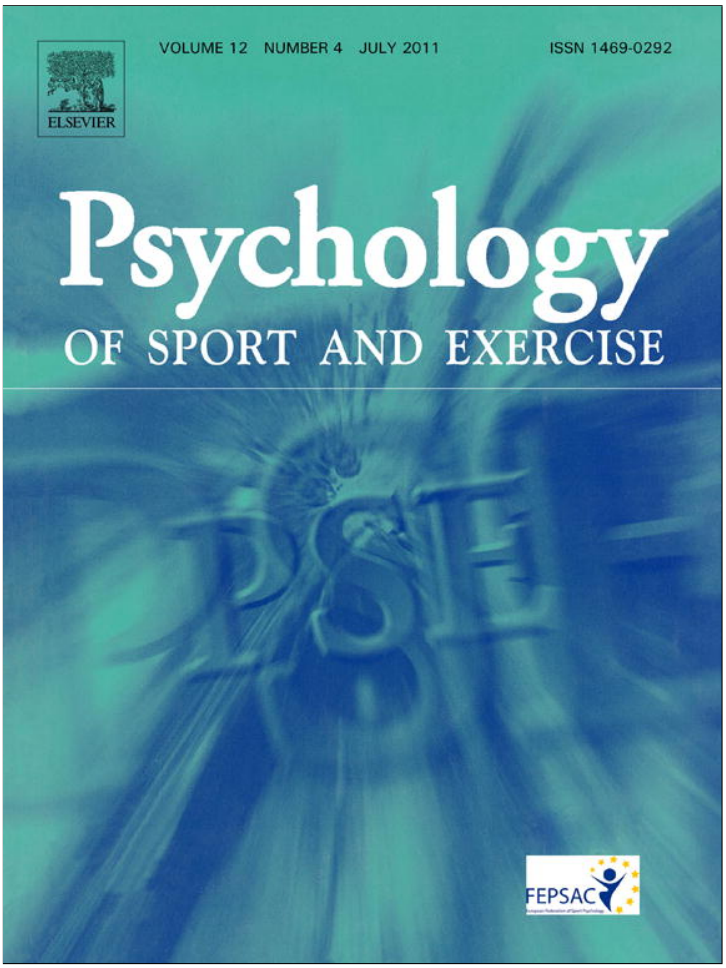

Psychology of Sport and Exercise 12 (2011) 442–450

Contents lists available at ScienceDirect

Psychology of Sport and Exercise

journal homepage: www.elsevier.com/locate/psychsport

Flow and performance: A study among talented Dutch soccer players

Arnold B. Bakker [a,*], Wido Oerlemans [a], Evangelia Demerouti [b], Bart Bruins Slot [c], Donovan Karamat Ali [d]

[a] Erasmus University Rotterdam, Rotterdam, The Netherlands
[b] Eindhoven University of Technology, Eindhoven, The Netherlands
[c] House of Performance, Utrecht, The Netherlands
[d] Jacques Necker, Utrecht, The Netherlands

ARTICLE INFO

Article history:
Received 24 May 2010
Received in revised form
26 November 2010
Accepted 10 February 2011
Available online 18 February 2011

Keywords:
Autonomy
Flow
Performance
Performance feedback
Soccer
Social support

ABSTRACT

Objective: The present study examines the relationship between environmental resources (autonomy, social support from the coach, and performance feedback), flow, and performance among young talented soccer players.
Design: The design was non-experimental and involved both self- and coach-rated reports of environmental resources, flow experiences, and performance.
Method: Both soccer players ($N = 398$) and coaches of 45 talented soccer teams in The Netherlands filled out a questionnaire. Soccer players answered questions about environmental resources, flow and performance during a particular match. In addition, coaches rated the performance of every player in the team during the same match.
Results: Results of multilevel analyses showed that flow at the team level is higher when the match results in a draw or win than when the match results in loss. Moreover, environmental resources and particularly performance feedback and support from the coach predicted flow during the soccer game, which, in turn, was positively related to self- and coach-ratings of performance.
Conclusions: The findings support the flow literature and the input–process–output model of team performance, and they indicate that common-method variance cannot account for the finding that the environment of soccer players facilitates flow and indirectly performance.

Flow is a state of consciousness where people become totally immersed in an activity. According to Csikszentmihalyi (1997), such a peak experience may emerge in any activity, and researchers have indeed found evidence for flow during the execution of a large number of different activities, including sports (e.g., Catley & Duda, 1997; Jackson & Csikszentmihalyi, 1999; Jackson & Marsh, 1996) and paid work (Bakker, 2005, 2008; Demerouti, 2006). In the present study, the phenomenon of flow is investigated among talented soccer players. We examine how environmental resources such as autonomy, social support, and performance feedback contribute to flow, and consequently impact upon individual and team performance.

A dominant model about team effectiveness is the input–process–output model (Guzzo & Shea, 1992; Hackman, 1987). The model posits that a variety of inputs combine to influence intragroup processes, which in turn affect team outputs. Inputs have been grouped into three categories, including individual factors (e.g., team member attributes), group-level factors (e.g., structure and size), and environmental-level factors (e.g., task characteristics and reward structure) (Barrick, Stewart, Neubert, & Mount, 1998; Hackman, 1987). In the present study, we focus on team member flow experiences, and environmental input factors – namely autonomy, social support from the coach, and performance feedback. Intragroup processes refer to the interactions that take place among the team members including communication, leadership and other forms of influence. Team output refers to team outcomes associated with productivity. In the present study we will focus on subjective and coach-ratings of individual performance, as well as the objective outcome of a soccer game.

Definition of flow

Csikszentmihalyi (1990) has defined flow as a state in which people are so intensely involved in an activity that nothing else seems to matter. The experience itself is so enjoyable that people will engage in the activity even at great cost, for the sheer sake of

* Correspondence to: Arnold B. Bakker, Erasmus University Rotterdam, Institute of Psychology, Department of Work & Organizational Psychology, Woudestein, T12-47, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands. Tel.: +31 10 408 8853.
E-mail address: bakker@fsw.eur.nl (A.B. Bakker).

1469-0292/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.psychsport.2011.02.003

doing it. In addition to the pleasure in the activity and the intrinsic motivation to continue doing it, the total immersion in an activity seems to be a central aspect of the flow experience (see also Bakker, 2005, 2008; Fullagar & Kelloway, 2009). Consistently, Lutz and Guiry (1994) describe flow as a state of mind experienced by people who are deeply involved in an activity. They are completely immersed in it, and therefore time may seem to stand still.

Csikszentmihalyi (1997; Jackson & Csikszentmihalyi, 1999) has argued that flow includes several other facets as well. Accordingly, flow is a multi-dimensional concept that also includes action-awareness merging (focus of awareness is narrowed down to the activity itself), lack of self-consciousness, complete concentration, a strong feeling of control, time distortion, goal clarity, and immediate feedback (see also Jackson & Eklund, 2002). Moreover, those in flow have an autotelic experience; *auto* is Greek for self, and *telos* is Greek for goal. This means that flow is an intrinsically motivating activity, so that the goal is an excuse for the process (Nakamura & Csikszentmihalyi, 2002).

Flow in sports

In sport settings, flow has been studied both in recreational settings as well as with top elite athletes (e.g., Jackson, 1996; Jackson, Kimiecik, Ford, & Marsh, 1998; Jackson & Marsh, 1996; Kimiecik & Stein, 1992). These studies show that particularly elite athletes are prone to experience flow either during training or competition. Most studies of flow in sport have focused on individual sports as it has been argued that these are more likely to elicit flow, particularly sports that are repetitive and provide fast feedback (Csikszentmihalyi, 1975).

However, there is empirical support of flow experiences in team sports as well (Jackson, 1995). For example, one study among college-aged athletes (Russell, 2001) looking for factors that facilitated, prevented and disrupted flow occurrences, found empirical support for the construct of flow across team and individual sport settings. Sports included in this particular study were football, baseball, volleyball, softball and basketball as team sports, and swimming, track, wrestling and triathlon as individual sports.

Since players in the same team share common experiences (e.g., they face the same opponent, the same weather, the same coach), we expect that flow experiences may cluster within teams. This means that scores on the outcome variables (flow, performance ratings) will correlate across members of the same soccer team. In addition, team-level flow may be the result of contagion effects, where individual soccer players transfer their own moods and behaviors to other players in their team. Evidence for this claim was provided by Totterdell (2000), who asked players from two professional cricket teams to provide ratings of their moods and performances 3 times a day for 4 days during a competitive match between the teams. The results showed significant associations between the average of teammates' happy moods and the players' own moods and subjective performances. Mood linkage was greater when players were happier and engaged in collective activity (see also Bakker & Xanthopoulou, 2009).

Conditions that foster flow

Balance between challenges and skills

Csikszentmihalyi's (1990, 1997) experience sampling studies have shown that people more often experience flow when engaging in active behaviors as compared to passive activities (e.g., watching television). One has to invest time and energy to experience flow. Indeed, research has shown that people need challenges to facilitate flow in a range of activities, including sports. Moreover, researchers generally agree that the occurrence of flow is most likely when people perceive a balance between the challenge of a situation and their own skills to deal with this challenge (e.g., Bakker, 2005; Clarke & Haworth, 1994; Csikszentmihalyi, 1990; Ellis, Voelkl, & Morris, 1994; Fullagar & Kelloway, 2009; Massimini & Carli, 1988). According to Delle Fave and Massimini (2005), such a situation facilitates the occurrence of flow-related phenomena, such as positive affect, arousal, and intrinsic motivation.

For soccer players, we may expect that the likelihood that they experience a balance increases when they are confronted with a team that is approximately equally skilled. In this situation, an exciting game may develop in which the soccer players have to do their utmost to beat the opponent. On the contrary, theoretically, there is a higher probability of relaxation if the opponent has fewer skills (low challenge in the situation, self high skills), and a higher probability of stress if the opponent is much better (high challenge, low skills). There is indeed some empirical evidence for this pattern of experiences (e.g., Csikszentmihalyi, 1997; Edwards, 1996; Massimini & Carli, 1988).

Thus, on the basis of the literature (Csikszentmihalyi, 1997; Fullagar & Kelloway, 2009), we predict that soccer players will report the highest levels of flow when the game results in a draw (vs. win or loss). Note that this does not imply that flow is outcome-dependent. In contrast, we expect that flow will be dependent on the processes that occur within the game, but these processes will be different for games resulting in a draw. Particularly a draw will indicate that the opponent represents the optimal challenge. Flow may be less likely during a soccer victory; the opponent may have been too weak to represent a serious challenge. In contrast, losing a game indicates that the opponent was too challenging perhaps resulting in a stressful experience. In sum, we predict that:

Hypothesis 1. The level of flow experienced at the individual level is higher when the game result at the team level is a draw than when the result is win or loose.

Environmental resources

Research in work settings has shown that environmental resources make a positive contribution to the motivation, engagement, and performance of individuals (Bakker & Demerouti, 2008; Halbesleben, 2010). Similar to these organizational psychologists who consider feedback or the information about the effectiveness of one's performance as a core job characteristic, Csikszentmihalyi (1997) regards immediate feedback as a necessary condition to experience flow. Feedback may be provided by both leaders and team members, but may also be derived from the activity itself. Moreover, Csikszentmihalyi (1997) regards the sense of control or autonomy as an important element promoting the experience of flow, because people feel causal agents of their actions. Indeed, autonomy or individual's freedom in scheduling their activities has repeatedly been found to increase positive affect (e.g., Saavedra & Kwun, 2000), and motivation (Fried & Ferris, 1987). Finally, Csikszentmihalyi (1997) suggests that in order for flow to occur there should be room for immersion in concentrated activity. This can be realized when people around you help you to become what you intend to be and support you to realize your capacity for self-regulation.

The positive relationship between these environmental resources and flow has been confirmed in work contexts. For instance, Demerouti (2006) found that autonomy, skill variety, job feedback, task identity, and task significance were predictive of flow experiences. In another study among consultants working at an employment agency, Mäkikangas, Bakker, Aunola, and

Demerouti (2010) showed that the levels of job resources (e.g., social support, opportunities for professional development, and supervisory coaching) and flow at work, as well as changes in these variables over a 3-months period, were positively associated with each other. Additionally, Bakker (2005) showed that music teachers' job resources, including autonomy, performance feedback, social support, and supervisory coaching had a positive influence on the balance between teachers challenges and skills, which, in turn, contributed to their own and students' experience of flow.

We expect that these relationships can also be found in a sports context. Supportive of this proposition is Kowal and Fortier's (1999) study among Canadian master's-level swimmers. Immediately following a swim practice, the swimmers completed a questionnaire that assessed different variables. Results indicated that perceptions of autonomy, competence, and relatedness were positively related to flow. Thus, we formulated our second hypothesis:

Hypothesis 2. Soccer players' environmental resources, including autonomy, social support from the coach, and performance feedback have a positive relationship with their experienced flow.

Flow and optimal performance

According to Engeser and Rheinberg (2008), flow should be associated with better performance for two reasons. First, flow is a highly functional state that should in itself foster performance. Second, individuals experiencing flow are more motivated to carry out further activities, and in order to experience flow again, they will set themselves more challenging tasks. Thus, flow could be seen as a motivating force for excellence. Additionally, we have argued above that when in flow, people are very concentrated, and they invest all available energy resources. This would facilitate performance (Beal, Weiss, Barros, & MacDermid, 2005; Cohen, 1980). Several studies document the relationship between flow and performance (for an overview, see Nakamura & Csikszentmihalyi, 2002). Within the context of sports, achieving peak performance is an all-important goal for competitive athletes and coaches, and flow can facilitate such outcomes (Jackson & Csikszentmihalyi, 1999). The mindset accompanying flow tends to push a person to his or her limits, and this is one reason why flow is so important to athletes seeking to do their best (Jackson & Roberts, 1992).

Although several studies have shown a positive relationship between flow and peak performance, the strongest relationships were found between flow and self-reported performance. The problem with this finding is that it may be partly attributed to common-method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In the present study, we include self- and coach-ratings of performance, to ensure that common-method variance cannot account for the findings. On the basis of previous research, we formulated the following hypotheses:

Hypothesis 3a. Flow is positively related to self-ratings of performance.

Hypothesis 3b. Flow is positively related to coach-ratings of performance.

Finally, the combination of Hypothesis 2 and Hypothesis 3 suggests that environmental resources are related to flow and that flow, in turn, will be related to performance during sports. Whereas environmental resources may contribute directly to performance, it is more likely that they help shape immersion in the performance activities. This is because resources are more distal while flow experience more proximal to performance during sports activities. This would mean that resources are not directly related to performance (and therefore mediation is not applicable), but indirectly related to performance through flow. Although some researchers have found that environmental resources are directly and positively related to performance (see Fried & Ferris, 1987; Kelly, 1992), the effect is weak and others have failed to find such a relationship (e.g., Bakker, Demerouti, & Verbeke, 2004). Therefore we hypothesized, that:

Hypothesis 4. Environmental resources have a positive, indirect relationship with self- and coach-ratings of performance via flow.

Method

Procedure and participants

The soccer teams were approached in consultation with the Royal Dutch Soccer Association (In Dutch: Koninklijke Nederlandse Voetbal Bond – KNVB). KNVB's head of youth development first informed the clubs' coordinators of youth development about the study during a meeting. Then, a letter explaining the purpose and the procedure of the study was sent to the clubs. In addition, each of the clubs was called to ask directly whether they wanted to participate. Of the 38 Dutch professional soccer clubs that were approached, 15 agreed to participate (39% of all clubs). Of each club participating, three teams were asked to participate in the study; the reserves, the 16–18 years old (A1) and the 14–16 years old (B1). In total, 398 soccer players filled out the questionnaire. Reasons of clubs for not participating were: 'We have other priorities now', 'Our players participate in other studies', and 'We don't think this study will gain new knowledge for our club'. Depending on the distance between the club's location and the university, it was decided whether the questionnaires were delivered at the clubs or sent by mail.

In a letter, the clubs' youth development coordinators were given instructions about the study and the questionnaires to be filled out by the players and coaches. In addition to questions about demographics, the questionnaire included items to assess environmental resources, soccer player's flow experiences, and soccer players' individual performance. A questionnaire to be filled out by the coach, indicating how the coach assessed the individual performance of the soccer players during a specific match, was included as an independent assessment of individual performance. All coaches were instructed to hand out the questionnaire to their players immediately after they had played the match. Players were instructed by their coach to fill out the questionnaire whilst keeping this particular match in mind. They were kindly requested to hand the questionnaire to their coach in a sealed envelope that was provided to assure anonymity. Furthermore, all coaches were asked to assess the individual performance of the players regarding the same match. Coaches also indicated the date of the match and the name of the opponent team. The surveys of the players and the coaches were linked by using unique codes. The official match results (win, loss or draw) were retrieved from the official KNVB files.

The total sample included 398 male soccer players (response rate = 63%). Of the sample, 147 persons (36.9%) played in the B1 (14–16 years old), 146 (36.6%) persons played in the A1 (16–18 years old), and 105 persons (26.4%) played in the reserves team. The mean age of the participants was 17.5 years (SD = 2.2 years). The mean length of time that the players were playing in their current team was 10.4 months (SD = 7.2 months). Of all soccer players, 32 had the position of goalkeeper (7.8%), 134 were defenders (33.8%), 130 had the position of midfielder (32.7%), and 102 were forwards (25.7%). There were 90 left-footed players (22.9%), 296 right-footed

players (75.3%), and 7 players were both left- and right-footed players (1.8%). Five players did not answer this question.

Measures

Environmental resources

The resources were assessed with three short scales (of three items each) that have been validated in an occupational context (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003). The three resources included are: autonomy, social support from the coach, and performance feedback. The resources were modified so that they referred to the environment of soccer players. Here is an example item of each scale: "I have the freedom to make my own choices in the field" (autonomy), "When I have personal problems, I can talk about them with my coach" (social support from the coach), and "I receive information about how well I am performing during matches and training sessions" (performance feedback). All items for measuring autonomy, social support, and performance feedback could be answered on a five-point scale (1 = never, 5 = always). Cronbach's alpha was .61 for autonomy, .82 for social support from the coach, and .65 for performance feedback.

Flow

The Flow State Scale (FSS) developed by Jackson and Marsh (1996) was used to measure the flow experience. We translated the scale into Dutch, and used the back-translation method to ensure conceptual equivalence of the items. The FSS can be used to measure flow during a specific event. It includes 36 items measuring the nine dimensions of the flow experience as described by Csikszentmihalyi (1990). Each of the dimensions was measured with four items. The participants were asked to answer the questions referring to the most recently played match (1 = totally disagree, 5 = totally agree). Here are some example items: "time stopped" ('transformation of time' dimension), "I knew what I wanted to achieve" ('clear goals' dimension), and "I enjoyed the experience" ('autotelic experience' dimension). The FSS has been used frequently in previous sport studies, and results show that the reliability of the scale is good; Cronbach's alpha coefficients range from .81 to .86 (Jackson & Marsh, 1996). In the present study, the FSS was translated to Dutch and slightly adjusted to the context of soccer. We created one overall flow index by combining the scores on each of the nine dimensions of flow (cf. Tenenbaum, Fogarty, & Jackson, 1999). The overall flow index showed good reliability ($\alpha = .91$).

Performance

Soccer players' individual performance during the most recently played soccer match was measured with two items: "Given my qualities, I performed above average during this match" (1 = completely disagree, 5 = completely agree), and "On the basis of this game, I give myself the following grade on a 10-point scale" (1–10). In addition to the self-ratings of performance provided by the soccer players, coaches independently responded to the (slightly modified) items. Both the individual performance ratings of soccer players ($\alpha = .88$) as well as the coach performance ratings ($\alpha = .78$) showed good reliabilities.

Match result

The match results (win, draw or loss) were retrieved from the official KNVB files.

Strategy of analysis

Conventional statistical analyses violate the assumption of independence of observations because of the hierarchical structure of the data, which may lead to spuriously results (Hox, 2002). For example, players in the same team share common experiences (e.g., the same match results). Therefore, we expect scores on the outcome variables (e.g., flow, performance ratings) to be correlated across members of the same soccer team. To address this issue, we used the multilevel application for Windows (Rasbash, Charlton, Browne, Healy, & Cameron, 2005), which accurately takes into account the hierarchical structure of the data. The multilevel regression analyses in this study distinguish between two levels of measurement: the person – soccer player – level (level 1) and the team level (level 2). In multilevel analyses, random effects provide estimates of the variation in the independent variable that is due to differences between teams (level 2 variation) and between persons (level 1 variation).

First, we tested whether the data has a hierarchical structure. Confirming this expectation, likelihood ratio tests (using the iterative generalized least squares (IGLS) method of model estimation) indicate that a two-level model – compared to a one level model – results in a better model fit for flow (ΔIGLS deviance = 80.138, $df = 1$; $p < .001$), self-rated performance (ΔIGLS deviance = 80.154, $df = 1$; $p < .001$), and coach-rated performance (ΔIGLS deviance = 125.123, $df = 1$; $p < .001$). The intra-class correlation (ICC-1) for the Flow State Scale is 0.25, for self-rated performance 0.17, and for coach-ratings of performance 0.38. Thus, a significant and relevant amount of the variance is accounted for at the team level, which demonstrates the need to perform multilevel analyses. Independent variables were centered to the grand mean to prevent multicollinearity problems (Aiken & West, 1991).

Results

Descriptive statistics

Table 1 presents the means, standard deviations and correlations among the study variables.

Table 1
Means, standard deviations, and correlations between all study variables, $N = 398$.

		Mean	SD	1	2	3	4	5	6	7	8	9
1	Age	17.51	2.24	–								
2	Team tenure (months)	13.52	17.83	0.28	–							
3	Minutes played during match	74.63	20.85	0.10	0.08	–						
4	Autonomy	2.61	0.68	−0.10	0.10	0.04	(.61)					
5	Social support coach	4.09	0.81	−0.23	0.06	0.08	0.30	(.82)				
6	Performance feedback	3.80	0.66	−0.17	0.06	−0.01	0.13	0.46	(.65)			
7	Flow	3.54	0.48	−0.08	0.04	−0.09	0.19	0.25	0.26	(.91)		
8	Self-rated performance	4.62	0.96	−0.13	0.07	−0.06	0.12	0.20	0.14	0.68	(.88)	
9	Coach-rated performance	4.36	0.88	−0.11	0.02	−0.01	0.06	0.12	0.04	0.46	0.50	(.78)

Note. SD = standard deviation. Correlations $r \geq |0.10|$ are significant at $p < .05$, $r \geq |0.13|$ are significant at $p < .01$, and $r \geq |0.17|$ are significant at $p < .001$. Cronbach's alpha for each of the study variables is shown between brackets.

Table 2
Multilevel estimates for models predicting flow; $N = 39$ teams, and $N = 373$ soccer players.

	Model 1				Model 2				Model 3			
	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign
Constant	3.545	0.043	82.442	***	3.730	0.095	39.263	***	3.546	0.041	86.488	***
Age	−0.008	0.017	−0.471		−0.008	0.016	−0.500		0.010	0.016	0.625	
Team tenure	−0.003	0.004	−0.750		−0.002	0.004	−0.500		−0.004	0.004	−1.000	
Minutes played	0.001	0.001	1.000		0.001	0.001	1.000		0.000	0.001	0.000	
Match result: win[a]					−0.132	0.109	−1.211		−0.098	0.103	−0.951	
Match result: loss[a]					−0.392	0.119	−3.294	***	−0.351	0.111	−3.162	***
Autonomy									0.059	0.035	1.686	
Social support coach									0.097	0.032	3.031	**
Performance feedback									0.093	0.038	2.447	**
$-2 \times \log$ (lh)			451.830				419.358				388.707	
Diff $-2 \times \log$			6.268	*n.s.*			32.472	***			30.651	***
df			3				2				3	
			R^2				R^2				R^2	
Team-level variance	0.056	0.017	0.0%		0.037	0.013	8.4%		0.032	0.011	10.6%	
Person-level variance	0.168	0.013	0.9%		0.168	0.013	0.9%		0.155	0.012	6.6%	

Note. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. Model 1 was compared to a Null Model with the intercept as the only predictor ($\gamma = 3.537$, $SE = 0.043$; $t = 82.256$; $-2 \times \log = 458.100$; team-level variance = 0.056, $SE = 0.017$; person-level variance = 0.170, $SE = 0.013$).
[a] Reference group = match result: draw.

Testing hypotheses for flow

To test the hypotheses concerning flow, we performed multilevel analyses with three nested models. In Model 1, age, team tenure, and minutes played in the game were added as control variables. In Model 2, we included match results, and in the third Model environmental resources. Results are displayed in Table 2. Adding the control variables (Model 1) to the intercept only model did not result in an increased model fit (ΔIGLS deviance = 6.268, $df = 3$; *n.s.*). None of the control variables was significantly related to flow.

Hypothesis 1 stated that flow is higher when the result of a match is a draw than when the result is win or loss. To test this hypothesis, we added match results as variables assessed at the team level in the second Model. In particular, we compared winning and losing to drawing a match (=reference group). Model 2 showed an improvement of the Model fit over Model 1 (ΔIGLS deviance = 32.472, $df = 2$; $p < .001$). The mean flow scores for the three groups were: loss $M = 3.34$; draw $M = 3.73$; win $M = 3.60$. As expected, players in teams that lost a match (vs. a draw) experienced less flow ($t = -3.29$; $p < .001$). The same negative trend was visible for players in teams that won a match (vs. a draw). However, this relationship was not significant ($t = -1.21$; $p = .11$). This partly confirmed Hypothesis 1. Altogether, match result explained 8.4% of the variance in flow on the team level.

Hypothesis 2 stated that soccer players' environmental resources, including autonomy, social support from the coach, and performance feedback, have a positive relationship with flow. Adding the three resources in Model 3 resulted in a significant increase of the model fit (ΔIGLS deviance = 30.651, $df = 3$; $p < .001$). Table 2 shows that social support from the coach ($t = 3.03$; $p < .01$), and performance feedback ($t = 2.45$; $p < .01$) are both significantly and positively associated with experiencing flow. However, autonomy ($t = 1.69$; *n.s.*) was not related to flow. Thus Hypothesis 2 is confirmed for two of the three resources. Altogether, environmental resources explained 2.2% of the variance in flow on the team level, and 5.7% of the variance in flow on the person level.

Testing hypotheses for performance ratings

Hypothesis 3a stated that flow is positively related to self-ratings of performance, and Hypothesis 3b stated that flow is positively related to coach-ratings of performance. In addition, according to Hypothesis 4, environmental resources are positively and indirectly related to performance *through* the experience of flow. To test indirect effects one has to follow the same procedure as for testing mediation save one exception: the direct effect of the predictor on the outcome does not need to be significant (Mathieu & Taylor, 2006). The other conditions for mediation are that (1) the independent variables (environmental resources) should significantly affect the mediator (flow); (2) the mediator has a significant unique effect on the outcome (performance), and (3) the effect of the independent variable on the outcome is significantly different from zero upon the addition of the mediator to the model.

Results in Table 2 show that two resources – social support from the coach and performance feedback – are significantly associated with experiencing flow, confirming the first condition for mediation. As autonomy did not relate significantly to flow, autonomy was not taken into consideration when testing for indirect effects.

To test the second and third condition for mediation (indirect effects), we performed multilevel analyses and conducted Sobel tests (Aiken & West, 1991) for self-rated performance (Table 3), and coach-ratings of performance (Table 4). In both tables, age, team tenure, and minutes played are included as control variables in Model 1. Thereafter, environmental resources were added in Model 2. Finally, flow was included in the final step as a mediator in Model 3.

Self-rated performance

Model 1 has an improved model fit compared to the intercept only model for self-rated performance (ΔIGLS deviance = 12.473, $df = 3$; $p < .01$), as demonstrated in Table 3. The individual estimates showed that minutes played related significantly and positively to self-rated performance ($t = 3.00$; $p < .01$). Altogether, control variables explained 0.1% of the variance at the team level, and 1% of the variance at the person level. Adding environmental resources in Model 2 resulted in a significant improvement of the model fit (ΔIGLS deviance = 20.087, $df = 3$; $p < .001$). Social support from the coach ($t = 2.67$; $p < .01$) was positively associated with self-rated performance. The resources explained an additional 0.6% of the variance for self-rated performance on the team level and 3.9% on the person level.

Hypothesis 3a stated that flow is positively related to self-ratings of performance. To test this hypothesis, flow was added as a predictor for self-rated performance in the third model, resulting

Table 3
Multilevel estimates for models predicting self-rated performance; $N = 39$ teams, and $N = 371$ soccer players.

	Model 1				Model 2				Model 3			
	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign
Constant	4.605	0.076	60.592	***	4.611	0.074	62.311	***	4.616	0.036	128.222	***
Age	−0.038	0.033	−1.152		−0.012	0.033	−0.364		−0.037	0.020	−1.850	
Team tenure	−0.002	0.008	−0.250		−0.006	0.008	−0.750		−0.001	0.006	−0.167	
Minutes played	0.006	0.002	3.000	**	0.005	0.002	2.500	**	0.003	0.002	1.500	
Autonomy					0.068	0.072	0.944		−0.021	0.055	−0.382	
Social support coach					0.179	0.067	2.672	**	−0.046	0.052	0.885	
Performance feedback					0.036	0.079	0.456		−0.096	0.061	−1.574	
Flow									1.364	0.078	17.487	***
$-2 \times \log$ (lh)			982.189				962.102				763.107	
Diff $-2 \times \log$			12.473	**			20.087	***			198.995	***
df			3				3				1	
			R^2				R^2				R^2	
Team-level variance	0.151	0.052	0.1%		0.146	0.050	0.7%		0.002	0.012	16.8%	
Person-level variance	0.732	0.057	1.0%		0.697	0.054	4.9%		0.456	0.035	31.9%	

Note. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. Model 1 was compared to a Null Model with the intercept as the only predictor ($\gamma = 4.601$, $SE = 0.076$; $t = 60.539$; $-2 \times \log = 80.154$; team-level variance = 0.152, $SE = 0.053$; person-level variance = 0.741, $SE = 0.057$).

in a substantial increase of the model fit (ΔIGLS deviance = 198.995, $df = 1$; $p < .001$). As predicted, flow was strongly and positively related to self-rated performance ($t = 17.49$; $p < .001$) confirming Hypothesis 3a. Thus, the more flow soccer players experience the higher they rate their own performance. This confirmed the second condition for mediation, being that the mediator (flow) has a significant unique effect on the outcome variable (self-rated performance). Flow explains an additional 16.1% of the variance in self-rated performance on the team level, and 27% on the person level.

Hypothesis 4 stated that environmental resources are positively and indirectly related to performance *through* the experience of flow. This entails the third condition to test for mediation, being that the effect of the independent variable (environmental resources) on the outcome variable (self-rated performance) is significantly different from zero upon the addition of the mediator (flow) to the model. Additional Sobel tests showed that the effects of social support from the coach (Sobel test = 3.32, $p < .001$), and performance feedback (Sobel test = 4.03, $p < .001$) on self-rated performance are significantly different from zero when flow is included in the Model. In sum, all the conditions for indirect effects are present: environmental resources (i.e. social support from the coach and performance feedback) were positively and indirectly related to self-rated performance *through* the experience of flow, which confirmed our Hypothesis 4 for self-rated performance.

Coach-rated performance

Similar analyses were performed for coach-ratings of performance, and results are displayed in Table 4. Adding control variables resulted in a marginally significant improvement of the model fit compared to the intercept only Model (ΔIGLS deviance = 7.622, $df = 3$; $p = .054$). Estimates showed that the minutes played in the match related positively to coach-rated performance ($t = 2.50$; $p < .01$) whereas age and team tenure are unrelated. The control variables explained 1.3% of the variance on the person level. Adding environmental resources in Model 2 did not result in a significant improvement of the model fit (ΔIGLS deviance = 6.408, $df = 3$; *n.s.*). None of the resources was significantly related to coach-rated performance.

Hypothesis 3b stated that flow is positively related to coach-ratings of performance. To test this hypothesis, flow was added in Model 3. Model 3 showed a significant increase in model fit compared to the second Model (ΔIGLS deviance = 51.721, $df = 1$; $p < .001$). Estimates in Model 3 showed that the more flow soccer players experienced, the higher their performance as rated by their coach ($t = 7.58$; $p < .001$), confirming Hypothesis 3b. It also

Table 4
Multilevel estimates for models predicting coach-rated performance; $N = 39$ teams, and $N = 340$ soccer players.

	Model 1				Model 2				Model 3			
	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign	Estimate	*SE*	*t*-Value	Sign
Constant	4.356	0.099	44.000	***	4.360	0.099	44.040	***	4.353	0.082	53.085	***
Age	−0.053	0.032	−1.656		−0.045	0.033	−1.364		−0.050	0.029	−1.724	
Team tenure	−0.004	0.007	−0.571		−0.005	0.007	−0.714		−0.003	0.006	−0.500	
Minutes played	0.005	0.002	2.500	**	0.004	0.002	2.000	*	0.004	0.002	2.000	*
Autonomy					−0.046	0.064	−0.719		−0.068	0.060	−1.133	
Social support coach					0.114	0.059	1.932		0.046	0.056	0.821	
Performance feedback					−0.037	0.070	−0.529		−0.102	0.066	−1.545	
Flow									0.682	0.090	7.578	***
$-2 \times \log$ (lh)			786.989				780.581				728.860	
Diff $-2 \times \log$			7.622				6.408				51.721	***
df			3				3				1	
			R^2				R^2				R^2	
Team-level variance	0.299	0.085	0.0%		0.299	0.085	0.0%		0.201	0.057	12.5%	
Person-level variance	0.477	0.039	1.3%		0.470	0.038	2.2%		0.416	0.034	9.0%	

Note. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. Model 1 was compared to a Null Model with the intercept as the only predictor ($\gamma = 4.363$, $SE = 0.097$; $t = 44.979$; $-2 \times \log = 794.611$; team-level variance = 0.299, $SE = 0.082$; person-level variance = 0.487, $SE = 0.040$).

confirmed the second condition for mediation, being that the mediator (flow) has a significant unique effect on the outcome (coach-rated performance). Flow explained 12.5% of the variance in coach-rated performance at the team level, and an additional 6.8% at the individual level.

Hypothesis 4 stated that environmental resources are positively and indirectly related to performance *through* the experience of flow. As hypothesized, additional Sobel tests confirmed that flow significantly carries the influence of social support from the coach (Sobel test = 4.05; $p < .001$) and performance feedback (Sobel test = 4.84, $p < .001$) to coach-rated performance. Thus, environmental resources (i.e. social support from the coach and performance feedback) are positively and indirectly related to coach-rated performance *through* the experience of flow, which confirmed Hypothesis 4 for coach-rated performance.

Discussion

This study made several contributions. First, we established a relationship between soccer players' environmental resources and their flow experiences. Particularly performance feedback and support from the coach predicted individual flow during the soccer game. Second, we showed that flow, in turn, was related to self- and coach-rated performance indicating that common-method variance cannot account for our findings. Third, we found that match result – as an objective factor at the team level – predicts flow experiences among soccer players. In particular, the flow experience among soccer players is higher when the match results in a draw than when the match results in loss (the difference with 'win' was not significant). In what follows, we discuss these findings in more detail, with a focus on the theoretical contributions.

Theoretical contributions

Environmental resources, flow, and optimal performance

On the basis of the input–process–output model of team effectiveness (Guzzo & Shea, 1992; Hackman, 1987) and earlier findings in a work context (Bakker, 2005, 2008; Mäkikangas et al., 2010), we hypothesized that resources in the environment of soccer players would be positively related to flow and indirectly to performance. The results provided evidence for this process – independent of the source of the information (the players, the coach, or the official soccer league data files).

These results are consistent with previous findings in the work context (Bakker, 2005; Demerouti, 2006; Fullagar & Kelloway, 2009) showing that a range of environmental resources can facilitate flow. Additionally, the results are consistent with Csikszentmihalyi (1997), who argued that immediate feedback is a necessary condition to experience flow, and that a sense of control or autonomy is an important facilitator of peak experiences. One reason why environmental resources may facilitate flow is that they can boost self-efficacy or the belief in the ability to succeed and reach one's goals (Salanova, Bakker, & Llorens, 2006). A second reason is that environmental resources can foster core self-evaluations or one's 'psychological capital' (Luthans, Avolio, Avey, & Norman, 2007), including optimism, hope, and self-esteem. Third, research has shown that environmental resources can satisfy basic psychological needs, including the need for competence (Kowal & Fortier, 1999; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008).

Regarding the relationship between flow and performance it is important to distinguish between self- and coach-ratings, and between the individual and the team level. The correlation between self- and coach-ratings of performance during the soccer game was positive and substantial. This means that common-method variance cannot account for our findings and it offers strong evidence for the contention that flow experiences are positively related to performance. Furthermore, it should be noted that coaches' performance ratings were independent of the objective match result. Apparently, when evaluating the performance of the individual players, coaches evaluate state performance against earlier performance and against the criteria set for each individual player. Flow was positively related to both ratings of performance. This is consistent with our argument that flow at the individual level facilitates performance since most of the available energy resources are invested towards performance (cf. Beal et al., 2005; Cohen, 1980).

Although not investigated in the present study, it should be noted that flow may impair players' ability to stick to the tactics. Total immersion in the soccer game may make players forget about weaknesses in the opposition that have been researched by the coach ahead of time and are intended to be exploited through strategy. This may be considered as a possible negative effect of flow among soccer players.[1]

As was expected and in agreement with earlier empirical studies (Bakker et al., 2004), environmental resources were only indirectly related to individual performance through flow. Flow, representing an individual experience, was successful in explaining why individuals in resourceful environments perform better. A resourceful environment alone cannot promote performance if the individual is not immersed in the performance activities. Either environmental resources are too distal to be related to performance or performance is too strongly related to individuals' capacity and motivation. In this respect, Blumberg and Pringle (1982) suggested that individual performance is a function of opportunities (representing environmental factors that facilitate performance like resources), individual capacity (including skills and abilities), and individual willingness (like motivation and enjoyment/satisfaction) to perform. Since flow comprises both capacity and willingness to perform it appeared to be a successful in predicting performance within the context of sports.

Objective conditions that foster flow

A very interesting finding was that flow at the team level had a positive relationship with the objective match result, although the relationship was not exactly as predicted. On the basis of the literature (Csikszentmihalyi, 1997; Fullagar & Kelloway, 2009), we hypothesized that the balance between players' challenge and skills and therefore the probability of flow experiences would be most likely when the game would result in a draw (vs. win or loss). Particularly a draw would indicate that the opponent represented the optimal challenge offering the perfect conditions for peak performance because when in flow, (nonverbal) communication and team play would be at the highest level.

This finding is innovative because previous research primarily looked at individual-level predictors of flow (availability of environmental resources as rated by individual players or workers). The present study included an objective factor at the team level that was able to predict a substantial amount of variance in individual flow. It should also be noted that previous research has consistently indicated that it is very difficult to determine the boundary between challenge and stressor (Hancock & Warm, 1989); and thus to find an objective factor that should trigger flow. We found specifically that the individual soccer player's experience of flow depended for 25% on team-level factors. Since soccer is a team sport, it is not surprising that flow experiences of individual soccer

[1] We would like to thank one of the anonymous reviewers for raising this possible negative effect of flow.

players are partly dependent on factors at the team level. For instance, individual players in soccer teams face a similar opponent, play in a similar stadium, and they are highly dependent on one another as they share similar goals (i.e. playing well and winning the match as a team). In addition, the fact that flow clusters in certain team can be the result of contagion effects, where soccer players transfer their own moods and behaviors to other players in their team (Bakker & Xanthopoulou, 2009; Totterdell, 2000).

We showed in this study that match result is one factor at the team level that predicts individual flow experiences. We hereby expected that a balance between challenges and skills at the team level – as approximated by match result – would result in individual soccer players experiencing more flow. Partly confirming this expectation, empirical findings showed that losing a match (i.e. indicating a disbalance in challenges/skills at the team level in a negative way) reduced the likelihood of individual soccer players experiencing flow compared to drawing a match (i.e. indicating a match between challenges/skills at team level). However, no significant differences were found between winning a match (i.e. a disbalance between challenges/skills at the team level in a positive way) and drawing a match, although the trend was in the expected direction. We hypothesized that the soccer players would experience more flow when the match result would be a draw (vs. win), because a draw indicates an objective match between challenges and skills at the team level. An explanation for this nonsignificant finding is that soccer players are likely to confuse their feelings of enjoyment after winning the match with the enjoyment they felt whilst playing the match. After winning a match, soccer players are likely to be in a very happy mood. People often confuse their present mood (e.g., enjoyment after the match) to the emotional experiences they had in the past (e.g. enjoyment whilst playing the match; Gilbert, 2007). This is very important, as enjoyment *during the match* is a sub-dimension of flow, whereas enjoyment *after the match* is not. Additional analyses indeed showed that the level of enjoyment *during the match* increased steadily from losing to drawing to winning ($p < .05$). This suggests that soccer players indeed rated their enjoyment *during the match* based on their enjoyment *after winning the match*. Conversely, the perceived challenges/skills balance among individual soccer players – one of the nine sub-dimension of flow (Csikszentmihalyi, 1990) – confirmed that soccer players *did* perceive the highest balance between challenges and skills when the match result was a draw, compared to either winning or losing the match ($p < .05$).

Strengths and weaknesses of this study

The present study has several strengths and weaknesses. Other-ratings of performance and the objective indicator of balance (result of the game) are clear strengths of the study. This means that common-method variance cannot account for the findings. Another strong point is that we included a large sample of talented soccer players. We had sufficient statistical power to find the predicted relationships. In addition, we used multilevel analyses, and found that flow and performance ratings are to a considerable extent dependent on objective factors at the team level that are collectively experienced by team members (e.g., for flow, match result was such a factor).

The present study also has some limitations. First, we conducted a cross-sectional study, and therefore the variables cannot be causally related. Second, some of the measures had a somewhat lower internal consistency. For example, autonomy had a reliability coefficient of 0.61. In general, an alpha coefficient equal to or greater than .60 is considered a minimum acceptable level, although some authorities argue for a stronger standard of at least .70. However, the correlation between autonomy and flow in the present study (0.19) is highly similar to the correlation of 0.18 found in the study of Bakker (2005) for two of the three indicators of flow. In the latter study, the autonomy measure had a reliability of 0.75. Thus, our findings replicate previous findings in the domain of work, and this suggests that unreliability is not a major drawback of this study. Nevertheless, the results should be interpreted with the limited reliability of the autonomy measure in mind.

Practical implications

The results of this study indicate that social support and performance feedback from the coach are important facilitators of flow, and that flow is related to performance. Previous studies in the domain of organizations suggest that such environmental resources provided by the coach foster people's confidence, self-efficacy and optimism (Tims, Bakker, & Xanthopoulou, 2011; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). This implies that coaches should regularly inform individual players about their performance and support each player personally.

Conclusion

This study shows that environmental resources – particularly performance feedback and support from the coach – facilitate flow during a soccer game. Flow, in turn, is related to self- and coach-ratings of performance. Our findings support the input–process–output model of team performance. Coaches may facilitate soccer players' experience of flow and indirectly soccer players' performance.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Bakker, A. B. (2005). Flow among music teachers and their students: the crossover of peak experiences. *Journal of Vocational Behavior, 66*, 26–44.

Bakker, A. B. (2008). The work-related flow inventory: construction and initial validation of the WOLF. *Journal of Vocational Behavior, 72*, 400–414.

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International, 13*, 209–223.

Bakker, A. B., Demerouti, E., Taris, T. W., Schaufeli, W. B., & Schreurs, P. (2003). A multi-group analysis of the job demands–resources model in four home care organizations. *International Journal of Stress Management, 10*, 16–38.

Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the job demands–resources model to predict burnout and performance. *Human Resource Management, 43*, 83–104.

Bakker, A. B., & Xanthopoulou, D. (2009). The crossover of daily work engagement: test of an actor–partner interdependence model. *Journal of Applied Psychology, 94*, 1562–1571.

Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Relating member ability and personality to work-team processes and team effectiveness. *Journal of Applied Psychology, 83*, 377–391.

Beal, D. J., Weiss, H. M., Barros, E., & MacDermid, S. M. (2005). An episodic process model of affective influences on performance. *Journal of Applied Psychology, 90*, 1054–1068.

Blumberg, M., & Pringle, C. D. (1982). The missing opportunity in organizational research: some implications for a theory of work performance. *Academy of Management Review, 7*, 560–569.

Catley, D., & Duda, J. L. (1997). Psychological antecedents of the frequency and intensity of flow in golfers. *International Journal of Sport Psychology, 28*, 309–322.

Clarke, S. G., & Haworth, J. T. (1994). "Flow" experience in the daily lives of sixth-form college students. *British Journal of Psychology, 85*, 511–523.

Cohen, S. (1980). Aftereffect of stress on human performance and social behaviour: a review of research and theory. *Psychological Bulletin, 49*, 11–28.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety: Experiencing flow in work and play*. San Francisco, CA: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper and Row.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life*. New York: HarperCollins.

Delle Fave, A., & Massimini, F. (2005). The investigation of optimal experience and apathy. *European Psychologist, 10*, 264–274.

Demerouti, E. (2006). Job resources, work-related flow and performance. *Journal of Occupational Health Psychology, 11*, 266–280.

Edwards, J. R. (1996). An examination of competing versions of the person–environment fit approach to stress. *Academy of Management Journal, 39*, 292–339.
Ellis, G. E., Voelkl, J. E., & Morris, C. (1994). Measurement and analysis issues with explanation of variance in daily experience using the flow model. *Journal of Leisure Research, 26*, 337–356.
Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge–skill balance. *Motivation and Emotion, 32*, 158–172.
Fried, Y., & Ferris, G. R. (1987). The validity of the job characteristics model: a review and a meta-analysis. *Personnel Psychology, 40*, 287–322.
Fullagar, C., & Kelloway, E. K. (2009). Flow at work: an experience sampling approach. *Journal of Occupational and Organizational Psychology, 82*, 595–615.
Gilbert, D. (2007). *Stumbling on happiness*. London, UK: Harper Perennial.
Guzzo, R. A., & Shea, G. P. (1992). Group performance and intergroup relations in organizations. In M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (pp. 269–313). Palo Alto, CA: Consulting Psychologists Press.
Hackman, J. R. (1987). The design of work teams. In J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315–342). Englewood Cliffs, New Jersey: Prentice-Hall.
Halbesleben, J. R. B. (2010). A meta-analysis of work engagement: relationships with burnout, demands, resources and consequences. In A. B. Bakker, & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research*. New York: Psychology Press.
Hancock, P. A., & Warm, J. S. (1989). A dynamic model of stress and sustained attention. *Human Factors, 31*, 519–537.
Hox, J. (2002). *Multilevel analysis: Techniques and applications*. London: Erlbaum.
Jackson, S. A. (1995). Factors influencing the occurrence of flow state in elite athletes. *Journal of Applied Sport Psychology, 7*, 138–166.
Jackson, S. A. (1996). Toward a conceptual understanding of the flow experience in elite athletes. *Research Quarterly for Exercise and Sport, 67*, 76–90.
Jackson, S. A., & Csikszentmihalyi, M. (1999). *Flow in sports: The keys to optimal experiences and performances*. Champaign, IL: Human Kinetics Publishers.
Jackson, S. A., & Eklund, R. C. (2002). Assessing flow in physical activity: the flow state scale-2 and dispositional flow scale-2. *Journal of Sport and Exercise Psychology, 24*, 133–150.
Jackson, S. A., Kimiecik, J. C., Ford, S., & Marsh, H. W. (1998). Psychological correlates of flow in sport. *Journal of Sport and Exercise Psychology, 20*, 358–378.
Jackson, S. A., & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: the flow state scale. *Journal of Sport and Exercise Psychology, 18*, 17–35.
Jackson, S. A., & Roberts, G. C. (1992). Positive performance states of athletes: toward a conceptual understanding of peak performance. *The Sport Psychologist, 6*, 156–171.
Kelly, J. (1992). Does job re-design theory explain job re-design outcomes? *Human Relations, 45*, 753–774.
Kimiecik, J. C., & Stein, G. L. (1992). Examining flow experiences in sports contexts: conceptual issues and methodological concerns. *Journal of Applied Sports Psychology, 4*, 144–160.
Kowal, J., & Fortier, M. S. (1999). Motivational determinants of flow: contributions from self-determination theory. *Journal of Social Psychology, 139*, 355–368.
Luthans, F., Avolio, B. J., Avey, J. B., & Norman, S. M. (2007). Psychological capital: measurement and relationship with performance and job satisfaction. *Personnel Psychology, 60*, 541–572.
Lutz, R. J., & Guiry, M. (1994). *Intense consumption experiences: Peaks, performances, and flows*. Paper presented at the Winter marketing educators' conference, St. Petersburg, FL, February.
Mäkikangas, A., Bakker, A. B., Aunola, K., & Demerouti, E. (2010). Job resources and flow at work: modelling the relationship via latent growth curve and mixture model methodology. *Journal of Occupational and Organizational Psychology, 83*, 795–814.
Massimini, F., & Carli, M. (1988). The systematic assessment of flow in daily life. In M. Csikszentmihalyi, & I. Csikszentmihalyi (Eds.), *Optimal experience: Psychological studies of flow in consciousness* (pp. 266–287). New York: Cambridge University Press.
Mathieu, J. E., & Taylor, S. R. (2006). Clarifying conditions and decision points for mediational type inferences in organizational behaviour. *Journal of Organizational Behavior, 27*, 1031–1056.
Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder, & J. S. Lopez (Eds.), *Handbook of positive psychology* (pp. 89–105). New York: Oxford University Press.
Podsakoff, P. M., MacKenzie, S. M., Lee, J., & Podsakoff, N. P. (2003). Common method variance in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
Rasbash, J., Charlton, C., Browne, W. J., Healy, M., & Cameron, B. (2005). *MLwiN version 2.02*. Centre for Multilevel Modelling, University of Bristol.
Russell, W. D. (2001). An examination of flow state occurrence in college athletes. *Journal of Sport Behavior, 24*, 83–107.
Saavedra, R., & Kwun, S. K. (2000). Affective states in job characteristics theory. *Journal of Organizational Behavior, 21*, 131–146.
Salanova, M., Bakker, A. B., & Llorens, S. (2006). Flow at work: evidence for a gain spiral of personal and organizational resources. *Journal of Happiness Studies, 7*, 1–22.
Tenenbaum, G., Fogarty, G. J., & Jackson, S. A. (1999). The flow experience: a Rasch analysis of Jackson's flow state scale. *Journal of Outcome Measurement, 3*, 278–294.
Tims, M., Bakker, A. B., & Xanthopoulou, D. (2011). Do transformational leaders enhance their followers' daily work engagement? *The Leadership Quarterly, 22*, 121–131.
Totterdell, P. (2000). Catching moods and hitting runs: mood linkage and subjective performance in professional sport teams. *Journal of Applied Psychology, 85*, 848–859.
Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: the role of basic psychological need satisfaction. *Work & Stress, 22*, 277–294.
Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Work engagement and financial returns: a diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology, 82*, 183–200.