Does Engaging in Creative Activities Influence the Use of Coping Skills and Perception of Challenge-Skill Balance in Elite Athletes?

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Abstract

The aim of this study was to test the notion that engagement in creative activity directly affects the flow state dimension of challenge-skills balance, and indirectly via coping strategies in the realm of sport. Two hundred and eight athletes classified as intermediate, advanced, and expert level were administered a Creative Activities and Accomplishment Checklist (CAAC), the Dispositional Coping Inventory for Competitive Sport (DCICS), and the Challenge-Skill Balance subscale of the Dispositional Flow Scale (CS-DFS-2). Measurement and structural equation modeling were used to test the postulated model. The best fit of the model showed that 36% of the variance in challenge-skills balance was accounted for by creative activities and task-oriented coping, of which 27% was attributed to the indirect effect from creative activities via task-oriented coping. The findings extend the role that creativity engagement has on flow state.

Keywords: creativity, coping skills, challenge-skill balance, sport psychology, elite athletes

Csikszentmihalyi's (1996) initial qualitative research on creativity highlighted the psychological state highly creative individuals reach when they are fully engaged in their creative process. This state called flow is commonly defined as an intrinsically rewarding experience requiring intense focus and absorption in the task at hand evoking a sense of effortless performance even when the situation is challenging (Csikszentmihalyi, 1990; Swann, Piggott, Schweickle, & Vella, 2018). Given the importance of positive affective experience for long-term participation in sport (Rhodes & Kates, 2015), facilitating the occurrence of flow is mandatory in this domain (Swann et al., 2018).

One of the conditions for flow to occur is the balance between the individual's perceived challenges and skills (Nakamura & Csikszentmihalyi, 2002). Considering the unique and unpredictable nature of sport challenges (Tenenbaum, Lane, Razon, Lidor, & Schinke, 2015), additional psychological skills may be required to achieve this state of balance (Jackman, Swann, & Crust, 2016; Swann, Keegan, Piggott, & Crust, 2012; Swann, Piggott, Crust, Keegan, & Hemmings, 2015). Interestingly, findings revealed that the accumulation of domain-related creative experiences such as frequent exposure to problem solving or creative work opportunities expand the individual's repertoire of thoughts and actions, and allow for the efficient use of coping skills (Fredrickson, 2001). Increased personal psychological resources thereby balance the level of challenge allowing athletes to feel in control under demanding sport situations (Lazarus, 1991) increasing the likelihood of reaching optimal psychological state. Unfortunately, the effects on athletes' psychological skills and states of being involved in problem solving, movements or tactics creation, and training plan design remain unarticulated (Santos, Memmert, Sampaio, & Leite, 2016). Consequently, few sport organisations promote the implementation of creativity supportive environments to foster athletes' optimal psychological development. To provide evidence supporting the relevance of implementing creative environments in the realm of sport, the aim of the present study was to explore the relationships between engagement in creative activities, use of coping strategies, and challenge-skill balance dimension of flow using the conceptual model presented in Figure 1. A theoretical explanation of this model follows along with its examination procedure.

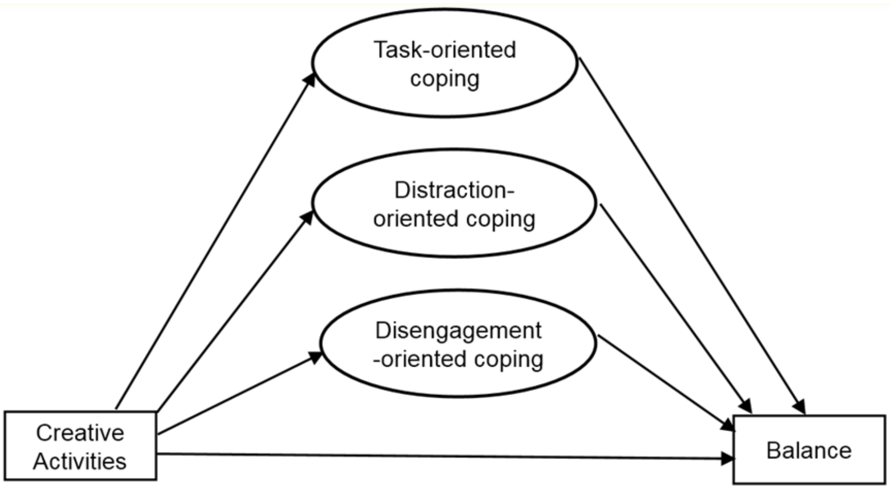


Figure 1: The full conceptual model illustrating a direct path between creative activities and challenge-skill balance mediated by three dimensions of coping

Challenge-Skill Balance Condition

In sport, flow is commonly conceptualized in terms of nine dimensions (Jackson & Csikszentmihalyi, 1999). Three dimensions are proposed to be the conditions necessary for flow to occur (i.e., challenge-skill balance, clear goals, and unambiguous feedback) whereas the remaining six are considered as characteristics of the flow experience (i.e., action-awareness merging, concentration on the task, sense of control, loss of self-consciousness, transformation of time, autotelic experience). Recently, in an attempt to actualize the conceptualisation of flow, Swann et al. (2017) suggested that the nine-dimensions model conflates two distinct psychological states: the flow and the clutch state. Whilst sharing a range of characteristics with flow, the clutch state is more effortful, intense, consciously demanding, and happens mainly in pressure situations when an outcome is on the line.

One occurrence process that is common to both flow and clutch state is the appraisal of challenging situations. Confidence in one's ability also appears to play an influential role in the individual assessment of new challenges (Stavrou, Jackson, Zervas, & Karteroliotis, 2007; Swann, Crust, Jackman, et al., 2017). In fact, the perception of a balance between the challenge at hand and the individual's skills is considered as a core precursor for flow occurrence (Nakamura & Csikszentmihalyi, 2002). Accordingly, findings of a recent meta-analysis have shown that matching skill and challenge is strongly related with flow state (Fong, Zaleski, & Leach, 2015). Although unresolved debates still remains about which and how many conditions are necessary for flow to occur (Swann et al., 2018), the challenge-skill condition is theoretically (Moneta, 2012) and empirically well supported. Namely, the manipulation of the balance between the task and skill has successfully triggered flow in participants of several experimental studies (Keller & Bless, 2008; Keller, Bless, Blomann, & Kleinböhl, 2011; Schweickle, Groves, Vella, & Swann, 2017). The current research thus focuses on this condition that facilitate both flow and clutch states.

Creative Activities and Challenge-Skill Balance

Frequent exposure to creative activities presents a potential way to influence athletes' appraisal of challenges and skills. According to Csikszentmihalyi, flow requires "a stretching of one's self toward new dimensions of skill and competence" (1975, p. 33). By pushing individuals to explore other alternatives, creative activities enhance individuals experiences and skills repertoire (Fink & Woschnjak, 2011; Simonton, 2000). Since the appraisal of a situation is based on different memory storage, a more substantial and diverse repertoire of experiences increases the probability of retrieving similar experiences from long-term memory (LTM). When facing subsequent challenges, familiar responses in LTM are thus more accessible (Tenenbaum et al., 2009). Therefore, we argued that creative experiences might directly influence the person-environment relationship by positively affecting challenge appraisal, and consequently facilitate the balance condition necessary to reach both flow and clutch state.

Coping Skills and Challenge-Skill Balance

As athletes evolve towards excellence, they encounter an increased number of stressors (Schinke, Tenenbaum, Lidor, & Battochio, 2010). Achieving a state of balance can thus demand additional effort. According to Keller et al. (2011), high skills-demands-compatibility result in increased stress levels as indicated by relatively high levels of salivary cortisol. Although elevated challenges have been positively associated with the occurrence of both flow state (Csikszentmihalyi, 1988; Keller et al., 2011) and clutch state (Schweickle et al., 2017), these results could have been mediated by athletes use of psychological skills to manage the stressful demands of the situation. According to the Lazarus's cognitive-motivational-relational theory (CMRT; 1999, 2000), after appraising whether the environment has the potential to endanger personal goals *(primary appraisal)*, the athlete can deploy, if needed, appropriate coping skills to deal with aspects of the problem or with emotions associated with it *(secondary appraisal)*. Coping skill could thus facilitate the athlete's perceived fit between challenge and skills.

Coping skills enable the athlete to invest cognitive and behavioral efforts directed to manage specific external and internal demands (Lazarus & Folkman, 1984). Various classifications of coping strategies exist (see Nicholls & Thelwell, 2010). Namely, Gaudreau and Blondin (2002) developed a model of coping in sport which includes three dimensions of coping: *task-oriented coping, distraction-oriented coping*, and *disengagement-oriented coping*. Task-oriented coping involves directly addressing the source of stress and deliberately attempting to reduce or remove the stressors. Distraction-oriented coping corresponds to strategies that can be used to direct one's attention momentarily on things that are unrelated to sport competition; whereas disengagement-oriented coping represents strategies that are used to disengage oneself from processes that generally lead to goal attainment.

Empirical evidence supports the association between coping and flow occurrence. For instance, results of a study exploring the relationship between psychological correlates and flow among 261 junior tennis players showed that athletes displaying active coping patterns (i.e., action orientation) are more likely to master the various challenges inherent in tennis competition, which is beneficial for flow (Koehn, Morris, & Watt, 2013). Similarly, athletes presenting higher flow disposition reported using more approach coping strategies to manage task demands whereas their lower flow disposition counterparts mentioned using more avoidance ones (Jackman et al., 2016). Yet, whether coping impact specifically the challenge-skill condition of flow remains unknown. Baring theoretical and empirical knowledge in mind, we hypothesized that task-oriented coping would be positively associated with challenge-skill balance dimension of flow, whereas distraction and disengagement coping would reveal a negative association.

Creative Activities and Coping Skills

Frequent involvement in creative activities could also impact the coping skills disposition. Indeed, the broaden-and-build theory (Fredrickson, 1998) stipulates that expressing one's individual creativity contributes to broadening their thought-action repertoire (Fredrickson, 2001). In this line, Nicholls, Perry and Calmeiro (2014) concluded that a wider cognitive repertoire allows athletes to create and develop new solutions in addition to building their enduring personal resources. Some evidence supports the relationship between creativity and task-oriented coping (Carson & Runco, 1999). For instance nonconformity, a personality trait underlying creativity, has been associated with increasingly frequent occurrence of task-oriented coping in male combat athletes (Bernacka, Sawicki, Mazurek-Kusiak, & Hawlena, 2016). However, the link between creative behaviors and coping disposition is underexplored. It is expected that frequent involvement in creative experience would be positively linked with task-oriented coping and negatively linked with distraction and disengagement coping.

In summary, the aim of the present study was to test the notion that engagement in creative activities directly affects the flow state dimension of challenge-skills balance and indirectly affects it via coping strategies in the realm of competitive sport. According to Csikszentmihalyi

(1975), challenge can be both triggered by the unknown of discovery and exploration or by more traditional competitions. Therefore, we argue that athletes who are frequently expose to the challenge coming from creative activities will present a higher disposition to experience a sense of balance between challenge and skills and this relationship will be mediated by a stronger disposition to use task oriented-coping. To test these assumptions, we postulated a conceptual model (see Figure 1) and tested its paths by implementing an introspective study. The measured variables were tested first for measurement integrity via confirmatory factor analyses (CFA), and upon subsequent modifications, structural equation modeling was used to determine the best model to fit the data.

Method

Participants

Two hundred and eight athletes aged between 14 to 37 years old participated in this study (*M* = 21.84, *SD* = 4.27). Considering Baker et al.'s (2015) Taxonomy of Skills in Sport, the sample was composed of 21 intermediate athletes, 73 advanced athletes, and 114 expert athletes. The sample was composed of 94 males and 114 females. All athletes were actively practicing in their respective sport daily. Seventeen different sports were represented: volleyball (*n* = 29), figure skating (*n* = 9), gymnastics (*n* = 1), swimming (*n* = 20), snowboarding (*n* = 7), fencing (*n* = 20), racquetball (*n* = 1), archery (*n* = 1), track and field (*n* = 2), hockey (*n* = 21), soccer (*n* = 36), badminton (*n* = 1), rugby (*n* = 8), speed skating (*n* = 12), ultimate Frisbee (*n* = 16), water polo (*n* = 15), and synchronized swimming (*n* = 9). All the athletes had been practicing in their respective sports for an average of *M* = 12.75 years (*SD*= 4.55), competing for *M* = 9.4 years (*SD*= 3.78), and were training *M* = 16.66 hours per week (*SD*= 8.70). At the time of the study, all participants trained in the province of Quebec, and spoke French and/or English, fluently.

Measures

Demographic information. A form was created asking participants to report on their gender, age, education, place of birth, and residence. In addition, participants were asked which specific sport they were engaged in, the number of years they had been practicing this sport since their initiation, as well as the number of years they were practicing it at a competitive level. They were also asked to list their best result in four different levels of competition (provincial, national, international, and Olympic). Finally, participants were required to report the average amount of time they spent training per week.

Creative activity and accomplishment checklist (CAAC; Runco, 1986; Holland, 1961). The CAAC allows obtaining very precise information about each athlete's specific creative activities and accomplishments. CAAC can be used to measure creative activities in a variety of domains (Runco, Noble, & Luptak, 1990). A CAAC sport subscale was developed for the present research. It contained 12 items, each of which requires athletes to describe the frequency of their engagement in certain creative activities related to their sport rated on a 4-points Likert-type scale ranging from 1 (*never*) to 4 (*more than five times*). As is true for all domains and scales on the CAAC, the items represent activities involving problem solving, creative production, and recognition of creative accomplishment by others (Agnoli, Corazza, & Runco, 2016) (e.g., "how often have you offered an original solution to a sport problem to others working in that field", "how often have you created something that required technical knowledge such as a new technical/artistic movement or choreography" and "how often have you designed a training plan or an exercise to test a new technique in your sport). An extensive psychometric investigation of the CAAC was recently presented by Paek and Runco (2016). Previous studies have used CAAC revealing an alpha coefficients of .85 for reliability of the total scale (Donggun & Runco, 2016) and from .68-.86 for the various areas (Runco et al., 2016). However, we are the first study to use the sport version of the scale. Our results show that the sports version of the CAAC was reliable (**Ω** =.80).

Since our study was conducted in an official bilingual province of Canada, the questionnaires were offered in both French and English to the participants to ensure everyone could answer in their primary language. As the original CAAC was developed in English, a structured translation/back translation process (Geisinger, 2003) was used to establish a French version of the assessment tool. To accomplish this, a bilingual sport scientist translated the questionnaire into French and a second bilingual individual re-translated the tool into English. The French items were translated in a way that maximized their linguistic and conceptual correspondence with their original English counterparts (Fournier et al., 2007). The initial translation and back-translation were compared to correct any points of divergence. CAAC was then corrected to be an accurate reproduction of the original item (Gustafsson, Hassmén, & Podlog, 2010).

Dispositional coping inventory for competitive sport (DCICS; Hurst, Thompson, Visek, Fisher, & Gaudreau, 2011)**.** The DCICS aims at assessing the athlete's typical utilization of coping strategies within the competitive sport environment on a 5 points Likert-type scale ranging from 1 (*not at all*) to 5 (*very strongly*). It was adapted from the situational version (Coping Inventory for Competitive Sport; CICS) originally designed in French (Gaudreau & Blondin, 2002). The DCICS consists of 10 first-order subscales that are categorized into three second-order dimensions: (1) task-oriented coping (i.e., mental imagery, thought control, relaxation, logical analysis, seeking support, and effort expenditure), (2) distraction-oriented coping (i.e., distancing and mental distraction), and (3) disengagement-oriented coping (i.e., disengagement/ resignation and venting of unpleasant emotions). Previous studies that have used this scale demonstrated internal consistency reliability (Cronbach's alpha) for the 10 subscales varying between .60 - .80 (Hurst et al., 2011). Following the procedures and recommendations described by Hurst and colleagues, the DCICS was adapted in French for the current study by changing the verb tenses of the original CICS from past to present. This allows to measure typical rather than specific coping responses. In addition, two items were added to the *distancing* first-order subscale to increase the content validity of the subscale. The final version of the DCICS that was administered to the athletes in the present study thus included 41 items.

Challenge-skills dimension of flow (DFS-2; Jackson & Eklund, 2002)**.** To assess the disposition of athlete to reach a state of balance, the challenge-skills balance subscale from the DFS-2 was used. The athlete was asked to think how often he/she experienced a sense of balance while practicing their sport using a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*). An example item, "When participating in my sport, I am challenged, but I believe my skills will allow me to meet the challenge." The French version used in this study was derived from the valid version of the Flow State Scale Revised (Fournier et al., 2007). The instrument demonstrated good construct validity (Jackson & Eklund, 2004), and acceptable reliability of .75 in a previous study using similar population (Crust & Swann, 2013).

Design and Procedure

To test the research the postulated model and its assumptions, we used a correlational research design. After receiving University of Montreal Health Research Ethic Committee approval, the questionnaires were administered in group sessions. After being presented with brief information about the contents and purpose of the study, athletes were asked to read and sign the Consent and Information document. Thereafter, they were asked to fill out the three questionnaires followed by the demographic information form. Test sessions lasted between 25 - 30 minutes.

Results

Prior to testing the conceptual model, we examined the distribution of the observed scores for each item in the five scales comprising the model presented in Figure 1. The distributions of all items emerged to be asymmetric. Diagonally weighted least square estimation method with mean and variance adjustment was applied for conducting confirmatory factor analysis (CFA) for each of the five scales because the number of response categories was five or fewer (Finney & DiStefano, 2013). Specifically, we conducted a one-factor model for CAAC, a six-factor model for task-orientated coping scale, a two-factor model for distraction-oriented coping scale, a two-factor model for disengagement-oriented coping scale, and a one-factor model for challenge-skills balance scale. Analyses were conducted in M*plus* 7 (Muthén & Muthén, 1998-2015). In addition to a non-significant χ^2 statistic, an adequate model-data fit was indicated by $RMSEA < .08$ and $CFI > .950$ (e.g., Yu, 2002). Fit indices from all the tested measurement models are shown in Table 1.

Creative Activity and Accomplishment Checklist

The one-factor model with 12 items fit poorly to the data. Two of the items, item 7, “participated in a sport club or organization”, and item 8, “won an award for a significant contribution in your sport”, loaded weakly on the unidimensional factor, and thus were removed from the scale. Although participation in extracurricular activities and external recognition are reliable indicators of creative involvement in other domains (Runco et al., 2016), these two items were not a solid representation of this notion in sport. In addition, modification indices suggested adding a residual covariance between item 6, “Used technology (video, apps) to capture an original sport idea,” and item 12, “Used technology to view slow motion or superimpose sports movement.” The two items are similar in content as both relate to technology use for generating creative ideas. The revised model demonstrated an adequate fit as shown in Table 1, $\chi^2(34) = 90.36$, $p < .01$, $RMSEA = .089$, $CFI = .950$. Standardized loadings were in the range of .32 - .77; all were statistically significant at $p < .01$. Coefficient omega (ω) for the sum scores across these categorical items was computed using the Green and Yang (2009) formula, $\omega = .80$.

Scale	χ^2	*df*	RMSEA	CFI
Creative activity	172.38*	54	.103	.901
Creative activity (revised)	90.36*	34	.089	.950
Task-oriented coping	328.77*	215	.050	.965
Distraction-oriented coping	138.02*	34	.121	.917
Distraction-oriented coping (revised)	55.09*	25	.076	.975
Disengagement-oriented coping	77.32*	19	.121	.954
Disengagement-oriented coping (revised)	26.73	18	.048	.993
Challenge-skill balance	1.55	2	.000	1.00

*p<.01.

Table 1: Evaluation of the Measurement Model for Each Scale.

Task-Oriented Coping Scale

Task-oriented coping consisted of six domains. Each domain was measured by 4 items except that effort expenditure was measured by 3 items. The six-factor CFA model demonstrated reasonable fit, $\chi^2(215) = 328.77$, $p < .01$, *RMSEA* =.050, *CFI* = .965. The standardized loadings ranged from .42 - .90. Reliability coefficient for the entire scale was ω=.91 and ranged from .67 (logical analysis) - .86 (relaxation) for the six subscales.

Distraction-Oriented Coping Scale

Distraction-oriented coping consisted of two subdomains. The distancing subscale consisted of 6 items and the mental distraction subscale consisted of 4 items. The two-factor model yielded an unsatisfactory fit. Item 23, “I keep all people at a distance,” had weak standardized loadings on the target factor and was thus removed from the model. This item was added to the DCSCI following Hurst and colleagues’ (2011) suggestion to increase content validity of the distancing factor. Therefore, to our knowledge, the present study is the first to use this item for the distancing subscale. The current analysis failed to support the inclusion of this item in the scale. In addition, modification indices suggested adding a residual covariance between item 40, “I retreat to a place where it is easy to think,” and item 41, “I search for calmness and quietness.” Conceptually, these two items share similar content (e.g., seeking a more internal calmness), which requires to relate them. The revised model showed an adequate fit, $\chi^2(25) = 55.09$, $p < .01$, *RMSEA* =.076, *CFI* = .975 as shown in Table 1, the standardized loadings ranged from .43 - .89 - all were statistically significant at $p < .01$, and the reliabilities were: ω = .77, .81, and .61 for the entire scale, the mental distraction subscale, and the distancing subscale, respectively.

Disengagement-Oriented Coping Scale

Disengagement-oriented coping consisted of two subdomains each measured by 4 items. The two-factor model for the disengagement-oriented subscale yielded an inadequate fit. Modification indices suggested adding a residual covariance between item 22, “I express my discontent,” and item 32, “I express my frustrations.” Both items relate to the expression of similar emotions. The revised two-factor model resulted in an excellent fit, $\chi^2(18) = 26.73$, $p > .05$, *RMSEA* =.048, *CFI* = .993. The standardized loadings ranged from .40 - .98, and the reliabilities were: ω = .78, .77, and .70 for the entire scale, the disengagement/resignation subscale, and the venting of unpleasant emotions subscale, respectively.

Challenge-Skills Balance Scale

The challenge-skills balance scale consisted of four items. The one-factor model fitted very well to the data, $\chi^2(2) = 1.55$, $p > .05$, $RMSEA = .000$, and CFI = 1.00. The standardized loadings were large, and ranged between .58-.95, with ω = .83.

In summary, the revised one-factor model for CAAC consisted of 10 items and one correlated residual. The revised two-factor model for distraction-oriented coping scale consisted of nine items and one correlated residual, and the revised two-factor model for disengagement-oriented coping scale consisted of eight items and one correlated residual. The originally hypothesized one-factor model for challenge-skills balance scale and six-factor model for task-oriented coping scale were successfully retained.

Structural Equation Modeling: Testing the Model

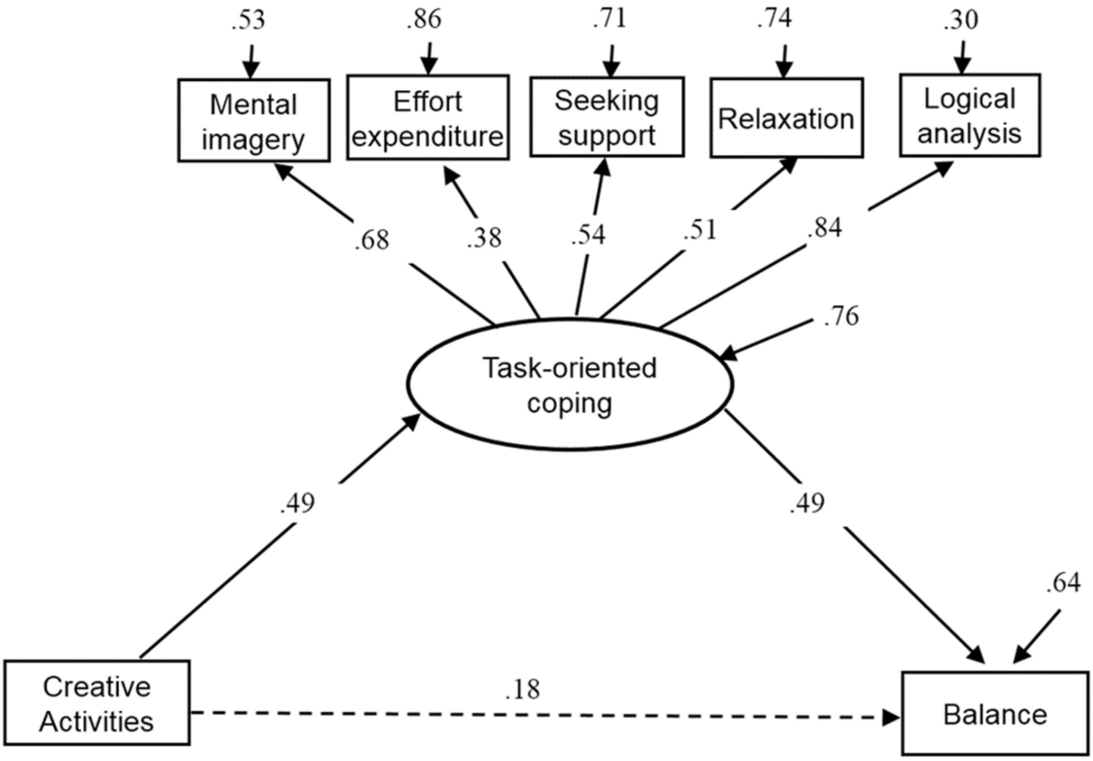
Next, we examined the conceptual model shown in Figure 1 using a structural equation model. The correlation coefficients among scores from the 12 scales/subscales along with their standard deviations are shown in Table 2. The diagonal elements are the estimated ω based on the measurement model we conducted in the previous step. The conceptual model was then tested using robust maximum likelihood estimation method. To correct for the unreliability of scale scores for each of the 12 variables, we used a single indicator for each of these 12 variables and constrained their residual variance as var(x)*(1- ω) where var(x) was the variance of the variable and ω was the corresponding reliability coefficient computed in the previous step. The model encountered improper solutions. Specifically, the standardized loading of distraction-oriented coping was greater than one, and thus removed from the model. The revised model yielded a poor fit, $\chi^2 = 86.48$, $df = 31$, $p < .01$, $RMSEA = .093$, and $CFI = .811$. We continued to test a model without the constructs of disengagement-oriented coping and distraction-oriented coping as reported next.

Scale/Subscale	1	2	3	4	5	6	7	8	9	10	11	12
1. Creative activities	(.80)											
2. Balance	.34	(.83)										
3. Mental imagery	.31	.34	(.80)									
4. Thought control	.17	.38	.50	(.79)								
5. Relaxation	.26	.18	.30	.27	(.86)							
6. Logical analysis	.26	.39	.41	.22	.32	(.67)						
7. Seeking support	.23	.15	.24	.33	.29	.36	(.72)					
8. Effort expenditure	.09	.29	.22	.20	.12	.24	.07	(.79)				
9. Distancing	.03	05	.16	.00	.12	.20	.00	-.01	(.61)			
10. Mental distraction	-.02	-.03	-.02	.15	.21	-.04	.18	.02	.20	(.81)		
11. Disengagement/ resignation	-.20	-.45	-.23	-.42	-.03	-.15	-.06	-.34	.25	.32	(.77)	
12. Venting of unpleasant emptions	-.07	.01	-.06	-.20	-.09	.22	.05	-.17	.09	.10	.23	(.70)
Standard Deviation	6.73	2.17	3.43	3.04	3.91	3.06	3.37	1.78	3.70	3.71	2.74	3.53

Table 2: Correlation Matrix and Standard Deviation of 12 Variables Involved in the Conceptual Model.

Model Re-Specification

In the re-specified structural equation model, the construct "creative activities" has both a direct effect and an indirect effect on balance via task-oriented coping (with 6 dimensions). This model showed an inadequate fit, $\chi^2 = 51.74$, $df = 19$, $p < .01$, $RMSEA = .091$, and $CFI = .874$. Modification indices suggested adding a residual covariance between the two dimensions of task-oriented coping: logical analysis and thought control. However, adding the residual covariance led to an out-of-boundary of the estimate of this parameter (i.e., residual correlation < -1). Logical analysis and thoughts control are considered cognitive operations used to identify and/or assess internal and external environmental demands. These strategies are used for effective coping in the form of thought restructuring (Gaudreau & Blondin, 2002). The analysis suggested that these cognitive operations act in parallel, and, therefore, only one was required to represent these cognitive processes. We decided to retain the logical analysis dimension and exclude thought control from the model because it better represents problem solving and decision-making; cognitive processes involve in creative actions. The revised model showed an excellent fit, $\chi^2 = 18.45$, $df = 13$, $p > .05$, $RMSEA = .045$, and $CFI = .970$. The path diagram along with standardized parameter estimates for this revised model is shown in Figure 2.



*$p < .01$. The dotted line indicates that the path coefficient was not significant, $p > .05$.

Figure 2: The final model illustrating a full mediation of creative activities and challenge-skill balance by task-oriented coping.

The standardized path coefficient from creative activities to task-oriented coping and from task-oriented coping to balance was .49 and .49, respectively; both were significant with $p < .01$. Therefore, the indirect effect from creative activities to balance via task-oriented coping was .24 (=.49 ×.49), $p < .01$. However, the direct effect from creative activities to balance (indicated by the dash line) was .18 and not significant ($p > .05$). The R^2 of balance was .36, meaning that 36% of the variance in balance was accounted for by creative activities and task-oriented coping, of which 27% was attributed to the indirect effect from creative activities via task-oriented coping.

Discussion

We aimed to explore the relationship between creative experiences, coping skills, and challenge-skills dimension of flow. By testing various versions of the model, the results support the link between creative activities and task-oriented coping while excluding the link between distraction-oriented coping and disengagement coping. The final model revealed an association between task-oriented coping and challenge-skills balance. More importantly, task-oriented coping was shown to significantly mediate the relationship between creative activities and challenge-skills dimension of flow.

Our findings support the relevance of engaging in creative activities such as creating new techniques/movements, setting up experiments to test new ideas, designing training plans, or finding original solutions to sport problems in fostering athletes' optimal psychological state. The novelty and exploration required while engaging in creative activities encourage individuals to break away from set patterns of thinking (Lewis & Lovatt, 2013). Indeed, when people are used to activities involving creativity, under-used thinking pathways are stimulated and increase the activation of cognitive flexibility, fluency, and originality (Walton, 2003). This process provides athletes with new cognitive resources making them more prone to interpret unfamiliar situations as challenging rather than threatening (Nicholls et al., 2014). Since creative activities potentially influence athletes' perception of challenge, a direct effect on the challenge skill equation was expected. Yet, in our final model, creative activities only weakly related to challenge-skill balance. Most of the challenge-skill balance variance was accounted for by the mediational path of task-oriented coping, which makes this link worth further elaboration.

A study conducted by Stavrou and colleagues (2007) provides partial explanation for our results. To examine the relationship between challenge, skills, and the nine flow dimensions, these researchers separately assessed athletes' perception of challenge and skill before competition and flow state right after the event. Findings revealed that it is the athletes' perception of skill level, and not the perceived challenge of the competition, that significantly correlated with the challenge-skill balance dimension of flow. In a competitive environment, these results denote that athletes who estimate positively their abilities to manage the demands of the situation might be more prone to experience a balance between the challenge and skills, even when the challenge is fairly high. This corroborates with Lazarus's (1999) idea that perceiving stressful situations as challenging rather than threatening only initiates the adaptation process, and may not directly affect the challenge-skill balance state. The capacity of an athlete to subsequently use relevant coping skills required for dealing with these challenges is thus essential (Schinke et al., 2010) because, only then, the athlete feels a sense of balance between challenge and skill. Fostering these coping skills in athletes is thus key and our results highlighted the relevance of creative activities to achieve that purpose.

Indeed, athletes who reported engaging more frequently in sport-related creative activities exhibited a higher disposition to use task-oriented coping skills. This linkage is in accordance with the broaden-build theory assumption postulating that the pleasantness coming from expressing ones creativity broadens athlete's behavioral and thoughts repertoire; thereby initiating the use of coping skills (Fredrickson, 2001). Since creativity is associated with higher-level cognitive functions (De Dreu, Nijstad, Baas, Wolsink, & Roskes, 2012), engagement in it may contribute specifically to the development of task-oriented coping strategies that require engagement in deep cognitive processing such as logical analysis, mental imagery, and planning (Nicholls et al., 2014). Our findings support this notion showing stronger association between creative activities and both mental imagery and logical analysis than with the remaining three behavioral task-oriented coping (e.g., effort expenditure, seeking support, and relaxation). However, the effect of engagement in creative activities on emotions as well as cognitive functions, and the use of coping strategies in the realm of sport must be substantiated experimentally along with the notion that it mediates the challenge-skills balance.

In line with our initial postulation, our results show negative associations between creative experiences and both distraction and disengagement-oriented coping and between these two coping dimensions and challenge-skills balance. However, these associations are too weak to reach significance. Therefore, there is no evidence to support the inclusion of distraction and disengagement coping in the final model. Distraction and disengagement oriented coping can be considered as avoidance strategies which involve attempts to disengage from the stressors (Hill & Hemmings, 2015). In a creative process, one must face the problem at hand and even sometimes create the problem itself (e.g., problem finding) to produce more original ideas (Runco, 2014). Therefore, athletes who are frequently involved in creative activities are less likely to develop an avoidance coping style which support the absence of significant associations between the involvement in creative processes and avoidance coping strategies.

Our analysis also revealed a negative association between distraction and disengagement coping and challenge-skill balance. These results are in accordance with Jackman et al. (2016) who showed that low flow disposition athletes used coping to alleviate the emotional consequences of the stressor rather than directly act towards it resulting in lower level of adaptability. The low disposition flow athletes also expressed being slow and ineffective in finding solutions to problem when the pressure was high. The authors concluded that avoidance coping prevent flow while approach coping promote it. Our study refines this conclusion by highlighting the impact of task-oriented coping strategies on the challenge-skill dimension of flow and the influence of creative activities as an initiator of this relationship.

Limitations of the Study

Despite the relevance of the present study, it does contain certain limitations. First, the correlational design used in the present study does not allow to infer causality. Further studies using an experimental design must develop creative activities to explore their unique effect on both the development of effective coping skills and the attainment of challenge-skills balance. Second, for the purpose of this study, the CAAC was adapted to sport from creative accomplishment and activity checklists used in other domains. Consequently, two items were loading poorly and were removed from the measurement model. Since creativity is a domain-specific construct (Baer, 2015), more effort should be devoted to develop and validate creativity assessment tools grounded in the specific sport context. Similarly, many modifications were made on the distraction and disengagement coping scales to reach an adequate fit with the measurement model. In accordance with other studies (Gaudreau, El Ali, & Marivain, 2005), the result of the present research highlights several problems with the distancing subscale. Items related to the distancing factor should thus be revised to better represent and assess the behavioral actions used to reduce or eliminate social relationships momentarily (Hurst et al., 2011). Finally, the current study focuses on the challenge skill balance process of occurrence and did not differentiate between flow and clutch state which represent the contemporary conceptualization of optimal psychological states (Swann et al., 2018). According to Swann, Crust and Vella (2017), flow happens in a context of novelty, uncertainties and exploration whereas clutch state occur in important moment when the outcome is on the line. Future studies should thus examine the various impact of engaging in creative activities on these two optimal states. Nevertheless, the operationalization of the theoretical construct we have tested was found to be sufficient, and thus the model can be challenged in other cultures and sports. Furthermore, the model can be expanded by including other variables such as emotion and cognitive function.

Conclusion

In addition to its empirical contribution to sport and creativity literature, some implications can be drawn from these research results. In fact, more effort should be devoted by sport coaches and practitioners to implement a creativity supportive environment. Coaches can confront athletes more frequently with challenging experiences, such as being responsible to develop new methods of training aiming at improving a specific skill or overseeing the development of new movements or tactics supporting sport innovations. This way, task-oriented coping can be stimulated resulting in a more frequent experience of challenge-skills balance, benefiting the athlete's enjoyment of the overall sport experience at the same time. Unfortunately, creativity fulfillment takes time (Runco, 2004) and sport is often under constrained time pressure. However, "unless enough people are motivated by the enjoyment that comes from confronting challenges, by discovering new ways of being and doing, there is no evolution of culture, no progress in thought or feeling" (Csikszentmihalyi, 1996, p. 110). Therefore, encouraging creativity in sport seems to be a promising avenue to ensure an ongoing evolvement of the field, resulting in psychological skills and states enhancement.

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