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10 Who takes risks in high-risk sports? A typological personality approach

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1 Abstract

2 We investigated the risk-taking behaviors of 302 men involved in high-risk sports (downhill
3 skiing, mountaineering, rock climbing, paragliding or skydiving). The sportsmen were
4 classified using a typological approach to personality based on eight personality types, which
5 were constructed from combinations of neuroticism, extraversion and conscientiousness.
6 Results showed that personality types with a configuration of low conscientiousness combined
7 with high extraversion and/or high neuroticism (Impulsive, Hedonist, Insecure) were greater
8 risk-takers. Conversely, personality types with a configuration of high conscientiousness
9 combined with low extraversion and/or high extraversion (Skeptic, Brooder, Entrepreneur)
10 were lower risk-takers. Results are discussed in the context of typology and other approaches
11 to understanding who takes risks in high-risk domains.

12

13 *Key words:* personality, typology, risk-taking behaviors, high-risk sports

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1 Who takes risks in high-risk sports? A typological personality approach

2 Risk-taking research has largely focused on disinhibition behaviors, which are
3 perceived as socially unacceptable volitional behaviors (e.g., dangerous driving, drug taking,
4 gambling, promiscuous sex) in which insufficient precaution is taken and from which the
5 outcomes are potentially very negative (e.g., serious injury or death of the self or others;
6 Turner, McClure, & Pirozzo, 2004). Conversely, few studies have a dedicated focus on high-
7 risk sports, in which the danger is recognized and socially accepted (Turner et al., 2004),
8 although the potential consequences are equally serious.

9 High-risk sports, usually defined as sports where one has to accept the possibility of
10 severe injury or death as an inherent part of the activity (Breivik, 1995), are demanding
11 activities that require specialized equipment and training to manage the risks involved (cf.
12 Fyffe & Peter, 1997). Nonetheless, although many high-risk sportspeople minimize the
13 associated risks as much as possible, others seem to engage deliberately in risk-taking
14 behaviors within the high-risk sport (e.g., Llewellyn & Sanchez, 2008; Slanger & Rudestam,
15 1997). Given the potentially life-threatening consequences of risk-taking enacted in high-risk
16 sport (Bonnet, Pardinielli, Romain, & Rouan, 2003), it is important to understand which
17 individual differences may lead some people to adopt them.

18 Personality seems to be one of the most important predictors of various risk-taking
19 behaviors (Selosse, 1998; Vollrath, Knoch, & Cassano, 1999) and neuroticism, extraversion,
20 and conscientiousness are the most studied personality factors in the high-risk health
21 behaviors area (e.g., Bermúdez, 1999; Clarke & Robertson, 2005; Vollrath & Torgersen,
22 2002). However, of these three personality traits, neuroticism and extraversion yield
23 equivocal findings. For example, although a number of researchers have reported a positive
24 relationship between extraversion and high-risk health behaviors (Vollrath et al., 1999) or
25 traffic and job accident involvement (e.g., Arthur & Graziano, 1996; Clarke & Robertson,

1 2005), other researchers have reported the opposite relationship in the same domains (e.g.,
2 Iverson & Erwin, 1997; Judge, 1993). Similar inconsistencies surround neuroticism findings:
3 Many studies have demonstrated that individuals high in neuroticism are more prone to taking
4 high-risk health behaviors (Vollrath et al., 1999) and are more accident-involved (e.g., Clarke
5 & Robertson, 2005; Sutherland & Cooper, 1991); other studies have revealed that specific
6 facets of neuroticism (e.g., depression) are negatively related to risk-taking behaviors
7 (Robinson, 1985; Sleasman, 2004).

8 These equivocal findings are likely linked to the complexity of personality, notably
9 the multi-faceted nature of some personality factors, particularly as they pertain to risk-taking.
10 For example, although the positive affectivity of extraverts may reduce the likelihood of their
11 risk-taking (Iverson & Erwin, 1997), they may also use risk-taking behaviors to achieve their
12 desired level of arousal (Eysenck & Eysenck, 1985; Zuckerman, 1990). Indeed, according to
13 Zuckerman (1990) sensation seeking appears to be a motivation for involvement in risk-
14 taking behaviors inasmuch as these are an obvious way to experience sensations that increase
15 the physiological arousal fulfilling the need for stimulation (see also Arnett, 1996). Thus,
16 extraversion can be conceptualized as being associated with both an increase and a decrease
17 in the tendency to approach risk. Similar complexities surround the relationship between
18 neuroticism and risk. For example, some personality facets of neuroticism (e.g., anxiety,
19 depression) might incite individuals to avoid risk-associated behaviors, as these will likely be
20 perceived as complex and stressful events that the neurotic will feel unable to cope with
21 (Robinson, 1985; Sleasman, 2004). Conversely, neurotic individuals might take risks with the
22 aim of regulating feelings of distress and tension (Eysenck, 1990; Michel, Carton, & Jouvent,
23 1997). In fact, the immediate risk-associated sensations that are experienced might be a way
24 of keeping negative affect at a distance, at least temporarily (Michel et al., 1997; Woodman,
25 Cazenave, & Le Scanff, 2008; Woodman, Huggins, Le Scanff, & Cazenave, in press).

1 In contrast to extraversion and neuroticism, conscientiousness consistently predicts the
2 inclination to refrain from risk-taking behaviors (Vollrath et al., 1999). The definition of
3 conscientiousness includes a number of different aspects: competence, order, dutifulness,
4 achievement striving, self-discipline and deliberation. There is evidence that these personality
5 traits are consistent with the development of healthy behaviors and the achievement of higher
6 levels of psychic and physical well-being (McCrae & Costa, 1999). Conversely, a lack of
7 conscientiousness is linked to a high level of risk taking (Clarke & Robertson, 2005; Vollrath
8 & Torgersen, 2002). Indeed, research has shown that individuals low in conscientiousness are
9 more prone to reckless driving, substance abuse, and high-risk sexual behaviors (Bermúdez,
10 1999; Vollrath et al., 1999). The negative relationship between conscientiousness and risk-
11 taking behaviors could be explained by several relevant features of low conscientious people
12 such as carelessness, lack of self-control, impulsivity and a lack of respect for authority and
13 social order (Clarke & Robertson, 2005).

14 Although it is reasonably established that conscientiousness is negatively related to
15 risk-taking (Clarke & Robertson, 2005; Vollrath & Torgersen, 2002) little is known about
16 how the personality factors of extraversion and neuroticism might moderate this association
17 (Røvik et al., 2007). The examination of such interactions is at the heart of the typological
18 approach, which Vollrath and Torgersen (2002) used to examine personality differences in
19 relation to high-risk health behaviors (tobacco, alcohol, drug consumption; high-risk sexual
20 behaviors). Vollrath and Torgersen's typologies were built on combinations of high and low
21 scores on the three basic personality factors of neuroticism, extraversion, and
22 conscientiousness, which results in eight personality types (see Table 1). Vollrath and
23 Torgersen (2002) found that personality types that combine low conscientiousness with high
24 extraversion and/or high neuroticism (i.e., Impulsive, Insecure, Hedonist) increased the
25 susceptibility to high-risk health behaviors, probably due to their low self-control (West,

1 Morrongiello & Rennie, 1998) the few women participants ($N = 13$) were excluded from the
2 study. The final sample comprised 302 French men who declared that they were currently
3 practicing one of the five following high-risk sports as their main sport activity: downhill
4 skiing ($n = 39$), mountaineering ($n = 152$), rock climbing ($n = 31$), paragliding ($n = 29$), or
5 skydiving ($n = 51$). The t tests revealed that these high-risk sport groups did not differ
6 significantly in age ($M = 31.6$ years; $SD = 9.7$), experience ($M = 10.6$ years; $SD = 7.7$), or
7 ability level (self-assessment rated on a five-point Likert scale from 1 “*novice*” to 5 “*expert*”,
8 $M = 4.2$; $SD = 1.5$), all $ps > .05$. The initial contact included a presentation of the study
9 purpose and an assurance of confidentiality. Next, each participant was mailed a 10-page
10 questionnaire. Participants' answers including the written informed consent were returned by
11 post or electronic mail.

12 *Measures*

13 *Personality.* The personality dimensions of the Five-Factor Model (i.e., neuroticism,
14 extraversion, openness to experience, agreeableness, and conscientiousness) were assessed
15 using the French version of the NEO Personality Inventory Revised (NEO PI-R; Costa &
16 McCrae, 1992; Rolland, Parker, & Stumpf, 1998). This inventory comprises 240 items rated
17 on a five-point Likert scale from 0 (*strongly disagree*) to 4 (*strongly agree*). Each of the five
18 NEO PI-R scales contains 48 items and yields a score between 0 and 192. The internal
19 reliability coefficients of the present sample range from .86 to .88. In accordance with
20 Torgersen's model (Torgersen, 1995; Vollrath & Torgersen, 2002), typologies were
21 constructed from three scales of the NEO PI-R: neuroticism, extraversion, and
22 conscientiousness. Factor scores were split at the median, and participants were assigned to
23 one of the eight personality types by combining high and low scores on each dimension (see
24 Table 1): Impulsive ($n = 32$), Hedonist ($n = 26$), Insecure ($n = 55$), Spectator ($n = 31$),
25 Complicated ($n = 31$), Entrepreneur ($n = 56$), Brooder ($n = 31$), and Skeptic ($n = 40$).

1 *Risk-taking.* Whereas risk-taking is readily observed and assessed in domains such as
2 road traffic (e.g., speeding, drink driving, not using a safety belt, traffic law violations), the
3 specificity of the high-risk sports environment makes the identification and objective
4 measurement of risk-taking rather more complex. Moreover, as the objective surveillance of
5 the large cohort of participants over time was logistically untenable (cf., Frone, 1998;
6 Westaby & Lowe, 2005), two self-report methods were used in this study to assess risk-
7 taking:

8 *Accidents.* The number of previous accidents is an objective measurement that has
9 been widely used in previous research (e.g., Bonnet et al., 2003; Cherpitel, Meyers, &
10 Perrine, 1998; Cogan & Brown, 1999; Rossi & Cereatti, 1993). Participants were
11 asked to report the number of accidents that they had experienced since the beginning
12 of their practicing the activity. They were asked to report only those accidents that had
13 resulted in severe injury involving withdrawal from participation for one day or more
14 and requiring medical attention. In order to control for number of years' exposure to
15 the high-risk sport, we also asked participants to provide the number of years they had
16 been practicing their sport. The ratio of accidents / years' practice was used as a
17 measure of accidents.

18 *Risk-taking behaviors.* Participants were asked to complete the three-item risk-taking
19 behavior scale (Lafollie & Le Scanff, 2007; see also Westaby & Lee, 2003). The items
20 of this scale are: "When practicing my high-risk sport I have sometimes been involved
21 in accidents (during last two years) that are caused by my somewhat irresponsible
22 attitude"; "I think I am very careful and far-sighted when I practice my high-risk
23 sport" (reverse scored); "My friends or colleagues who are experts in the activity think
24 that I take too many risks when I practice my high-risk sport". Each item was scored

1 on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). This
2 instrument showed acceptable internal reliability with Cronbach's alpha of .70.

3 Results

4 *Preliminary analyses*

5 The assumptions of parametric and multivariate analysis (cf. Tabachnick & Fidell,
6 2001) were satisfied for the present data set. In order to verify that no specific sport group was
7 more prone to risk-taking than any other, we ran one-way randomized ANOVAs, which
8 revealed no significant differences in accidents, $F(4, 297) = 0.85, p = .49, \eta^2 = .01$, or risk-
9 taking behaviors, $F(4, 297) = 0.53, p = .71, \eta^2 < .01$. Moreover, a chi-square test showed no
10 difference in the dispersion of sport groups between personality types, $\chi^2(28, N = 302) =$
11 $14.72, p = .98$. In other words, each personality group had an equal number of sports
12 represented within it in relation to the total sample (downhill skiing, 12.91%; mountaineering,
13 50.33%; rock climbing, 10.27%; paragliding, 9.60%; and skydiving, 16.89%). Finally, there
14 was no significant difference between personality types for experience, $F(7, 294) = 1.68, p =$
15 $.11, \eta^2 = .04$. However, there was a significant age difference between personality types, $F(7,$
16 $294) = 3.07, p < .01, \eta^2 = .07$. Consequently, we included age as a covariate in subsequent
17 analyses.

18 *Risk-taking differences between personality types*

19 In order to investigate differences between the eight personality types on risk-taking,
20 we ran a one-way randomized MANCOVA, with personality types as the independent
21 variable, number of accidents and risk-taking behaviors as dependent variables, and age as
22 covariate. Single-factor ANCOVAs and Tukey's post-hoc tests were used to observe specific
23 differences between the personality types for each dependent variable. In line with Vollrath
24 and Torgersen (2002), differences were also examined by comparing each typology to the
25 average of the other seven types pooled with simple *a priori* contrasts.

1 The MANCOVA revealed a significant personality type difference on risk-taking,
2 Wilks' Lambda $F(14, 584) = 3.55, p < .001, \eta^2 = .08$. ANCOVAs showed significant
3 personality type differences for accidents, $F(7, 293) = 2.70, p < .01, \eta^2 = .06$, and for risk-
4 taking behaviors, $F(7, 293) = 5.10, p < .001, \eta^2 = .11$. Tukey's post-hoc tests and *a priori*
5 contrast tests are reported next for accidents and risk-taking behaviors, respectively.

6 *Accidents.* Tukey's post-hoc tests revealed a significant difference between the
7 Impulsive and Skeptic personality types, with Impulsive persons reporting more accidents
8 than Skeptic persons (see Table 2). The *a priori* contrasts advocated by Vollrath and
9 Torgersen (2002) revealed that the Impulsive personality type reported more accidents than
10 the seven other types pooled, $t(300) = 3.46, p < .001$; the Skeptic personality type reported
11 fewer accidents than the seven other types pooled, $t(300) = 2.87, p < .01$.

12 *Risk-taking behaviors.* Tukey's post-hoc tests revealed significant differences between
13 each of the three hypothesized high-risk personality types (Impulsive, Hedonist, and Insecure)
14 and each of the three hypothesized low-risk personality types (Skeptics, Brooders, and
15 Entrepreneurs), with the so-called high-risk personality types reporting a higher degree of
16 risk-taking behaviors than low-risk personality types (see Table 2). The *a priori* contrasts also
17 revealed that each of the three hypothesized high-risk personality types reported a higher
18 degree of risk-taking behaviors than the seven other types pooled: Impulsive, $t(300) = 3.54, p$
19 $< .001$; Hedonist, $t(300) = 2.02, p < .05$; and Insecure, $t(300) = 1.97, p < .05$; each of the three
20 hypothesized low-risk personality types reported a lower degree of risk-taking behaviors than
21 the seven other types pooled: Skeptic, $t(300) = 2.44, p < .05$; Brooder, $t(300) = 3.03, p < .01$;
22 Entrepreneur, $t(300) = 2.51, p < .05$.

23 No significant differences for the number of accidents or the risk-taking behaviors
24 emerged for the Complicated type and the Spectator type. Thus, in agreement with Vollrath

1 and Torgersen (2002), these personality profiles are neither particularly low nor particularly
2 high risk takers.

3 Discussion

4 In order to better understand the personality differences that lead some people to take
5 risks in high-risk sport, the present study examined the interactive relationships between three
6 personality factors on risk-taking behaviors. The results revealed that the typological
7 combinations of neuroticism, extraversion, and conscientiousness were largely successful in
8 discriminating between self-reported low-risk takers and high-risk takers. Specifically,
9 Skeptic, Brooder, and Entrepreneur persons reported lower risk-taking behaviors with
10 Skeptics also reporting significantly fewer accidents. Conversely, Impulsive, Hedonist, and
11 Insecure persons reported greater risk-taking behaviors with Impulsives also reporting
12 significantly more accidents.

13 The risk-taking of Impulsive persons could be explained by their desire to enhance
14 bodily sensation experiences (Cooper et al., 2000) and their tendency to focus on satisfying
15 immediate needs for stimulation, regardless of future consequences for themselves or for
16 others (West et al., 1993; Zuckerman, 1990). Focusing on bodily sensations may also serve to
17 divert Impulsives' attention from their ill-being and problems (Cooper et al., 2000; Taylor &
18 Hamilton, 1997). If the impulsive person relies on the mastery of danger to experience relief
19 and well-being, he/she is more likely to come to depend on risk-taking as a means of emotion
20 regulation (Pardinielli, Rouan, Gimenez, & Bertagne, 2005; Woodman et al., 2008; Woodman
21 et al., in press). It seems likely that ever-increasing levels of risk and the associated risk of
22 accidents will be necessary to satisfy such people despite their knowledge of the potential
23 negative outcomes (Assailly, 2007). While Impulsives might use risk-taking behaviors as a
24 means of regulating their negative affect (Cooper et al., 2000; Taylor & Hamilton, 1997),
25 Hedonists do not appear to have such emotional difficulty and are likely oriented by the

1 positive affect and pleasure associated with the risk behavior (Zuckerman, 1990). Less aware
2 of their own limits, Hedonists may take risks simply to satisfy sensation seeking needs,
3 regardless of the risk to themselves and to others (West et al., 1993). The propensity for
4 Insecure individuals to take risks is less clear. In fact, introverted and neurotic persons are
5 very concerned about their current and future health risks (Vollrath et al., 1999; Watson &
6 Pennebaker, 1989). Thus, one might expect such individuals to tend toward avoiding risky
7 situations (Deroche, Stephan, Brewer, & Le Scanff, 2007). However, the negative affectivity
8 of Insecure individuals in conjunction with their low self-control could lead them to engage in
9 risk behaviors as a means of coping with aversive mood states and ill-being (Cooper et al.,
10 2000).

11 In line with the equivocal findings from previous research the present study highlights
12 that the relationship between extraversion and risk-taking should not be conceptualized in
13 isolation from other dimensions of personality. Indeed, extraversion may be positively related
14 to risk-associated behavior for some people (Impulsives and Hedonists) and negatively related
15 for others (Insecures). In the same way, neuroticism may be linked positively (Impulsives and
16 Insecures) or negatively (Hedonists) with risk-taking behaviors. Thus, it is only the
17 combination of the personality factors of neuroticism, extraversion and conscientiousness that
18 allows us to identify low and high-risk takers within high-risk sport. Moreover, although low
19 conscientiousness is not always linked to risk-taking (e.g., when it associated with low
20 extraversion and low neuroticism; Spectators), this trait appears as the most consistent
21 personality predictor of risk-taking in high-risk sport. The negative relationship between
22 conscientiousness and risk-taking behaviors could be explained by several characteristics of
23 low conscientiousness individuals (Clarke & Robertson, 2005). For example, individuals who
24 are low in conscientiousness exhibit behaviors that are characterized by a focus on satisfying
25 immediate needs, regardless of future consequences for oneself or for others (West et al.,

1 1993). They also set fewer goals, do not follow rules (Arthur & Doverspike, 2001), and do not
2 have a logical or systematic approach to decision making or cost–benefit analysis (Wallace &
3 Vodanovich, 2003). Conversely, the health protective effect of conscientiousness could be
4 explained by its characteristic ingredients of tenacity, persistence, and effort that favor social
5 success and improve quality of life, as well as being essential factors for maintaining goal-
6 directed behavior (Bermúdez, 1999).

7 Although the results from the present study are promising, several limitations should
8 be considered. First, the use of personality typology has been criticized by some authors (e.g.,
9 Grant & Langan-Fox, 2006; Røvik et al., 2007). For example, Pittenger (2004) argued that the
10 typological categorization comes at a cost, and recommended the use of more traditional
11 multiple regression analyses to study the multidimensional, potentially interactive, effects of
12 personality on risk-taking (cf. Korotkov & Hannah, 2004). In contrast, Vollrath and Torgersen
13 (2002) advocated the use of typology insofar as this method allows one to avoid the potential
14 problem of non-linearity associated with the three-way interactive effect of personality traits
15 on individuals' behaviors (see also Grant & Langan-Fox, 2006). Another advantage of the
16 typological approach is its ability to provide a reasonably simplified view of a complex
17 process (i.e., three-way interactions between personality traits) and thus allows one more
18 easily to classify individuals (Pittenger, 2004). Of course, if one accepts the aforementioned
19 criticisms that can be leveled at the typological approach, the present results emerge as
20 hypothesized despite such limitations rather than because of them. As such, the results are all
21 the more robust and provide strong support for the notion that one can discriminate between
22 different degrees of risk-taking on the basis of personality typology. At the very least, the
23 typological approach seems worthy of future investigation in the high-risk domain.

24 A second potential limitation of the present typological approach is that it uses only
25 three factors of personality. That is, Torgersen's typology ignores the potential variance

1 accounted for by openness to experience and agreeableness (Pittenger, 2004). This is
2 potentially important given that previous research has revealed a positive relationship
3 between openness to experience and risk-taking (Clarke & Robertson, 2005) and a negative
4 relationship between agreeableness and risk-taking (Mesken, Lajunen, & Summala, 2002).
5 Thus, discarding these personality factors might reduce the possibility of developing a robust
6 model that predicts individual differences in risk-taking. We believe that future research
7 would do well to consider how the typological model might be extended to incorporate all
8 five personality factors in this risk-taking context.

9 Third, some methodological limitations should also be borne in mind when assessing
10 these findings. Whereas risk-taking behaviors are readily observed and assessed in some
11 domains such as road traffic (e.g., speeding, drink driving), the specificity of the high-risk
12 sports environment makes the identification and measurement of risk-taking more complex.
13 In the current study we used two indices of risk-taking: the relative number of accidents
14 experienced within the activity; and the level of declared risk-taking behaviors. Clearly, each
15 has its limitations. As accidents are the most extreme outcome of a risky situation and can be
16 strongly linked with environmental factors (e.g., difficult weather), they are likely a rather
17 crude measure of risk-taking. Moreover, participants in the present study were asked to report
18 the number of accidents that they had experienced since the beginning of their involvement in
19 the activity. Although we used the ratio of accidents / years' practice as an adjusted measure
20 of accidents, the lack of a specific time-frame used when assessing accident and injury recall
21 may have been a limitation. Specifically, more recent accidents may have taken recall
22 prevalence over more temporally distal accidents and this difference may have been greater
23 for those who had been involved in their sport for many years. Further, although the risk-
24 taking behaviors inventory that we used was a rather more refined measure of risk-taking, it
25 nevertheless has the inconvenience of being reliant on self-report. It is, however, worth noting

1 that the results emerged as hypothesized despite these limitations. Nonetheless, future
2 research should certainly consider measurements other than self-report (e.g., peer
3 assessments, objective observation criteria).

4 In summary, the findings of the current study contribute to an in-depth understanding
5 of individual differences involved in risk-taking behaviors adopted in a socially accepted
6 high-risk domain. The personality typology approach provided a sound framework for this
7 investigation and should prove useful in developing individually tailored prevention strategies
8 with a particular focus on the potential buffering role of conscientiousness.

9

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