limitation. Our short scale therefore addresses
596 certain gaps in the literature (such as comprehensive coverage of theoretical constructs,
597 parsimonious development, and the availability of a French version), but not all of them
598 (specifically, the inability to distinctly capture the sub-dimensions of the empowering and
599 disempowering climate).

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In terms of methodology, the present study went one step further than previous ones (Milton et al., 2018; Vlachos & Papaioannou, 2023) by evaluating the construct validity of student questionnaires across two French-speaking countries, and across gender. Outcomes suggest an almost excellent invariance by gender but highlight certain issues by country. However, we are able to demonstrate that the structure of this new 12-item scale is understood in the same way and that the scalar variances observed reflect real intercultural disparities. The invariance analyses are therefore encouraging, even though we recommend users of this scale to check for potential biases related to gender and territory, **particularly by examining the three items related to performance**. Similarly, testing the reliability of the questionnaire in other French-speaking countries and cultural settings (e.g., Belgium, Switzerland, French-speaking countries in Africa, etc.) would represent a relevant avenue of research. In doing so, it will allow the continued monitoring of student responses to the questionnaire in order to establish its stability over time and with different samples. Future research should confirm the concurrent validity of this tool, especially the disempowering dimension, with variables related to need frustration and symptomatic variables of the negative effects of controlling motivational strategies.

In conclusion, the 12-item Short French Motivational Climate Questionnaire in PE is a reliable short measurement instrument for capturing the two-factor structure of empowering and disempowering motivational climates among French-speaking elementary and high school students from both territories. In order to establish a comprehensive overview of the motivational climate prevailing in PE classes, it could be used with an observational grid using the same theoretical assumptions in PE (Girard, Desbiens, et al., 2023). In addition to supporting research regarding the relationship between students' perception of motivational variables and different

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- 623 outcomes, such as achievement goals, the intention to be physically active or leisure-time
- 624 physical activity, it can also be used to support PE teachers' professional development.

For Peer Review

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762 Table 1. QCFA for the 22 items and 12 items solution

	22 items	12 items
Determinant	.00003	.030
KMO	.934	.867
NNFI/TLI	.997	.979
GFI	1.000	1.000
RMSR	.042	.044
CFI	.997	.986
RMSEA	.002	.051
Estimation of fidelity		
Factor 1 (n = 16)	$\Omega_{\text{ordinal}} = .92$	$\Omega_{\text{ordinal}} = .86$
	GLB = .93	GLB = .86
	$\alpha_{\text{ordinal}} = .92$	$\alpha_{\text{ordinal}} = .86$
Factor 2 (n = 6)	$\Omega_{\text{ordinal}} = .78$	$\Omega_{\text{ordinal}} = .78$
	GLB = .80	GLB = .80
	$\alpha_{\text{ordinal}} = .78$	$\alpha_{\text{ordinal}} = .78$
Bartlett test	$\chi^2 = 4013.2, df = 231, p < .001$ $\chi^2 = 1391.3, df = 66, p < .001.$	
Parallel analysis	2 factors recommended	2 factors recommended
Proportion of variance explained	$F_1 = 39.39\%$	$F_1 = 40.05\%$
	$F_2 = 9.48\%$	$F_2 = 15.38\%$
	$F_{1+2} = 48.87\%$	$F_{1+2} = 55.44\%$

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Table 2. Loadings and communalities of the two factors of the 22-item and 12-item solution

	22 items			12 items		
	Factor 1	Factor 2	h^2	Factor 1	Factor 2	h^2
Autonomy_9	.595	-.009	.359			
Autonomy_21	.739	.067	.502	.744	-.319	.722
Autonomy_26	.609	.010	.365			
Autonomy_40	.586	.042	.321	.641	-.307	.495
Mastery_6	.793	.034	.603			
Mastery_13	.707	.000	.499			
Mastery_18	.604	-.111	.442	.768	-.393	.620
Mastery_41	.597	-.021	.369			
Mastery_48	.594	-.172	.383			
Mastery_54	.731	-.096	.612			
Structure_4	.733	.067	.494			
Structure_36	.617	.123	.322			
Structure_52	.613	.063	.342	.714	-.343	.549
Warmth_17	.766	.002	.584			
Warmth_39	.606	-.189	.515	.738	-.486	.764
Warmth_56	.662	-.164	.572	.800	-.405	.719
Performance_3	.007	.724	.520	-.334	.760	.688
Performance_10	.094	.689	.421	-.271	.669	.701
Performance_29	-.055	.692	.520	-.425	.727	.684
Control_55	-.201	.463	.345	-.446	.560	.623
Chaos_49	-.080	.498	.294	-.358	.562	.520
Hostility_7	-.084	.506	.304	-.319	.574	.547

Note. Factor 1 = Empowering; Factor 2 = Disempowering; h^2 = Communalities

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Table 3. Loadings of the two factors CFA with the 12-item solution and factor correlation

	Loadings
Factor correlation between factor 1 and factor 2	.73
Factor 1. Empowering ($M = 5.20$; $SD = 1.22$)	
4. Encourages students to help each other learn and improve (M18)	.62
5. Encourages students to find and try different ways of doing things (A21)	.70
7. Listens to students (W39)	.81
8. Thinks it is important that students participate in class for enjoyment (A40)	.59
10. Clearly shares the evaluation criteria (S52)	.40
12. Ensures that the working atmosphere among students is pleasant for everyone (W56)	.66
Factor 2. Disempowering ($M = 3.09$; $SD = 1.28$)	
1 Gives more attention to the top students (P3)	-.57
2. Proposes situations that may lead some students to feel excluded (H7)	-.53
3. Praises mostly the students who perform better than others (P10)	-.55
6. Primarily encourages the students who win and those who are good (P29)	-.61
9. Contradicts himself/herself in the instructions (Ch49)	-.40
11. Rarely takes students' perspectives into account (C55)	-.70

Note. M = Mastery; A = Autonomy; W = Warmth; S = Structure; P = Performance; H = Hostility; Ch = Chaotic; C = Control. The items in English are the result of a free translation to facilitate reading. Validated French items are available in supplementary file 1.

SHORT MOTIVATIONAL CLIMATE QUESTIONNAIRE IN PE

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Table 4. Measurement invariance testing across gender groups, country groups and gender x country groups

Groups	Model	RMSEA (90% CI)	CFI	TLI	CM	ΔRMSEA	ΔCFI	ΔTLI
G x C	a	.043 (.036 - .051)	.869	.837	-	-	-	-
QBC-F = 96								
QBC-M = 104	b	.044 (.037 - .050)	.849	.835	a	.01	-.020	.002
FRA-F = 109								
FRA-M = 87	c	.048 (.042 - .054)	.788	.798	b	.04	-.061	.037
Gender	a	.052 (.042 - .062)	.912	.891	-	-	-	-
Female = 205								
Male = 191	b	.049 (.039 - .058)	.915	.904	a	-.003	.003	.013
	c	.047 (.038 - .056)	.914	.911	b	-.002	-.001	.007
Country	a	.054 (.044 - .063)	.896	.870	-	-	-	-
Quebec = 206								
France = 200	b	.054 (.045 - .063)	.884	.868	a	.000	-.012	.002
	c	.065 (.057 - .073)	.816	.810	b	.011	-.068	.058

Note. CM = comparison model; G x C = gender x country; a = configural; b = metric; c = scalar; FRA-F = French Females; FRA-M = French Males; QBC-F = Quebecer Females; QBC-M = Quebecer-Males

Supplementary file 1. Item comprehension of the pool of 57 items

Depuis le début de l'année, mon enseignant d'éducation physique, ... Since the beginning of the year, my physical education teacher, ...		Study 1 Mean and (standard deviation)		Study 1 Problem mentioned during the interview	Study 2 22 items version	Study 3 12 items version
Autonomy						
Q1	Donne des options et des choix aux élèves Give students options and choices (Milton et al., 2018)	6.90	(.32)	« options » “options”		
Q9	Tient compte de l'opinion des élèves Considers the students' opinions (Mastagli et al., 2022)	6.90	(.32)	« tient compte » et « opinion » “considers and opinion”	X	
Q15	Explique pourquoi il est important de faire ce qu'il demande Explains why it is important to do what is asked (Milton et al., 2018)	7.00	(.00)			
Q21	Encourage les élèves à trouver et essayer différentes manières de faire Encourages students to find and try different ways of doing things	7.00	(.00)		X	X
Q26	Fait participer chaque élève dans l'évaluation de ses apprentissages Involves each student in the assessment of their learning	6.70	(.95)	« fait participer » “involves”	X	
Q28	Trouve important que les élèves participent au cours parce qu'ils en ont envie Finds it important that students participate in class because they want to (Mastagli et al., 2022)	7.00	(.00)			
Q40	Pense qu'il est important que les élèves participent au cours par plaisir Thinks it is important that students participate in class for enjoyment (Milton et al., 2018)	7.00	(.00)		X	X
Q46	Implique les élèves pour trouver des moyens de s'améliorer Engages students in finding ways to improve (Girard et al., 2023)	6.50	(1.08)	« implique » “engages”		
Control						
Q4	Utilise des punitions ou des récompenses pour obliger les élèves à participer Uses punishments or rewards to force students to participate (Milton et al., 2018)	6.90	(0.32)	« obliger les élèves » To force		
Q12	Prend toutes les décisions, sans consulter les élèves Makes all decisions without consulting the students	7.00	(.00)			
Q27	Impose à tous les élèves de réaliser les mêmes activités, de la même manière et au même rythme - Requires all students to do the same activities in the same way and at the same pace	7.00	(.00)			
Q35	Met de la pression aux élèves pour faire exactement comme il le demande Puts pressure on students to do exactly as he/she asks (Solstad et al., 2020)	7.00	(.00)			
Q55	Prend rarement en compte le point de vue des élèves Rarely takes students' perspectives into account (Appleton et al., 2016)	6.80	(.53)	« point de vue » “perspectives”	X	X

Mastery						
Q5	<i>S'assure que les élèves se sentent bien quand ils font de leur mieux</i> Ensures that students feel good when they do their best (Appleton et al., 2016)	7.00	(0.00)		X	
Q13	<i>Encourage, avant tout, les progrès de chacun des élèves</i> Primarily encourages each student's progress (Mastagli et al., 2022)	6.90	(.32)	« avant tout » “primairly”	X	
Q18	<i>Encourage les élèves à s'entraider pour apprendre et s'améliorer</i> Encourages students to help each other learn and improve (Milton et al., 2018)	7.00	(.00)		X	X
Q24	<i>Propose différents niveaux de difficultés dans les activités</i> Offers different levels of difficulty in activities (Mastagli et al., 2022)	6.90	(.32)	Phrase entière Entire sentence		
Q34	<i>Aide les élèves à comprendre ce qu'ils font de bien et pourquoi</i> Helps students understand what they are doing well and why	7.00	(.00)			
Q41	<i>Offre à tous les élèves l'occasion de participer aux démonstrations</i> Provides all students the opportunity to participate in demonstrations (Girard et al., 2023)	7.00	(.00)		X	
Q48	<i>Propose des activités stimulantes et réalisables pour chacun des élèves</i> Proposes stimulating and achievable activities for each student	7.00	(.00)		X	
Q54	<i>Aide chaque élève à prendre conscience de ses progrès</i> Helps each student become aware of their progress (Girard et al., 2023)	7.00	(.00)		X	
Performance						
Q2	<i>Accorde plus d'attention aux meilleurs élèves</i> Gives more attention to the top students (Milton et al., 2018)	6.90	(0.32)		X	X
Q10	<i>Félicite surtout les élèves qui réussissent mieux que les autres</i> Praises mostly the students who perform better than others (Milton et al., 2018)	7.00	(.00)		X	X
Q19	<i>Incite les élèves à se comparer entre eux</i> Encourages students to compare themselves to each other (Appleton et al., 2016)	6.80	(.42)	« incite » “encourages”		
Q29	<i>Encourage surtout les élèves qui gagnent et ceux qui sont bons</i> Primarily encourages the students who win and those who are good (Solstad et al., 2020)	7.00	(.00)		X	X
Q42	<i>Valorise surtout la performance finale</i> Values mostly the final performance (Appleton et al., 2016)	7.00	(.00)			
Q47	<i>Met davantage l'accent sur les erreurs ou les difficultés des élèves</i> Emphasizes students' mistakes or difficulties (Girard et al., 2023)	6.90	(.32)	« accent sur les erreurs » “emphasizes mistakes”		
Q53	<i>Attire principalement l'attention des élèves sur ce qu'ils ont mal fait</i> Primarily draws students' attention to what they did wrong (Girard et al., 2023)	7.00	(.00)			

Structure						
Q3	<i>Nomme clairement les objectifs d'apprentissage du cours</i> Clearly states the learning objectives of the course (Mastagli et al., 2022)	7.00	(.00)	Phrase entière Entire sentence	X	
Q11	<i>Donne des consignes claires</i> Gives clear instructions (Mastagli et al., 2022)	7.00	(.00)			
Q22	<i>S'assure que les élèves ont bien compris ce qu'ils doivent faire</i> Ensures that students understand what they need to do (Girard et al., 2023)	7.00	(.00)			
Q30	<i>Offre des conseils ou de l'aide aux élèves lorsqu'ils en ont besoin</i> Offers advice or help to students when they need it (Mastagli et al., 2022)	7.00	(.00)			
Q32	<i>Utilise la démonstration pour faire comprendre aux élèves ce qu'ils doivent faire</i> Uses demonstration to help students understand what they need to do	7.00	(.00)			
Q36	<i>Explique aux élèves comment le cours va se dérouler</i> Explains to students how the course will proceed	7.00	(.00)		X	
Q43	<i>Intervient auprès des élèves qui ne respectent pas les consignes</i> Intervenes with students who do not follow instructions	7.00	(.00)			
Q52	<i>Partage de façon claire les critères d'évaluation</i> Clearly shares the evaluation criteria	6.60	(.84)	« partage » et « critères d'évaluation » “share” and “evaluation criteria”	X	X
Chaos						
Q7	<i>Donne peu d'explications sur ce que les élèves doivent faire</i> Gives little explanation about what students need to do (Girard et al., 2023)	7.00	(0.00)	Phrase entière Entire sentence		
Q16	<i>Donne des explications qui sont difficiles à comprendre</i> Gives explanations that are difficult to understand	7.00	(.00)			
Q25	<i>Laisse les élèves à eux-mêmes, sans les aider, pendant les activités</i> Leaves students on their own without helping them during activities (Girard et al., 2023)	6.70	(.67)	« eux-mêmes » « own »		
Q38	<i>Est difficile à suivre</i> Is hard to follow	7.00	(.00)			
Q49	<i>Se contredit dans ses consignes</i> Contradicts himself/herself in the instructions (Girard et al., 2023)	6.60	(.84)	« se contredit » “contradicts himself”	X	X
Q57	<i>Fait un retour qui ne permet pas aux élèves de comprendre ce qu'ils ont appris.</i> Provides feedback that does not allow students to understand what they have learned (Girard et al., 2023)	6.10	(1.52)	« fait un retour » et « ne permet pas » “provides feedback” and “does not allow”		

Relatesness supporting - Warmth						
Q8	Est quelqu'un sur qui les élèves peuvent compter, peu importe ce qui arrive.	5.20	2.90	Entire sentence misunderstood: deleted.		
Q17	Apprécie les élèves tels qu'ils sont Appreciates students as they are (Solstad et al., 2020)	7.00	(.00)		X	
Q20	Est ouvert et ne juge pas les élèves Is open and does not judge students (Appleton et al., 2016)	7.00	(.00)			
Q37	Se soucie vraiment que tous les élèves se sentent inclus et respectés dans le groupe Truly cares that all students feel included and respected in the group (Girard et al., 2023)	6.90	(.32)	« se soucie » “cares”		
Q33	Parle aux élèves sur un ton chaleureux et bienveillant Speaks to students in a warm and kind tone (Mastagli et al., 2022)	7.00	(.00)			
Q39	Est à l'écoute des élèves Listens to students (Milton et al., 2018)	7.00	(.00)		X	X
Q44	Montre qu'il est sensible à ce que les élèves ressentent Shows sensitivity to what students are feeling (Solstad et al., 2020)	7.00	(.00)			
Q50	Prend le temps de discuter avec les élèves à propos de sujets qui ne sont pas en lien avec les cours d'éducation physique - Takes time to discuss topics with students that are not related to physical education classes	7.00	(.00)			
Q56	S'assure que l'ambiance de travail entre les élèves est agréable pour tous Ensures that the working atmosphere among students is pleasant for everyone	7.00	(.00)		X	X
Relatedness thwarting - Hostility						
Q6	Propose des situations qui peuvent amener des élèves à se sentir exclus Proposes situations that may lead some students to feel excluded (Girard et al., 2023)	6.90	(.32)		X	X
Q14	Limite les moments où les élèves peuvent travailler ensemble Limits the times when students can work together (Girard et al., 2023)	7.00	(.00)			
Q23	Refuse de discuter de sujets qui ne sont pas en lien avec le cours Refuses to discuss topics not related to the course	7.00	(.00)			
Q31	Manque d'intérêt envers ce que les élèves ressentent Lacks interest in what students are feeling (Girard et al., 2023)	7.00	(.00)			
Q45	Fait des blagues parfois désagréables pour les élèves Makes jokes that are sometimes unpleasant for students	7.00	(.00)			
Q51	Utilise un ton froid avec les élèves Uses a cold tone with students (Girard et al., 2023)	6.60	(1.26)	« ton froid » “cold tone”		

Note. The references reflect that the items are only inspired by the original sources and do not represent exact transcriptions. The items in English are the result of a free translation to facilitate reading. The authors do not recommend using the items without a rigorous process of translation and understanding with the target population.