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Is motivation for marathon a protective factor or a risk factor of injury?

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Abstract

This research investigated whether and how self-determined motivation predicts perceived susceptibility to injury during competition (marathon). Two correlational studies including 378 (Study 1) and 339 (Study 2) marathon runners were conducted. Participants filled out a questionnaire the day before the race measuring self-determined motivation, perceived susceptibilities to marathon-related injury and to keep running through pain, and control variables. Study 1 showed that self-determined motivation was negatively related to perceived susceptibility to marathon-related injury. Study 2 replicated this finding and showed that this relationship was partially mediated by perceived susceptibility to keep running through pain during the race. Moreover, results indicated that the predictive role of self-determination was mostly driven by controlled forms of motivation, and more particularly external regulation. These results suggest that self-determined motivation for sport is a protective factor of injury.

Keywords: Self-determined motivation; perceived susceptibility to injury; competitive sport.

Is motivation for marathon a protective factor or a risk factor of injury?

Background

It is well established that physical activity, defined as any bodily movement produced by skeletal muscles that requires energy expenditure, has beneficial effects on health, as it can reduce the risk of cardiovascular diseases, diabetes, or cancer (World Health Organization, 2010). However, while research highlights the benefits of moderate physical activity (i.e., activity that requires a moderate amount of effort and noticeably accelerates the heart rate), intense physical activity (i.e., activity that necessitates a large amount of effort and causes rapid breathing and a substantial increase in heart rate) can be damaging for health (Landolfi, 2013). For example, a large-scale study indicated a dose effect with moderate runners having the lowest mortality rate, while strenuous runners had a similar mortality rate to the sedentary group (Schnohr et al., 2015). There is also evidence that sport (i.e., the competitive form of physical activity) enhances risks of musculoskeletal injuries (e.g., Van Mechelen et al., 1992). It is therefore crucial to identify the risk and preventive factors of injuries in this context. The present research investigated this question in marathon, an intense competitive sport.

Models of injury prevention in sports have identified internal (e.g., physical fitness, previous injuries, psychological variables) and external (e.g., equipment, weather conditions) risk factors (e.g., Meeuwisse et al., 2007), among which perceived susceptibility to injury (i.e., the perceived likelihood that an injury will occur, Deroche et al., 2009). In running, people who evaluate their susceptibility to injury as high are more able to detect early warning signals, leading them to take preventive measures (e.g., reducing training intensity), and to thereby avoid injuries (Ekenman et al., 2001). Studies have identified past experiences of injury (Williams-Avery & MacKinnon, 1996), stress (Williams & Andersen, 1998), and personality variables (e.g., Deroche et al., 2007) as predictors of perceived susceptibility; however, few studies have investigated its motivational factors (Stephan et al., 2009). The

goal of this research was to examine this question based on self-determination theory (e.g., Ryan & Deci, 2002).

This model distinguishes different motives that vary depending on how they satisfy the need for autonomy. When motivation is autonomous, individuals experience a sense of personal choice and autonomy when behaving and feel their actions represent their true self (e.g., a person running for the satisfaction felt when mastering his/her abilities). Intrinsic motivation (i.e., enjoyment in the task itself) is the highest form of such motivation, that also encompasses identified regulation, which is adopted when the individual values the behaviour and its consequences (e.g., running for one's health). In contrast, when motivation is controlled, people feel pressured into behaving by external forces (e.g., a person running for the prestige associated with the activity). External regulation (i.e., when the behaviour is driven by external demands) represents the most controlled form of motivation, that also includes introjected regulation, which is more internalized but still involves feelings of pressure to engage in the activity. Finally, amotivation represents lacking the intention to act.

Research has shown that an autonomous motivation may be beneficial following serious injury (for a review see Podlog & Eklund, 2007), and may positively predict sport injury prevention intentions (Chan & Hagger, 2012). However, Chan and Hagger's (2012) study examined the motivation toward *health behaviours*, and not toward *sport*. In the present research, we hypothesized that self-determined motivation toward marathon predicts perceived susceptibility to injury. To our knowledge, no study has examined this relationship, but related research on harmonious passion (strong inclination toward an activity) may provide support to this hypothesis. Harmoniously passionate individuals are less likely to evaluate their probability to be injured as high (Stephan et al., 2009), suggesting that they are in control of injury occurrence through their ability to adopt preventive behaviours when detecting early warning signals (Deroche et al., 2012). Both harmonious passion and self-

determined motivation are characterized by an autonomous regulation of an activity representing the person's identity (Vallerand et al., 2006), suggesting that self-determined individuals may also be more able to adopt preventive behaviours than non-self-determined individuals. Even if they feel early signs suggesting the occurrence of injury, controlled individuals may persevere in order to prove something to others or to gain prestige, being in turn more likely to be injured (Masters & Ogles, 1998).

Based on Stephan et al.'s (2009) results, we predicted a negative relationship between self-determined motivation for marathon and perceived susceptibility to injury. However, although this relationship may reflect the ability of self-determined individuals to adopt preventive behaviours, it could in contrast reflect a lower perception of the risks associated with sport participation, leading them to take less preventive measures to avoid injuries (e.g., Ekenman et al., 2001). This alternative hypothesis rests on evidence that autonomous motivation is associated with positive emotions (e.g., Puente & Anshel, 2010), low stress levels and better scores of global indicators of well-being (Maltby & Day, 2001), even in the acute phase of exercise (i.e., a subset of physical activity that is planned, structured, and repetitive and aims at improving or maintaining physical fitness) (e.g., Guérin & Fortier, 2013). Given that emotions play a prominent role in risky decision making (Loewenstein et al., 2001), autonomous individuals could be less likely to perceive the negative aspects of their sport, such as the risk it presents for their health. Related work on exercise addiction provides support for this hypothesis. According to Sachs (1981), people who exercise for extrinsic reasons do not consider their activity as a central part of their lives, and may therefore not suffer withdrawal symptoms when they cannot exercise. In contrast, people who exercise for intrinsic reasons may view exercise as a central part of their lives, and experience disturbing deprivation sensations when they are unable to exercise. They may therefore be

114 more likely to continue exercising regardless of warning signals of physical injury or injury
115 itself.

116 The goal of this research was to disentangle these competing hypotheses. In Study 1,
117 we predicted that the more marathon runners are self-determined for marathon, the less they
118 perceive themselves as susceptible to be injured when running a marathon. Study 2
119 investigated two competing explanations of this prediction, by examining the mediational role
120 of situational susceptibility to adopt risky behaviours (the tendency to act in a certain way
121 under hypothetical situations), which has been shown to reliably predict health behaviours
122 (e.g., Lazuras et al., 2010). If self-determined motivation negatively predicts the perceived
123 susceptibility to adopt risky behaviours (e.g., keep running through pain) during the
124 marathon, and if this susceptibility mediates the relationship between self-determination and
125 perceived susceptibility to injury, this would suggest that self-determined motivation for
126 marathon is health-protective. In contrast, if self-determined motivation positively predicts the
127 perceived susceptibility to keep running through pain, and if this relationship is mediated by
128 perceived susceptibility to injury, this would suggest that self-determined motivation for
129 marathon is health-threatening.

130 In addition to examine the degree of self-determination, we investigated the role of
131 each form of motivation separately, as they may differentially affect injury-related variables.
132 For example, while identified regulation and intrinsic motivation are both autonomous forms
133 of motivation, the former could be health-protective when the person runs for health reasons,
134 while the latter could be health-threatening when the person runs to surpass him/herself.
135 Moreover, investigating each form of motivation separately allowed us to examine whether
136 the relationship between self-determination and injury-related variables was driven by
137 autonomous and/or controlled forms of motivation.

138 **Study 1**

Materials and methods

Participants and Procedure. The day before the ‘Marathon des Alpes-Maritimes 2009’ (Nice, France), we invited marathon runners when they went out of the registration office to take part to our study. The only exclusion criterion was to not speak French as native language. After being informed of the study, 378 marathon runners (106 women; 142 competitive runners, 207 regular leisure-time runners, 26 occasional leisure-time runners; $M_{age}=43$ years, $SD=9.76$) agreed to take part in this study on a voluntarily basis. They filled out a 20-minute long computerized anonymous questionnaire before being debriefed and thanked. The protocol followed the institutional rules in terms of ethics and informed consent was obtained.

Measures

Self-determined motivation for marathon was measured by the Sports Motivation Scale (Brière et al., 1995), composed of six subscales measuring the forms of motivation postulated by the self-determination theory (Ryan & Deci, 2002). After reading the following statement “I participate in marathon:...”, participants rated the extent to which each item corresponded to their own reasons to participate in marathon running on a 7-point scale from (1) never to (7) always. Four items measured intrinsic motivation to gain knowledge and intrinsic motivation to accomplishment (e.g., “for the satisfaction I experience while I am mastering my abilities”), four items measured intrinsic motivation to experience stimulation (e.g., “for the excitement I feel when I am really involved in the activity”), four items measured identified extrinsic motivation (e.g., “because what I learn in this activity will be useful later”), four items measured introjected extrinsic motivation (e.g., “because I would feel guilty if I could not succeed in this activity”), five items measured external regulation motivation (e.g., “to be seen in a good light by others”), and five items measured amotivation (e.g., “I do not know why I run this marathon, if I could, I would get exempted”). All items

were presented in a random order. The average of items of the subscales was calculated, as each one presented an acceptable internal consistency ($.70 < \alpha < .81$).

Each motivation was then separately submitted to the analyses, but we also merged them to assess the degree of self-determination, by giving each subscale a specific weight according to its respective place on the self-determination continuum, multiplying this weight by the score of the subscale, and adding the scores of all subscales to derive a single score (e.g., Li & Harmer, 1996). Specifically, the scores for the three types of intrinsic motivation were averaged and assigned the highest positive weight (+2) because intrinsic motivation is the highest self-determined form of motivation. Identified extrinsic motivation, a self-determined type of extrinsic motivation, was assigned a lower weight (+1). These positive weights represent the degree of autonomous motivation. The scores for external regulation and introjection were averaged and assigned a negative weight (-1), and amotivation, which represents the absence of self-determination, was weighted highly negatively (-2). These negative weights represent the degree of controlled motivation. Support for the validity and reliability of this type of composite index has been obtained in several studies (e.g., Vallerand & Losier, 1999). However, one limit of such index is that it does not distinguish between people with high autonomous and high controlled motivations, from people with low autonomous and low controlled motivations. In order to address this limit, we also considered the autonomous and controlled motivation indices separately.

Perceived susceptibility to marathon-related injury. Participants responded to the four items used in past research (Deroche et al., 2007) to measure their perceived susceptibility to experience injury during the marathon. This scale includes three absolute risk items: “What do you believe is the chance that you will get an injury during the marathon”, “How susceptible do you feel you will get an injury during the marathon?”, and “What do you think the likelihood is that you will get an injury during the marathon?”, and one comparative

risk item: “What do you believe your chances are of getting an injury during the marathon compared to other runners?”. For the absolute risk items, participants responded on a 1–7 scale (item 1: from 1 “*no chance of being injured*” to 7 “*certain to be injured*”; item 2: from 1 “not at all susceptible” to 7 “very susceptible”; item 3: from 1 “less than a 10% chance” to 7 “100% chance”). For the comparative risk item, participants answered on a scale ranging from 1 “a lot lower” to 7 “a lot higher”. The scale showed good reliability in the present study ($\alpha=.83$). A principal-axis factor analysis showed that all items loaded on a single factor that explained 66.85% of the variance, with factor loadings ranging from .80 to .84.

Results and Discussion

Descriptive statistics and correlations among the measures are presented in Table 1. In line with the hypotheses, results showed that the self-determination index was negatively related to perceived susceptibility to injury, $r=-.11$, $p=.035$. In other words, the more participants were self-determined for marathon, the less they perceived themselves as susceptible to be injured during the race. More specifically, results indicated that while the autonomous motivation index was not significantly correlated to perceived susceptibility to injury, $r=-.01$, $p=.871$, the controlled motivation index was significantly related to this variable, $r=.13$, $p=.011$. In other words, the more runners adopted a controlled motivation toward marathon, the more they perceived themselves as susceptible to be injured during the race. Furthermore, when each form of motivation was considered separately, results showed that only external regulation ($r=.11$, $p=.036$) and amotivation ($r=.12$, $p=.02$) were significantly correlated with perceived susceptibility to injury.

Given that perceived susceptibility to injury is an important factor of health preventive behaviours (e.g., Ekenman et al., 2001), these results suggest that self-determined motivation for sports may be associated with health-related outcomes, and that this association may be driven mostly by controlled forms of motivation. However, they do not indicate whether self-

determined motivation is beneficial or harmful. On the one hand, a low perceived susceptibility to injury may reflect high control of injury occurrence due to the appropriate adoption of precautionary behaviours. On the other hand, it may reflect a lower perception of the risks associated with running a marathon, which may lead to more risky behaviours. Study 2 aimed at identifying which of these hypotheses may explain the relationships between self-determined motivation and perceived susceptibility to injury observed in Study 1, by examining the mediating role of perceived susceptibility to adopt a risky behaviour during the race. In addition, Study 2 included past experiences of injury as a control variable, as it is an important predictor of perceived susceptibility to injury (Williams-Avery & MacKinnon, 1996). Finally, Study 2 used a different measure of self-determined motivation to further ascertain its relationship with perceived susceptibility to injury. A situational scale was chosen to better reflect the motivational state of the participants for the competition of interest.

Study 2

Materials and methods

Participants and Procedure. The procedure of Study 2 was mostly the same as in Study 1. It was carried out during the following edition of the “Marathon des Alpes-Maritimes” in 2010. Three-hundred-and-thirty-nine participants (79 women; $M_{age}=43.02$ years, $SD=10.18$) took part in Study 2 by filling out a computerized anonymous questionnaire. Among them, 118 participants ran everyday and 222 ran 2-3 times a week, during 73 minutes on average ($SD=23.92$), and since 12 years on average ($SD=9.53$). Participants had run 6.4 marathons on average ($SD=10.18$) before this one, with a mean best performance of 218.38 min ($SD=42.71$). The protocol followed the institutional rules in terms of ethics and informed consent was obtained.

Measures.

Self-determined motivation for marathon was measured by the Situational Motivation Scale (SIMS, Guay et al., 2000), recommended for the assessment of self-determined motivation in a specific event as it is the case in our study. The SIMS is composed of four subscales and begins with the following sentence: “Why do you participate in this marathon?” Four items measured intrinsic motivation (e.g., “because I think that this activity is interesting”), four items measured identified extrinsic motivation (e.g., “because I am doing it for my own good”), four items measured external regulation motivation (e.g., “because I am supposed to do it”), and four items measured amotivation (e.g., “I don’t know; I don’t see what this activity brings me”). Participants answered on a 7-point scale from (1) totally disagree to (7) totally agree. In this study, each subscale presented an acceptable internal consistency ($.72 < \alpha s < .88$). The average of items of each subscale was then used to calculate the self-determination index (e.g., Li & Harmer, 1996). The intrinsic motivation score was assigned the highest positive weight (+2). Identified regulation was assigned a lower weight (+1). The score for external regulation was assigned a negative weight (-1), and amotivation was weighted highly negatively (-2).

Perceived susceptibility to marathon-related injury. Participants responded to the same four items used in Study 1. The scale showed good reliability ($\alpha=.86$). A principal-axis factor analysis showed that items loaded on a single factor that explained 74.98% of the variance, with factor loadings ranging from .81 to .91.

Situational susceptibility to adopt a risky behaviour. In line with measures developed in research on injury prevention (Deroche et al., 2011) and doping (Lazuras et al., 2010), participants responded to the following question: “During the marathon, if you feel a pain that you think might lead to injury, please indicate until what pain intensity you would continue running at the same pace.” Answers were provided on a 7-point scale ranging from (1) very

low to (7) very high. Assessing susceptibility with a one-item measure is a common practice which has proved to be valid in the exercise domain (Courneya, 1994).

Past experiences of injury. Participants responded to the following question (e.g., Deroche et al., 2007): “During the past 12 months, how many times have you been injured while running (injury necessitating to stop running for at least one session)?”

Data analysis. Multiple regression analyses were carried out to test our hypotheses. We first examined whether motivational variables predicted perceived susceptibility to injury and to keep running through pain, by testing the role of the self-determination index, then the role of autonomous and controlled motivation separately, and finally the role of each form of motivation. Next, the mediating role of perceived susceptibility to keep running through pain was tested with the *a* and *b* joint significance test (Cohen & Cohen, 1983). The joint significance test consists in testing mediation by estimating *a* (effect of the predictor on the process) and *b* (effect of the process on the outcome, controlling for the predictor), and testing them individually against zero. There is a significant indirect effect when both *a* and *b* are significant, and a significant mediation when *a*, *b*, and the total effect of the predictor on the criterion are significant. This test was chosen because it is the only test that does not suffer from the Type I error issue, and it is statistically as powerful as other commonly used tests, such as the percentile bootstrap and numerical integration tests (Judd et al., 2014).

Results and Discussion

Descriptive statistics and correlations among the measures are presented in Table 2.

First, as in Study 1, results showed that the self-determination index negatively predicted perceived susceptibility to injury, $\beta = -.10$, $p = .049$, but Study 2 goes beyond Study 1 by observing this relationship after controlling for past experiences of injury, $\beta = .38$, $p < .001$. Importantly, the self-determination index also negatively predicted perceived susceptibility to keep running through pain during the marathon, $\beta = -.11$, $p = .045$, after controlling for past

experiences of injury, $\beta=.16$, $p=.003$. In other words, the more runners were self-determined toward marathon, the less they perceived themselves as susceptible to adopt a risky behaviour during the race. Moreover, when the self-determination index, perceived susceptibility to keep running through pain, and past experiences of injury were simultaneously entered as predictors of perceived susceptibility to injury, the perceived susceptibility to keep running through pain was a significant and positive predictor, $\beta=.22$, $p<.001$, along with past experiences of injury, $\beta=.34$, $p<.001$, whereas self-determination was not significant, $\beta=-.07$, $p=.153$. In sum, given that the predictor (self-determination) significantly affected the criterion (perceived susceptibility to injury) and the mediator (perceived susceptibility to keep running through pain), and that the mediator significantly affected the criterion after controlling for the predictor, this suggests that the perceived susceptibility to keep running through pain mediated the relationship between self-determination and perceived susceptibility to injury. In other words, the more runners were self-determined for marathon, the less they perceived themselves as susceptible to take the risk to be injured during the race; in turn, the less they were susceptible to adopt a risky behaviour, the less they perceived a risk to be injured during the race.

Next, we examined the role of autonomous and controlled motivation separately. Multiple regression analyses showed that neither autonomous motivation, $\beta=-.07$, $p=.172$, nor controlled motivation, $\beta=.07$, $p=.176$, significantly predicted perceived susceptibility to injury, after controlling for past experiences of injury, $\beta=.38$, $p<.001$. However, while autonomous motivation did not significantly predict perceived susceptibility to keep running through pain, $\beta=-.05$, $p=.329$, controlled motivation marginally predicted it, $\beta=.10$, $p=.074$, after controlling for past experiences of injury, $\beta=.16$, $p=.004$. In other words, the more runners endorsed a controlled motivation toward marathon, the more they tended to be susceptible to keep running through pain. Given that the a path was significant, we examined

whether the *b* path was also significant. Results confirmed that the perceived susceptibility to keep running through pain significantly predicted perceived susceptibility to injury, $\beta=.22$, $p<.001$, after controlling for controlled motivation, $\beta=.05$, $p=.342$, and past experiences of injury, $\beta=.34$, $p<.001$. Overall, these results suggest an indirect effect of controlled motivation on perceived susceptibility to injury, through its impact on perceived susceptibility to keep running through pain.

Finally, we examined the role of each form of motivation separately. Concerning perceived susceptibility to injury, results indicated that intrinsic motivation ($\beta=-.06$, $p=.215$), identified regulation ($\beta=-.08$, $p=.106$), and external regulation ($\beta=-.00$, $p=.985$) were not significant predictors (after controlling for past experiences of injury, $\beta=.38$, $p<.001$), while amotivation was a marginal predictor ($\beta=.10$, $p=.054$). In other words, the more runners were amotivated, the more they tended to perceive they were at risk of injury. Results concerning perceived susceptibility to keep running through pain showed that it was not significantly predicted by neither intrinsic motivation ($\beta=-.05$, $p=.367$), identified regulation ($\beta=-.07$, $p=.222$), nor amotivation ($\beta=.07$, $p=.174$), after controlling for past experiences of injury, $\beta=.16$, $p=.004$. In contrast, external regulation significantly predicted perceived susceptibility to keep running through pain ($\beta=.11$, $p=.049$, after controlling for past experiences of injury, $\beta=.15$, $p=.006$). In other words, the more runners adopted an external regulation, the more they were susceptible to adopt a risky behaviour during the race. Given that the *a* path was significant, we examined the *b* path. Results confirmed that the perceived susceptibility to keep running through pain significantly predicted perceived susceptibility to injury, $\beta=.23$, $p<.001$, after controlling for external regulation, $\beta=-.03$, $p=.563$, and past experiences of injury, $\beta=.34$, $p<.001$. Overall, these results suggest an indirect effect of external regulation on perceived susceptibility to injury, through its impact on perceived susceptibility to keep running through pain.

Discussion

The present study examined the role of self-determined motivation in predicting injury prevention-related variables during an intense competitive sport (i.e., marathon). Results of two studies showed that the more runners were self-determined for marathon, the less they perceived a risk to be injured during the race. Two competing explanations of this relationship were examined. On the one hand, self-determined individuals engage in the activity willingly and have thus a flexible behavioural engagement (Ryan & Deci, 2002). Therefore, they may be able to initiate preventive actions as soon as they feel that the activity is hazardous for them, resulting in a low perceived susceptibility to injury (e.g., Masters & Ogles, 1998). In this case, adopting a self-determined motivation would be health protective. A concurrent explanation is that self-determined individuals may be less likely to perceive negative aspects of their sport such as the risk it may present for their health (e.g., Sachs, 1981). One could posit that self-determined motivation negatively predicted perceived susceptibility because self-determined individuals were less likely to perceive the risk running a marathon may present for their health. In this case, self-determined motivation could be health damaging.

The results provided support for an adaptive interpretation of the negative relationship between self-determined motivation and perceived susceptibility to injury. Study 2 showed that the more runners were self-determined, the less they were susceptible to engage in a risky behaviour during the race (i.e., keeping running through pain), which was a proxy of perceived susceptibility to injury. In addition, the predictive role of self-determination was mostly driven by controlled forms of motivation, and more particularly external regulation. In other words, the less runners were externally regulated, the less they felt susceptible to keep running through pain, and the less they perceived themselves as susceptible to be injured.

These findings suggest that self-determined individuals, who have more control over their behaviours, could pay more attention to their bodily signs of pain and fatigue, while non

self-determined individuals, who feel coerced by external pressures would be more exposed to possible injuries. For example, if a runner feels an alerting pain during the race, this person might not want to abandon if he/she is motivated for external reasons such as the pride to finish a marathon while it is more likely that this person stops if he/she runs for the pleasure, as there is no pleasure to run with a continuous feeling of pain. Taken together, these findings indicate that self-determined motivation for sport may be a factor of engagement in preventive behaviours with regard to injury. However, this research presents some limitations. We did not measure the occurrence of actual injuries nor actual preventive behaviours, but instead situational susceptibility to adopt a risky behaviour. When questioning participants about their feeling of pain that might lead to injury, they may have understood the question differently, depending on their self-definition of injury. Finally, we used a cross-sectional design, which does not allow us to draw conclusions about causality. Future research should be conducted to confirm these results based on a prospective design and behavioural measures (i.e., objective injuries and objective preventive behaviours).

Perspective

While the role of self-determination for engaging in healthy behaviours has been examined (e.g., Chan & Hagger, 2012), the present study went a step further by showing that self-determination for sport may also predict adoption of preventive behaviours during competition. Concerning practical implications, our findings can provide a valuable contribution to injury prevention in marathon. While aerobic exercise has many health benefits, marathon running is also quite constraining for the body with a yearly incidence rates for injury reported to be as high as 90% in those training for marathons (Fredericson & Misra, 2007). By adopting self-determined motivations, runners can reduce their amount of risky behaviors and in turn the likelihood to be injured. A strength of self-determination theory is to consider motivation as depending on contextual factors, which may improve

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388 one's feelings of self-determination in sport. For example, by acting in an autonomy
389 supportive way, the coach and the relatives can lead the runner to focus more on the personal
390 benefits of running (e.g., in terms of health) and the satisfaction and pleasure experienced
391 during the race (see Mageau & Vallerand, 2003). These strategies may be used in a promising
392 manner in the domain of injury prevention in competitive sports.
393

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396

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Table 1

Descriptive Statistics and Correlations Among the Variables (Study 1)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Perceived susceptibility to injury	2.43	1.09	-											
2. Intrinsic Motivation Knowledge	4.03	1.36	-.05	-										
3. Intrinsic Motivation Achievement	5.17	1.09	-.02	.64***	-									
4. Intrinsic Motivation Stimulation	5.23	1.16	-.01	.45***	.64***	-								
5. Identified Regulation	3.63	1.21	.04	.53***	.48***	.48***	-							
6. Introjected Regulation	3.70	1.34	.06	.30***	.33***	.41***	.49***	-						
7. External Regulation	2.79	1.36	.11*	.28***	.23***	.25***	.52***	.57***	-					
8. Amotivation	1.69	0.95	.12*	.04	-.13*	-.08	.19***	.28***	.36***	-				
9. Autonomous Motivation Index	13.25	2.92	-.01	.81***	.82***	.76***	.83***	.49***	.43***	.04	-			
10. Controlled Motivation Index	6.63	2.58	.13*	.18***	.05	.11*	.40***	.61***	.67***	.90***	.27***	-		
11. Self-determination Index	6.62	3.34	-.11*	.57***	.67***	.58***	.41***	-.05	-.15**	-.66***	.67***	-.54***	-	
12. Sex	-	-	-.01	.07	.11*	.10	.09	.04	.02	.11*	.03	.08	-	-

484

Note. Sex was coded as follows: male = 1, female = 2. * $p < .05$; ** $p < .01$; *** $p < .001$.

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Table 2

Descriptive Statistics and Correlations Among the Variables (Study 2)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Perceived susceptibility to injury	1.98	0.73	-										
2. Intrinsic Motivation	5.70	1.15	-.03	-									
3. Identified Regulation	5.54	1.16	-.04	.82***	-								
4. External Regulation	2.97	1.39	.02	.13*	.29***	-							
5. Amotivation	1.90	1.21	.09††	-.19**	-.15**	.44***	-						
6. Autonomous Motivation Index	16.94	3.32	-.03	.98***	.92***	.19***	-.18**	-					
7. Controlled Motivation Index	6.77	3.28	.08	-.08	.01	.75***	.93***	-.05	-				
8. Self-determination Index	10.18	4.79	-.08	.73***	.63***	-.38***	-.76***	.73***	-.72***	-			
9. Susceptibility to adopt a risky behaviour	2.71	1.40	.30***	-.04	-.06	.11*	.08	-.05	.10 [†]	-.10 [†]	-		
10. Past experiences of injury	0.66	0.97	.37***	.05	.07	.07	-.02	.06	.02	.03	.15**	-	
11. Sex	-	-	.09††	.15**	.15**	.04	-.13*	.16**	-.07	.16**	-.05	-.00	-

Note. Sex was coded as follows: male = 1, female = 2. †† $p < .10$; † $p < .06$; * $p < .05$; ** $p < .01$; *** $p < .001$.