Predicting and Differentiating Flow Experience in Sport: The Contribution of Dispositional and State Variables

IOANNIS KTISTAKIS
NIKOLAOS APOSTOLIDIS
Section Team Sports, School of Physical Education and Sport Science
National and Kapodistrian University of Athens
GREECE

NEKTARIOS A.M. STAVROU
Sport Psychology & Motor Behavior Laboratory
School of Physical Education and Sport Science
National and Kapodistrian University of Athens, GREECE
Sport Psychology Lab, Hellenic Sports Research Institute
Olympic Athletic Center of Athens "Spyros Louis"
GREECE

Abstract

Flow is characterized by positive affect, centering of attention, absorption, spontaneous action, total immersion in performing an activity, having the athlete an immediate and unambiguous feedback about his/her performance. The purpose of the current study was to examine whether sport-specific cognitive schemata (trait and state variables) constitute significant predictors of flow states, and second whether significant differences exist in flow experience based on the balance between challenge of the competition and athletes' skills. Two hundred and seventy five (275) athletes ranging in age from sixteen (16) to twenty nine (29) years (M= 19.40, SD=3.10) (158 males, 117 females). The athletes who volunteered participated in the study, filled in the Trait-Sport Confidence Inventory, the Perception of Success Questionnaire, the Sport Anxiety Scale-II based on how they usually feel when they compete in sports. One hour before the competition the athletes completed the Competitive State anxiety Inventory-2 (intensity and direction), the challenge of the game, and the skills of the athlete, whereas just after the competition the athletes complete the Flow State Scale-2 based on how they felt during the competition. Athletes in the flow and relaxation quadrants revealed the most optimal states, whereas the athletes in the apathy groups showed the least optimal state. Hierarchal regression analysis demonstrated significant prediction of athletes' flow experience based on dispositional (confidence, task orientation) and state variables (self-confidence, direction of anxiety symptoms). The results of the present study provide fruitfully information to the athletes, coaches, and sport psychology consults regarding the link of personal and situational characteristics in the experience of optimal mental state.

Key words: flow experience, challenge, skills, trait-state variables

Introduction

The optimal stimulation theory has emerged from Chikszentmihalyi's work, which refers to the enjoyment and the experience of flow states in work and leisure activities (Chikszentmihalyi, 1975, 1990, 1997; Chikszentmihalyi & Chikszentmihalyi, 1988; Chikszentmihalyi & Rathaunde, 1993). The term "flow" is defined as "a subjective state that people report when they are completely involved in something to the point of forgetting time, fatigue, and everything else by the activity itself" (Chikszentmihalyi & Rathaunde, 1993, p. 57). This state is characterized by positive affect, a focus of attention, absorption, spontaneous action, total immersion in performing an activity, perception of control over actions and environment, immediate and unambiguous feedback, distortion of time and perception of superior functioning (Chikszentmihalyi, 1988; Jackson, 1992a,b). Research findings in sport settings (e.g. Jackson, 1992, 1996; Jackson & Roberts, 1992) showed that elite athletes experience flow often during their training or competition, and contend that flow is an important factor of their sport experience, but also in their sport performance (Stavrou, Zervas, Karteroliotis, & Jackson, 2007; Swann, Keegan, Crust, & Piggott, 2016). Chikszentmihalyi (1975, 1982, 1990) states that whether or not the athlete will experience flow depends on one's perception of the challenges and skills than on the objective nature of them.

When the challenge and skills are in balance in a level above his/her average, the person enjoys the moment and aims to learn new skills, which is helpful in experiencing higher self-esteem. Thus, the person feels that he or she can act upon them without feeling of boredom, anxiety, or worry. On the other hand, when the skills outperform the challenge, relaxation exists. Also, when the skills and challenge are below average, apathy exists, and when the challenge outweigh skills the person will feel anxiety.

In sport activities, Stein, Kimiecik, Daniels, and Jackson (1995), based on the aforementioned balance between challenge and skills, divided the athletes into four groups, that are: apathy (low challenge-low skills), anxiety (high challenge-low skills), relaxation (low challenge-high skills), and flow (high challenge-high skills). The results showed that flow and relaxation groups revealed the most positive experience, indicating that the skills of the person are more important than the challenge of the situation. The athletes of the anxiety group revealed the lowest quality of flow experience (Stavrou et al., 2007).

In addition to the above, research findings have showed that certain dispositional and state factors, as well as situational characteristics interact with the sport situation to determine whether or not an athlete will experience flow (Kimiecik & Stein, 1992). Also, they considered that state personal factors will be more closely related to specific flow experiences than corresponding dispositional factors.

A number of researchers (e.g., Duda, 1988, 1992; Jackman, Swann, & Crust, 2016; Jackson & Roberts, 1992; Privette, 1983; Stavrou, Psychountaki, Georgiadis, Karteroliotis, & Zervas, 2015; Stein, Kimiecik, Daniels, & Jackson, 1995) maintain that athletes with a task orientation experience flow more frequently than athletes who are ego oriented. Task orientation may enable athletes to be more concentrated on the task at hand, leading to task absorption, and being free from the concern of the outcome (Stavrou et al., 2015). These may lead the athletes to experience flow. On the other hand, ego-involved athletes may also experience flow, although it might be more difficult, since ego-involvement is more likely to produce states of apathy or anxiety. Jackson (1988), Jackson and Roberts (1992), and Jackman et al. (2016) sustained that college athletes high in task orientation had more flow experiences than athletes low in task involvement, whereas an ego goal orientation was not related to flow experiences. In line with the above, Stavrou et al. (2015) revealed a close link between the orthogonal models of flow and goal orientation.

Research findings on flow suggest that competitive anxiety is not a state or concept that will produce optimal experience, but an emotion that will prevent, disturb, or induce flow (Jackson, 1995; Stein et al., 1995). Athletes who continuously compare their ability to others and are consumed by objective outcomes (win/loss) are more likely to perceive more competitive situations as overly challenging, and maybe threatening, which lead to higher levels of anxiety (Jackson & Roberts, 1992). Kimiecik and Stein (1995) separating the athletes into apathy, anxiety, relaxation, and flow group sustained that the athletes of the anxiety group revealed the lowest levels of flow experience. Jackson (1992a,b, 1995), and Jackson and Roberts (1992) recognized anxiety as a critical factor of flow, and suggest that it will have a negative, debilitative effect on flow state. Also, Catley and Duda (1997), and Stein *et al.* (1995) found that athletes who were classified as having flow experience showed higher confidence than the group of athletes in the anxiety state. Stein *et al.* (1995) indicate that some students could interpret anxiety as enjoyable. This could be attributed to the fact that, in a task oriented student class (focus on learning), students usually interpret situations where challenges outweigh skills as challenging, not threatening, which is more often in competitive environment.

Jackson's (1992a,b, 1995) interviews with elite athletes, Stein *et al.*, (1995), and Catley and Duda (1997) showed that the most frequent and important factor for getting into flow was confidence. The fact that many athletes referred confidence as being important for them to get into flow, indicates that it is a critical component in the challenge-skill balance for elite athletes. A highly confident person can focus on the task, and the experience being less worried about the outcome or the evaluation from others (Jackson & Roberts, 1992). People with low confidence may worry about their performance, making them quite self-conscious, which may lead to non-flow experiences. As Csikszentmihalyi (1990) points out, high self-consciousness can prevent or induce flow experiences. In addition, highly confident people are more likely to perceive that their skills will match the challenges of the situation, than people with low confidence (Jackson, 1992a,b; Jackson & Roberts, 1992). Providing additional support to above findings Jackman et al. (2016) revealed that mental toughness can facilitate the experience of flow.

The purpose of the current study was to examine whether sport-specific cognitive schemata (trait and state variables) constitute significant predictors of flow states, and second whether significant differences exist in flow experience based on the balance between challenge of the competition and athletes' skills. Based on the purpose and the research design of the present study the following hypotheses have been examined: (1) Athletes in flow state experience the most optimal experience compared to the athletes in apathy, anxiety, and relaxation state.

(2) Athletes' trait characteristics (anxiety, confidence, goal orientation) and state variables (anxiety, confidence,) constitute significant predictors of flow experience.

Materials and Method

Participants

Two hundred and seventy five (275) athletes ranging in age from sixteen(16) to twenty nine(29) years (*M*= 19.40, *SD*=3.10) (158 males, 117 females). The participants were involved in individual (166 athletes) and team(109 athletes) sports. The selection of the subjects was based on the following criteria: (a) to have at least two years of competitive experience, and (b) participation in at least ten competitions. The competitive experience of the subjects ranged from two to eighteen years (*M* = 6.63, *SD*= 3.98) and from 10 to 500competitions events with a mean of approximately eighty two (82) games (SD = 73.78).

Instruments

Trait Sport Confidence Inventory. The Trait Sport Confidence Inventory (TSCI; Vealey, 1986), was used to measure the magnitude of trait sport self-confidence the athletes usually experience. The scale contains 13 items, and the subjects responded on a 7-point Likert format, from «1» (hardly ever) to «7» (very much). The scale showed acceptable internal consistency (Cronbach *á* .93), with test-retest reliability .90.

Perception of Success Questionnaire. The Perception of Success Questionnaire (POSQ; Roberts, Treasure,&Balague, 1998) was used to measure task and ego orientation. The POSQ is a sport specific questionnaire which contains two subscales (task and ego orientation). Ego and task orientation is measured by six items each. The subjects were asked to indicate when they felt most successful in their sport participation. The subjects respond on a 5-point Likert scale, from «1» (strongly disagree) to «5» (strongly agree). The questionnaire showed acceptable rates in the internal consistency (Cronbach *α* for task orientation .87 and .85 for ego orientation). In addition, the confirmatory analysis supported the two-factor structure.

Sport Anxiety Scale-II. The Sport Anxiety Scale-II (SAS-II; Smith, Smoll, Cumming, &Grossbard, 2006)was used to evaluate the intensity of anxiety the athletes' usually experience prior to the competition. The SAS-II contains three subscales: (a) somatic anxiety, (b) worry, and (c) concentration disruption, and consists of 15 items. Participants rated their responses to each subscale based on the intensity of their experience in each item, using a 4-point ordinal scale from 1 "Not at all" to 4 "Very much". Internal consistency analysis indicated acceptable Cronbach a indices (above .70) as well factor structure validity.

Competitive State Anxiety Inventory-2. The Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) was used to measure cognitive anxiety, somatic anxiety, and self-confidence. A 4-point Likert scale format was utilized as a response type to measure the intensity of cognitive anxiety, somatic anxiety, and self-confidence. The ratings of the intensity scale range from «1» (Not at all) to «4» (Very much). In addition, a 7-point Likert scale was used to measure the direction facilitative-debilitative of the three factors with the anchoring of "-3" representing "very debilitative" to "+3" as "very facilitative". CSAI-2 showed acceptable rates in the internal consistency for the intensity and direction scale in the three different time measure (Cronbach *á* for cognitive anxiety .76-.82 and .75-80, somatic anxiety .70-.78 and .81-.84, and self-confidence .89-.90 and .85-.87) respectively. The intensity and the direction scale of CSAI-2 showed the same factor structure and accepted internal consistency which points out that CSAI-2 can measure intensity and the direction of cognitive anxiety, somatic anxiety and self-confidence.

Flow State Scale-2. The Flow State Scale-2(FSS-2; Jackson & Eklund, 2002) was used to measure the magnitude of flow characteristics during a competition. The FSS-2 contains nine factors: (a) challenge-skill balance, (b) action-awareness merging, (c) clear goals, (d) unambiguous feedback, (e) concentration on task at hand, (f) sense of control, (g) loss of self-consciousness, (h) transformation of time, and (i) autotelic experience. Each subscale consist of 4 items, with the total instrument to contain 36 items. The subjects responded on a five point Likert scale with anchors of "1" (strongly disagree) to "5" (strongly agree). The subscales' internal consistency rates ranged from .70 to .90. Confirmatory analysis supported the nine factor solution.

Challenges and Skills Measures. Two 11-point Likert type scales were administered to measure the challenge of the competition, and the perceived skill levels. The two scales were: (a) "How challenging was this event for you?", measuring the perceived challenge of the competition, and (b) "How skilled were you in this event?", measuring the perceived skills of the athlete.

Demographic information. A questionnaire was developed to collect demographic information concerning the subjects such as age, sex, sport, competitive experience in years, and competitions.

Procedure

Following the ethical approval from the Department Ethical Review Board the first author conducted the coaches and the athletes who volunteer to participate in the study. The procedure of this study included the following phases: (a) the selection of the participants, participants agreement, as well as background and demographic information, (b) the completion of the trait questionnaires (SCAT, TSCI, POSQ, SAS-II) in non-competitive situations. Additionally, the athletes completed CSAI-2 and the two additional scales (challenge of the game, skills of the athlete) 30 minutes before the competition based on how they felt during the time of completion. Also 15 minutes after the competition the athletes completed the FSS-2 on the basis of how they felt during the competition.

Statistical analysis

Multivariate statistical analyses were applied to examine the purposes of the study. In order to examine whether athletes in the four experiential states (apathy, anxiety, relaxation, flow) differed significantly in the FSS-2 subscales, multivariate analysis of variance (MANOVA) was applied. In the following, univariate ANOVAs were performed on the subscales where there were significant MANOVA effects (Tukey test). In addition, Bonferroni adjustment was applied to control for the inflation of Type I error (Tabachnick & Fidell, 2006). Hierarchical regression analysis was conducted to examine the level of prediction of the dispositional and state factors on flow experience (Cohen, Cohen, West, & Aiken, 2003; Tabachnick & Fidell, 2006).

Results

Orthogonal model of flow theory. The athletes were separated, based on median splits, into low and high groups based on the scales "situation challenge" and "athlete's skills".This method has been used by researchers who examined similar variables (e.g., Stavrou et al., 2007, 2015; Stein *et al.,* 1995). Thus, based on the orthogonal model of flow, the athletes were separated into four states: *apathy* (low challenge–low skills), *anxiety* (high challenge–low skills), *relaxation* (low challenge–high skills), and *flow* (high challenge–high skills). Multivariate analysis of variance (MANOVA) results indicated significant differences between the four states (Wilks' Lambda = .589, $F_{3,271}$ = 5.665, p<.001). Follow-up ANOVAs (Tukey test) on each dependent factor, applying Bonferroni adjustment, indicated significant differences in the following subscales: challenge-skill balance ($F_{3,271}$= 31.971, p<.001, η^2_p = 0.261), action-awareness merging ($F_{3,271}$ = 7.041, p<.001, η^2_p = 0.072), clear goals ($F_{3,271}$ = 30.458, p<.001, η^2_p= 0.252), unambiguous feedback ($F_{3,271}$ = 16.327, p<.001, η^2_p = 0.153), concentration on task at hand ($F_{3,271}$ = 12.960, p<.001, η^2_p = 0.125), sense of control ($F_{3,271}$ = 13.697, p<.001, η^2_p = 0.132), loss of self-consciousness ($F_{3,271}$ = 9.830, p<.001, η^2_p = 0.098), and autotelic experience ($F_{3,271}$ = 9.241, p<.001, η^2_p = 0.093). The athletes in the flow and relaxation quadrants showed higher mean values in the FSS-2subscales, compared to the athletes in the apathy and anxiety states who indicated lower values in flow experience (Table 1.).

Table 1. Means (M), standard deviations (SD) among apathy, anxiety, relaxation and flow quadrantson the FSS-2 Subscales

Groups **FSS-2 Subscales**	Apathy *M(SD)*	Anxiety *M(SD)*	Relaxation *M(SD)*	Flow *M(SD)*
Challenge-skill balance	11.36 (2.82)	12.98 (3.47)	13.60 (3.68)	15.70 (2.53)
Action-awareness merging	11.91 (2.85)	11.74 (3.10)	13.36 (3.82)	13.67 (2.99)
Clear goals	13.36 (3.10)	15.15 (2.18)	16.04 (2.89)	17.14 (2.41)
Unambiguous feedback	11.40 (3.04)	12.35 (3.37)	13.30 (4.10)	14.67 (2.83)
Concentration on task at hand	13.03 (3.48)	14.46 (3.00)	15.32 (3.48)	15.89 (2.76)
Sense of control	12.70 (3.08)	14.02 (2.81)	14.57 (3.93)	15.67 (2.84)
Loss of self- consciousness	11.94 (3.85)	12.13 (4.28)	14.87 (3.17)	14.08 (3.30)
Transformation of time	11.56 (2.91)	12.50 (3.42)	10.85 (3.94)	11.89 (3.53)
Autotelic experience	11.64 (4.22)	13.76 (5.42)	13.36 (4.96)	13.62 (4.63)

Predicting flow experience

An hierarchical multiple regression analysis was conducted to determine the importance of individual characteristics, as well as, trait and state variables in the prediction of flow experience. The hierarchical multiple regression analyses (Tabachnick & Fidell, 2006) was used in order to examine the contribution of each of the TSCI, POSQ, SAS-II, and CSAI-2 (intensity and direction dimension) subscales in the prediction of athletes' flow experience.

In the regression analyses the athletes' demographic information, the trait variables (anxiety, confidence, goal orientation) and the state variables (cognitive anxiety, somatic anxiety, self-confidence) served as the predictor variables, whereas the athlete's total flow experience as the dependent variables in the regression analysis. Table 2 displays the unstandardized regression coefficients (*B*), standardized regression coefficients (β), t-values, and the level of significance (*p*) (Cohen et al., 2003; Tabachnick & Fidell, 2006).

The regression analysis results showed that the *R* for regression in the 1st Step was not significant F (4, 270) = 1.22, *ns*, the value of R^2 was .018 and adjusted R^2 .003. The *R* for regression in the 2nd Step was significant F (6, 264) = 6.356, $p < .001$), and the values of R^2 as well as adjusted R^2 were .19 and .16, respectively. Additionally, there was a significant increase in the prediction value compared to the 1st step (R^2_{change} = .18, F_{change} = 9.628, *df* 6,264, $p < .001$). The significant predictors in the 2nd Step were trait self-confidence (β = .25), and task orientation (β = .22). The 3rd Step was significant F (6, 258) = 12.880, $p < .001$ and the values $R^2$and adjusted R^2were .44 and .41, respectively. A significant increase in the prediction value revealed in comparison to the 2nd Step (R^2_{change} = .25, F_{change}= 19.340, *df* 6 258, $p < .001$). The significant predictors in the 3rd Step were the self-confidence (intensity) (β= .27), cognitive anxiety (direction)(β= .17), and self-confidence (direction) (β= .31)

Table 2. Hierarchical multiple regression analyses predicting athlete's flow experience from dispositional and state variable

	Total flow experience		
Step andvariables	B	Beta	*t*
Step 1 (R^2 = .018, F = 1.22, *df*4,270, ns)			
Gender	-.148	-.031	-.501
Age	.056	.073	1.004
Experience (in years)	.056	.093	1.085
Experience (in competitions)	-.001	-.028	-.394
Step 2 (R^2=.19, F= 5.356, *df*10,264, p<.001)			
Gender	-.026	-.005	-.092
Age	.029	.038	.559
Experience (in years)	.023	.038	.478
Experience (in competitions)	-.002	-.077	-.998
Trait self-confidence	.048	.250	3.275***
Ego orientation	-.015	-.032	-.562
Task orientation	.115	.217	3.568***
Somatic anxiety	.030	.082	1.106
Worry	-.062	-.141	-1.660
Concentration disruption	-.039	-.049	-.757
Step 3 (R^2=.44, F= 12.88, *df* 16,258, p<.001)			
Gender	.245	.051	1.015
Age	-.007	-.009	-.160
Experience (in years)	.036	.060	.881
Experience (in competitions)	-.002	-.075	-1.143
Trait self-confidence	.021	.108	1.641
Ego orientation	-.005	-.010	-.208
Task orientation	.065	.124	2.366*
Somatic anxiety	.011	.030	.436
Worry	-.023	-.052	-.656
Concentration disruption	-.012	-.014	-.263
Cognitive anxiety (intensity)	.055	.088	1.184
Somatic anxiety (intensity)	-.019	-.031	-.449
Self-confidence (intensity)	.164	.265	3.497***
Cognitive anxiety (direction)	.079	1.73	2.308*
Somatic anxiety (direction)	-.044	-.103	-1.371
Self-confidence (intensity)	.114	.311	4.006***

*p<.05, **p<.01, ***p<.001

Discussion

The present study sought to investigate the level of prediction of dispositional and state variables on athletes flow states. Flow seems to be a very sensitive measure, because it is a process that is changed very often, usually it has a short duration, depending upon personal and situational characteristics, and is closely linked to athletes' performance (Swann et al., 2016; Vurgun, Dorak, Ozsaker, &Uludag, 2016). Dispositional and state variables must be considered as factors that contribute to get athletes into flow. However, the athletes have mentioned several physical, psychological, and environmental factors for preventing, disrupting, or getting an athlete into flow.

The results of this study indicated that the athletes, who perceived that challenges and skills were above average, they experienced the most optimal flow state, than other flow states, such as anxiety, apathy, and relaxation, giving support to the second hypothesis. The apathy group (low challenge, low skill) revealed the lowest rates in flow experience (Stavrou et al., 2007; Stein et al., 2015). This could be attributed to the fact that athletes in the apathy group are not interested in succeeding in a competition nor they have the abilities for a successful outcome. Athletes in the anxiety group feel the challenge and wish to succeed. However, these athletes do not get into flow, because they feel that they don't have the potentials to succeed. On the other hand, athletes who are in a state of relaxation perceive that they can succeed, have the potentials for a successful outcome, but they estimate that the competition is not important (lack of challenge), and, therefore, they do not feel flow (Stavrou et al, 2007). Nevertheless, athletes in the relaxation state can feel and experience pleasant feelings, because they can carry out what is necessary to complete an unchallenged and unworthy competition or task. In other words, athletes may feel bored to win an easy opponent, but they feel successful when they do it, because beating an opponent is crucial in a competitive environment. On the other hand, athletes in the anxiety context do not have the capabilities to succeed but they are interesting in succeeding, feel challenged, which is not sufficient to experience flow. It must be mentioned that in a learning environment, anxiety might be interpreted as positive because when challenges outweigh skills might be estimated the particular situation as challenging, not threatening, because the person is stretching his/her efforts to learn new skills. On the other hand, the results showed that in a competitive environment, the fact that a person's skills are crucial for getting into flow, can be reinforced by the fact that there was a high relationship between the skills and the factors of FSS-2compared to the relationship between the FSS-2 and the perceived challenge of the competition.

Flow experience was considered as a meta-state variable, in the current study. It was hypothesized that athletes who experience flow, they should be initially task orientated, estimate that they have the possibilities to meet the demands of the task, and be self-confident, and also experience low levels of anxiety. Specifically, anxiety, competence, and confidence must be pre-existent factors, antecedents of flow and not consequences of getting someone in flow state. This aspect is supported by Jackson's (1995) contentions that there are several variables that prevent, disrupt, or create flow. Based on this view, hierarchical regression analysis was conducted with trait and state variables as independent variables and the total score of the FSS-2 factors as the dependent one. It should be noted that all state questionnaires were completed on the basis of how the athletes felt before the competition, and the total flow experience on how they felt during the competition.

The hierarchical multiple regression analysis indicated that state variables were stronger predictors of flow experiences than the corresponding dispositional factors. These results are in accordance with those reported by Kimiecik and Stein (1992). This could be attributed to the fact that flow is not a trait characteristic but a state one, has short duration, and depends on the interaction of state variables and situational characteristics. Also, the demands and the difficulties of the competition can change very often due to personal and environmental factors. The orientation of the athlete can change from ego to task and vice versa, whereas confidence, and anxiety may either increase or decrease as a function of opponent's ability and his/ her psycho physiological condition during the competition. For example, an athlete might be task oriented if he/she has to compete against a skillful opponent, or he/she is ego oriented with a convenient opponent, or when he/she is well mentally and physically prepared. Additionally, athlete's orientation can change from task to ego when he/she wins a capable opponent, or from ego to task when he/she makes an unexpected mistake in a simple task during the competition.

The results that emerged hierarchical regression analysis, showed that trait and state confidence were the most significant predictor of flow experiences, supporting the hypothesis. There is a strong support from psychology and sport psychology literature that confidence is critical to performance and persistence (e.g., Bandura, 1986; Feltz, 1988). Also, confidence appears to be critical factor to help, prevent, and induce flow (Jackson, 1995). According to the results, confidence seems to be crucial no matter what the competence, the experience, or the achievement level of the athlete is.

The fact that many athletes consider confidence as being important for them to be able to get into flow, may mean that it is rather the perception of skill than the perception of challenge which is the critical component to get into flow. In other words, more critical seems to be the belief that one can successfully meet the challenges of the game -which means that they have the skills- than the challenges of the game per se.

Finally, it's important to be mentioned that that task orientation was a significant predictor for the flow states. It is obviously that task oriented athletes can get into flow more often than ego oriented athlete, or that task orientation is the preferred orientation. The athlete with a mastery orientation seems to be able to experience flow more often (Stavrou et al., 2015). Also, task-oriented athletes may get into flow more easily due to the concentration on the process, on the task at hand being free from the concern of the outcome. As well, the type of the orientation (task and ego) is a dispositional measure and maybe that is why is so «week» predictor of flow experiences. The critical point is the timing of goal orientation, which must be seen as a joint function with environmental and personal factors (Stavrou et al., 2015).

The present study attempted to provide information concerning the relationships between flow and trait/ state variables of athletes. The results of the present study showed that challenge and skills are two dimensions which differentiate flow experience and there are significant differences between the four groups (apathy, anxiety, relaxation, and flow). In addition, confidence and task-orientation were the most common predictors, indicating that athlete's perception that he/she has the ability to meet the challenge of the situation seems to be more important than the challenge of the situation per se. Examining the antecedents of flow among athletes over the length of a season may yield further insight into the psychological processes that characterize flow experience. On the other hand, the examination of state characteristics of the game like importance of the competition, uncertainty of the game, performance in previous games, level of physical preparation, and other situational characteristics might offer additional information to flow experience.

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