



Development and validation of the coach's task presentation scale: A quantitative self-report instrument



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ABSTRACT

Objective: A major concern for coaches is the transmission of effective information in the moments before sport practice, when they communicate to players what they are supposed to do and how (Rink, 1994). The present study's main objective was to cover a gap in the sport psychology measurement field and to develop and validate a quantitative self-report instrument to measure the effectiveness of coaches' task presentation for athletes. The resulting instrument was the *Escala de Presentación de las Tareas por Parte del Entrenador (EPTE)* [Coach's Task Presentation Scale].

Design: The two studies developed to validate the EPTE used a cross-sectional research design.

Method: Participants in Study 1 included 830 college athletes aged between 18 and 27, who completed the EPTE. Participants in Study 2 included 677 college athletes aged between 17 and 29, who completed the EPTE and other questionnaires measuring coach's interpersonal style (autonomy support and controlling style) and basic psychological needs satisfaction/thwarting. Study 1 comprised translation, item formulation and examination of the reliability and factorial structure of the EPTE. Study 2 provided evidence of factorial validity and evidence of validity based on relationships with other variables in the context of the Self Determination Theory (Deci & Ryan, 2000).

Results: The results of reliability analysis and the different sources of validity provided, demonstrated the instrument's adequacy in terms of psychometric properties.

Conclusions: The EPTE is a valid, reliable scale that can be used to measure the effectiveness of task presentation by coaches, according to the perception of athletes.

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For instructors, task presentation (Rink, 2010) or pre-practice information (Hodges & Franks, 2002) is the most important behavior in the teaching process. It is a key factor in teaching motor skills, a key ingredient in the recipe for success, and one of the key aspects of coaches' responsibilities in the initial stages of the instruction process (Hodges & Franks, 2002; Williams & Hodges, 2005). This is an essential phase focused on teaching athletes before they start engaging in the learning task (Williams & Hodges, 2005).

Task presentation is defined as an instructional event where the coach/instructor communicates to the players "what they are to do and how they are to do" (Rink, 1994). Task presentation is also known as the initial stages of the teaching process (Williams & Hodges, 2005) or structure before the activity (Haerens et al., 2013), and includes verbal instructions from the coach/instructor (e.g., explaining and presenting tasks) accompanied by nonverbal ones (e.g., demonstrating a movement technique).

In Physical Education instruction, the clarity of the verbal information provided by an instructor while presenting a motor task is considered a variable that predicts pedagogical effectiveness (Gusthart, Kelly, & Rink, 1997; Hall, Heidorn, & Welch, 2011; Landin, 1994; Rink, 1994; Rink & Werner, 1989). Likewise, early research on teaching has identified teacher clarity as one of the most consistent variables related to teacher effectiveness (Brophy & Good, 1986; Rosenshine & Stevens, 1986). In sports, from a behavioral

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perspective, the key to providing effective sports leadership is to focus on giving clear technical instructions (Smoll & Smith, 2001) and providing positive reinforcement (Curtis, Smith, & Smoll, 1979; Smith & Smoll, 2007); both are regarded as important aspects of effective leadership, not only in the sport context, but also in the physical education context (Hall et al., 2011).

Previous research examining effective task presentation skill has used an observational instrument called the Qualitative Measures of Teaching Performance Scale (QMTPS), a qualitative observational system developed by Rink and Werner (1989). The QMTPS evaluates seven categories of task presentation: clarity, demonstration, appropriate number of cues, accuracy of cues, qualitative cues provided, student responses appropriate to task focus, and teacher specific congruent feedback. An instructor's total QMTPS score captures one dimension: his/her skill or effectiveness at planning, presenting, and describing tasks to students. The QMTPS was validated for the physical education context, connecting an instructor's total score to his/her students' achievement levels in physical education, by assessing volleyball receiving and passing techniques (Gusthart et al., 1997). Several studies have used the QMTPS to qualitatively explore teachers' task presentation skills. In elementary schools, examples include physical education units on jumping and landing skills (Gusthart & Sprigings, 1989; Werner & Rink, 1989), on striking with a paddle, dance, volleyball, and soccer (Hall et al., 2011); and in secondary schools, on volleyball (Gusthart, Kelly, & Graham, 1995; Gusthart et al., 1997), soccer (Lee, 2011) and basketball units (Sau-Ching, 2001).

Observational and self-report methodological approaches enable us to examine and evaluate the coaching environment in different but complementary ways. However, there are no self-report instruments to measure the effectiveness of coaches' task presentation that represents the quality of the instruction in terms of its content (e.g., the information is accurate), the method in which that content is communicated (e.g., verbal cues and visual demonstrations) (Becker, 2009) and the coaches ability to communicate information on performance. For this reason, the development of a quantitative self-report instrument to measure effectiveness of coaches' task presentation would cover a gap in the sport psychology measurement field. Self-report questionnaires do not require excessive temporal and economical resources, permit access to bigger sample sizes (which would increase the strength of generalization of results), and provide data that can be easily coded, analyzed and benchmarked. As a result, a self-report questionnaire to measure task presentation would allow assessing the target variable quite often and systematically, providing a clear advantage for longitudinal studies or for intervention programs (e.g., to evaluate the evolution of task presentation in the expected direction). For these reasons, recognizing the merits and contribution of observational measures, we consider that a self-report questionnaire to measure the effectiveness of coaches' task presentation for athletes would be a complementary and valuable resource for the sport psychology/coaching behavior context.

The main purpose of the present study was to cover this gap in the sport psychology measurement field. The existing qualitative observational system (the Qualitative Measures of Teaching Performance Scale; QMTPS), was adapted into a quantitative self-report version called the Coach's Task Presentation Scale (EPTE from the Spanish *Escala de Presentación de las Tareas por parte del Entrenador*). This new version taps five of the QMTPS's seven categories: clarity, demonstration, appropriate number of cues, accuracy of cues, and qualitative cues provided. The category "student responses appropriate to task focus" was not included because it asks the athlete/student to self-report whether or not he/she completed the task in keeping with the teacher's instructions. The category "teacher specific congruent feedback" was left out as well,

because this information provided during activity or after performance is considered as feedback (Williams & Hodges, 2005). Furthermore, there are existing questionnaires that measure this behavior in sport (i.e., Corrective Feedback Scale and Perceived Coaching Feedback Scale: Mouratidis, Lens, & Vansteenkiste, 2010; The Quality of Change-Oriented Feedback Scale: Carpentier & Mageau, 2013).

Structure is a dimension of social context that has been identified as predictor of athletes' well-being and ill-being (Deci & Ryan, 1991). A notable feature of structure is communication of clear and understandable guidelines and expectations for activity (Curran, Hill, & Niemiec, 2013; Reeve, 2009) to an athlete (Curran et al., 2013) that should help him/her to achieve the goal of different activities (Smith et al., 2015). Similarly, task presentation involves communicating (verbal and nonverbal) to the athletes the meaning and importance of what is to be learned; organizing players, space, equipment, and time for practice; and communicating the focus or intent of the practice (Rink, 1994). That allows us to associate structure with task presentation. For the reasons above, the present study conceptualizes task presentation as a specific aspect of structure before the activity.

Structure before the activity and structure during the activity are different construct, and previous studies have shown that both dimensions of structure are unrelated (Haerens et al., 2013). In developing the EPTE, we focused on structure before the activity and did not consider developing items to assess structure during an activity. As it has been stated, the information provided during activity is another stage of the teaching process (Williams & Hodges, 2005) and is one of the more frequently used feedback types (praise, instruction, instruction during performance, encouragement, criticism, confirmation/reinforcement) (Koka & Hein, 2003; Smith, Smoll, & Hunt, 1977). Furthermore, as it was mentioned above, there are self-report questionnaires that measure feedback behavior in sport (Carpentier & Mageau, 2013; Mouratidis et al., 2010).

There are also existing observational measures that include an assessment of structure before and during the class (Haerens et al., 2013; Smith et al., 2015), and that examine the links between observed structure and variables formulated in the SDT framework such as need satisfaction (Smith et al., 2015). Recently, Haerens et al. (2013) developed and provided initial validation for an observational system with four factors (autonomy support, structure before the activity, structure during the activity and relatedness support) to assess the motivational environment in physical education. This system can be used to assess the "Structure before the activity", which refers to the provision of giving clear guidelines and instructions, clarifying expectations, and providing demonstrations. The observational measure developed by Smith et al. (2015) measures the observed structure rated across the whole session. It is important to point out that there are clear differences between those instruments and the EPTE scale. The more evident is that the formers are observational systems and the EPTE is a self-report instrument. Regarding the measure developed by Smith et al. (2015), the EPTE do not tap the same construct, as it has been stated that structure before and structure during the learning process are different (Haerens et al., 2013). Additionally, the "Structure before the activity" factor from Haerens et al. (2013) instrument do not consider the coaches ability to communicate information on performance in a way that gives the athletes an accurate motor plan for performance, while this aspect has been specifically addressed in the EPTE (providing information about the appropriate number of cues, accuracy of cues and whether qualitative cues are provided). Further to this, Curran et al. (2013) consider that it is important for future research to develop a well-validated, sport specific measure of structure. In light of the

above, there is demand for a valid, reliable quantitative self-report questionnaire to measure task presentation in the sport context.

1. Variables related to task presentation effectiveness

In recent years, researchers have tried to determine how demonstrations may guide or constrain the learning process while ensuring that the learner has some degree of autonomy (Williams & Hodges, 2005). Moreover, attention has been paid on whether cue words should be either instructional or motivational to help focus on the task at hand (Chroni, Perkos, & Theodorakis, 2007). Similarly, the communication of clear verbal instructions and demonstrating activities, has garnered most attention in sport domain (Curran et al., 2013; Smith et al., 2015). In line with these concerns, we were also interested in determining empirically whether the effectiveness of an instructor/coach's task presentation is associated with certain motivational dimensions and psychological variables exhibited by the athletes with whom he/she interacts. In the end, the EPTE could be used to test the relationship between task presentation in sport domain and other dimensions of the teaching environment that have been formulated within the framework of the Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), such as coaches' interpersonal styles (autonomy supportive and controlling) and the basic psychological needs.

The way in which coaches may communicate information, expectations, strategies, limits, introduce rules, organizing the content of goals, training regimens and other aspects of structure can be perceived by athletes as either autonomy support or control (Curran et al., 2013; Smith et al., 2015). On the one hand, autonomy supportive is an interpersonal style in which an authority figure (such as the coach) actively collaborates in engaging players, and creates the conditions for them to experience volition, choice, and personal development. On the other hand, controlling interpersonal style implies an authority figure (such as the coach) who acts in a coercive and authoritarian manner, imposing his/her way of thinking and acting on players (Ryan & Deci, 2002). In the educational context, basic elements of classroom structure that have been found to be fully consistent with the implementation of autonomy-supportive instructional behaviors include clear expectations and guidance for students' activities (Reeve, 2009). So far, a positive relationship has been observed between structure and autonomy support (Curran et al., 2013; Haerens et al., 2013; Jang, Reeve, & Deci, 2010; Smith et al., 2015), but not controlling style (Jang et al., 2010; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009; Tessier et al., 2013). Additionally, it has been stated that structure can be perceived by athletes as either autonomy support or controlling style (Curran et al., 2013; Jang et al., 2010; Smith et al., 2015). According to that, we would expect that the EPTE will show significant and positive relationship with autonomy support, but no relationship will be expected with controlling style.

Basic Psychological Needs Theory (BPNT; Ryan & Deci, 2002), a sub-theory within SDT, maintains that people have three basic psychological needs: *competence* (how effective an individual feels in interactions with his/her social environment), *autonomy* (to what extent an individual feels like the agent of his/her own life and actions), and *relatedness* (to what extent an individual feels a sense of belonging and connection to other people in his/her social environment). Structure has been found to be positively associated with athletes' basic psychological need satisfaction (Curran et al., 2013; Smith et al., 2015). As we conceptualize task presentation as a specific aspect of structure before the activity, we argue that task presentation from coaches will relate positively to athletes' satisfaction of *each* of the basic psychological needs. Those expected relationships would emerge following different links. First

of all, providing clear expectations is a prerequisite for students (or athletes) to develop a sense of effectiveness, and it is likely to afford satisfaction of the need for competence (Haerens et al., 2013). Moreover, explaining the personal relevance of the learning activities (Curran et al., 2013; Reeve & Jang, 2006), displaying a sincere interest in the learners' preferences, and actively listening to them is likely to afford satisfaction of the need for autonomy (Curran et al., 2013; Haerens et al., 2013). Finally, when providing guidance and instruction, athletes may appreciate the investment of the coach's time, so it is likely to afford satisfaction of the need for relatedness (Haerens et al., 2013; Smith et al., 2015). Consequently, the EPTE will positively relate to satisfaction of basic psychological needs, and conversely will negatively relate to thwarting of basic psychological needs.

2. Aim and objectives

Making summary of the ideas that have been discussed so far, we could say that task presentation is a contributing factor to effective teaching and, in turn, student learning motor skills (Hall et al., 2011), and the success of the athletes' response (Rink & Hall, 2008). Therefore, it has been stated that it is clearly important to assess task presentation effectiveness in the sport context. However, there are still potential gaps in the literature in different settings (Hall et al., 2011). The majority of research examining specific aspects of task presentations has relied almost exclusively on observation systems. Yet, scarcely any quantitative self-report instrument is currently available to measure task presentation. Therefore, the present research objective was to develop and validate the *Escala de Presentación de las Tareas por parte del Entrenador* (EPTE) [Coach's Task Presentation Scale], for use with athletes.

The process of the construct validation involves three stages: substantive, structural and external (Gunnell et al., 2014; Messick, 1995). The substantive stage defines and delineates the construct under investigation; the structural stage pertains to establishing evidence of factorial validity and reliability relative to the construct of interest; and the external stage examines whether the construct under investigation is related to other variables in accordance with the theoretical expectations. According to this construct validation process, the present research was developed in two separate studies with different objectives. Study 1 comprised translation, item formulation and examination of the reliability and factorial structure of the EPTE. Study 2 provided evidence of factorial validity and measurement invariance across gender; and evidence of validity based on relationships with other variables in the context of the Self Determination Theory (Deci & Ryan, 2000; Ryan & Deci, 2000). In regard to the invariance analysis, we considered that testing for gender invariance would contribute to the EPTE validation process because significant gender differences in athletes' perceived coaching behaviors have been found in the literature (e.g., Koh & Wang, 2015). Taking into account those results, it seems reasonable that future research could be interested in testing gender differences in the athletes' perceptions of coaches' task presentation effectiveness. Factorial invariance analyses would provide an indication of whether or not statistically significant differences based on scale scores would reflect real differences across gender groups in the underlying latent variable measured by the EPTE.

3. Study 1

This first study comprised the substantive stage; therefore it involved translation, item formulation, and examination of the reliability and factorial structure of the EPTE.

3.1. Method

3.1.1. Procedure

The Qualitative Measures of Teaching Performance Scale (QMTPS; Rink & Werner, 1989) was translated, following the back-translation procedure and the established guidelines for test translation and adaptation from one culture to another (Balluerka, Gorostiaga, Alonso-Arbiol, & Haranburu, 2007; Muñiz, Elosua, & Hambleton, 2013). The scale's questions examine how coaches present tasks, by means of seven categories. Of those seven, the following five were considered in creating the EPTE: clarity, demonstration, appropriate number of cues, accuracy of cues, and qualitative cues provided. Those categories together comprise a single dimension: the effectiveness of a coach's task presentation. The other two categories (student responses appropriate to task focus, and teacher specific congruent feedback) were not included as they are not directly related to the tasks effectiveness.

Three experts translated descriptions of this qualitative observation system's categories from English into Spanish simultaneously and independently of one another. Discrepancies in their translations were discussed to develop the first Spanish-language version of this instrument adapted into a self-report quantitative format. The resulting first version was then translated back into English, and the two versions were compared to determine their equivalence (the qualitative observational version and the quantitative self-report version). Based on that comparison, and because the observational version described the categories more generally (various aspects were considered at once and sometimes overlapped), certain modifications were made to the self-report scale, making sure the wording of items was as clear and accurate as possible. For example, in the observational version, to examine the category of clarity, the behavior to be registered was first described as follow: "Teacher's verbal explanation/directions communicate a clear idea of what to do and how to do it. This judgment is confirmed on the basis of student movement responses to the presentation and is relative to the situation". Then, clarity was assessed by different questions: mentions the objective of each task (correspond to item 4 in the EPTE), verbally explains the movement, work, exercise or activity (corresponded to item 6 in the EPTE) and, clearly explains what to do and how to do it (correspond to item 10 in the EPTE). In the same way, the self-report version detailed in question format each of the descriptions of the categories raised in the observational version. The response format had a different qualitative scale for each category (yes/no, full/partial/none, appropriate/inappropriate/none given, accurate/inaccurate/none given), therefore it was decided to evaluate the self-report version on a Likert-type response scale from 1 (strongly disagree) to 5 (strongly agree). The above steps produced the final version of the quantitative self-report scale in Spanish and English (see Table 1), made up of 11 items.

The present research was conducted in accordance with international ethical guidelines that are consistent with American Psychological Association (APA) guidelines. Ethical approval for the study was obtained from a university ethics review committee. Participants were contacted through people in charge of each sport in which the national university system participates. The questionnaires were administered during the 2013 Universiada, an annual competition event that concentrates Mexican university sport teams from different sports. The athletes' participation was voluntary as well as anonymous, and participants provided informed consent. Administration was carried out in hotels, providing a more suitable environment for participants by separating them from potentially distracting stimuli. The questionnaires took approximately 30 min to complete.

3.1.2. Participants

The sample included 830 athletes (529 men and 291 women; 10 athletes did not report their gender) belonging to university teams from all states in the Mexican Republic. They ranged in age from 18 to 27 years old ($M = 21.21$, $SD = 2.1$), all practiced for over two hours a day ($SD = 0.79$), and had been with the same coach an average of 3 years ($SD = 1.13$). The total sample was randomly divided into two subsamples. Sample 1A was used to conduct reliability and exploratory factor analysis (EFA), and included 414 players (268 men and 146 women) with an average age of 21 years ($SD = 2.16$). Sample 1B was used to conduct reliability and confirmatory factor analysis (CFA), and included 416 players (271 men and 145 women) with an average age of 21 years old ($SD = 1.93$).

3.1.3. Instrument

Effectiveness of the coach's task presentation. The *Escala de Presentación de las Tareas por parte del Entrenador* (EPTE) [Coach's Task Presentation Scale] was administered. Its 11 items (see Table 1) are based on the Qualitative Measures of Teaching Performance Scale (QMTPS; Rink & Werner, 1989) and are evaluated on a Likert-type response scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The instructions ask players to rate their coaches on how they present tasks during practice, comprising aspects of clarity (e.g., "My coach states each task's objective to do"), demonstration (e.g., "My coach verbally explains the movement, task, exercise, or activity to do"), appropriate number of cues (e.g., "My coach gives me accurate cues to focus on while completing a movement task"), accuracy of cues (e.g., "My coach gives me cues about form and techniques to focus on in order to do the activity, task, or exercise correctly"), and qualitative cues provided (e.g., "My coach provides information about qualitative cues to focus on the process of movement").

3.1.4. Data analysis

Using sample 1A we calculated descriptive statistics of the items of the EPTE, and bivariate correlations between the items. Factorial structure was tested through exploratory factor analysis (EFA), and internal consistency was estimated. Sample 1B was used to collect reliability evidence and to provide evidence of factorial validity of the EPTE using confirmatory factor analysis (CFA). The analyses were carried out using SPSS 20 and LISREL 8.80.

In both samples, to evaluate the internal consistency, different reliability indices were estimated: Cronbach's alpha coefficient (α), composite reliability value (ρ), and Average Variance Extracted (AVE) value. ρ values of 0.70 or greater indicate an acceptable reliability (Raykov, 2001), and AVE values of 0.50 or greater indicate a good score reliability (Fornell & Larcker, 1981).

For carrying out the EFA, principal axis factoring was chosen as the extraction method, and an oblique rotation criterion was applied (Lloret-Segura, Ferreres-Traver, Hernández-Baeza, & Tomás-Marco, 2014; Sass & Schmitt, 2010).

With regard to CFA, multiple fit indices were chosen to achieve a comprehensive evaluation of fit of the tested models: the Satorra-Bentler chi-square ($S-B\chi^2$), the comparative fit index (CFI), the non-normed fit index (NNFI), the root mean squared error of approximation (RMSEA), and the standardized root mean square residual (SRMR). For the CFI and NNFI, values above 0.90 are traditionally considered reasonable model fit, whereas stringent recommendations suggest values close to 0.95 (Hu & Bentler, 1999). For the RMSEA and the SRMR, values below 0.08 are traditionally considered reasonable model fit whereas stringent recommendations suggest values close to 0.05 (Hu & Bentler, 1999). Evaluation of parameter estimates was also considered. Additionally, to compare the alternative models' goodness of fit, incremental fit indices were estimated. Regarding criteria for interpreting these indices, it has

Table 1
EPTE items' descriptive statistics.

Items	M	SD	Skewness	Kurtosis
1. Mi entrenador me informa de los elementos a enfocarme sobre las formas o técnicas al realizar la actividad, tarea o ejercicio correctamente [My coach gives me cues about form and techniques to focus on in order to do the activity, task, or exercise correctly].	4.26	0.88	-1.39	2.66
2. Mi entrenador me informa sobre los elementos apropiados a enfocarme para la realización del movimiento de la tarea [My coach gives me accurate cues to focus on while completing a movement task].	4.24	0.88	-1.38	2.39
3. Mi entrenador me demuestra visualmente la forma incorrecta de ejecutar el movimiento a través de un compañero, medios visuales o una combinación de estos [My coach models incorrect performance executed by him/herself, athlete(s), visual aids and/or a combination of these].	4.12	1.07	-1.33	1.65
4. Mi entrenador menciona el objetivo de cada una de las tareas que se van a realizar [My coach states each task's objective to do].	4.16	0.93	-1.19	1.42
5. Mi entrenador me comunica demasiados elementos a enfocarme sobre la ejecución del movimiento de la tarea [My coach presents too many cues related to the performance of the movement task].	3.86	0.99	-0.76	0.42
6. Mi entrenador me da una explicación verbal del movimiento, tarea, ejercicio o actividad que se va a realizar [My coach verbally explains the movement, task, exercise, or activity to do].	4.31	0.84	-1.35	2.19
7. Mi entrenador me comunica de manera precisa los elementos en que me voy a enfocaren la tarea que se va a realizar, reflejando las bases del análisis de la mecánica del movimiento [My coach communicates accurately the elements which I will focus in the task, reflecting mechanical principles].	4.14	0.88	-1.06	1.41
8. Mi entrenador me informa sobre los elementos de calidad en los que me tengo que enfocar en el proceso del movimiento que se va a realizar [My coach provides information about qualitative cues to focus on the process of movement].	4.18	0.86	-1.15	1.74
9. Mi entrenador me demuestra visualmente la forma correcta de realizar el movimiento a través de un compañero, medios visuales o una combinación de estos [My coach models correct performance executed by him/herself, athlete(s), visual aids and/or a combination of these].	4.21	0.93	-1.31	1.72
10. Mi entrenador me da una explicación clara de lo que hay que hacer y cómo hacerlo [My coach's verbal explanation/directions communicate a clear idea of what to do and how to do it].	4.27	0.86	-1.28	1.93
11. Mi entrenador me demuestra visualmente la forma de realizar el movimiento a través de un compañero, medios visuales o una combinación de estos [My coach models the performance executed by him/herself, athlete(s), visual aids and/or a combination of these].	4.21	0.91	-1.22	1.50

been suggested that a difference of 0.01 or less between values of CFI (Δ CFI; Cheung & Rensvold, 2002) and NNFI (Δ NNFI; Widaman, 1985) reflect practically irrelevant differences between models. Similarly, Chen (2007) suggested RMSEA increases of less than 0.015 between alternative models indicate irrelevant differences and therefore, the most parsimonious model should be selected.

3.2. Results

3.2.1. Descriptive analysis and inter-item correlations

Descriptive statistics (mean, standard deviation, skewness and kurtosis) of the items are offered in Table 1. Bivariate correlations between each of the scale's items were all above 0.50 ($p < 0.01$), except between items 3 and 5 ($r = 0.48$).

3.2.2. Exploratory factor analysis

EFA was carried out in Sample 1A. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.95, and the Bartlett test of sphericity was statistically significant ($p < 0.01$), indicating the suitability of these data for factor analytic procedures.

The results obtained showed a one-factor solution that accounted for 66% of common variance. All items' factor loadings were higher than 0.40.

3.2.3. Reliability

In Sample 1A, the scale's internal consistency was satisfactory ($\alpha = 0.94$; $\rho = 0.94$; AVE = 0.69). In Sample 1B, reliability was also satisfactory ($\alpha = 0.94$; $\rho = 0.93$; AVE = 0.58).

3.2.4. Confirmatory factor analysis

Before conducting CFA with Sample 1B, normality of the item's distribution was tested. Mardia coefficient value was 52.15, showing a non-normal multivariate distribution of data. Skewness and kurtosis values ranged between -0.75 and 1.32 and between 0.28 and 2.46 respectively, for this reason, robust maximum likelihood (RML) was chosen as the method of estimation.

Two alternative models were tested: a one-factor model and a four-factor model. The first model hypothesized that the 11 items of the EPTE were measuring a single dimension (Coach's Task

Presentation). The four-factor model considered the categories originally described in the qualitative scale and covered in the questionnaire (clarity, demonstration, appropriate number of cues, accuracy of cues, and qualitative cues provided) except for qualitative cues provided because it was measured with just one item.

The proposed single-factor model showed satisfactory goodness of fit indices: $S-B\chi^2 = 135.335$, $df = 44$, $p < 0.01$, CFI = 0.992, NNFI = 0.988, RMSEA = 0.068, SRMR = 0.037. The items' factor loadings ranged from 0.67 to 0.86, all statistically significant ($p < 0.01$). The four-factor model also showed satisfactory goodness of fit indices: $S-B\chi^2 = 44.663$, $df = 29$, $p < 0.05$, CFI = 0.998, NNFI = 0.995, RMSEA = 0.035, SRMR = 0.034. The items' factor loadings ranged from 0.63 to 0.92, all statistically significant ($p < 0.05$). The correlations between factors were all above 0.88.

When comparing the two alternative models, the incremental fit indices showed negligible differences for CFI and NNFI values (Δ CFI = 0.006 and Δ NNFI = 0.007) indicating that both models showed a similar fit, but non-negligible differences for RMSEA values (Δ RMSEA = 0.033). Taking into account those results, and that the high correlations between the factors indicated singularity, the most parsimonious model (one-factor model) was selected.

4. Study 2

This second study comprised the structural and external stages, therefore it provided evidence of the factorial validity and measurement invariance across gender; and additionally provided evidence of validity based on relationships of the EPTE with other variables in the context of the SDT, concretely coach's interpersonal style (autonomy support and controlling style) and basic psychological needs satisfaction and thwarting. According to previous literature, it was hypothesized that the EPTE would show significant and positive relationship with autonomy support and basic psychological needs satisfaction. Conversely, the EPTE would show significant and negative relationship with basic psychological needs thwarting. No relationship was hypothesized between the EPTE and controlling style.

4.1. Method

4.1.1. Procedure

The present research was conducted in accordance with international ethical guidelines that are consistent with American Psychological Association (APA) guidelines. We followed the same procedures described for collecting sample in Study 1. The questionnaires were administered during the 2014 Universiada (see Study 1 for more details).

4.1.2. Participants

The sample included 677 athletes (306 men and 371 women) belonging to university teams from all states in the Mexican Republic. They ranged in age from 17 to 29 years old ($M = 21.38$, $SD = 2.11$), all practiced for over two hours a day ($SD = 0.76$), trained four days a week ($SD = 1.2$), and had been with the same coach an average of 3 years ($SD = 1.51$).

4.1.3. Instruments

In addition to the EPTE (see Study 1 for a description of the scale), different instruments were used in Study 2 to provide evidence of validity based on relationships with other variables. Those instruments are briefly described below.

Coach's autonomy-supportive interpersonal style. We used the Spanish-language version (Balaguer, Castillo, Duda, & Tomás, 2009) adapted for Mexican context (López-Walle, Balaguer, Castillo, & Tristán, 2012) of the Sport Climate Questionnaire (SCQ; SDT website: <http://www.psych.rochester.edu/SDT/>). Perceived autonomy support was measured through 15 items; each item starts with the phrase: "On my sport team ..." for example, "I feel that my coach provides me with choices and options" and "My coach listens to how I would like to do things in sport." Responses to the items were recorded on a seven-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Previous research has confirmed the reliability of this instrument (Álvarez, Estevan, Falcó, & Castillo, 2013; Balaguer et al., 2009; Castillo et al., 2014; González, Castillo, García-Merita, & Balaguer, 2015; López-Walle et al., 2012; Ramis, Torregrosa, Viladrich, & Cruz, 2013).

Basic psychological needs satisfaction. A global score was created from the following three scales: 1) Perceived satisfaction of the need for *autonomy* was evaluated using the Spanish version (Balaguer, Castillo, & Duda, 2008) adapted to the Mexican context (López-Walle et al., 2012) of the Perceived Autonomy Support in Sport Questionnaire (Reinboth & Duda, 2006). The 10 items are scored using a Likert scale ranging from 1 (*not at all true*) to 5 (*very much*). Athletes were requested to indicate how they felt in general when they do sport, for example: "When I do sport..." "I feel that my choices and actions are based on my true interests and values" and "...I feel I can give a lot of inputs to deciding how to practice/training is being carried out.". Previous research has confirmed the reliability of this instrument (Álvarez et al., 2013; Balaguer et al., 2012; González et al., 2015). 2) Perceived satisfaction of the need for *competence*, using the Spanish-language version (Balaguer et al., 2008) utilized in Mexican context (López-Walle et al., 2012) of the Perceived Competence subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). The scale is composed of five-items that are answered in a seven-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Exemplar items include "I am pretty skilled at sport" and "I am satisfied with my sport." Previous research has confirmed the reliability of this instrument (Adie, Duda, & Ntoumanis, 2012; Álvarez et al., 2013; Balaguer et al., 2008, 2012; Cecchini, Fernández-Rio, & Méndez-Giménez, 2015; González et al., 2015; López-Walle et al., 2012; Matosic, Cox, & Amorose, 2014). 3) Perceived satisfaction of the need for *relatedness*, measured by the

acceptance subscale of Richer and Vallerand (1998) Perceived Relatedness Scale, applying the Spanish version (Balaguer et al., 2008) utilized in Mexican contexts (López-Walle et al., 2012). The five-item questionnaire is answered in a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample item of this scale is: "When I do sport, I feel supported." Previous research has confirmed the reliability of this instrument (Adie et al., 2012; Álvarez et al., 2013; Balaguer et al., 2008, 2012; González et al., 2015; López-Walle et al., 2012).

Coach's controlling interpersonal style. The Spanish-language version (Castillo et al., 2014) utilized in Mexican context (Tristán et al., 2014) of the Controlling Coach Behaviors Scale (CCBS; Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010) was administered. The scale is composed of 12 items and responses are provided on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The athletes were initially presented with a common stem ("My coach") followed by the items tapping four controlling motivational strategies (each one comprised by 3 items): controlling use of rewards (e.g., "... only uses rewards/praise so that I stay focused on tasks during training"), negative conditional regard (e.g., "... is less supportive of me when I am not training and competing well"), intimidation (e.g., "... threatens to punish me to keep me in line during training"), and excessive personal control (e.g., "... tries to control what I do during my free time"). This scale has been used in other studies showing appropriate psychometric properties (Castillo et al., 2014; Matosic et al., 2014; Stebbings, Taylor, Spray, & Ntoumanis, 2012; Stebbings, Taylor, & Spray, 2015). A global score was used as indicator of athletes' perceptions of coach's controlling interpersonal style.

Basic psychological needs thwarting. The Psychological Need Thwarting Scale (PNTS; Bartholomew et al., 2011) was administered, specifically the Spanish-language version (Castillo, González, Fabra, Mercé, & Balaguer, 2012) used in Mexican context (López-Walle, Tristán, Cantú-Berrueto, Zamarripa, & Cocca, 2013). The scale is made up of 12 items and measure athletes' perceptions of the thwarting of the psychological needs of autonomy, competence, and relatedness in sport. Example items were: "I feel pushed to behave in certain ways" (autonomy thwarting), "There are times when I am told things that make me feel incompetent" (competence thwarting), and "I feel I am rejected by those around me" (relatedness thwarting). Responses to the questionnaire were made on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). This scale has been used in other studies with appropriate psychometric properties (Castillo et al., 2012; López-Walle et al., 2013; Martinet, Guillet-Descas, & Moiret, 2015; Myers, Martin, Ntoumanis, Celimli, & Bartholomew, 2014; Stebbings et al., 2012). A global score was used as indicator of athletes' perceptions of the thwarting of the three basic psychological needs.

4.1.4. Data analysis

An independent sample from the one used in Study 1 was used to cross-validate the internal structure of the EPTE using CFA, and to estimate the reliability of the scale; additionally, factorial invariance across gender was tested. A series of multi-sample CFA were conducted to evaluate the instrument's measurement equivalence across gender. Different nested models were tested to estimate structural equivalence (M1), invariance of factor loadings (M2), invariance of factor loadings and intercepts (M3), and invariance of factor loadings, intercepts, and measurement errors or uniquenesses (M4). To compare the nested models' goodness of fit, the incremental fit indices were compared, using the same criteria described in Study 1 for model comparison.

Finally, correlation analyses were carried out in order to provide evidence of validity based on relationships with other variables. The analyses were carried out using SPSS 20 and LISREL 8.80.

4.2. Results

4.2.1. Confirmatory factor analysis

The single-factor structure of the EPTE was cross-validated with an independent sample in Study 2. The proposed one-factor model showed satisfactory goodness of fit indices: $S-B\chi^2 = 127.109$, $df = 44$, $p < 0.01$, CFI = 0.995, NNFI = 0.992, RMSEA = 0.054, SRMR = 0.024. The items' factor loadings ranged from 0.22 to 0.91, all statistically significant ($p < 0.05$).

4.2.2. Factorial invariance across gender

Before proceeding on to multi-sample analyses, we tested the one-factor model of the EPTE's structure in the male (Model-M0a) and female (Model-M0b) subsamples separately. The M0a and M0b's goodness of fit indices were found to be satisfactory (see Table 2), and all estimated parameters statistically significant ($p < 0.01$).

The model testing structural equivalence (M1) had satisfactory goodness of fit indices, so we concluded that the EPTE's factor structure did not vary in the two groups compared. This model was considered the basis for the subsequent model nesting with restrictions. M2 (invariance of factor loadings), M3 (invariance of factor loadings and intercepts), and M4 (invariance of factor loadings, intercepts, and measurement errors) yielded satisfactory goodness of fit indices compared to the baseline model (M1). Differences did not exceed the values applied as criteria except in the case of M4, where differences between its indices and those of M1 (Δ NNFI) were over 0.010. Thus, we confirmed the invariance of factor loadings and item intercepts across gender, but not invariance in measurement error.

4.2.3. Reliability and evidence of validity based on relationships with other variables

Table 3 shows descriptive statistics, reliability indices, and correlations of the EPTE and the external variables considered in the study to provide evidence of validity. In Sample 2, the scale's internal consistency of the EPTE and of the other variables in the study was satisfactory (see Table 3).

The results of correlation analysis revealed a significant positive relationship of Task Presentation effectiveness (EPTE) with Autonomy Support ($r_{xy} = 0.54$, $p < 0.01$) and Basic Psychological Needs Satisfaction ($r_{xy} = 0.44$, $p < 0.01$). Conversely, Task Presentation effectiveness (EPTE) showed significant negative relationship with Basic Psychological Needs Thwarting ($r_{xy} = -0.16$, $p < 0.01$), but also with Controlling Style ($r_{xy} = -0.13$, $p < 0.01$). These results provide empirical evidence of the scale's validity in that they confirm the hypothesized relationships between the EPTE and other variables associated with task presentation effectiveness in the literature.

5. Discussion and conclusions

The present research objective was to develop and validate, in college athletes, a quantitative self-report instrument that

measures task presentation effectiveness: the *Escala de Presentación de las Tareas por parte del Entrenador* (EPTE) [Coach's Task Presentation Scale]. We examined the instrument's psychometric properties, reliability, and validity, finding its internal consistency to be satisfactory, and providing different sources of evidence to support its validity. Regarding evidence of validity based on internal structure, the results of EFA indicated the presence of a single factor explaining a high percentage of total variance. Likewise, CFA confirmed there was one latent, underlying factor. Finally, multi-sample CFAs confirmed the invariance of the EPTE's factor structure, factor loadings, and intercepts across gender. These results support the EPTE's strong factorial invariance (Meredith, 1993) as a function of gender, meaning that average item and scale scores are comparable across groups. That is, when using the EPTE in practical research for testing gender differences in task presentation effectiveness, it could be concluded that statistically significant differences based on scale scores will reflect real differences across groups in the underlying latent factor. These findings indicate the EPTE is a valid scale to assess the effectiveness of a coach's task presentation for both male and female athletes, and allows for unbiased comparison of average scores in the two groups. Future studies across other target groups (e.g., other cultures, age groups) and in other subjects can also move this line of research forward to determine the extent to which the EPTE can be considered a valid measure of the effectiveness of a coach's task presentation in other environments different to the athletes population participating in sport.

According to previous literature that has analyzed the relationship between structure and other variables formulated within the framework of the SDT (Curran et al., 2013; Haerens et al., 2013; Smith et al., 2015), we hypothesized that the Task Presentation effectiveness (EPTE) would show significant and positive relationship with autonomy support and basic psychological needs satisfaction. We also expected that, the EPTE would show significant and negative relationship with basic psychological needs thwarting, but no relationship with controlling style. The evidence of validity based on the scale's relationship with other variables was consistent with earlier research findings and supported our hypotheses, except for the relationship between the EPTE and controlling style. The correlation of the EPTE scale with Autonomy Support was positive and showed a large effect size (in accordance with the corresponding Cohen's d value). As in previous studies (e.g., Balaguer et al., 2012; Haerens et al., 2013), this result suggest that when coaches provide a rationale for their requests training activities and consider the players' perspectives (allowing some choice in terms of activities, and acknowledging how players are feeling), they create the conditions to foster a sense of support autonomy for the athletes. It is noteworthy that the correlation of the EPTE scale with Controlling Style was negative, although showing a small effect size (in accordance with the corresponding Cohen's d value). Previous studies have not found relationship between structure and controlling style (Jang et al., 2010; Sierens et al., 2009; Tessier et al., 2013), and have suggested that

Table 2
Goodness of fit indices for tested invariance models across gender.

Model	Description	χ^2	df	χ^2/df	NNFI	CFI	RMSEA	Δ NNFI	Δ CFI	Δ RMSEA
M0a	Baseline Model – Men	128.172	42	3.052	0.972	0.981	0.062			
M0b	Baseline Model-Women	112.309	42	2.674	0.949	0.967	0.076			
M1	Structural Invariance	240.525	84	2.863	0.965	0.977	0.047			
M2	FL Invariance	263.742	94	2.806	0.961	0.975	0.047	0.004	0.002	0.000
M3	M2 + Intercept Inv.	292.020	105	2.781	0.957	0.972	0.046	0.008	0.005	0.001
M4	M3 + Uniq. Inv.	338.414	119	2.844	0.950	0.967	0.046	0.015	0.010	0.001

Note: Inv. = Invariance; FL = factor loadings; Uniq. = Uniquenesses.

Table 3

Means, standard deviations, reliability indices and correlations of the EPTE scale with the theoretical outcome measures.

	Mean	SD	Range	α	AVE	rho	Correlations			
							EPTE	AS	CS	BSNS
EPTE	4.30	0.71	1–5	0.92	0.67	0.95	1			
AS	5.14	1.21	1–7	0.94	0.63	0.96	0.54**			
CS	3.21	1.71	1–7	0.98	0.66	0.97	–0.13**	–0.14**		
BSNS	5.06	0.77	1–7	0.94	0.44	0.93	0.44**	0.61**	–0.14**	
BSNT	3.22	1.61	1–7	0.96	0.66	0.95	–0.16**	–0.17**	0.52**	–0.27**

Note: α = Cronbach's alpha; AVE = average variance extracted value; rho = composite reliability value; EPTE = task presentation effectiveness; AS = Autonomy Support; CS = Controlling Style; BSNS = Basic Psychological Needs Satisfaction; BSNT = Basic Psychological Needs Thwarting.

although beneficial outcomes are noted when a coach offers autonomy support in a structured way (Curran et al., 2013), autonomy support, controlling style and structure are independent dimensions of the environment (Smith et al., 2015; Tessier et al., 2013). The results of the present study indicate that effective task presentation is positively and strongly associated with coaches interacting in a supportive style, meanwhile effective task presentation is negatively but weakly associated with coaches interacting with athletes in an authoritarian, coercive style.

The correlation of the EPTE scale with Basic Psychological Needs Satisfaction was positive and showed a large effect size, meanwhile the correlation of the EPTE scale with Basic Psychological Needs Thwarting was negative as expected, but showing a small effect size (in accordance with the corresponding Cohen's *d* values). As stated in previous studies, these results point that when coaches give clear verbal instructions, demonstrate activities, provide a rationale for their requests and recommendations, and consider the players' perspectives, those conditions are conducive to athletes' need satisfaction (Curran et al., 2013; Smith et al., 2015). These results are also in accordance with Smith et al. (2015) who found that the structure positively predicted autonomy, competence and relatedness need satisfaction. The results of the present study indicate that effective task presentation is positively and strongly associated with basic psychological needs satisfaction, meanwhile effective task presentation is negatively but weakly associated with basic psychological needs thwarting.

Our findings have a number of theoretical and practical implications. First, considering that the EPTE measures one of the key aspects of coaches' responsibilities in the initial stages of the instruction process in teaching athletes (Hodges & Franks, 2002), we provide with a quantitative self-report instrument that can potentially be used in the coaching behavior context. Even though there are existing observational instruments to assess structure (Haerens et al., 2013; Smith et al., 2015), the EPTE scale adds additional value to the measurement of effectiveness of task presentation. The EPTE is a quantitative self-report instrument that focuses on measuring structure before the activity. It is an important clarification, as it has been stated that structure before and structure during the learning process are different (Haerens et al., 2013). Moreover, the instruments used in physical education to measure teacher' task presentation do not consider the teacher ability to communicate information on performance in a way that gives the students an accurate motor plan for performance, meanwhile this aspect has been specifically addressed in the EPTE when measuring the effectiveness of coaches' task presentation for athletes. Furthermore, the EPTE scale would contribute to stimulate research on the role that task presentation plays, not only in the coaching context, but also in the physical education context. These two contexts (sport and physical activity) share common features, but nevertheless they are also distinct and have unique attributes. Thus, future research could consider validating the use of the EPTE in physical education contexts, as it could be easily applied just

rewording the items (making reference to "my teacher" instead of "my coach"). Finally, taking into account that coach's task presentation has not been thoroughly studied from the perspective of SDT, the development of the EPTE will allow continuing this line of research on coaches' task presentation effectiveness testing the complete sequence of the SDT, and adding some interesting questions that could be addressed. For example, as the EPTE focus in measuring the structure before the activity, that could be interesting to study whether athletes having their needs satisfied during task-presentation would predict overall reports of need satisfaction.

Within sport context, it is likely that coaches present tasks at multiple times throughout a session. Although in the physical education context it has been stated that structure before the activity is most prominent in the beginning of the lesson and decreases during the rest of the lesson (Haerens et al., 2013). On the one hand, according to Coker (2009), task presentation at the beginning of the lesson should focus athletes' attention on the critical elements (cues), and make them aware of major technical features of the new task or skill. Once this idea of the movement has been conveyed, the focus of the instructions should shift to develop athletes' skill level. On the other hand, when presenting a task during a session, the coach's role is to develop clear task presentations and translate movement into verbal and visual (demonstration) pictures for the athletes (Coker, 2009; Rink, 2013) in a way that organize cues and facilitate the athlete's development of a motor plan (Rink, 2013). Coaches can facilitate the accuracy of the reproduction by sequencing the action with a few descriptive terms, and using the cues in a way that also communicates the dynamic qualities of the movement (Rink, 2013). When we say that the EPTE focus in measuring the structure before the activity, we should clarify that the activity can be proposed at the beginning of the session or at different times throughout the session. Otherwise, the EPTE scale does not cover the structure during the activity. We recognize that structure both before and during the activity, are important behaviors in the teaching process for ensuring motivation and other associated responses. Nevertheless, there are existing self-report questionnaires that measure structure during the activity (feedback behavior in sport). With this in mind, we considered important to fill the gap in the measurement of structure before the activity, by developing a quantitative self-report instrument.

In summary, the EPTE is a valid, reliable instrument for use in athletes. It gives the scientific community a self-report instrument with which to quantitatively determine the effectiveness of coaches' task presentation. Moreover, the results lend substantial support to the scale's relationship with variables studied by SDT in the sport context. Understanding the effectiveness of coaches' task presentation in the moments prior to training, when presenting a new task throughout a session, and potentially during match team talks, is an interesting and unique area of study in the context of sport that is worthy of future research. The development of the EPTE scale could contribute to the study of the influence of specific

behaviors used in the task-presentation phase of training/matches in sport.

In addition to the limitations mentioned throughout the discussion, other limitations of our study are highlighted next. First, one limitation of the present study is that the samples included only university teams. That point out a need for further research to determine whether the psychometric properties of the EPTE can be replicated with young athletes and with different performance levels of the athletes in sport, as the technical instructions may vary in sport according to age, experience in the sport and level of performance. Second, while the current study provides support for the psychometric soundness of the EPTE for Mexican university athletes, this measure should be tested with a variety of samples comprised of athletes from other Spanish speaking countries, and also the English version of the EPTE should be tested. However, the current study represents the first stage in the validation of the EPTE.

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