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Risk-Taking and Sensation Seeking in Military Contexts: A Literature Review

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Abstract

The article is based on a literature review of studies covering risk-taking and sensation seeking within military contexts over a time span of 3 decades from 1983 to 2015. Literature was gathered through a four-stage search procedure identifying 25 studies of risk-taking and 16 studies of sensation seeking altogether. Because warfare and military conflicts are dangerous and risky pursuits, one could imagine there being a lot of empirical research about risk-taking and sensation seeking in the military. We have found this not to be the case. The research is both small in volume and scattered when it comes to use of theories, methods, and samples of military personnel. In general, there seem to be few clear research paradigms. The results of the empirical studies show that there are adaptive as well as nonadaptive forms of risk-taking in relation to military situations. Similarly, military personnel scoring high on sensation seeking possess certain advantages, for instance, dealing with stress and risk, yet may also cause problems of various kinds. The review ends by pointing out implications for research and practice.

Keywords

military, soldiers, danger, risk-taking, sensation seeking

Introduction

Military conduct is an instrument of organized political violence (Weber, 1965) and is, thus, intimately related to risks and risk-taking. Soldiers ultimately put their own or others' lives at risk when executing military skills in pursuit of political goals. Although the type and content of military warfare has changed dramatically, even since the Cold War, the element of risk is still present, albeit in new ways. It is, therefore, of great interest to study attitudes and behaviors of soldiers in relation to different contexts of war or military conflicts (Sookermany, Sand, & Breivik, 2015). It is of special interest to look at personality types, attitudes, and types of behaviors that typically survive and thrive in contexts of war. In this article, we focus on two key areas and present a review of studies that have been conducted over the last 3 decades related to the concepts of "risk-taking" and "sensation seeking" within a military context. Seeking challenges and taking risks may, in some cases, contribute positively to military missions and goals, but may, in other cases, be related to problematic and negative behaviors. Our purpose is, thus, to identify positive as well as negative aspects of sensation seeking and risk-taking in military contexts as evidenced in relevant empirical research. One may, thus, be better able to assign people with specific personality profiles to relevant tasks whether it is to improve military performance or avoid unnecessary losses.

Risk-taking may be defined as a basic *attitude*. Some define it as a *personality trait*, or rather subtrait. In the Eysenck test battery, risk-taking is one of the subscales (Eysenck & Eysenck, 1985). Another personality trait that is closely linked to risk-taking is sensation seeking, which is also defined as a subtrait in the Eysenck test battery. The definition of sensation seeking actually includes the willingness to take risks of various types (Zuckerman, 1994). Empirical findings underline the strong correlation between risk-taking and especially the Thrill-and-Adventure-Seeking (TAS) subscale of the sensation seeking scale (Eysenck & Eysenck, 1985, p. 73). We, therefore, decided to include sensation seeking as the second part of our investigation. In the following, we will first present a theoretical background for the concepts of risk-taking and sensation seeking. We will then clarify our method and data collection. Then follows a presentation and discussion of relevant studies of risk-taking and sensation seeking in military contexts, before we suggest possible implications of our findings for theory and practice.

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Theoretical Rationale

The Concepts of "Risk" and "Risk-Taking"

Historically, the terms *risqué, risco, riscare* entered European vocabulary in Early Modern times, around 1650. The concept of risk was connected to the insurance and possible loss of ships (Lupton, 1999). Today, the concept has different meanings related to discipline, field of study, and context. In decision-making literature, one distinguishes between decision under certainty, uncertainty, and risk (Gilboa, 2009).

In economy and risk management literature, risk is typically understood as something negative, as the possibility of a loss of some kind (Yates & Stone, 1992). Yet, in some psychological studies, risk can be seen as something positive. Risk-taking, or even risk-seeking, is identified in sports and other contexts as the positive experience of thrills or flow (Csikszentmihalyi, 1990; Zuckerman, 1994). Here, risk is experienced as a value in itself, independent of the outcome. It is hypothetically true that some types of soldiers may experience dangerous military operations as thrilling and valuable as such. Risk-taking seems, therefore, not only to be accompanied by concern, anxiety, and fear, but among some by robustness, boldness, and deep flow (Rachman, 1990; Shaffer, 1947; Walton, 1986). Risk, thus, contains negative as well as positive possibilities dependent upon person, situation, and context. We think this may be true also for some soldiers in risky military contexts.

As Mary Douglas has pointed out, "risk" and "safety" are not neutral concepts but have strong social and cultural underpinnings (Douglas, 1992; Douglas & Wildavsky, 1982). Since the Enlightenment period and especially in modern society, there is a concern for safety and control. Several authors have stated that "in isolation there is no such thing as acceptable risk; because by its very nature, risk should always be rejected" (Yates & Stone, 1992, p. 3). Other authors, such as Adams (1995), dispute this and think that people are not in general risk-aversive: "Zero-risk man is a figment of the imagination of the safety profession. *Homo prudens* is but one aspect of the human character. *Homo aleatorius*—dice man, gambling man, risk-taking man—also lurks within every one of us" (Adams, 1995, p. 16). Such a view may be supported by evolutionary theories that maintain that humans have survived on the earth by taking risks (Staski & Marks, 1992). Soldiering and warfare are, in many respects, close to earlier evolutionary situations and may consequently benefit from a more balanced view on risks and risk-taking than is usual in many disciplines.

Risk-taking is not only related to physical risk or economic risk. Several studies presented in the following sections distinguish between various dimensions or domains of risk-taking. In two recent studies by Breivik, Sand, and Sookermany (2017), and Sand, Breivik, and Sookermany (2018), risk-taking is distinguished in eight different dimensions: social, economic, achievement, intellectual, military/political, physical, ethical, and existential risk-taking. In the studies presented later in this article, we will find different conceptions and risk scales. The Domain Specific Scale (DOSPERT), developed by E. U. Weber, Blais, and Betz (2002), assesses risk-taking in five content domains: financial decisions, health/safety, recreational, ethical, and social decisions. The Evaluation of Risk Scale (EVAR) by Sicard, Jouve, Blin, and Mathieu (1999) assesses risk preferences and has five subscales: self-control, danger-seeking, energy, impulsiveness, and invincibility. Last, the Military Operational Risk Taking Scale (MORTS) distinguishes between essential/adaptive versus nonessential/maladaptive operational risk (Momen et al., 2010). The use of the DOSPERT, EVAR, and MORTS scales shows that it is of interest to focus on a wider set of risk-taking dimensions and domains than just physical risk-taking when studying military conduct.

The Sensation Seeking Theory

The sensation seeking theory is especially linked to Zuckerman (1979, 1994, 2007) and his research. The close connection between risk-taking and sensation seeking is established already in the definition of sensation seeking. According to Zuckerman's (1994) theory, sensation seeking is "a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (p. 27). Genetic studies show that as much as 60% or more of the variance in sensation seeking is genetically determined (Zuckerman, 1994). Sensation seeking is related to low levels of the enzyme monoamine oxidase (MAO) and corresponding high levels of dopamine and adrenaline in the brain. High sensation seekers are, thus, understimulated but have a strong reward system. They react with persistent curiosity to new and unusual stimuli and are attracted to active exploration of the environment. High sensation seekers appraise situations as less risky than low sensation seekers, and in response to situations with a given risk, they experience less anxiety and more positive feelings (Zuckerman, 1994). This is especially important and relevant in war situations with unexpected hardships and dangers. In general, Zuckerman (1979) concluded that high sensation seekers show greater tolerance for high-intensity stimuli and tolerate a wider range of discomfort produced by painful stimuli. They are optimistic and feel less impact of negative life stresses (Zuckerman, 1979).

The high sensation seeker will feel at home in risk sports with thrills and dangers and the euphoria that goes with success in these sports. As shown in several studies by Breivik (1991), athletes in high-risk sports and paratroopers in special forces show similar personality profiles with high scores on sensation seeking and psychoticism (mental toughness) and low scores on neuroticism and anxiety.

In relation to psychopathology, the high sensation seeker is an impulsive extravert, with tendencies toward mania and sociopathy (Zuckerman, 1979). High sensation seekers are drawn to gambling, prefer higher odds, and bet more in some types of games; they drive faster, experiment more with drugs, and they also seek stimulation in drinking, smoking, and sexual activities (Zuckerman, 2007). In relation to the military, one could imagine a lot of situations where high sensations seekers would be welcomed, for instance, in special operations with risk or in situations where innovations and flexibility are important factors. In general, high sensation seekers should be well suited for warlike situations, especially dangerous contexts. But in some circumstances, high sensation seekers would not be welcomed and would mean trouble. That is, for instance, the case with the use of drugs, alcohol, fast driving, and unnecessary or nonrelevant forms of risk-taking.

Method

The gathering and examination of academic publications for the present article was carried out in four stages. The first, initial stage was searching four EBSCO academic databases (Military & Government Collection; PsychINFO; Academic Search Premier; E-journals). The searches were limited to academic journals and abstracts only, and in addition to "sensation seeking" or "risk taking," articles had to include at least one of the following terms: "military," "armed forces," "army," "air force," "navy," or "soldier" to be included. The database result lists were reviewed with a focus on research aiming at military personnel in service-related situations, due to the scope of the article, that is, studies on risk-taking and/or sensation seeking taking place in leisure time or among veterans were excluded. This rather narrow approach generated relatively few, however, highly relevant articles for our scope. In the second stage, the articles were read carefully and references to previous works of interest for this study were examined and eventually included. In the third stage, all article titles found were searched in Google Scholar to uncover additional references of relevance. This "network analysis"-type approach is preferable compared with extensive database searches in situations where rather specific concepts (such as risk-taking and sensation seeking) are at stake. Altogether, we identified 25 studies of risk-taking and 16 studies of sensation seeking in military contexts over a time span of 3 decades from 1983 to 2015. In the fourth and final stage, all gathered articles were analyzed with respect to scope of the study, and categorized dependent upon focus and content. The risk-taking articles as well as the studies on sensation seeking were both grouped into seven subcategories. In the following section, we present our findings related to risk-taking and sensation seeking. In our presentation of the various studies, we decided to stay as close as possible to the vocabulary and the terms that the different authors themselves have used. Bear in mind that the authors themselves have provided a dense description of their main findings in their abstracts, and, thus, that much of our synopsis are excerpts also based on their description in the abstracts, implying that, for readability reasons, we have made necessary rephrasings. Still, when sentences or longer passages are referred to, we use quotation marks.

Studies of Risk-Taking in Military Contexts

Risk Perception

Obviously, risk perception is important in a military context. Not only how risk is perceived but also how it is interpreted, assessed, and communicated with other soldiers is of great importance for relevant action. Bakx and Richardson (2013) studied differences in the assessment of mission risks and mission benefits between operators ($n = 55$) and members of the management level ($n = 20$) in the transport helicopter branch of the Royal Netherlands Air Force (RNLAF). The two organizational levels had a coherent perception of risks but relative to their different positions. How people assess safety and risk can be fully consistent and locally rational and yet still differ depending on their position. Perceived measures of control seemed to influence how risks were perceived. The authors suggest that a multidimensional risk theory connected with actual organizational risk management practice is considered more relevant than unidimensional ones.

Not only perceived measures of control but actual performance level may influence how risks are perceived. Joseph and Reddy (2013) looked at risk perception and safety attitudes in relation to risk-taking and hazardous events in a study of 275 Indian army helicopter pilots. They found, contrary to their hypothesis, that pilots who were higher in rank and instrument rating and those who were instructors were more likely to be involved in hazardous events and risky flying. The authors conclude that "aviator risk management training programs are needed to modify attitudes and risk perception, especially in older and experienced pilots and instructors who are more exposed to risky flying" (Joseph & Reddy, 2013, p. 49).

Risk perception is also influenced by emotional states and actual risk exposure. This was shown in two studies by Kobbeltvedt, Brun, and Laberg (2004). In the first study, Norwegian cadets ($n = 136$) were asked to give ratings on three categories of critical incidents: threats, constraints, and suffering among civilians. The results showed that dread had strong correlation with anticipated anxiousness as well as perceived personal and general risk. In the second study, peacekeepers in Kosovo ($n = 766$) reported frequencies of exposure to threats, constraints, and suffering among civilians. The authors found that both the character of risk and the actual risk exposure had impact on subjective risk perceptions.

In another Norwegian study by Kobbeltvedt, Brun, Johnsen, and Eid (2005), the focus was on affective and cognitive processes underlying risk perception. The authors followed a group of military sailors ($n = 129$) during an international operation and explored the longitudinal relations between perceived risk and related feelings. The study showed that "across time, worry and emotional distress were reciprocally related. Perceived risk had impact on worry, but not on emotional distress. Neither worry nor emotional distress influenced perceived risk" (Kobbeltvedt et al., 2005, p. 417). The results of the Norwegian studies seem to show that both the character of risk and the exposure level influence emotional states such as worry and dread, but risk perception is relatively unaffected by such states over time.

How risk is perceived and handled is influenced by the social environment and culture. Turner and Tennant (2009) studied risk, safety, and accidents in military operations from a social constructivist point of view, by interviewing members working for three organizations jointly responsible for planning and training in a particular unit of the United Kingdom's Royal Marine Commandos: Health and Safety Executive ($n = 2$), Ministry of Defence ($n = 2$), and Royal Marine Commandos ($n = 2$). The discourse among the members of the three organizations showed both "shared and contested meanings of risk, safety, and accidents" (Turner & Tennant, 2009, p. 21). The groups tried in different ways to find a balance between getting the job done and implementing safety. Because the meaning of risk in military settings is dependent upon position and organizational context, the authors concluded that "a more contextualized understanding of what risk, safety, and accidents mean in organizational life" (Turner & Tennant, 2009, p. 1) is needed.

A more specific way of influencing risk management is by using social cues and framing effects. A Chinese study by Yinling and Danmin (2008) examined how Chinese military undergraduates responded to social and verbal cues in making decisions. In their first experiment, the authors used the "Asian disease" problem, which demonstrates that whether decisions are framed as gains or losses affects people's choices in a risk-aversive or risk-accepting way. In the second experiment, the robustness of the effects of social cues was examined. The authors concluded "the number of lives at risk was a social cue which could affect the participants' risky preference, and that the participants were more sensitive to the small (*vs* large) group context" (Yinling & Danmin 2008, p. 241).

The studies of risk perception show that several factors such as level of exposure, emotional states, as well as organizational context and culture, may affect assessment and communication of risk.

Risky Behavior and Accidents

Soldiers in training and during deployment have access to various activities, including risky ones. An Israeli study by Ben-Shalom and Glicksohn (2013) looked at the association between dimensions of operational stress, forms of risk-taking with small arms, and possible mediators among 461 compulsory service soldiers in 31 companies. The authors tested two hypotheses. The *threat–unauthorized preparedness* hypothesis predicted that during prolonged periods of boredom, exhausted or indifferent personnel may use their weapons as a form of excitement and amusement. A second hypothesis termed *negative affect–risky games hypothesis* predicted a correlation between general negative affect and risk-taking. Both hypotheses were confirmed.

Another Israeli study by Glicksohn, Ben-Shalom, and Lazar (2004) tried to profile the antisocial risk-taker; a person who either admits to risky behavior, especially the weapon-related, and/or implies such behavior. A total of 362 soldiers in basic training in four different infantry units participated in the study. Sensation Seeking Form V (SSS-V) and Eysenck's Personality Questionnaire–Revised Short Form (EPQ-R-S) were used as personality measures. The results indicated that target offenders scored high on psychoticism (P) and low on the Lie-scale (L) of the Eysenck's Personality Questionnaire. Individuals with this profile are typically those who might take unnecessary risks, endangering themselves and others.

A study by Joseph, Reddy, and Sharma (2013) of 205 Indian Army aviators looked at Locus of control (LOC) and safety attitudes in relation to involvement in hazardous events. The authors found a positive correlation between external LOC and involvement in hazardous events. Internal LOC was associated with increased self-confidence, safety orientation, and denial (Joseph et al., 2013, p. 9). The authors think future research needs to look into whether training can help to modify LOC and negative attitudes, and thus reduce errors.

The three studies mentioned in this section show that personality factors play an important role when it comes to risk-taking and involvement in hazardous events. More research is needed, but the sensation seeking personality trait should be further investigated in this respect.

Attitudes Toward Risk and Safety and the Role of Leadership

Several factors influence risky behavior. In two Swedish studies, the focus was on attitudes toward risk and safety and the role of leadership. In one study by Börjesson, Österberg, and Enander (2011), the purpose was to look at the relations between individual characteristics, leadership, group cohesion, and risk and safety attitudes among Swedish conscripts ($n = 389$). The study distinguished between necessary and unnecessary risk-taking with reference to military relevance. The authors found positive associations between safety-specific leadership and safety attitudes, while safety skepticism and leadership promoting risk-taking were associated with stronger attitudes of necessary risk-taking (Börjesson et al.,

2011, p. 659). Unnecessary risk-taking was negatively associated with safety-specific leadership and group cohesion and positively associated with safety fatalism and with leadership promoting risk-taking. The results highlight the importance of a balanced leadership and a distinction between necessary and unnecessary risk-taking in military contexts.

In another study by Börjesson, Österberg, and Enander (2015), the focus was on risk propensity within two military samples. The first sample comprised Swedish soldiers (n = 119) and officers (n = 12) from a logistic regiment, part of the core battalion of the Nordic Battle Group. The second sample consisted of officers (n = 23) and soldiers (n = 15) also from a logistic regiment, part of the 25th Swedish contingent in Kosovo. The EVAR scale (Killgore, Vo, Castro, & Hoge, 2006) was used to measure the participants' risk propensity. The results showed that negative safety values and risk propensity decreased with age, while men had a more skeptical view of safety measures and a higher risk propensity than women. The study further showed that a skeptical view of safety was "associated with a higher sense of personal invincibility, and together with lack of deliberation predicted variations in danger-seeking scores" (Börjesson et al., 2015, p. 55). The Swedish studies show that factors such as leadership, gender, age, group cohesion, and specific attitudes influence risk propensity.

In three studies, Frost (1983) addressed the role of personal risk-taking in effective leadership. One of the studies surveyed 40 army leaders with personal experience of combat during the Korean and/or Vietnam War. Effective combat leaders were judged to demonstrate more personally risk-taking acts than ineffective combat leaders. The two other studies found similar results for leadership within a large urban fire department. The studies by Frost, thus, indicate that an important and positive aspect of leadership may include the willingness to expose oneself to danger in potentially life-threatening situations. Further studies are needed to examine the interplay between soldier characteristics, risk management culture, and leadership behavior during training and deployment.

Risk-Taking and Motivation

Motivation is an important factor for military success, especially in dangerous operations. In a study by Jobe, Holgate, and Scrapansky (1983), army enlisted male personnel were tested with respect to the psychological correlates of volunteering for a hazardous combat simulation (Experiment 1) and a riskless psychological experiment (Experiment 2). The results showed that volunteers were less anxious and more willing to take risks than the nonvolunteers. Noncommissioned officers, smokers, later born children, and children of lower socioeconomic class parents were overrepresented among the volunteers. In Experiment 2, which solicited volunteers for a routine, nonhazardous experiment, only mother's education level discriminated the volunteers from the nonvolunteers. The results show that volunteer samples differ significantly from nonvolunteer samples in situations with perceived risk. Differences include not only willingness to take risks but also family and socioeconomic background.

Risk-taking may, however, also be influenced by strategic and situational factors, as discussed by Johnson, Wranghama, and Rosen (2002). They reason that military battles include possibility of failure as well as success. In some cases, battles may be expected, or are defendable, as part of overall strategies, but, in many cases, patently weaker forces fight despite nonviolent options. The authors define this as "'military incompetence,' a failure in the assessment of winning probability" (Johnson et al., 2002, p. 245). Previous explanations include stupidity, psychological deviance, and cognitive constraints but they have all been rejected. Another proposal suggests that such risk-taking could be adaptive as exaggerated effort may lead to Performance Enhancement (PE). Another possibility is Opponent Deception (OD) by bluffing. The authors conducted a test of the two hypotheses using data collected by the U.S. Historical Evaluation Research Organization (HERO), mainly from the Arab–Israeli and Second World Wars. The OD hypothesis was supported over the PE but the authors did not rule out other explanations. Both hypotheses include a risk-taking strategy, and both strategies may succeed but may also potentially be responsible for "military incompetence."

Who Are the Risk-Takers?

Soldiers differ in willingness to take risks, so who are the military risk-takers? MacLean and Parsons (2010) looked at unequal risks in combat occupations among 5,569 men who had served in the American All-Volunteer Force in the late 1970s and early 1980s. On what they called the supply side, they found that men who had greater academic abilities were more likely to go to college. Thereby, they avoided military service and the possibility of serving in a combat occupation. On the demand side, the armed forces were more likely to exclude men with lower academic abilities. But they were also more likely to assign such men to combat occupations when they had entered the military system. There was, thus, an overrepresentation of men with lower academic abilities among soldiers and especially in combat occupations. The psychological makeup of soldiers is another aspect of the recruitment process. Rydstedt and Österberg (2013) did an exploratory study of psychological characteristics of Swedish mandatory enlisted soldiers volunteering (n = 146) and not volunteering (n = 275) for international missions. The study showed that "the volunteers reported greater stress tolerance, concern for others, extraversion, and self-confidence than the non-volunteers. There were no differences between the groups in orderliness, temper instability, or independence" (Rydstedt & Österberg, 2013, p. 678). The authors concluded

that volunteers reported greater psychological fitness for military missions and greater hardiness during the military service compared with the nonvolunteers.

The mindset of enlisted soldiers differs. Some of them are risk-takers, and some may be unduly optimistic. Moen and Rundmo (2005) studied predictors of unrealistic optimism in three Norwegian subgroups: skydivers ($n = 88$), firefighters ($n = 73$), and soldiers ($n = 38$). In addition to background variables, three predictors of unrealistic optimism were included in the study: safety attitudes, control, and anxiety. The authors found "that optimism differed between the subgroups, and that different factors influenced risk perception depending on the group and whether the assessment was of oneself or of others" (Moen & Rundmo, 2005, p. 363). Of the three predictors, safety attitude was found to be the most important. This may be because respondents preoccupied with safety are more aware of potential dangers and are thereby less optimistic than the other.

It is hard to draw clear conclusions from the studies mentioned in this section. Both sociodemographic background, personality factors, and general mind-set seem to influence soldiers' risk behavior and choice of career.

Risk Propensity

The vocabulary about risk and risk-taking varies. While some studies use "risk-taking," others use "risk propensity" as the key term. Risk propensity measures the disposition or inclination to take risks. Several French studies by Sicard and coworkers have studied risk propensity in various samples and contexts.

In a study by Sicard, Taillemite, Jouve, and Blin (2003), the authors focused on risk propensity in commercial ($n = 63$) and military ($n = 33$) pilots. The EVAR scale was used together with the Barrat impulsiveness scale. Results showed significantly higher scores in all EVAR factors except "impulsiveness" in military pilots compared with commercial pilots.

Another study by Sicard, Jouve, Couderc, and Blin (2001) tried to evaluate the effects of age on risk proneness in a French naval crew ($n = 130$) using the EVAR scale. The results revealed a significant negative correlation between "energy" and age, whereas the other factors were not influenced by age.

One interesting problem is to find out to what extent risk propensity is stable across situations. A study by Sicard, Jouve, and Blin (2001) looked at risk propensity in Military Special Operations. The authors used the Bond and Lader mood and alertness scale and the EVAR scale to assess risk proneness in a maritime counterterrorism exercise. In the project, 10 pilots were submitted to strenuous night flights with some sleep deprivation. The results showed that "compared with baseline data, the pilots reported an increase in impulsiveness, whereas EVAR factors were consistent in a control group composed of nine navy crew members" (Sicard, Jouve, & Blin, 2001, p. 871). The authors concluded that further studies with a larger population of various age and personality traits are needed.

There are few studies of sex differences in risk propensity. A study of women compared with men was conducted by Killgore, Grugle, Killgore, and Balkin (2010) who looked at self-reported risk-taking propensity. The study was part of the validation of the EVAR scale. The sample included 29 men and 25 women and included both military (22%) and civilian personnel (78%). The results showed that "men scored significantly higher than women on four of nine indices of risk-taking propensity: 'danger seeking,' 'energy,' 'invincibility,' and 'total risk-propensity.'" The authors concluded that although the higher scores by men were consistent with prior research on other measures of risk-taking, there is a need for further research on this scale with samples including men and women.

Development of Risk Scales

Obviously, relevant risk scales are important if one wants to study various forms of military risk. The EVAR scale (Sicard et al., 1999) was developed to measure state and trait aspects of risk proneness. A study by Killgore et al. (2006) assessed risk propensity in American soldiers ($n = 165$). The authors administered an English version of the EVAR scale to obtain reliability, validity, and normative data for English-speaking respondents. Analysis suggested that the factor structure of the American sample differed somewhat from that obtained in the French studies. The original scale has five subscales: "self-control," "danger-seeking," "energy," "impulsiveness," and "invincibility." Here, a three-factor solution with "recklessness/impulsivity," "self-confidence," and "need for control" emerged. The results showed also that "EVAR scores correlated with age, military rank, and years of service and discriminated soldiers with histories of high-risk behavior" (Killgore et al., 2006, p. 233). The authors concluded that the English version of the EVAR scale is reliable and valid for evaluating risk propensity in U.S. soldiers.

The scale was further developed by Killgore, Castro, and Hoge (2010). Here, the goal was to develop a modified version that could be used together with optical scanners, the EVAR-B. A total of 2,015 U.S. Army soldiers completed the EVAR-B and a survey assessing risk-related behaviors 3 months after returning home from combat deployment in Iraq. The authors found that "EVAR-B demonstrated acceptable internal consistency and reliability and correlated significantly with independent measures of self-reported risk-taking behavior, including alcohol use and aggressive behavior, in the weeks preceding the survey" (Killgore, Castro, & Hoge, 2010, p. 725). By using specific tentative cutoffs, the scale significantly differentiated heavy drinkers, dangerous drivers, and soldiers reporting recent aggressive outbursts.

Another scale developed specifically for the military is the MORTS scale, validated by Momen et al. (2010). The

31-item MORTS-scale "was developed to identify military personnel with the tendency to engage in or avoid operationally nonessential risks that are maladaptive to the mission" (Momen et al., 2010, p. 128). The study recruited 333 active duty Marine Corps personnel from the Third Marine Expeditionary Force who completed the MORTS scale along with two measures of nonmilitary-specific risk-taking: DOSPERT and EVAR. The participants also completed the State-Trait Anxiety Inventory (STAI). The MORTS had excellent internal reliability and convergent validity with the risk-taking scales of other domains. Analysis revealed two factors: "essential/adaptive risk-taking," which included high loadings from items indicating a preference for taking essential risks in military operations; and "nonessential/maladaptive risk-taking," which included items indicating preference for taking risks that were nonessential to the mission. The revised version of the MORTS subscales of adaptive and maladaptive risk-taking each included eight items.

Hunter and Stewart (2011) developed an Army-specific version of the Hazardous Events Scale (HES), a measure of involvement in potentially dangerous situations in aviation that does not lead to accidents. The scale was administered over the course of four separate surveys to a large sample of U.S. Army aviators. The authors also reanalyzed data from four civilian studies in which the civilian version of the HES had been used. The results showed that there was a positive correlation between the HES and accident involvement. The authors discuss whether the HES can be used "as a surrogate measure for accident involvement and indicator of pilot accident risk for both individual pilots and organizations" (Hunter & Stewart, 2011, p. 123).

Development of relevant scales and measures has so far provided some scales that show acceptable reliability and validity, with the EVAR scale as the broadest and most used measure of military risk-taking.

Studies of Sensation Seeking in Military Contexts

Military Groups That Score High on Sensation Seeking

Some parts of the military system seem especially attractive to high sensation seekers. In an Israeli study by Glicksohn and Bozna (2000), bomb-disposal experts ($n = 42$) were compared with anti-terror operatives ($n = 44$) on the sensation seeking SSS-V scale and other personality measures. The participants were all males with at least 2 years' experience on the job. The anti-terror operatives had higher scores on the TAS subscale than the bomb-disposal experts. Both high-risk professional groups scored relatively low on Experience Seeking (ES) and Boredom Susceptibility (BS) compared with public norms. The authors concluded that the high-risk professional is characterized by the nonimpulsive, socialized mode of sensation seeking comprising TAS, and not by other sensation-seeking subfactors, which refer to a more impulsive, unsocialized mode of sensation seeking.

A study by Klinteberg et al. (1992) also found the relation between sensation seeking and impulsivity intriguing. In the study, platelet MAO activity and serum levels of the adrenal androgen metabolite dehydroepiandrosterone sulfate (DHEA-S) were measured in 18 male air force pilot recruits and 19 randomly selected male conscripts. Personality scales and computerized neuropsychological tests were used. The pilot recruits had higher scores on sensation-seeking-related scales, thus, indicating social disinhibition, interest in risky sports, and need for change. They also had higher scores on impulsivity related to sensation seeking but not on impulsivity related to psychosocial disorders.

Differences between socialized and nonsocialized high sensation seekers were also investigated in a study by Dåderman, Meurling, and Hallman (2001). A sample of 47 juvenile delinquents (mean age 17 years) was compared with 18 Swedish Air Force pilot recruits (mean age 23 years) and 19 conscripts (mean age 18 years) as a control group. Personality was measured by Zuckerman's SSS scales, the Karolinska Scales of Personality, and the Eysenck Personality Questionnaire. The results showed that "juvenile delinquents and pilot recruits were both high in sensation seeking, but on different subscales. Delinquents were high in impulsiveness, somatic anxiety, and extraversion-sociability, and low in socialization, suggesting psychiatric/psychological vulnerability" (Dåderman et al., 2001, p. 239). The authors concluded that the results may have implications for the treatment of juvenile delinquents.

Diving is a high-risk activity as it can lead to serious injury and even death if one makes mistakes. A study by Biersner and LaRocco (1983) tested a representative sample of 30 male U.S. Navy divers on several personality measures: sensation seeking, socialization, LOC, and trait anxiety. On sensation seeking, the divers scored significantly higher on TAS and significantly lower on Experience Seeking and Disinhibition than norm groups. This is in accordance with the findings of Glicksohn and Bozna (2000) about bomb disposal and anti-terror groups.

The need for challenge and adventure also seems to be important for peacekeepers. A Dutch study by van Emmerik and Euwema (2009) looked at the motivation of international peacekeepers and the role of self-efficacy, cultural empathy, and what they called "adventurism." Data were collected from male ($n = 730$) and female ($n = 15$) military peacekeepers taking part in UN and NATO peacekeeping operations. The results showed that preparation, adventurism, and cultural empathy were important factors in willingness to take part again in the future. The study, thus, indicates that the need for adventure and challenge is also important for many outside the high-risk area and that those who feel competent are especially motivated.

An American study by Montes and Weatherly (2014) explored the relationship between personality traits and

military enlistment. The study was conducted to identify differences in sensation seeking, impulsivity, and individuating behaviors between three groups of participants. The groups included Reserve Officers' Training Corps (ROTC) students ($n = 34$), students with relatives in the military ($n = 27$), and students with no relatives in the military ($n = 29$). The results showed that ROTC participants scored higher on sensation seeking and were more individuated than non-ROTC participants. Furthermore, the ROTC participants scored higher on impulsivity than participants who had no relatives in the military. The study gives support to the idea that some specific military positions are attractive to high sensation seekers.

The studies of groups that score high on sensation seeking have given a relatively clear picture of the advantages as well as the disadvantages of the high sensation seeking personality type in military contexts. It is obviously important to use the strengths of high sensation seekers as well as avoid some weaknesses. The Israeli studies give some guidance in this respect.

Sensation Seeking and Military Performance

As mentioned in the section "Introduction," high sensation seekers may have some performance advantages in some military situations. Neria, Solomon, Ginzburg, and Dekel (2000) studied how sensation seeking was related to wartime performance and long-term adjustment among Israeli war veterans. The study examined Israeli veterans of the 1973 Yom Kippur War from three groups: combat stress reaction (CSR) casualties ($n = 112$); veterans who received medals for bravery ($n = 98$); and controls ($n = 189$). The findings showed that sensation seeking played an important role in performance during the war as well as in subsequent long-term adjustment. Decorated war veterans had higher sensation seeking scores than CSR casualties and controls. In addition, the study indicated that high sensation seekers had lower levels of war-related intrusion, avoidance tendencies, and posttraumatic stress disorder (PTSD) symptoms than low sensation seekers. Furthermore, officers scored higher on sensation seeking than nonofficers. The authors speculate whether the difference in conduct between high and low sensation seekers during war stress is related to better coping strategies among high sensation seekers (Folkman & Lazarus, 1980). The study is one of the very few studies of long-term adjustment of wartime heroes.

Sensation Seeking, Need for Structure, and the Context

Parmak has been principal investigator in several studies of Estonian soldiers deployed to the Helmand province in Afghanistan, as part of NATO's International Security Assistance Force (ISAF). The focus has been on "Sensation Seeking" versus "Need for Structure" (Parmak, Mylle, & Euwema, 2013). This contrast is meaningful because the environment in operational deployments is typically characterized by elevated risks and unpredictable incidents, as well as tightly organized life, regulations, and duties. It was hypothesized that those who experienced a mismatch between personality needs and environmental characteristics were more vulnerable to experiences of psychological distress.

In Parmak et al. (2013), Sensation Seeking and Need for Structure were related to soldiers' perception of complexity (predictability) and potential harms (riskiness) involved in two field exercise tasks. The sample consisted of 291 male Estonian recruits from an Infantry battalion. The results showed that soldiers scoring high on Sensation Seeking perceived unpredictable and chaotic situations as more manageable than soldiers with lower scores in that trait. The opposite holds for soldiers with a high score on Need for Structure who perceived unpredictable and chaotic situations as less manageable than low scorers. The study showed that both of the explored personality traits were significantly and inversely related to soldiers' perception of situation structure.

The studies of Parmak and coworkers show the need for studying and using the match or mismatch between person and environment in an optimal way in varying military contexts.

Changes in Sensation Seeking From Before to After Deployment

Sensation seeking is supposed to be a stable trait measure. But change of context may matter. A Danish study by Braender (2016) looked at what happened when soldiers returned from the battlefield. Data were based on two surveys of Danish combat soldiers before and after their deployment to Helmand, Afghanistan. The sample consisted of soldiers without combat deployment experience ($n = 52$) and soldiers with such experience ($n = 26$). The author used a three-item scale to measure the need for excitement, adventure, and stimulation. In contrast to the author's expectations, the soldiers wanted more adventure and challenge after deployment as compared with before. The author suggests an explanation along the line of addiction. Soldiers increase their tolerance levels to strong stimulations by being exposed to danger.

In a study by Parmak, Euwema, and Mylle (2012), the focus was on changes in Sensation Seeking and Need for Structure from before to after a combat deployment. The study consisted of three rotations of Estonian male professional soldiers ($n = 192$) deployed to Afghanistan. The study found that there was a certain adaptation and adjustment in both Sensation Seeking and Need for Structure across deployment. Soldiers who were lower in Sensation Seeking

were more inclined to seek situations with strong sensations after deployment, in contrast with the higher sensation seeking soldiers. Furthermore, soldiers at the extremes of the Need for Structure dimension adjusted their behavior after deployment toward a moderate level. This means that supposedly stable personality traits show temporal adaptations that are functional, because combat environments demand a willingness to tolerate intense sensations, as well as tight regulations.

In Parmak, Mylle, and Euwema (2014), the focus was on Sensation Seeking and perceived Need for Structure in relation to soldiers' well-being before and after operational deployment. As in the study of Parmak et al. (2012), the sample consisted of three rotations of professional soldiers deployed for a 6-month tour of duty to Afghanistan, however, the final sample included 167 soldiers in total. The results showed that well-being declined in the soldier sample as a whole after deployment, but the degree of decline differed depending upon personality profile. Well-being did not decrease for soldiers who liked well-ordered environments and who, in addition, had at least a moderate need for sensations.

Taken together, the studies mentioned above suggest that there is an interaction between personality measures and environmental and situational characteristics that may lead to adjustment in the expression of personality and behavior.

Development of Relevant Tests and Assessment Measures

Kelley, Killgore, Athy, and Dretsch (2010) included the Brief Sensation Seeking scale as part of a preliminary study to develop a risk assessment battery. The objective was to evaluate the effects of repeated exposure to the battery. The participants were 213 active-duty U.S. Army soldiers who completed the task battery once per day for 3 consecutive days. The trait assessments were found to correlate well with performances on the behavioral assessments. On the Brief SSS, scores remained stable across the 3 days of testing. The long-term goal was to develop a test battery that could be used when studying the effects of combat exposure on risk propensity and health risk behaviors across the deployment cycle. This may be important as some evidence suggests that soldiers will exhibit greater risk propensity after deployment than before deployment.

Tests can be used to recruit and select personnel, but also to predict success and failure. In a study by Lubin, Fiedler, and Van (1999), a psychological state scale called Multiple Affect Adjective State List–Revised (MAACL-R), developed by Zuckerman and Lubin (1965), was used to predict success among male ($n = 114$) and female ($n = 86$) recruits in Air Force basic training. The results showed that personality states measured by the MAACL-R scale (Anxiety, Depression, Hostility, Positive Affect, and Sensation Seeking) were efficient predictors of success and failure. The results also suggested "that it is not depressed mood per se that is relevant in predicting success or failure in a stressful environment, but rather dysphoric mood, including anxiety and hostility, when combined with relatively high sensation seeking" (Lubin et al., 1999, p. 71). Anxious and hostile high sensation seekers typically exhibit suboptimal performance.

Sensation Seeking, Captivity, and Postwar Experiences

In an Israeli study by Solomon, Ginzburg, Neria, and Ohry (1995), the focus was on sensation seeking in relation to how well soldiers cope with captivity. The study examined the implication of both sensation seeking and the subjective appraisal of captivity in the long-term adjustment of ex-prisoners of war (ex-POWs). Israeli ex-POWs ($n = 164$) and comparable controls ($n = 184$) were studied 18 years after their participation in the Yom Kippur War. The following scales were used: PTSD Inventory, The Impact of Event scale (IES), Symptom Checklist (SCL)-90 Self-Report of psychiatric symptoms, and short-form SSS (Madsen, Das, Bogan, & Grossman, 1987). The findings showed that high sensation seekers adjusted better to the stresses of captivity, used more active coping strategies, and were problem-focused, while low sensation seekers were more emotion-focused and used less creative and flexible thinking. The high sensation seekers experienced the situation as challenging, and had fewer feelings of helplessness. In contrast, "low sensation seeking ex-POWs reported more PTSD symptoms, more severe psychiatric symptomatology, and more intense intrusive and avoidance tendencies" (Solomon et al., 1995, p. 57). Elevated sensation seeking scores may, in themselves, or in combination with other factors, help to develop more active and relevant coping strategies during war and afterward.

Sensation Seeking and Hardiness

Sensation seeking has some relation to hardiness. Hardiness is another personality trait that seems especially relevant for many military situations. A study by Johnsen et al. (2013) investigated the effects of psychological hardiness on a successful completion of a rigorous 250-km ski march over 9 days in Arctic winter conditions. Participants were 178 soldiers with a mean age of 19.9 years (range 18-23). A hierarchical regression analysis "showed that successful completion of the ski march was predicted by total hardiness scores, after controlling for nutrition factors, physical fitness and sensation seeking" (Johnsen et al., 2013, p. 368). The authors used the Arnett Inventory of Sensation Seeking, which focuses on intensity and novelty of stimulation. On a long ski trip with routines, hardships, and boredom, it is not a surprise that this version of sensation seeking was not among the key findings.

A second hierarchical regression found that it was the commitment aspect of hardiness that was the most significant predictor of success. This may be because commitment enhances self-efficacy and active coping skills.

Hardiness also played an important role in a study of U.S. Marine recruits by Lovering et al. (2015). This study examined psychological and physical health factors in a cohort of U.S. Marine recruits with the goal of developing a comprehensive understanding of attributes recruits bring to training. In total, 1,350 male recruits completed a multimeasure survey during the first week of training. A MANOVA analysis showed that recruits who reported higher scores on hardiness also reported higher scores on measures of grit, ambition, sensation seeking, training expectations, positive ways of coping, physical and mental health, fitness scores, and lower scores on a measure of depression. The study, thus, shows that sensation seeking is positively correlated with other personality traits and attitudes that characterize Marine recruits. The authors claim the findings form a foundation for predictive models of injury risk and/or attrition.

The relation to hardiness shows that it is of interest in future research to look at sensation seeking in a broader personality context where other aspects of military conduct are taken into consideration.

Concluding Discussion

Because warfare and military conflicts are dangerous pursuits, one could imagine there being a lot of empirical research about risk-taking and sensation seeking in the military. We have found this not to be the case. The research is both small in volume and scattered when it comes to use of theories, methods, and samples of military personnel. In general, there seem to be few clear research paradigms. There has, for instance, not been any agreement about which tests of risk-taking are the most relevant for military situations. This also means that there is no clear agreement on which forms or dimensions of risk-taking are interesting in relation to military operations (strategic, physical, psychological, social, etc., types of risk). Different scales have been used to measure risk-taking (EVAR, DOSPERT, MORTS, HES). In relation to personality, Eysenck's EPQ and Zuckerman's SSS have been the most used, whereas the Big Five, which is presently the dominant personality scale, has not been used in relation to risk-taking. There is also a lack of systematic effort to show how different parts of the military system attract people with specific differences in personalities and risk attitudes.

Even if most of the studies are directed toward a better understanding of the military and of how people behave in dangerous military conflicts and warfare, some of the studies have a goal of testing general psychological theories, and use military personnel as convenient subjects. The research groups are often quite small and few groups have a consistent and systematic research output on the same topic over time. Likewise, international cooperation is often lacking. Accordingly, we found little evidence of the existing contributions belonging to a collaborative research field, accordingly, there are few traces of studies building on each other or even substantial cross-referencing among the articles.

The United States is the most important contributor to empirical studies of risk-taking and sensation seeking. Of the 25 studies of risk-taking presented in this review, the United States carried out nine; Norway, Sweden, and France three; Israel and India two; the United Kingdom, the Netherlands, and China one. Of the 16 studies of sensation seeking, the United States did five; Israel three, and Estonia three; Sweden two; Norway, the Netherlands, and Denmark one. It is no surprise that countries often involved in military conflicts, such as the United States and Israel, are important research producers in this area. It is more surprising that Norway and Sweden, which are considered small and peaceful nations, contribute more than expected. However, it is in accordance with their safety profiles that the research focus in Norway is to improve risk perception and, in Sweden, the development of a military safety culture.

We found few researchers with long-term interests in military risk-taking and sensation seeking: An Israeli group, with Ben-Shalom (two publications) and Glicksohn (three publications) as main investigators, has carried out quite unique studies of military veterans from the Special Forces (Ben-Shalom & Glicksohn, 2013; Glicksohn & Bozna, 2000; Glicksohn et al., 2004); an Estonian research group with Parmak (three publications) as main investigator has done interesting studies on sensation seeking in relation to need for structure (Parmak et al., 2012; Parmak et al., 2013, 2014); a French group led by Sicard (four publications) has developed and used the EVAR risk scale (Sicard, Jouve, & Blin, 2001; Sicard et al., 1999; Sicard, Jouve, Couderc, & Blin, 2001; Sicard et al., 2003); a Norwegian group (two publications) has looked at risk perceptions (Kobbeltvedt et al., 2005; Kobbeltvedt et al., 2004); a Swedish group (two publications) has investigated safety culture (Börjesson et al., 2011, 2015); and an Indian team (two publications) has been looking at safety attitudes in aviation culture (Joseph & Reddy, 2013; Joseph et al., 2013).

Implications for Future Research

Based on this review of existing research, it is clear that the concept of risk needs to be clarified. We argued in the "Introduction" that the risk concept should not only be understood in negative terms but also as a possibility for something positive. In fact, some people may seek and enjoy risk in itself. We think this is also relevant for military settings. The risk concept is not unidimensional. We think that future research needs to identify and define the central dimensions of risk. In addition to military risk, there are physical, psychological, social, and several other types of risk. Although soldiers' lives may be at stake, the risk of

losing face or letting one's comrades down may feel even worse. There is, then, the need for an agreement on the best tests for military situations and of military relevance. This is important for both risk-taking and personality measures.

It is important to develop stable research groups that work according to well-defined paradigms and do systematic research over time related to specific parts and groups in the military. Sensation seeking and risk-taking are of special interest when it comes to identification and selection of personnel to the most extreme tasks and missions in the military. The recent development in international terrorism makes research in this area very relevant and important.

Consequently, developing "Risk and the Military" as a research field implies bringing scholars studying risk in the military together so as to recognize their contributions in a way that enables us to build on each other's knowledge. In essence, this review should partially serve as an opportunity of bringing awareness to the latter.

Implications for Practice

As we have seen, the findings are not as numerous and systematic as to be able to draw strong conclusions. But it seems that sensation seeking is an important personality factor that can be identified through testing, and that high sensation seekers have several advantages, but also some problems of which the military system needs to be aware. The goal must be to be able to identify, select, and use the best people for different types of tasks and missions. High sensation seekers accept risk, take risks, and sometimes seek risks; traits that can be used in risky military situations. Furthermore, they function better during prolonged military stress and experience fewer problems afterward. Even if sometimes they may be unruly and show little empathy and tolerance for structure, high sensation seekers have positive qualities in other situations that make them well worth being taken care of. One should, however, also be aware that some of them are tempted to unruly behavior, risky play, drinking, dangerous driving, and other suboptimal or negative pursuits.

Authors' Note

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