

A longitudinal examination of elite youth soccer players: The role of passion and basic need satisfaction in athletes' optimal functioning

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ABSTRACT

Objectives: Grounded in the basic psychological needs theory (BPNT; Ryan & Deci, 2017) and dualistic model of passion (DMP; Vallerand et al., 2003), the aim of the present study was to examine within-person variations in athletes' optimal functioning (i.e., positive and negative affect, athletic satisfaction, and quality of preparation and performance) as a function of passion types and need satisfaction over the course of three competitive seasons.

Method: Elite youth soccer players (n = 91) completed multi-section questionnaires on up to five occasions over the course of three competitive seasons.

Results: Results of Hierarchical Linear Modeling analyses showed that between-person variations in harmonious passion (HP) were positively related to optimal functioning, whereas it was only partially the case with obsessive passion (OP). Moreover, within-person variations in the satisfaction of autonomy, relatedness, and competence were also associated with increases in athletes' psychological well-being (i.e., positive and negative affect, and athletic satisfaction). Additionally, results from a multilevel indirect effects model revealed that HP and increases in competence were both positively related to increases in the quality of athletes' preparation, which in turn led to increases in performance, as rated by coaches, over the span of three competitive seasons.

Conclusions: Overall, the results offer support for the effects of needs and passion on optimal functioning and are discussed in line with their implications for athletes in elite youth sports settings.

1. Introduction

The journey toward becoming a professional athlete requires focus, dedication, and long-term engagement. In order to reach their quest of becoming a professional soccer player, most athletes prepare, practice, and play every day in the youth ranks of a professional team, with the hope of one day playing for the first team. Thus, players have to train rigorously over the course of several years and improve their performance in order to eventually reach their desired goal of becoming professional athletes. In addition to performance, psychological well-being is a key component of the optimal functioning of youth athletes. However, both performance and psychological well-being can fluctuate over time. Over the years of progressing through the youth ranks, athletes are thus very likely to experience ups and downs in terms of both performance and psychological well-being.

1.1. Self-determination theory and basic psychological needs

As part of Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan

& Deci, 2017), the Basic Psychological Needs Theory (BPNT) posits that three fundamental psychological needs (i.e., autonomy, relatedness, and competence) are essential for the optimal functioning and positive development of all humans at any given point in time. Autonomy is a sense of volition and personal initiative people experience regarding their choices and decisions (DeCharms, 1968). Relatedness refers to a desire to feel connected to significant others and experience belongingness (Baumeister & Leary, 1995). Finally, competence represents a desire to interact effectively and to assert a sense of mastery within ones' environment (White, 1959). The satisfaction of the three basic needs has been associated with a range of positive outcomes related to psychological well-being such as positive and negative affect (Questaed & Duda, 2010), and life satisfaction (Tay & Diener, 2011), as well as behavioral outcomes such as deliberate practice (Verner-Filion, Vallerand, Amiot, & Mocanu, 2017), and performance (Baard, Deci, & Ryan, 2004). More specifically, competence has been shown to be the key need to predict behavioral markers of effort and performance in both the exercise (Edmunds, Ntoumanis, & Duda, 2006) and competitive sports (Halvari, Ulstad, Bagoien, & Skjesol, 2009) domains.

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SDT also proposes that many situational and environmental factors can influence the satisfaction of all three basic psychological needs. Over the course of athletes' involvement in academy settings, one's sense of autonomy, competence, and relatedness can be affected by various factors, such as the appointment of a new coach, new teammates, being promoted to another team, one's own personal development, and even the simple passage of time. However, most of the existing research regarding need satisfaction in sport used either cross-sectional or longitudinal designs to study its role at between-person level. To this day, only a handful of papers in the sport and exercise psychology literature have looked at the effects of within-person differences in need satisfaction on changes in the optimal functioning of athletes over time (e.g., Adie, Duda, & Ntoumanis, 2012; Gagné, Ryan, & Bargmann, 2003; Reinboth & Duda, 2006). As proposed by Adie, Duda, and Ntoumanis (2008), assessing longitudinal patterns of change among athletic outcomes in relation with changes in need satisfaction is key to provide a better understanding of the fluctuations in athletes' optimal functioning over time.

Gagné et al. (2003) were the first to investigate this issue in the sport and exercise domains. In a study using a daily diary methodology with gymnasts, Gagné and colleagues found that within-person variations in need satisfaction accounted for variations on athletes' well-being on a daily basis. Similar findings were obtained in recent research with youth soccer players (Adie et al., 2012; Cheval, Chalabaev, Quested, Courvoisier, & Sarrazin, 2017), dancers (Quested, Duda, Ntoumanis, & Maxwell, 2013), and athletes from various other sports (Reinboth & Duda, 2006; Stenling, Lindwall, & Hassmén, 2015). To this day, research looking at within-person variations in need satisfaction has predominantly looked at athletes' psychological well-being. To the best of our knowledge, only one published study has looked at the influence of within-person variations of need satisfaction the other key aspect of optimal functioning, namely performance-related outcomes. In a study with recreational basketball players, Sheldon, Zhaoyang, and Williams (2013) found no significant relation between within-person variations in need satisfaction on performance. However, this study focused solely on recreational sports with one performance indicator (i.e., shots taken and shooting percentage during games). Performance, especially in competitive team sports, is a complex and multifaceted variable, encompassing aspects, such as the quality of one's technical, tactical, physical and mental attributes (Hughes & Bartlett, 2002; Morris, 2000). Yet, no research has investigated at the influence of within-person variations in need satisfaction on competitive sports performance using an indicator assessing all of the aforementioned facets, while also investigating the role of needs in changes in psychological well-being.

In addition to need satisfaction, we propose that passion plays a key role in process of the development and attainment of optimal functioning in athletes (Vallerand et al., 2008; Verner-Filion et al., 2017). Indeed, passion is an internalized regulation of a need-satisfying activity (Lalonde et al., 2017). As such, passion represents an important motivational force that helps players maintain focus and overcome the obstacles they inevitably face in the process of reaching the professional ranks.

1.2. The dualistic model of passion

According to the Dualistic Model of Passion (DMP; Vallerand, 2015; Vallerand et al., 2003), passion is defined as a strong inclination toward a self-defining activity that is important, liked (and even loved), and in which a significant amount of time and energy is invested. Passion is thus proposed to be a key contributing factor to the optimal functioning of athletes. Passionate athletes who reach high levels of performance would be expected to also experience higher levels of psychological well-being. Unfortunately, it is not always the case. For some athletes, passion indeed leads to high levels of performance, but at the cost of

their psychological well-being (Vallerand et al., 2008, 2007; Verner-Filion et al., 2017). This is because the DMP posits the existence of two types of passion (i.e., *Harmonious Passion* – HP – and *Obsessive Passion* – OP) that can be distinguished in terms of how the passionate activity is regulated and integrated with other life domains and how they affect outcomes. With HP, the activity occupies a significant, but not overpowering, space in one's identity and remains under the control of the individual as it is in harmony with other important life aspects. This is because, with HP, the process of internalization of the activity in the self occurs in an autonomous fashion (Deci & Ryan, 2000). Thus, individuals with HP freely accept and engage in their passionate activity without any contingency attached to it (Mageau, Carpentier, & Vallerand, 2011).

In contrast, with OP, individuals face an uncontrollable urge to partake in the activity they love and find enjoyable, as activity engagement is beyond their control. Since everything gravitates around the passionate activity, OP is associated with a rigid persistence, even when activity engagement is detrimental to other goals or activities in the person's life (Vallerand et al., 2003). This is because, with OP, the process of internalization of the activity in the self occurs in a controlled way (Deci & Ryan, 2000), as it originates from intra- and/or inter-personal pressures and in addition to some sense of enjoyment can also provide extrinsic benefits such as a boost of self-esteem (Mageau et al., 2011).

Passion represents a major motivational force providing people with the energy for athletes to engage and persevere in demanding behaviors and activities that are essential to reach high levels of performance. The DMP thus posits that passion should influence performance indirectly through such behavior. Past research has shown that deliberate practice, defined as a highly structured activity motivated by the explicit aim of improvement, is a key mediating variable in the relation between passion and performance (Bonneville-Roussy, Lavigne, & Vallerand, 2011; Vallerand et al., 2007, 2008). In line with the construct of deliberate practice (Ericsson & Charness, 1994), the quality of athletes' preparation is important for performance. In addition to the quantity of hours spent training on deliberately enhancing their skills, maintaining a healthy lifestyle also matters for performance. The quality of athletes' preparation thus refers to efforts athletes put toward being in the best form possible (i.e., eating and sleeping habits, seriousness, concentration, and effort displayed daily, etc.). Coaches in professional academies are in a prime position to evaluate the quality of athletes' preparation as they interact with the athletes on a daily basis.

Moreover, passion can go beyond deliberate practice and performance to facilitate other outcomes, such as psychological well-being. In what they called “the two roads to performance”, Vallerand et al. (2007, 2008) showed that, in addition to its positive relation with deliberate practice and performance, HP is also associated with higher levels of psychological well-being. In contrast, performance comes at the cost of psychological well-being with OP. This is because HP is characterized by an autonomous (Curran, Appleton, Hill, & Hall, 2011; Mageau et al., 2009; Vallerand et al., 2006), open (Hodgins & Knee, 2002), and mindful (St-Louis, Verner-Filion, Bergeron, & Vallerand, 2018) engagement in the activity that is conducive to positive experiences (e.g., sustained engagement, concentration, positive affect, etc.; Vallerand, 2015) without any contingencies. Consequently, HP allows athletes to experience high levels of both performance and psychological well-being. In contrast, OP is characterized by a controlled (Vallerand et al., 2006), ego-invested (Hodgins & Knee, 2002) and contingent (Mageau et al., 2011) engagement in the activity that one loves that can lead to increased effort (Bélanger, Lafrenière, Vallerand, & Kruglanski, 2013a), albeit at the cost of psychological well-being. Overall, research has shown that HP is associated with more adaptive cognitive, affective, and behavioral outcomes compared to OP (see Curran, Hill, Appleton, Vallerand, & Standage, 2015; Vallerand, 2015, for reviews).

1.3. Passion, need satisfaction, and optimal functioning in sport

Building on past research on passion and need satisfaction in the sports domain (Curran, Appleton, Hill, & Hall, 2013), Verner-Filion et al. (2017) have shown that need satisfaction, as proposed by SDT, plays a pivotal role in the understanding of the relation between passion and optimal functioning in athletes. Specifically, results of two studies supported the mediating role of need satisfaction in the positive relation between HP and life satisfaction, deliberate practice, as well as measures of performance, such as informant reports (coaches; Study 1) and the number of games played in elite hockey leagues over the span of 15 years (Study 2). In contrast, OP was positively associated with performance through the effects of deliberate practice, but not need satisfaction. OP was also unrelated (Study 1) or negatively related (Study 2) to life satisfaction. Thus, OP in athletes is associated with a deep involvement in their quest toward performance by spending numerous hours in order to reach their goals. This devotion ultimately leads to performance, albeit at the cost of lower levels of psychological well-being because activity involvement does not lead to need satisfaction. OP is thus only partially related to optimal functioning in athletes. In contrast, HP in athletes is positively related to all indicators of optimal functioning (i.e., psychological well-being, deliberate practice, as well as short- and long-term performance) in athletes through the mediating effect of need satisfaction. Past research has thus demonstrated the importance of both passion and need satisfaction to better understand optimal functioning in athletes (Curran et al., 2013; Verner-Filion et al., 2017). However, no research to date has jointly investigated the effects of passion and variations in need satisfaction on the process of change in well-being, preparation, and performance over time in the context of elite youth sports.

1.4. The present research

The findings presented above provide strong support for the tenability of the integration of the dualistic model of passion and basic psychological needs theory in achievement-oriented domains, such as sport. The aim of the present study was threefold. First, it sought to look at the influence of passion on longitudinal within-person variations in athletes' optimal functioning (i.e., psychological well-being, quality of preparation and performance) over the span of three competitive seasons. It was hypothesized that HP and OP would be respectively positively and negatively associated with within-person variations in psychological well-being (i.e., positive and negative affect, and athletic satisfaction). Moreover, and in line with past research on passion, deliberate practice, and performance, HP and OP were both hypothesized to be positively associated with within-person variations in the quality of athletes' preparation, but not directly with variations in performance (Bonneville-Roussy et al., 2011; Vallerand et al., 2008, 2007; Verner-Filion et al., 2017). The second aim was to look at the influence of within-person variations of autonomy, relatedness, and competence on athletes' optimal functioning. More specifically, it was expected that within-person variations in all three needs would be positively associated with athletes' psychological well-being. Moreover, only within-person variations in competence were expected to relate positively to the quality of athletes' preparation (Edmunds et al., 2006; Halvari et al., 2009) given the highly competence-focused environment in which the study took place (Quested et al., 2013). With regards to performance, and in line with past research on deliberate practice (e.g., Vallerand et al., 2008, 2007; Verner-Filion et al., 2017), changes in the quality of preparation were expected to be positively related to changes in performance. As mentioned above, both types of passion, as well as changes in competence, were expected to be indirectly and positively related to changes in performance through the effects of changes in the quality of preparation. Thus, the third and final aim was to test a mediational model in which both types of passion and within-person changes in competence both predicted changes in deliberate practice, which in turn predicted changes in performance.

2. Method

2.1. Participants

Participants were registered youth players from the academy of a North American professional soccer club. This study ran over course of three competitive seasons. Considering the context in which this study was conducted (i.e., professional soccer club academy) and the study duration (i.e., three seasons), it was not expected that all participants would take part of all measurement points. This is because, during the three seasons in which the current study took place, new participants joined the ranks of the academy, while others left either because they were cut from the Academy or they dropped out. Thus, this study relied on a multi-wave sample over the course of three competitive seasons. Overall, the sample used in this study comprised 116 male youth soccer players, ranging from 12 to 24 years of age ($M = 16.02$ years, $SD = 2.59$), participated voluntarily in the study. All these players trained and played with either one of the teams from the club academy (i.e., U-13, U-14, U-16, U-18, or for the club's U-21 reserve team) at some point during the three competitive seasons in which the study took place. Of these 116 players, 91 successfully completed at least one of the follow-up questionnaires (ranging from one to four occasions). Overall, participants completed 91 baseline questionnaires and 210 follow-up questionnaires, for a grand total of 301 questionnaires.

2.2. Procedures

A North American professional soccer club was contacted and informed about the conducting a study to better understand the motivational processes involved in the optimal functioning of athletes. After permission to conduct the research was granted by the Youth Club Director and following University ethical approval, a letter detailing the purpose and protocol of the study was sent to all eligible players and their parents. Written consent from both the athletes and their parents was obtained prior to data collection. In line with APA's guidelines on anonymity and confidentiality, players were told that their participation was voluntary and that they could stop participating at any point in time. Athletes were met twice per year, at the beginning (i.e., September) and at the end (i.e., following May) of each season for the first two years of the study. During the third year of the study, participants were met solely at the end of the season. Overall, participants were met on up to five occasions over the course of three competitive seasons. Questionnaires were administered by the principal researcher in a supervised classroom within the club's facilities at each measurement point (total number of observations for positive and negative affect and life satisfaction = 210). Coaches were contacted a few weeks after athletes completed their questionnaire to provide an assessment of athletes' quality of preparation and performance. This delay was granted to coaches so they would have time to know their athletes in more depth and thus, assess them with greater accuracy. Unfortunately, this time lag led to a little attrition regarding these two variables, as some athletes left the club between the completion of their questionnaire and the time coaches completed their evaluations. Finally, on some occasions, coaches failed to complete either the quality of preparation (i.e., total number of observations = 147) or performance (i.e., total number of observations = 180) scales.

2.3. Measures

All measures were assessed at each measurement point, with the exception of passion, which was only assessed at Time 1.

Passion (Time 1 only). Athletes' passion was assessed using the Passion Scale (Marsh et al., 2013; Vallerand et al., 2003). Participants were asked to complete the items with respect to soccer. Two six-item subscales were used to assess harmonious (e.g., "Being a soccer player is in harmony with other things that are part of me"; $\alpha = .81$) and

obsessive (e.g., “I have difficulties controlling my urge to play soccer, $\alpha = .75$). Items were rated using a scale ranging from 1 (*do not agree at all*) to 7 (*very strongly agree*). The same seven-point Likert scale was used for all instruments throughout the manuscript, unless indicated otherwise.

Need satisfaction (Times 1 to 5). Athletes' needs for autonomy (e.g., “I am free to express my ideas and opinions in my sport”, $\alpha = .77$ [at Time 1]/.73 [average from Time 2 to Time 5]), relatedness (e.g., “I get along with people in my sport”, $\alpha = .83/.85$) and competence (e.g., “I feel like I am a competent athlete”, $\alpha = .79/.71$) were assessed using a 12-item version of the Basic Need Satisfaction Scale (Deci & Ryan, 2000), applied to soccer with youth players. This scale has been used in past research with elite youth soccer players and showed good reliability (Gaudreau et al., 2016). However, one item from the autonomy subscale showed very poor factor loading (“I feel pressured by others”, reversed, original $\alpha = .58/.50$) and was thus removed from further analyses, at all measurement times.

Affect (Times 1 to 5). Athletes reported the affect they generally experienced in their sport by completing the *Positive and Negative Affect Scale* (Watson, Clark, & Tellegen, 1988). This scale comprises two 10-item subscales assessing both positive (e.g., “When playing soccer, I feel happy”; $\alpha = .81/.85$) and negative (e.g., “When playing soccer, I feel sad”; $\alpha = .77/.77$) affect.

Athletic satisfaction (Times 1 to 5). The five-item (e.g., “I am satisfied of my life as an athlete”; $\alpha = .80/.82$) Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985), was adapted to sport and used to assess athletes satisfaction toward soccer.

Quality of preparation (Times 1 to 5). Coaches assessed athletes' quality of preparation using a scale ranging for 0 (*very poor*) to 10 (*excellent*). When completing this scale, coaches were asked to reflect on the effort athletes typically made on a daily basis to be in the best form possible (i.e., quality of eating habits, quality of sleep, energy levels displayed daily, etc.). Coaches were in a good position to assess these parameters considering athletes trained with them on a daily basis throughout the year.

Performance (Times 1 to 5). Coaches were asked to evaluate the performance of their athletes on a 27-item questionnaire using a five-point Likert scale ranging from 0 (*very poor performance*) to 5 (*outstanding performance*). Each coach was asked to provide an assessment of the athletes' technical abilities (e.g., quality of passes, shots, dribbles, etc.), tactical awareness (e.g., positioning, anticipation, etc.), physical abilities (e.g., speed, endurance, strength, etc.), and mental strength (e.g., self-confidence, concentration, etc.). This scale was built in partnership with the coaches. Coaches were told to “Rate each of [their] players' performance since the [last measurement point] on the following scale”. All items were aggregated to form a single indicator of players' performance and showed adequate reliability ($\alpha = .83/.75$).

2.4. Data analysis

Data were analyzed using hierarchical linear modeling with HLM 7.0 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011) given that the present study involved a hierarchically structured data set, where within-person measures (i.e., need satisfaction, affect, athletic satisfaction, quality of preparation, and performance) were nested under participants' between-person measures (i.e., HP and OP, as well as base levels of all other variables). Considering the multi-wave nature of the research design (which allowed for new participants to join the study along the course of the three seasons during which the study took place), the between-person measures of each participants comprised of the first questionnaire they filled upon joining the study (Level-2). Subsequent measurement points completed by the participants acted as within-person measures (Level-1), nested under their between-person measures. All participants who completed the baseline questionnaire and at least one follow-up were included in the analyses because HLM's procedure readily handles missing data and the unbalanced structure of

the data (Raudenbush & Bryk, 2002). Consequently, all reported analyses were conducted using the raw data from the participants. Moreover, HLM analyses with the restricted maximum likelihood method of estimation were conducted, thus allowing for the examination both between- and within-person sources of variances in athletes' affect, athletic satisfaction, quality of preparation and performance. All between-person variables were centered at the sample mean, while within-person measures were centered at the grand mean. Concerning the issue of statistical power in this study, Maas and Hox (2005) have shown that unbiased estimation of level-1 and level-2 variables in HLM are obtained with 50 or more level-2 units (participants). Thus, the sample used in this study more than met the requirements for power. Consequently, the hypothesized relations among athletes' HP and OP, autonomy, relatedness and competence on affect, athletic satisfaction, quality of preparation, and performance, were examined with the following equation:

Level 1: Within-person Outcome (i.e., affect, athletic satisfaction, quality of preparation, or performance)_{ij} = β_{0j} + β_{1j} (Within-person Autonomy) + β_{2j} (Within-person Relatedness) + β_{3j} (Within-person Competence) + r_{ij}

Level 2: $\beta_{0j} = \gamma_{00}$ + γ_{01} (HP) + γ_{02} (OP) + γ_{03} (Baseline Outcome) + u_{0j}

$\beta_{1j} = \gamma_{10}$ + γ_{11} (Baseline Autonomy) + u_{1j}

$\beta_{2j} = \gamma_{20}$ + γ_{21} (Baseline Relatedness) + u_{2j}

$\beta_{3j} = \gamma_{30}$ + γ_{31} (Baseline Competence) + u_{3j}

More specifically, because these equations controlled for baseline levels of all three needs and outcomes, they allowed for the study of the influence of passion and changes in all three basic psychological needs on changes in outcomes (i.e., affect, athletic satisfaction, quality of preparation, or performance).

Indirect effect model. The proposed mediational model was tested in two steps. The first step tested the effects of the predictors (both HP and OP, as well as changes in competence) on the mediator (quality of preparation) using the formulae described above. The second step of the model tested the effects of the mediator on the outcome (performance) using the following equation:

Level 1: Within-person Performance_{ij} = β_{0j} + β_{1j} (Within-person Preparation) + r_{ij}

Level 2: $\beta_{0j} = \gamma_{00}$ + γ_{01} (Baseline Performance) + u_{0j}

$\beta_{1j} = \gamma_{10}$ + γ_{11} (Baseline Preparation) + u_{1j}

3. Results

3.1. Preliminary analyses

In order to screen for multivariate outliers, we computed Mahalanobis distance values for all participants. Four participants exceeded the critical chi-square value at the $p = .001$ and were thus removed from the final sample ($N = 87$). All participants included in the final analyses completed at least one follow-up questionnaire (T2) after the initial assessment (T1). A total of 24 players had data collected at all five measurement points. At Time 1, the players included in the final analyses were 16.01 years old on average. They were playing in the different teams of the Academy as follow: U-13 ($n = 17$); U-14 ($n = 12$); U-16 ($n = 26$); U-18 ($n = 19$); and U-21 ($n = 13$). Participants completed a total of 201 questionnaires (average of 2.31 per athlete, for positive and negative affect and athletic satisfaction). For the reasons mentioned above, the final number of observation for the quality of preparation and performance (i.e., 145/177 observations, averages of 1.67 and 2.03 per athlete, respectively) were slightly lower. Means, standard deviations, and Pearson correlations for variables at Time 1 are presented in Table 1. The information regarding the within-person measures was obtained by aggregating the data from Time 2 to

Table 1
Means, standard deviations, and correlations involving variables at time 1.

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Harmonious Passion	5.95	0.70	–									
2. Obsessive Passion	5.09	1.05	.39*	–								
3. Dispositional Autonomy	5.78	0.87	.35*	.07	–							
4. Dispositional Relatedness	6.03	0.71	.35*	.15	.47*	–						
5. Dispositional Competence	5.60	0.71	.30*	.11	.41*	.37*	–					
6. Dispositional Positive Affect	6.02	0.56	.30*	.18*	.43*	.53*	.51*	–				
7. Dispositional Negative Affect	2.30	0.71	-.10	.02	-.20*	-.14	-.27*	-.13	–			
8. Dispositional Athletic Satisfaction	5.90	0.73	.34*	.23*	.43*	.40*	.42*	.53*	-.04	–		
9. Dispositional Quality of Preparation	7.40	1.78	-.13	.09	.15	.20*	-.01	.16	-.12	.05	–	
10. Dispositional Performance	68.09	7.28	.13	.08	.06	.14	-.11	.03	-.03	.06	.43*	–

Note. * $p < .05$.

Table 2
Means, standard deviations, and correlations involving all variables from time 2 to time 6.

	M	SD	1	2	3	4	5	6	7	8	ICC
1. Situational Autonomy ^a	5.82	0.79	–								–
2. Situational Relatedness ^a	5.91	0.78	.38*	–							–
3. Situational Competence ^a	5.76	0.77	.44*	.38*	–						–
4. Situational Positive Affect ^a	6.08	0.57	.48*	.44*	.47*	–					.600
5. Situational Negative Affect ^a	2.36	0.75	-.24*	-.07	-.17*	-.14*	–				.482
6. Situational Athletic Satisfaction ^a	5.71	0.94	.48*	.52*	.45*	.46*	-.05	–			.615
7. Situational Quality of Preparation ^a	6.86	1.53	.13	.09	.13	.17*	-.09	.06	–		.518
7. Situational Performance ^a	67.29	7.65	-.01	.11	.04	-.01	-.04	.03	.26*	–	.392

Note. * $p < .05$, ^a The mean reflects an aggregation of situational scores.

Table 3
Results of the HLM analysis predicting change in positive affect, negative affect, athletic satisfaction, and quality of preparation from harmonious passion, obsessive passion, autonomy, relatedness and competence.

Outcome →	Positive Affect		Negative Affect		Athletic Satisfaction	
	b	SE	b	SE	b	SE
<i>Means as outcomes, β_{0j}</i>						
Intercept (γ ₀₀)	6.06	.04***	2.38	.06***	5.70	.07***
Harmonious Passion (γ ₀₁)	.12	.04**	-.22	.09*	.09	.07
Obsessive Passion (γ ₀₂)	-.00	.04	.13	.05*	-.15	.04***
Dispositional Outcome (γ ₀₃)	.25	.08***	.55	.09***	.56	.08***
<i>Slope as Outcome, β_{1j} (Situational Autonomy)</i>						
Intercept (γ ₁₀)	.20	.04***	-.15	.07*	.32	.06***
Dispositional Autonomy (γ ₁₁)	.01	.04	-.03	.07	-.02	.07
<i>Slope as Outcome, β_{2j} (Situational Relatedness)</i>						
Intercept (γ ₂₀)	.15	.05**	-.02	.06	.32	.06***
Dispositional Relatedness (γ ₂₁)	-.00	.07	-.12	.08	-.06	.07
<i>Slope as Outcome, β_{3j} (Situational Competence)</i>						
Intercept (γ ₃₀)	.18	.05***	-.02	.07	.13	.06*
Dispositional Competence (γ ₃₁)	-.03	.05	.12	.08	.10	.07

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

Time 5 and is presented in Table 2. Before conducting the main analyses, unconditional mean models were tested to estimate the variance in within-person variations in all five outcomes. These models allowed for the calculation of the intra-class correlation (ICCs; see Table 2). Results of the unconditional models in all five outcomes showed that a significant part of variability lay at the within-person level (between 38.5% and 60.8%, depending on the outcome). Finally, inspection of the means of all outcomes at each measurement point during the study revealed no differences over time, on any outcome. These results provided support for the inspection of the effects of passion and need satisfaction as predictors of change in the optimal functioning.

3.2. Main analyses

Positive affect. Results (see Table 3) from the prediction of means (β_{0j}) showed that HP was related to positive affect (γ₀₁ = .12, $p = .005$)

at mean level. Thus, the more athletes were harmoniously passionate toward soccer, the higher levels of positive affect they reported. However, OP was unrelated to positive affect.

In addition, results revealed that the within-person satisfaction of autonomy, relatedness, and competence were positively associated with positive affect at the within-person level (γ₁₀ = .20, $p < .001$; γ₂₀ = .15, $p = .004$; γ₃₀ = .18, $p < .001$, respectively). More precisely, athletes who experienced higher satisfaction of all three basic psychological needs at each measurement point reported higher levels of positive affect on a within-person basis.

Negative affect. Results (see Table 3) from the prediction of means (β_{0j}) showed that HP was negatively associated with negative affect (γ₀₁ = -.23, $p = .017$). In contrast, OP was positively related to negative affect (γ₀₂ = .13, $p = .022$) at the mean level.

In addition, results revealed that the within-person satisfaction of autonomy was negatively associated with negative affect at the within-

Table 4
Results of the HLM analysis predicting change in quality of preparation and performance from harmonious passion, obsessive passion, autonomy, relatedness and competence.

Outcome →	Quality of Preparation		Performance	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
<i>Means as outcomes, β_{0j}</i>				
Intercept (γ ₀₀)	6.70	.15***	66.58	.69***
Harmonious Passion (γ ₀₁)	.42	.18*	.09	.87
Obsessive Passion (γ ₀₂)	.18	.15	-.86	.62
Dispositional Outcome (γ ₀₃)	.41	.08***	.46	.09***
<i>Slope as Outcome, β_{ij} (Situational Autonomy)</i>				
Intercept (γ ₁₀)	-.16	.14	-.96	.63
Dispositional Autonomy (γ ₁₁)	-.23	.16	-1.08	.54
<i>Slope as Outcome, β_{ij} (Situational Relatedness)</i>				
Intercept (γ ₂₀)	-.09	.16	-.05	.54
Dispositional Relatedness (γ ₂₁)	.14	.19	-.19	.80
<i>Slope as Outcome, β_{ij} (Situational Competence)</i>				
Intercept (γ ₃₀)	.46	.16**	1.44	.95
Dispositional Competence (γ ₃₁)	-.12	.19	.14	1.28

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

person level (γ₁₀ = -.15, *p* = .034). No significant effects were found for within-person variations in relatedness and competence.

Athletic satisfaction. Results (see Table 3) from the prediction of means (β_{0j}) showed that OP, but not HP, was negatively associated with changes in athletic satisfaction (γ₀₂ = -.15, *p* < .001). Results also revealed that the within-person satisfaction of autonomy, relatedness, and competence were all positively associated with within-person athletic satisfaction (γ₁₀ = .32, *p* < .001; γ₂₀ = .32, *p* < .001; γ₃₀ = .13, *p* = .031, respectively). More precisely, athletes who experienced higher satisfaction of all three basic psychological needs at each measurement time reported higher levels in athletic satisfaction.

Quality of preparation. Results (see Table 4) from the prediction of means (β_{0j}) showed that HP positively predicted the quality of athletes' preparation (γ₀₁ = .42, *p* = .021). Contrarily to our initial hypothesis, OP was unrelated to the changes in the quality of athletes' preparation. Results revealed that the within-person satisfaction of competence was positively associated with the quality of preparation at the within-person level (γ₃₀ = .46, *p* = .004). No significant effects were found for within-person autonomy and relatedness.

Performance. Results (see Table 4) from the prediction of means (β_{0j}) and slopes (γ₁₀, γ₂₀, and γ₃₀) showed that neither types of passion, nor changes in need satisfaction directly predicted athletes' performance. In line with past research on the effects of deliberate practice on performance, we tested a second model in which the quality of preparation predicted changes in performance. Results (see Table 5) revealed that the within-person changes in the quality of preparation were positively associated with the changes in performance at the within-person level (γ₁₀ = 1.16, *p* = .011).

Indirect effect model. In order to test for the mediating role of the quality of preparation in the relation of passion and need satisfaction

Table 5
Results of the HLM analysis predicting change in performance from quality of preparation.

Outcome →	Quality of Preparation	
	<i>b</i>	<i>SE</i>
<i>Means as outcomes, β_{0j}</i>		
Intercept (γ ₀₀)	66.75	.79***
Dispositional Performance (γ ₀₃)	.47	.11***
<i>Slope as Outcome, β_{ij} (Situational Quality of Preparation)</i>		
Intercept (γ ₁₀)	1.16	.44*
Dispositional Quality of Preparation (γ ₁₁)	.27	.25

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

with performance, we used the Bayesian macro for indirect effects for regression model provided and validated by Falk and Biesanz (2016). This macro provides the 95% Hierarchical Bayesian CIs, as well as the *p*-values for the indirect effects test based on the posterior distribution of the regression coefficients, which perform substantially better in terms of Type I and II error rates compared to other methods of estimation (Biesanz, Falk, & Savalei, 2010; Falk & Biesanz, 2016).

As shown above, HP (γ₀₁ = .42, *p* = .021) and within-person changes in competence (γ₃₀ = .46, *p* = .004) were positively related to within-person quality of athletes' preparation. In contrast, OP and changes in autonomy and relatedness were unrelated to changes in quality of preparation. In turn, the changes in the quality of athletes' preparation were positively related to changes in performance at the within-person level (γ₁₀ = 1.16, *p* = .011). Results of indirect effects (see Fig. 1) showed that within-person changes in the quality of athletes' preparation significantly mediated the relationships of both HP (95% CI = [0.029, 1.166], *p* = .020) and within-person changes in competence (95% CI = [0.075, 1.181], *p* = .010) with within-person changes in performance. The indirect effect of our within-person mediation model (i.e., within-person changes in competence to within-person changes in performance) was also computed using the Monte-Carlo estimator available from the Falk and Biesanz (2016) macro. This estimator allows to account for the covariance between paths of lower level meditation models (Bauer, Preacher, & Gil, 2006; Kenny, Korchmaros, & Bolger, 2003). Significant indirect effects were obtained for this model using both the Monte-Carlo and Bayesian estimators.

4. Discussion

Youth soccer players playing in academies dedicate themselves to their sport on a daily basis trying to improve their skills to reach their dream of playing one day in the professional ranks. Such a long-term dedication requires athletes to be passionate toward their sport, as were the players taking part in this study who reported an average of 6.87 out of 7 on the passion criterion scale. Moreover, athletes are continuously changing during adolescence. The study of change in need satisfaction is thus essential to better understand the processes involved in the optimal functioning of youth athletes (Ryan & Deci, 2017). Grounded in the Dualistic Model of Passion (Vallerand et al., 2003) and Basic Psychological Needs Theory (Deci & Ryan, 2000; Ryan & Deci, 2017), the purpose of the present research was to look at the influence of both between-person (i.e., passion) and within-person (i.e., satisfaction of the basic needs of autonomy, relatedness and competence) variations on changes in youth soccer players' optimal functioning (i.e.,

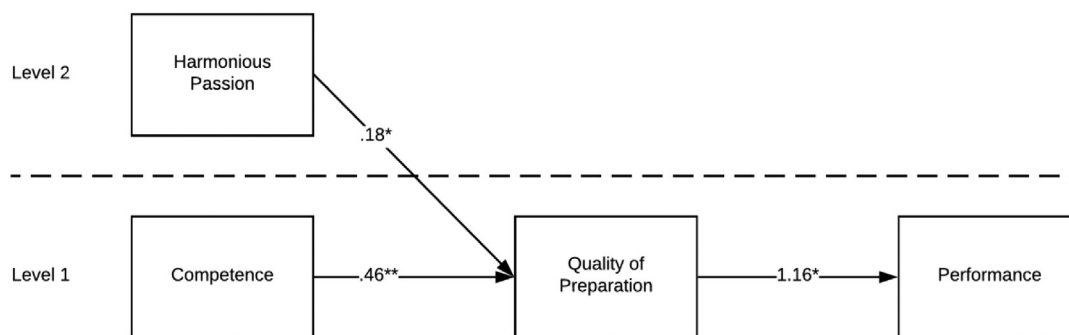


Fig. 1. Multilevel model of the indirect effects of harmonious passion and competence on performance through the quality of athletes' Preparation. Note. * $p < .05$, ** $p < .01$.

psychological well-being and performance-related outcomes) over the span of three competitive seasons.

With regards to need satisfaction, it was hypothesized that within-person variations in all three needs of autonomy, relatedness, and competence would be positively related to athletes' psychological well-being. Moreover, within-person variations in competence were expected to relate positively to the quality of athletes' preparation. As for passion, HP was expected to be positively and directly related to both changes in psychological well-being and in the quality of athletes' preparation. In contrast, OP was hypothesized to be positively associated with variations in the quality of preparation, but not in psychological well-being. Finally, the mediating role of changes in the quality of athletes' preparation in the relation of both types of passion and changes in competence with changes in performance was investigated. Overall, the results of the present study provided general support for these hypotheses and lead to a number of implications.

4.1. Within-person changes in need satisfaction and optimal functioning in athletes

Building upon past research (Adie et al., 2012; Gagné et al., 2003), the results of the present study also highlight the role of within-person changes in autonomy, relatedness and competence to better understand variations in athletes optimal functioning, especially with regards to psychological well-being. The proposed hypotheses were supported by the present results. However, some unexpected findings were uncovered in the present research. The implications of all the present findings on athletes' psychological well-being and performance-related outcomes are discussed in the sections below.

Psychological well-being. With regards to athletes' psychological well-being, the present findings offer strong support for the BPNT and the proposed hypotheses. Within-person variations in all three needs (i.e., autonomy, relatedness, and competence) were positively related with positive affect and athletic satisfaction over time. All three needs are thus key in allowing athletes to experience a positive, healthy engagement in soccer over time. The current findings are in line with past research showing that changes in the satisfaction of autonomy, relatedness and competence are all associated with positive changes in the quality of emotional experiences in athletes (Adie et al., 2012; Gagné et al., 2003; Quested et al., 2013; Stenling et al., 2015).

The present results, however, differed from our hypotheses with regard to changes in negative affect. Only within-person variations of autonomy, but not in competence or relatedness, were negatively associated with negative affect. The present findings, in line with past research in sport (Adie et al., 2008; Reinboth, Duda, & Ntoumanis, 2004), thus only provided partial support for the importance of all three needs in the occurrence of negatively-valenced emotional outcomes in sport. In contrast, Gagné et al. (2003) showed that daily changes in all three needs for gymnasts were negatively related to negative affect prior to, but not after, a practice. Along the same lines, Quested et al.

(2013) showed that changes in competence, but not autonomy or relatedness, were negatively associated with daily negative affect in settings where performance was more salient (i.e., rehearsals and group performances). Past research (Gagné et al., 2003; Quested et al., 2013), along with the current findings, thus highlights the variability of the influence of all three needs on negatively-valenced indicators of psychological well-being. This may be due to the nature of the sport (e.g., individual vs. team sports) or the context (e.g., highly evaluative vs. task and mastery based) in which athletes are involved. Overall, the present findings provide further support for the greater importance of need satisfaction in the study of psychological well-being rather than the absence of ill-being (Adie et al., 2008). Future research on need thwarting is necessary in order to clarify this issue.

Performance-related outcomes. The main takeaway from the present results with regards to performance-related outcome is the key role of within-person variations in competence. More specifically, within-person competence was the only need in the proposed model to be positively associated with the quality of athletes' preparation over time. Moreover, results from our mediation model revealed the changes in competence were indirectly and positively related to increases in performance through increases in the quality of preparation from baseline. These findings are in line with past research showing the daily feelings of competence were the sole need related to optimal functioning in performance-oriented settings with dancers (Quested et al., 2013). Thus, the more athletes felt competent compared to their own baseline assessment, the more positively their coaches evaluated the quality of their preparation, and, in turn, their performance on the field when compared to baseline. The present findings thus suggest that within-person variations in competence have a great impact, not only on the players themselves (e.g., psychological well-being), but also on the perceptions from their coaches regarding the seriousness and attention toward their own preparation off the field. In turn, the quality of athletes' preparation translated into a more positive evaluation the players' performance on the field. In line with past research (Reinboth et al., 2004), competence thus appears to be a key factor in order to better understand optimal functioning of athletes', both in terms of psychological well-being and performance.

4.2. Passion and optimal functioning in athletes

Passion has been shown to be a key determinant of optimal functioning in achievement-oriented domains, such as sport. Specifically, past research has shown that both HP and OP are associated with deliberate practice and, indirectly with performance. In the pursuit of performance, HP has been positively, while OP has been either unrelated or negatively related, to psychological well-being (Bonnevillero-Roussy et al., 2011; Vallerand et al., 2008, 2007; Verner-Filion et al., 2017).

The present results corroborate past findings with regards to HP, as it was positively associated with changes in positive affect while also

being negatively related to negative affect. Moreover, HP was also positively related to changes in the quality of athletes' preparation which, in turn, was associated with increases in performance over time. Thus, HP was associated with increases in psychological well-being and performance (indirectly through quality of preparation) from baseline over the course of three competitive seasons. With HP, athletes are thus able to benefit from their time in highly competitive settings such as professional soccer academies by experiencing increases both in the quality of their emotional experiences (i.e., more positive affect and less negative affect) and behavioral engagement (i.e., quality of preparation), which in turn leads to increases in performance over time.

In contrast, the results only partially replicated past findings with regards to OP. On the one hand, and in line with past research, OP was detrimental to athlete's well-being by being associated with increases in negative affect and decreases in athletic satisfaction. On the other hand, OP was unrelated to the quality of preparation and did not indirectly lead to changes in performance over time. With regards to OP, these results differ from past research on passion and performance (e.g., Bonneville-Roussy et al., 2011; Vallerand et al., 2008, 2007; Verner-Filion et al., 2017) and person-environment fit (Amiot, Vallerand, & Blanchard, 2006). However, past research has solely focused on the effects of passion on indicators of optimal functioning (i.e., psychological well-being, preparation and performance) as *outcomes*. In contrast, the current study investigates the effects of passion of these indicators as *processes*. To the best of our knowledge, the findings from the current study are the first to demonstrate that both types of passion are differentially related to within-person variations in psychological well-being and performance-related outcomes in athletes. Thus, passion matters not only for between-person differences in optimal functioning, but also with respect to the ongoing development of psychological well-being and performance of athletes over time. The present findings thus contribute to the literature on passion and performance by testing the influence of both types of passion on within-person variations in optimal functioning over time.

4.3. Limitations, future research, and conclusions

The present research has some limitations, however. The longitudinal design used in this study allows for the examination of change in athletes over the course of three seasons, but the data is still correlational in nature. Even though the present research goes beyond cross-sectional results, causes and effects cannot be determined. Thus, additional research using experimental designs is warranted. For example, future research could use recently developed experimental manipulations to induce either types of passions (e.g., Bélanger, Lafrenière, Vallerand, & Kruglanski, 2013b, Study 3). Another limitation of this study consists in the use of self-report questionnaires to gather all data with respect to the motivational (i.e., passion and need satisfaction) and emotional (i.e., athletic satisfaction, positive and negative affect) variables assessed herein. However, it should be noted that, although they were assessed through questionnaires, the quality of athletes' preparation and their performance were nevertheless assessed by the coaches and not through athletes' self-reports. Another limit of the current study resides in the instrument used to assess autonomy, as we needed to remove an item (negatively-valenced) for the final analyses due to poor reliability. Future research could use other instruments to assess need satisfaction (e.g., Gillet, Rosnet, & Vallerand, 2008; Ng, Lonsdale, & Hodge, 2011) in order to try to replicate the present findings. Moreover, future research using novel and different indicators of psychological well-being would be useful. This is especially true for negative-valenced indicators of psychological well-being, such as anxiety, stress, or depression. These outcomes have mostly been overlooked by research on within-person changes in need satisfaction. Future work may consider using alternative measures of psychological well-being, such as cortisol level or informant reports, to address the two aforementioned limitations. Finally, the sample used in this study was uniquely composed of

adolescent and young adult male elite soccer players. Future research with different populations (e.g., adult participants, females, exercisers, other team sports, individual sports, etc.) is warranted to support the generalizability of our findings.

In conclusion, the present research builds upon the DMP (Vallerand et al., 2007, 2008, 2006; Verner-Filion et al., 2017) and BPNT in providing clearer understanding of the processes involved in athletes' changes in psychological well-being and performance over time. As such, these findings underscore the fact that athletes need not suffer psychologically to reach high performance. Indeed, to the extent that they have a harmonious passion for sport and that they experience increases in the satisfaction of their basic psychological needs (especially competence) over time, athletes can experience improvements in their psychological well-being and the quality of their preparation, thereby leading to increased performance as they go through their athletic career.

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