



## Personality and risky downhill sports: Associations with impulsivity dimensions



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### ABSTRACT

Studies show high-risk sports participants report higher levels of Sensation Seeking compared to non-participants, but few have explored other aspects of impulsivity. Using principal component scores to summarize measures of Reward Sensitivity, Punishment Sensitivity, and Rash Impulsivity we compared downhill sport participants (both beginner and proficient) to non-participants in an undergraduate sample ( $N = 279$ , 50% female). Downhill sport participants scored significantly higher on Reward Sensitivity, possibly driven by the anticipatory approach facets of the BAS, and proficient participants scored significantly lower on Punishment Sensitivity than beginners and non-participants, driven by traits related more closely to fear than anxiety. No differences were found in Rash Impulsivity. Popular high-risk sports may serve as an important example of an exception to the co-occurrence of common impulsive traits.

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### 1. Introduction

Downhill skiing, snowboarding, and mountain biking, are considered high-risk activities (Malkin & Rabinowitz, 1998), involving high speeds (Shealy, Ettlinger, & Johnson, 2005) and rugged terrain, which increase the chances of falls or collisions. Despite the known risks, their popularity has increased over the last few decades (Hudson, 2004). Risky behavior has been associated with a variety of impulsive traits. Impulsivity, however, is heterogeneous (e.g. Cross, Copping, & Campbell, 2011). Although, some studies of personality and high-risk sports have looked at subsets of traits, no studies to date have looked at estimates of dissociable impulsive traits by extracting specific factors that summarize the common variance across trait measures.

Several of these dissociable traits appear to arise from distinct biopsychological processes that may independently influence engagement in risky sport. Notably, the Reinforcement Sensitivity Theory (RST; Gray & McNaughton, 2000) suggests that risky behavior may result from either over-sensitivity to likely reinforcement (i.e., high Reward Sensitivity) or under-sensitivity to probable punishment (i.e., low Punishment Sensitivity). Further, factor analysis suggests that at least one dimension of impulsivity exists

separately from these traits (e.g. Franken & Muris, 2006; Miller, Joseph, & Tudway, 2004). A general tendency to act without thinking of the consequences, called “Rash Impulsivity” (e.g. Dawe, Gullo, & Loxton, 2004) or “inadequate effortful control” (e.g. Cross et al., 2011) appears to reflect limitations on the functioning of the orbital and ventromedial prefrontal cortex necessary for executive control of behavior (Congdon & Canli, 2008). In addition to these three sets of traits, Cross et al. (2011) also distinguished a fourth dimension of Sensation Seeking which may emerge from the combination of high Reward and low Punishment Sensitivity. This trait, in particular, has been examined extensively in relation to risky sports.

Sensation Seeking is consistently reported as being higher in high-risk compared to low-risk sport practitioners and non-athletes (Goma-i-Freixanet, Martha, & Muro, 2012). It seems likely that aspects of Sensation Seeking related to Reward or Punishment Sensitivity would be related to high-risk sport given the excitement and risks of downhill sports. Rash Impulsivity, however, would likely lead to risk for injury on the slopes, limiting the potential for an individual to become proficient with them.

The RST provides a framework for understanding some personality influences on risky sports. It posits that there are individual differences in the average activity of Behavioral Approach (BAS) and Behavioral Inhibition (BIS) Systems. The former is thought to respond in a goal-directed manner to appetitive stimuli and to the removal of aversive stimuli, while the latter is involved in resolving goal conflicts that can arise between BAS activation and activation of a third system, the Fight-Flight-Freeze System (FFFS).

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The FFFS is activated upon presentation of aversive stimuli and cues predicting punishment (Gray & McNaughton, 2000).

Risky sports may be undertaken by individuals who are reward seekers driven by strong Reward Sensitivity (i.e., high tonic BAS activation) and less inhibited by Punishment Sensitivity (i.e., low tonic BIS-FFFS co-activation). Higher Reward and lower Punishment Sensitivity have been reported in skydivers compared to rowers (a low risk sport; Franken, Zijlstra, & Muris, 2006). Small differences have been reported between alpinists and controls in Punishment, but not Reward Sensitivity (Goma-I-Freixanet, 1991), although mountaineering provides less immediate excitement than downhill sports. Findings have been mixed in studies that have included measures of Rash Impulsivity; however, with some finding null (Goma-I-Freixanet, 1991, 2001) and others finding negative relationships (Llewellyn & Sanchez, 2008).

In the present study, we examined differences in traits between students living in western Canada who practice popular downhill sports recreationally, and those who do not. We used leading measures of impulsive traits and, with Principal Components Analysis (PCA), extracted oblique scores related to the dimensions hypothesized to underlie them. We then compared groups based on sport involvement in terms of these traits. We anticipated that Sensation Seeking measures would contribute positively to the approach-oriented Reward Sensitivity component, and negatively to the avoidance-oriented Punishment Sensitivity scores, consistent with the tripartite model of impulsive traits described by Cross et al. (2011). We hypothesized that individuals who become proficient at a downhill sport would score higher on Reward Sensitivity, and would score lower on Punishment Sensitivity. We did not expect to see differences in Rash Impulsivity. To our knowledge this is the first study to explore differences between multiple measures of Reward and Punishment Sensitivity, as well as Rash Impulsivity in mainstream risk sports. Furthermore, most studies on high-risk sports include male-only (or largely male) samples (Jensen & Guthrie, 2006) and we were able to recruit an equal representation of females.

## 2. Method

### 2.1. Participants

Undergraduate students ( $n = 279$ ) participated for extra credit in a psychology course at a large university in western Canada. Carlson, Pritchard, and Dominelli (2013) reported on data from the same participants in a study of impulsivity and externalizing behaviors. Demographic data are presented in Table 1. Participants responded to an online posting of the study on a departmental website. Procedures were approved by the relevant institutional research ethics board and participants provided informed consent. Students completed questionnaires online using the website [SurveyMonkey.com](http://SurveyMonkey.com).

### 2.2. Measures

#### 2.2.1. International personality item pool 50-item Big Five instrument (IPIP Big Five)

The IPIP Big Five is a 50-item measure of the higher-order traits in the Five Factor Model (Goldberg et al., 2006). The Cronbach alphas for our sample were as follows: Neuroticism (N; .88), Extraversion (E; .88), Openness to Experience (O; .76), Agreeableness (A; .78), Conscientiousness (C; .83). The Conscientiousness scale was reverse coded (C-rev) so that high scores indicated higher impulsivity. Each scale had 10 items scored using a 5-point Likert scale ranging from 1 (very inaccurate) to 5 (very accurate), and 25 items were reverse coded.

#### 2.2.2. Behavioral Inhibition system and Behavioral Activation system scales (BIS/BAS)

The BIS/BAS (Carver & White, 1994) are comprised of 20 items scored on a 4-point scale ranging from 1 (strongly agree) to 4 (strongly disagree). The BIS scale ( $\alpha = .80$ ) putatively measures an individual's sensitivity to punishment or avoidance motivation. Conversely, the BAS scale has three subscales: Drive (BAS-drive,  $\alpha = .81$ ), Fun Seeking (BAS-FS,  $\alpha = .80$ ), and Reward Responsiveness (BAS-RR,  $\alpha = .81$ ). Scales were scored so that high scores indicate high BIS/FFFS or high BAS activity.

#### 2.2.3. Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ)

The SPSRQ (Torrubia, Avila, Molto, & Caseras, 2001) is a 48-item measure, comprised of two subscales: Sensitivity to Punishment (SP;  $\alpha = .85$ ) and Sensitivity to Reward (SR;  $\alpha = .80$ ), each scored using a "yes/no" response format.

#### 2.2.4. UPPS-P Impulsive Behaviour Scale

The UPPS-P included Whiteside and Lynam's (2001) original 45-item measure along with the 14-item Positive Urgency scale (Cyders et al., 2007). The associated Cronbach's Alphas observed: Premeditation (Pre; .88), Negative Urgency (NU; .88), Sensation Seeking (SS; .89), Perseverance (Pers; .85), and Positive Urgency (PU; .93). A 4-point scale ranging from 1 (agree strongly) to 4 (disagree strongly) was used. Three items were reverse coded. In order to make high scores indicative of greater impulsivity we reverse scored the Premeditation (Pre-rev) and Perseverance (Pers-rev) scales.

#### 2.2.5. ZKPQ Impulsive Sensation Seeking Scale (ImpSS)

The ImpSS measures two factors, Impulsivity (Z-Imp;  $\alpha = .84$ ) and Sensation Seeking (Z-SS;  $\alpha = .91$ ), but is usually treated as a single scale (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). We substituted the original true/false response with a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

### 2.3. Data analysis

We conducted  $3 \times 2$  analyses of variance (ANOVAs) separately for each scale described above with downhill sport participation (No-sport, Beginner, Proficient) and sex (male, female) as the factors. The sport groups were based on self-rating using a Likert scale (1 = beginner, 2 = novice, 3 = intermediate, 4 = advanced, 5 = expert). Individuals who did not participate in any downhill sport were in the "No-sport" group ( $n = 104$ ), those who did but were less than intermediate in ability were "Beginners" ( $n = 53$ ), and those who were intermediate or higher were in the "Proficient" group ( $n = 122$ ). We applied a Bonferroni correction for testing multiple dependent variables, setting significance at  $\alpha = .003$  ( $\alpha = .05/16$  scales). Significant  $F$ -tests were followed up using least significant difference (LSD) tests.

We anticipated that there would be common variance in measures that relate to "Reward Sensitivity" (e.g. E, SS, Z-SS, BAS-drive, BAS-FS, BAS-RR, and SR), "Punishment Sensitivity" (e.g. N, BIS, SP), and "Rash Impulsivity" (e.g. C-rev, Pre-rev, Pers-rev, Z-Imp). We summarized the measures by extracting component scores using a PCA. We applied an Oblimin rotation to allow for correlation among components. We then conducted ANOVAs similar to those used with the individual scales, but with component scores as the quasi-dependent variables.

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