Changes in Present Mood States of Youth Soccer Players During the Competition Period

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Cambios en los Estados de Ànimo de Futbolistas Juveniles Durante el Periodo de Competición

Variações de Estados de Ânimo Presentes de Futebolistas Juvenis Durante um Período Competitivo

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Abstract

Atlhetes' mood states may vary depending on match contexts. This study analyzes present mood states variations over time in 18 male youth soccer players (M_{age}: 15.4 ± 0.266 years) during a competitive season. The Present Mood States List (PMSL) was applied for the assessment of present mood states 40 minutes before each Event in a sequence of training sessions and matches. The presence values of each PMSL Factor were calculated in each Event for each soccer player. Specific patterns of changes in mood states have been detected over time. Furthermore, depending on which Event was related to a specific match, some mood states differed in their pattern of change. The importance of including the dynamic component of time as an influential variable in athlete mood states changes is discussed.

Keywords: mood states, soccer, time course, Sport psychology.

Resumen

Estados de ánimo de los atletas pueden cambiar dependiendo de los contextos del juego. El estudio examinó los cambios en los estados de ánimo medidos en 18 futbolistas jóvenes del sexo masculino (promedio de 15,4 años $\pm$ 0.266) que ocurrieron en un periodo competitivo, dependiendo del decurso temporal. Para acceder a los estados de ánimo de los participantes, se utilizó la Lista de Estados de Ánimo Presentes (LEAP), aplicada 40 minutos antes de cada Evento de una secuencia de entrenamientos y partidos. Los valores de presencia de cada Factor de la LEAP en cada Evento se calcuralon para cada futbolista. Los patrones específicos de alteración de los estados de ánimo se encontraron dependiendo de los Eventos relacionados con una partida. La importancia de incluir el componente dinámico de la temporalidad como variable influyente en los modelos de variación del estado de ánimo de los atletas es discutida.

Palabras clave: Estados de ánimo, futbol, decurso temporal, psicología del deporte.

Resumo

Os estados de ânimo de atletas podem variar dependendo do contexto do jogo. Este estudo analisou variações de estados de ânimo de 18 futebolistas masculinos juvenis (M$_{idade}$: 15,4 ± 0,266 anos) ao longo de um período competitivo. A Lista de Estados de Ânimo Presentes (LEAP) foi utilizada para a avaliação dos estados de ânimo presentes cerca de 40 minutos antes de cada Evento, numa sequência de sessões de treinamento e jogos. Os valores de presença de cada Fator da LEAP foram calculados em cada Evento para cada atleta. Padrões específicos de variações de estados de ânimos foram detectados em função da passagem do tempo. Além disso, dependendo do Evento relacionado a um jogo específico, alguns estados de ânimo mudaram seu padrão de variação. A importância de incluir o componente dinâmico do tempo como variável influente nas variações de estados de ânimos em atletas é discutida.

Introduction

A subjective emotional experience - also understood as feeling or sensation - is the essence of an emotion, and its objective manifestations is observed in its influences on behaviour or by physiological signals from the body or brain are indirect indicators of these internal experiences. As a consequence, the best way to access these feelings is through verbal reports (LeDoux & Hofmann, 2018). Measures of subjective states assessed through verbal reports of the athletes, can describe psychological conditions (Bueno & Souza, 2019).

Engelmann (1986, p. 121) define mood states as a "fundamental patterns of general functioning and orientation", representing "the effect upon a person of his own configuration of activity", approaching what is understood as *feeling* in everyday language (Bueno & Souza, 2019; Engelmann, 1986). Altough the relevance to investigate the subjective athletes' experience presupone the study of a wide range of states, there are a primacy in investigations of negative aspects such as depression, anxiety and stress, mainly because these aspects could have a detrimental effect upon sports performance (Frame & Reichin, 2019; Rocha & Osório, 2018).

Studies about athletes' mood states have followed the same tradition, particularly using the Profile of Mood States – POMS (Chennaoui et al., 2016; Morgan, 1980), which has just one positive factor (Vigor) and five negative factors (Tension, Depression, Confusion, Angry and Fatigue), and has been pointed out as a limitation for the advancement of theoretical models and methods of intervention in this field (Hagtvet & Hanin, 2007; Hanin, 2012; Hernández, 2016; Prapavessis, 2000). Even with that, POMS has been widely used to investigate mood states in sport over the world.

Applicable instruments for the investigation of this wide range of mood states in sports contexts are necessary. The Present Mood States List (PMSL) elaborated by Engelmann (1986, 2001) is a Brazilian instrument which involves positive and negative mood states, resulting from wide empirical research performed in Brazil and could probabilistically give adequate access to subjective states of people. PMSL measures the presence of a person's mood states at the time when is responding and has been used in the investigation of Present Mood States in sport in Brazil (Bueno & Di Bonifácio, 2007, 2009; Bueno & Souza, 2019).

The understanding about how, when and why these *feelings* influence athletes remains unclear and contradictory, with "a scarcity of empirical evidence to support the timing, and content of psychological skill application during the time preceding competition" (Hagan et al., 2017a). For instance, Vega Marcos et al. (2008) described the mood states profile of professional soccer players assessed with the POMS in four precompetition events during the play-offs of a national championship and did not find significant differences in this profile, between the beginning and the end of the championship phase period. This study suggests the stability of mood states along time within the same championship phase. Torres-Luque, et al. (2013) analyzed the relationship between the evolution of training load, days of competition and mood states with the POMS in elite judo athletes during a competitive period and

detected effects of training load and competitive cycles on mood states, Fatigue in particular. In their study, Torres-Luque et al. (2013) extended the evaluation of mood states to training sessions, without limiting it to the days of competition. Box et al. (2018) examined mood states during a consecutive 5-week fitness competition (CrossFit® Open) involving five separate CrossFit® workouts. They data suggests that baseline mood (in a controlled setting) and pre-workout mood did not differ across the 5-weeks of the competition, In addition, they found certain negative moods increases immediately following the workout (i.e., Fatigue), but these values declined to pre-workout values during recovery, while feelings of Vigor remained elevated throughout the entire session.

Hagan et al. (2017b) examined the competitive anxiety responses of elite and semi-elite table tennis athletes as temporal events, based on the multidimensional anxiety theory as a framework (i.e. Martens et al., 1990) using the time-to-event paradigm. This paradigm takes into account the closeness of a relevant event (for instance, a championship match) as crucial aspect to modulate how athletes feel before the competition. Present Mood States were closely related to the different context conditions such as training load (Torres-Luque et al., 2013), championship phase (Di Bonifácio, 2013; Vega Marcos et al., 2008), perception of one's performance (Lewis et al., 2017), location of the match (R. C. da Silva, 2013), injury incidence (Olmedilla, Ortega & Gómez, 2014), sports performance (Borges-Hernández, 2016) and match outcome (Hassmén & Blomstrand, 1995; Nogueira, 2009).

Mood states of soccer players have also been studied using the PMSL (see Bueno & Souza, 2019 for a review). Nogueira (2009) described the profile of Present Mood States as a function of the positions of youth soccer players and related to the competition phase. The results showed a common profile of mood states for all athletes immediately before the match, but differences between before and after the game, as well as the presence of specific mood states for the different positions of the athletes and the influence of the match outcome

on post-match mood states. Dias-Silva (2013) revealed a common Present Mood States profile for soccer players and a specific Present Mood State profile for their positions, which were related to the behaviour of the players during the match.

The investigation of the Present Mood States and its changes over time is relevant in order to help construct the periodization of training and competition and also in order to permit psychological intervention aiming at a better preparation of the athlete for competition. Although, mood states seem to be stable during a competitive period, as suggested by the conclusions of Vega Marcos et al. (2008) and Box et al. (2018), the presence of different stimuli and contexts (such as phase of competition, field position, location, environment, social contacts and match outcomes), may modify the intensity and valence of these states as shown by Bueno and Di Bonifácio (2009), Nogueira (2009), Torres-Luque et al. (2013) and Hagan et al. (2017b). The aim of the present study was to examine wheter Present Mood States of youth soccer players' changes or not during a competitive period (sequence of matches and trainning sessions) as a function of the closeness of the match.

Method

Participants

Participated voluntairily 18 Brazilian soccer players (M_{age}= 15.4 years; SD = 0. 266) belonging to a U-15 male soccer team. This soccer team was disputing the second phase of a state championship and accepted to participate in the study after authorization of their parents. This study has been approved by the Ethics Committee of the institution responsible for the research[1].

Instruments

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To acess the athletes' Present Mood States, PMSL was used. In PMSL, mood states are accessed through 40 locutions presented in the first singular person that denote these mood states. A 5-point likert-type scale located at the side of each locution contains degrees of intensity to be responded by the participant. These 40 locutions are divided into 12 Factors, take into account the hedonic value and activation level of each item. In order to facilitate the description and identification of the data, the authors who have used the PMSL in the sporting context (Picoli, 2016; Silva, 2017) have named the following factors from the representative locutions: I—Humiliation/Anger, II—Fatigue, III—Hope, IV—Limerence/Empathy, V—Physiological Response, VI—Repulsion, VII—Interest, VIII—Surprise, IX—Hunger, X—Disregard/Envy, XI—Receptivity, and XII—Serenity.

Procedure

All athletes responded in the locker room to the PMSL (Engelmann, 1986) in three conditions: about 40 minutes before the last training session preceding the match (Training-Previous condition), about 40 minutes before the match (Match condition) and about 40 minutes before the first training after the match (Training-Post condition). Data were collected during three consecutive championship rounds, for a total of three Training-Previous condition (TR-PRE), three Matches condition (MATCH) and three Training-Post condition (TR-POST) assessments.

Data analysis

Players were divided into four groups, each referring to their field position: Goalkeepers (n=2), Defenders (n=7), Midfielders (n=7) and Forwards (n=2). The presence values of each PMSL factor, as proposed by Engelmann (1986), were calculated multiplying the value assigned by the participant on the scale at the side of each locution by its value of correlation (charge) with each factor. To permit comparisons envolving factors with diferent number of correlated locutions a standardization was done to put each value of presence of

each PMSL factor in a 0-1 scale. This standardization was done this way: In each PMSL factor, the maximum possible value was calculated by multiplying all its positive charges by 5 (maximum value of the PMSL scale at the side of the locution) and its negative charges by 1 (minimum value of the LEAP scale at the side of the locution) and the mean of the values obtained was calculated. For the minimum value the opposite was done: the positive charges were multiplied by 1 and the negative ones multiplied by 5 and the mean of the obtained values was calculated. From there, the minimum value obtained was adjusted to 0 (zero) and the maximum value was adjusted as well, corresponding to the scale proportion (for instance, if a minimum value was adjusted from 2 to 0, the maximum value was deducted by 2 as well). To the maximum value adjustment to 1 (one), it was divided by itself. Thus, the presence value obtained in the original scale (1 to 5) was also divided by the maximum value adjusted, having the value of presence of the PMSL factor. This scale standardization procedure was done for all presence values of all participants at all events. The mean values of presence of each PMSL factor were considered for statistical analysis.

Also, statistical analysis used the value of the Event Series, calculated by the mean value of the presence of PMSL factors in the TR-PRE, MATCH and TR-POST for the same round of the championship. Kolmogorov-Smirnov test was done and presented a normal distribution (p=0.068). Data were compared by analysis of variance (ANOVA) multivarieted with repeated measures of mixed-model. The *post hoc* Bonferroni test was used when significant differences were detected in the data. The level of significance was set at $p \leq .05$ and the calculations were made using the SPSS 20.0 software for Windows.

Results

The data reported refer to the comparisons of the mean values of all participants as a single group, since there were not statistically differences between values of the presence of PMSL factors as a function of player's field position. Factors I (Humiliation/Anger), VI

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(Repulsion), VIII (Surprise), IX (Hunger) and X (Disregard/Envy) showed very low presence values (> 0.30) throughout the study.

Comparison of the presence values of each Factor of a same Series between Events revealed changes in mood states as a function of time course (Figure 1). Temporal patterns of changes in mood states were detected, represented by Factors II (Fatigue), VII (Interest) and XII (Serenity). Factor II (Fatigue) presence values were higher for TR-PRE than for MATCH (p=0.001) and MATCH values were also lower than TR-POST values (p=0.002). For Factor VII (Interest) presence values, TR-PRE values were higher than TR-POST values (p=0.008) and MATCH values were also higher than TR-POST values (p=0.000). For Factor XII (Serenity), TR-PRE values were higher than TR-POST values in Series 1 (p= 0.023) and 3 (p=0.023), but were lower than TR-POST values in Series 2 (p=0.034). Thus, TR-PRE values were higher for Factor II (Fatigue) compared to MATCH values and MATCH values were higher for Factors VII (Interest) and XII (Serenity) compared to TR-POST values. TR-POST values of Factor II (Fatigue) were higher than MATCH values.

INSERT FIGURE 1 HERE

Comparison of the values for each Factor between Series revealed a change in mood states as function of time (Figure 2). Temporal patterns of mood state changes were detected regarding Factors IV (Limerence/Empathy) and VII (Interest). Higher Factor IV (Limerence/Empathy) presence values were detected for Series 1 compared to Series 2 (p=0.012). Factor VII (Interest) presence values were higher for Series 1 compared to Series 2 (p=0,003) and also to Series 3 (being marginally significant in the latter case, with $p = 0.055$). Thus Factor IV (Limerence/Empathy) presence values were higher in Series 1 than in Series 2 and Factor VII (Interest) presence values were also higher than those of Series 2 and 3.

INSERT FIGURE 2 HERE

Statistical analysis for the comparison of presence values between Events and the different Series revealed temporal patterns of change both as a function of Event and Series of Factors III (Hope) and XI (Receptivity). This means that an interaction was detected between Event and Series, showing that the presence values of the PMSL Factors depended on the type of Event and to which Series they belonged (Figure 3). The presence values of Factor III (Hope) in TR-PRE of Series 1 were higher than those of Series 2 (p=0.001) and 3 (p=0.000) and the TR-PRE values of Series 2 were higher than those of Series 3 (p=0.001). These data indicate a progressive decline of Factor III (Hope) from Series to Series. Analysis of Factor III (Hope) also showed higher presence values in Series 1 MATCH than in Series 2 (p=0.001) and 3 MATCHES (p=0.039), revealing the same pattern of decline along the Series of competition. Factor XI (Receptivity) showed the same pattern of reduction of TR-PRE presence values in Series 1 compared to Series 2 (p=0.001) and 3 (p=0.000), as well as higher presence values in Series 1 MATCHES compared to Series 2 (p=0.005) and in Series 2 MATCHES compared to Series 3 (p=0.028). It can be seen that Factor VII (Interest) also showed statistically significant differences depending on Event and Series, but no interaction between these variables.

INSERT FIGURE 3 HERE

Factor V (Physiologic) was the one showing the greatest change during the study since the differences detected showed a pattern of Factor presence over the time course of the sequence of Series of Events, side by side with specific changes in Series 3. The TR-POST presence values were higher than MATCH and TR-PRE values for all 3 Series. In Series 3, some changes were detected in the presence values of this Factor compared to Series 1 and 2. TR-PRE presence values were higher in Series 1 (p=0.007) and 2 (p=0.000) than those of the MATCHES of both series, but the TR-PRE value of Series 3 was lower than that of MATCH 3 (p=0,000). The MATCH presence values differed between the 3 Series, with the Series 2

MATCH value being lower than those of Series 1 and 3. Thus, analysis of the interaction between Series and Event revealed a common pattern for the presence of mood states Factors along the temporal sequence for all 3 Series, although there were some significant and specific changes in Series 3 compared to Series 1 and 2.

INSERT FIGURE 4 HERE

Discussion

The results of the present study, considering the time course between training sessions and matches, are in according to time-to-event paradigm (Hagan et al., 2017b), which these event are an important influence to Present Mood States variations as well as the influence of match outcome. Although the match outcome was not the aim of the present study, the discussion of the results takes into consideration the fact that the participant team was defeated in all matches.

Patterns of change in Present Mood States represented by PMSL Factors II (Fatigue), VII (Interest) and XII (Serenity) were detected between Events (TR-PRE, MATCH and TR-POST), suggesting that the temporal patterns of change in these mood states are repeated along time. While the presence value of Factor VII (Interest) increased with proximity to the match, the presence of Factor II (Fatigue) decreased concomitantly. Torres-Luque et al. (2013) showed that the value of the Fatigue Factor of the POMS also decreased before the competition, then increasing after it, as expected after physical and mental effort during a sequence of training sessions and matches. Nogueira (2009) reported that youth soccer players showed high values of presence in the locution "I am tired", which is the one with the highest load in Factor II (Fatigue), immediately after the matches, regardless of the outcome. Although in the present study the evaluation was performed 48 hours after the matches, as recorded in the TR-POST, the high presence of Factor II (Fatigue) after the competition persisted. Russell et al. (2019) highlighted an inconsistency of studies about mental fatigue in

sports, especially its influence on sports performance and stressed the need to "improving the ecological validity of research in the area of mental fatigue and sport". A possibility to do this advance, according to them, is to investigate the effect of mental fatigue on performance over a season.

Factor VII (Interest) seems to be a Factor present about 40 minutes before the match, as also shown by Bueno and Di Bonifácio (2007), Dias-Silva (2013), Di Bonifácio (2013) and Silva (2013). Factor VII (Interest) can be considered related to organic activation and motivation. Pujals and Vieira (2002) reported that a specific interest (improving performance) is present in young soccer athletes, which is a motivational Factor linked to the need of achievement (Brunstein & Heckhausen, 2018) and to intrinsic and extrinsic motivation (Brunstein, 2018). Gea Garcia et al. (2016) showed that the temporal proximity of competitive matches causes an increased intensity of Vigor and Tension (POMS Factors) in college athletes. In the current study, the highest presence values of Factor XII (Serenity) were detected temporally more distant from the matches. It is important to note that the level of competition and the age range are different between these studies and an investigation of the influence of these aspects to the presence of this Factor will be relevant.

Presence values of Factors IV (Limerence/Empathy) and VII (Interest) differed in their patterns of change according to a Series of Events, as shown by the mean presence values of PMSL Factors related to the same match. The mean presence values of Factors IV (Limerence/Empathy) and VII (Interest) decreased as soon as the chances of classification for the next championship phase became improbable (between Series 1 and 2 Matches), with the team already eliminated from the competition after the second match and participating in the remaining matches only for a perfunctory appearance. The relationship between these Factors within this context can be understood in terms of the interaction between group cohesion (Lafferty et al., 2017) and achievement goals (Mascret et al., 2015). The elimination may

have affected group cohesion, explaining the reduced value of Factor IV (Limerence/Empathy). Thus, these data suggest that, regardless of this unfavorable context, the mood states related to these PMSL Factors are commonly observed in competitive collective sport experience.

Depending on the type of Event and on the Series to which it belonged, Factors III (Hope) and XI (Receptivity) showed specific patterns of change. The mean presence value of Factor III (Hope) was reduced as soon as the possibility of the team to be disqualified increased or was already defined. Even so, this Factor was present in all Events of the study period. This PMSL Factor was present in the early international competition phases among elite voleyball players, although the values did not continue to be high during the course of the competition (Di Bonifácio, 2013). Pujals and Vieira (2002) also observed that Hope was a positive psychological Factor among youth soccer players, influencing performance in the field.

Nogueira (2009) and Silva (2013) showed high presence values in locution with a greater correlation load with Factor XI (Receptivity) after the matches in which they were defeated for midfielders. In the present study, no difference was detected between groups regarding this PMSL Factor. This may have occurred due to the fact that, in the present category (U-15), unlike adult categories examined in other studies, players had little specialization for each function to be performed in the field. However, this factor was found to be present after the defeats even though its presence value was reduced compared to the Match values.

Factor V (Physiologic) showed the greatest changes during the competition. It is possible that the locutions correlated with this Factor ("I feel cold", "I feel warm" and "I am thirsty") are highly sensitive to situational and contextual conditions. In this study, experimenter can identify contextual conditons, as related to the chances of classification in

the championship. Besides, situational conditions was observed, as training sessions at times performed on a synthetic grass field and at others on a natural grass field, the meteorological conditions during the Events. These conditions, however, were not experimentally controlled in the present study.

Mood states analyzed in the present study showed differences that could be attributed to the match as an important temporal reference for these changes. Time-perspective can be an important aspect to be studied in terms of predict how these mood states changes over time (Stolarski et al., 2019). The assessment with two-day distance to the match revealed diverse mood states during the present study. Other studies have shown a relationship between the mood states of athletes and the time course during a competitive period. Using the POMS at different time points, Keikha et al.(2015) evaluated the mood states of university athletes acting in different sports and showed that the mood states profile of the participants was different only one day before the competitions and remained stable when evaluated one hour and one week before the competition (cf. Vega Marcos et al., 2008). Hassmén and Blomstrand (1995) assessed the mood states profile of soccer players with the POMS about one hour before the match, immediately after a match and two hours after a match and detected differences in the mood states profile of the athletes between these different time points. These differences were related to the results obtained by the team in the matches evaluated.

Some elements such as the chance of classification and the outcome of matches (defeat in particular) influenced the way the Present Mood States changed during the present study period. It was perceived by changes in the presence of PMSL Factors showing the increased intensity of the locutions involving Present Mood States of negative hedonic value such as "I am angry", "I am sad", "I feel humiliated" and "I feel ashamed" after the matches and by the reduction of presence values of Factors III (Hope) and VII (Interest) at the end of

the study period, since the team no longer had any chance of classification. Studies report that defeat elicits negative emotions and reduces positive emotions among the athletes after a competition (Ahmadi et al., 2015; Lewis et al., 2017; Rubio, 2006) and that the intensity of negative mood states changes as the competition progresses (Bueno & Di Bonifácio, 2007). Further studies may confirm how other results (a tie and winning) will influence the presence of specific Present Mood States and their changes along a competititive period.

In the present study, analysis of Present Mood States revealed significant differences in the their presence values along the time sequence of the competition, suggesting that investigation with an instrument such as the PMSL, made in Brazil with Brazilian population, may be more appropriate to investigate these aspects. PMSL contains more positive and negative mood states than other instruments like POMS, increasing the spectrum of possibilities of relationships with other variables of the sport context linked to the changes in Present Mood States of the athletes. The applicability of PMSL to investigate Present Mood States is very quickly and was compared to confirm the concordance level of other instruments as PANAS (Pires et al., 2013). The results agreed with those obtained with the PMSL by Bueno and Di Bonifácio (2007), Dias-Silva (2013), Di Bonifácio (2013), Nogueira (2009), Silva (2013). The presence of Factors III (Hope) and VII (Interest) and of the locution "I am happy" (a locution negatively correlated with Factor I - Humiliation/Anger, decreasing the presence value of this Factor) reveals a common mood states among Soccer, Football, Volleyball and Futsal athletes before the matches.

The present study expands the investigation of Present Mood States of athletes by assessing them not only immediately before a match, but also during the training sessions, allowing the analysis of changes in these mood states as a function of time course during a competitive period. Martini (2000 pp. 103) pointed out that "The psychological preparation of sportsmen (...) should be based on systematic interventions carried out according to a

program that will accompany and consider the succession of sport events". The data obtained in the present study permit a better understanding of how, when and which mood states change, providing better support to the planning and implementation of interventions in the preparation of athletes for competition. Thus, it is important to include the dynamic component of temporality as a variable affecting the models of variation of neuropsychological processes (Staddon & Bueno, 1991), especially in investigations of subjective aspects such as Present Mood States within the sport context.

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Author's Contribution

Picoli, R. M. M.: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Visualization, Writing – original draft and Writing – review & editing.

Bueno, J. L. O: Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation and Writing – review & editing.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the manuscript reported in this paper.

FIGURE 1
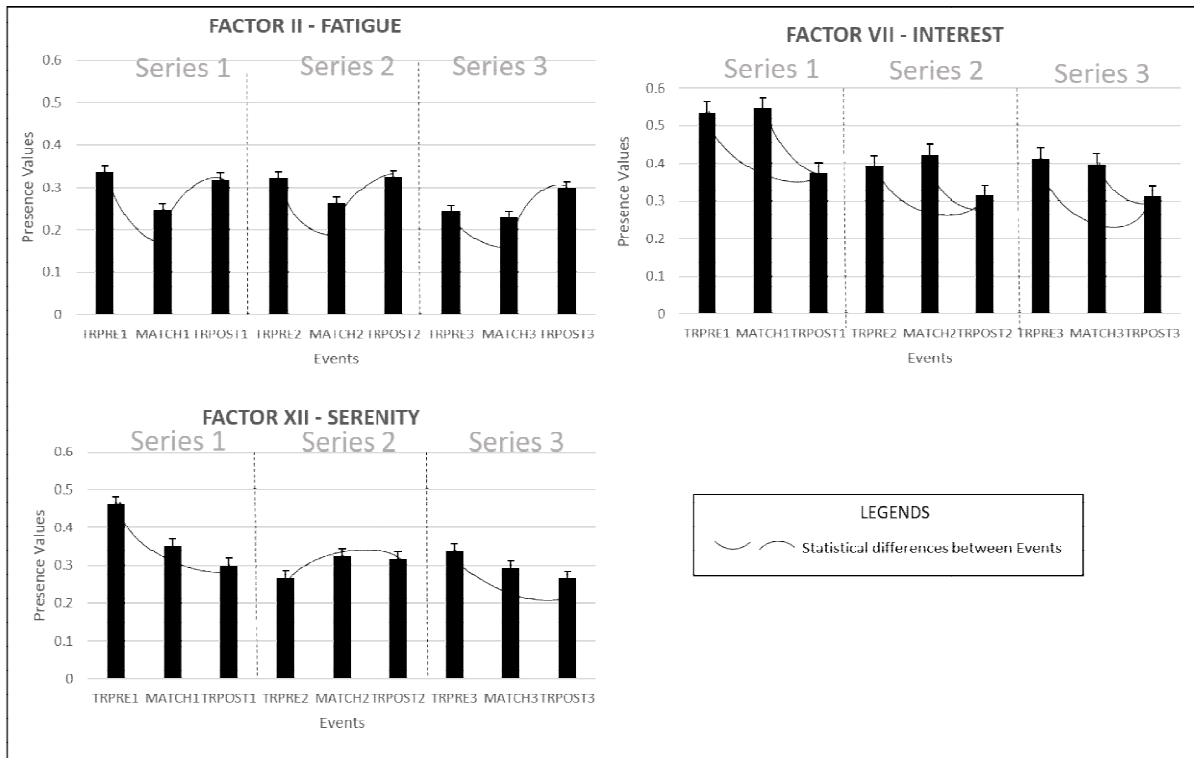
Figure 1. **Mean values of Factors II (Fatigue), VII (Interest) and XII (Serenity) and statistically significant differences detected in the comparison as a function of Events, indicated by connecting lines.**

FIGURE 2
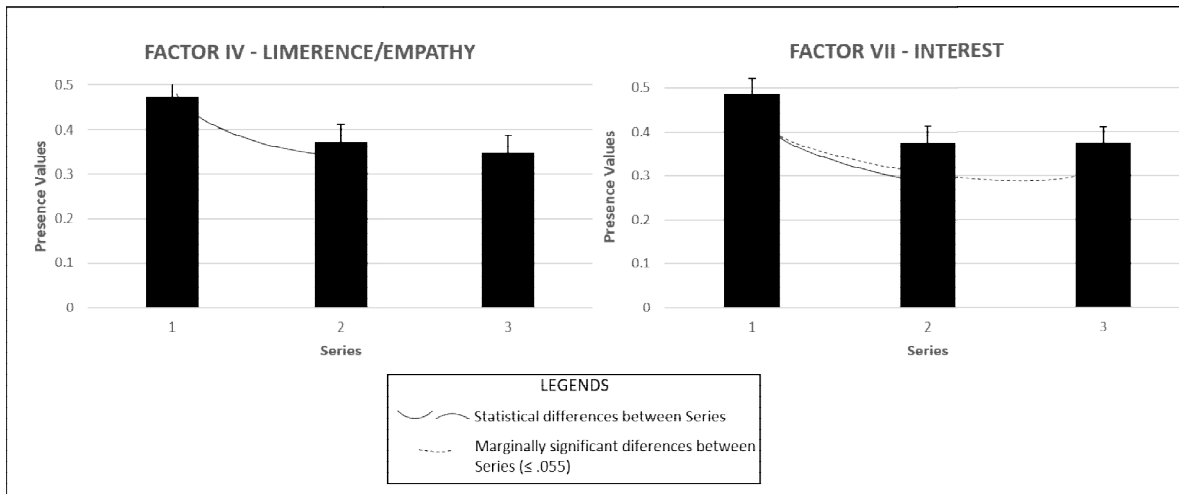
Figure 2. **Mean values of Factors IV (Limerence/Empathy) and VII (Interest) and statistically significant differences detected in the comparison as a function of Series.**

FIGURE 3
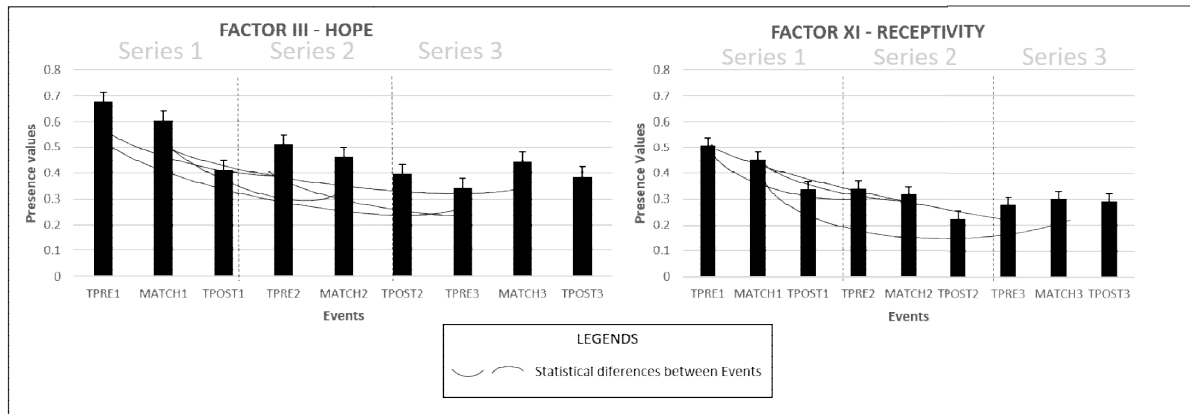
Figure 3. **Mean values of Factor III (Hope) and XI (Receptivity) and statistically significant differences detected in the comparison as a function of Events and Series.**

FIGURE 4
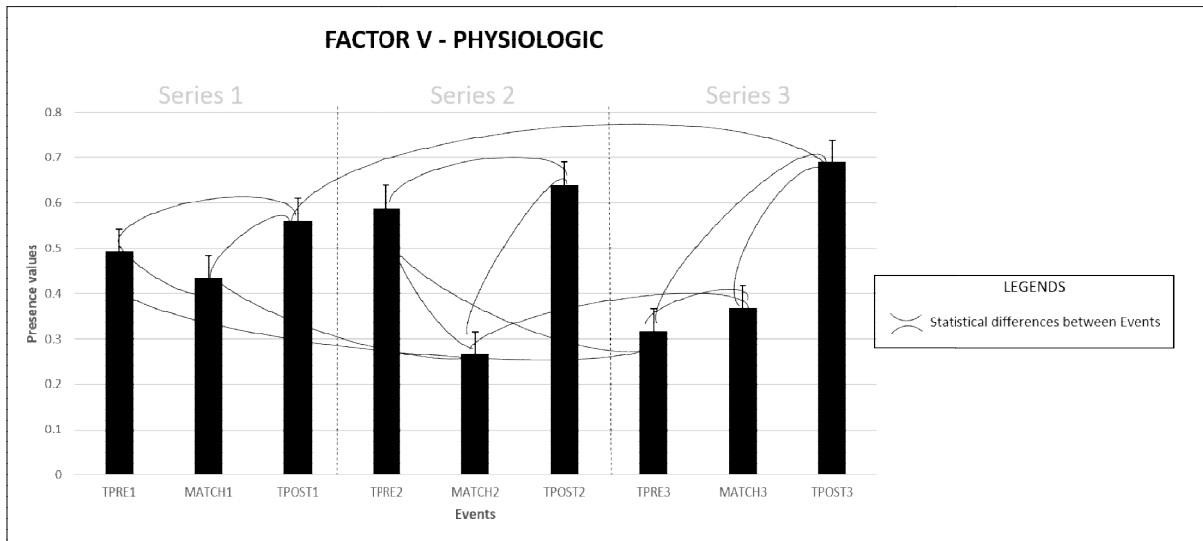
Figure 4. **Mean values of Factor V (Physiologic) presence and the statistically significant differences detected in the comparison as a function of Events, Series and their interaction.**

This preprint was submitted under the following conditions: