

Psychological Characteristics of Decision-Making and Emotion Regulation in Military Personnel Under Extreme Conditions: A Narrative Review and an Integrative Model

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Abstract

Background: Military and tactical personnel must make consequential decisions under threat, time pressure and uncertainty, conditions in which stress-related changes in cognition and emotion can degrade performance.

Objective: To synthesise psychological evidence on decision-making and emotion regulation in extreme conditions and to propose an integrative model that can be applied in tactical training.

Methods: A narrative review was conducted in the IMRAD format. Peer-reviewed studies, authoritative monographs and defence-research reports on military, police and other high-stakes populations were coded into three domains: cognitive-decisional effects of stress, emotion-regulation processes, and moderators and interventions.

Results: Acute stress narrows attention, reduces cognitive flexibility, shifts control from deliberative to habitual processing and changes risk preferences. Expert recognition-based decisions remain effective in familiar situations but become vulnerable when cues are atypical. Emotion-regulation strategies differ in cognitive cost and effectiveness, and their value depends on timing and context. Hardiness, resilience and experience moderate stress effects, while graded stress exposure combined with regulation skills and scenario-based decision practice is the most promising training approach. The Appraisal–Regulation–Decision (ARD) model integrates these findings.

Conclusions: Decision quality in extreme situations depends on how well emotional arousal is regulated before it distorts attention and cognition. Training should therefore combine realistic stress exposure, explicit regulation skills and varied decision drills. A quasi-experimental protocol for empirical validation of the ARD model is proposed.

Keywords: *decision-making, emotion regulation, extreme situations, military personnel, stress, resilience, tactical training*

1. Introduction

Military and special tactical activity regularly places personnel in situations that can be described as extreme: a threat to life or safety, severe time pressure, incomplete or ambiguous information, and consequences of error that are often irreversible. In such conditions the quality of a decision is determined not only by knowledge and technical skill but also by the way the person perceives, interprets and emotionally responds to the situation [1, 2]. For institutions that prepare personnel for these tasks, understanding the psychological mechanisms behind decisions under stress is therefore a practical necessity rather than a purely academic question.

Acute stress triggers a coordinated neuroendocrine response. Catecholamines and glucocorticoids released under high arousal impair the functioning of the prefrontal cortex, which supports working memory, inhibition and flexible planning, while strengthening more automatic, habit-based systems [3]. Classic and later models

describe the relation between arousal and performance as non-linear and task-dependent [4, 5], and attentional control theory explains how anxiety consumes the cognitive resources needed to inhibit irrelevant cues and to shift between tasks [6]. These mechanisms help explain why well-trained personnel sometimes make errors that they would not make under calm conditions.

Research on decision-making in professional settings has developed along two lines. The classical line compares human choices with normative models of rational choice, whereas the naturalistic decision-making tradition studies how experienced practitioners actually decide in time-pressured, ambiguous and high-stakes environments, typically by recognising familiar patterns and mentally simulating a course of action [7, 8]. The question of when such intuitive expertise can be trusted has been analysed in a well-known exchange between the two traditions [9], and its implications for training under stress have been discussed in detail [10].

A second body of work concerns emotion regulation, that is, the processes by which people influence which emotions they have, when they have them and how they experience and express them [11, 12]. Meta-analytic evidence shows that regulation strategies differ in their effects on affect and in their association with psychological problems [13, 14]. However, much of this evidence comes from laboratory samples or clinical populations, and it is seldom linked directly to the quality of operational decisions. Conversely, studies of stress and decision-making often describe performance degradation without specifying which regulatory processes protect or fail to protect performance. As a result, the two literatures remain only partly integrated.

The present article addresses this gap. It asks three research questions: (RQ1) How do acute stress and extreme conditions change the processes of decision-making? (RQ2) What role do emotion-regulation strategies play in maintaining decision quality in operational contexts? (RQ3) Which individual characteristics and training approaches moderate these relationships? On the basis of the answers, the article proposes an integrative conceptual model and an empirical protocol for its validation, with particular attention to the needs of special tactical training programmes.

2. Methods

2.1. Design

The study is a narrative review organised according to the IMRAD structure. A narrative design was selected because the relevant evidence is methodologically heterogeneous, ranging from neuroscience experiments and laboratory studies to field research with military and police samples and training evaluations, and is therefore not suitable for quantitative pooling.

2.2. Source selection

Sources were selected on the basis of conceptual relevance, methodological quality and recognition in the field. Peer-reviewed journal articles, authoritative monographs and technical reports of defence-research organisations were considered. Priority was given to studies of military, police and other high-stakes professional populations, supplemented by basic experimental research that explains underlying mechanisms. Foundational works were included irrespective of their publication date, whereas for applied questions more recent studies were preferred. Studies of clinical treatment outcomes for trauma-related disorders and works devoted exclusively to technological decision-support systems were outside the scope of the review.

2.3. Analytic approach

The selected sources were coded into three analytic domains: (A) cognitive-decisional effects of stress; (B) emotion-regulation processes; and (C) individual moderators and training interventions. Findings were integrated by thematic synthesis. The strength of evidence for each principal finding was rated qualitatively as strong, moderate or preliminary, taking into account the consistency of results across studies, the quality of designs and

the similarity of samples to operational personnel. These ratings are the author's interpretive judgements and are reported in Table 1. The review did not involve human participants or new data collection, and ethical approval was therefore not required.

3. Results

3.1. *Acute stress and cognitive-decisional processes*

Reviews of the stress–performance literature agree that stress affects performance through several channels, including attention, working memory, perception and the selection of strategies [1, 2, 15, 16]. A frequently reported effect is the narrowing of attention: under high arousal, the range of cues that are used shrinks, so that peripheral but potentially relevant information is neglected [17]. Attentional control theory adds that anxiety impairs inhibition and shifting functions, which makes performers more responsive to threat-related distractors and less flexible in changing plans [6]. Compensatory effort can temporarily protect performance, but at the price of higher cognitive and physiological cost [18].

Stress also changes the mode of control. Evidence from experimental studies indicates that stress promotes a shift from flexible, goal-directed (“thinking”) processing to habitual, stimulus-driven (“doing”) processing [19]. This may be advantageous when an action is well practised and the situation is familiar, but it becomes a liability when circumstances change and the habitual response is no longer appropriate. In addition, stress alters risk preferences in a context-dependent way: it can increase attention to potential rewards and risk-taking in some conditions and shift preferences differently for gains and for losses [20, 21]. Taken together, these findings suggest that stress does not simply make decisions “worse”; rather, it systematically changes how information is sampled, weighed and translated into action. The relation between arousal and performance is, however, not purely negative, since moderate arousal may support readiness and effort [4].

3.2. *Decision-making in naturalistic and expert contexts*

Studies of experienced practitioners such as firefighters, military commanders and other professionals show that they seldom compare several options analytically. Instead, they recognise the situation as a variant of a familiar pattern, retrieve an associated course of action and test it through mental simulation, a process described by the recognition-primed decision model [7, 8]. This strategy is fast and well suited to time-pressured conditions. Its validity, however, depends on the environment: intuitive expertise is reliable when the environment is sufficiently regular and the person has had adequate opportunities to learn its patterns [9]. When cues are atypical or contradictory, as often happens in unfamiliar tactical situations, recognition-based decisions are more error-prone and more strongly affected by stress-induced narrowing of attention. It follows that preparation for extreme situations needs to expose personnel to a wide variety of cue patterns and not just to repetitions of standard scenarios [10].

3.3. *Emotion regulation in operational contexts*

According to the process model, regulation strategies can be applied at different points of the emotion-generating sequence: before the emotion fully develops (situation selection and modification, attentional deployment, cognitive change such as reappraisal) or after it has developed (response modulation such as suppression) [11, 12]. A meta-analysis of experimental studies found that strategies from the process model have, on average, a small-to-medium effect on emotional outcomes, with attentional deployment and cognitive change showing more favourable effects than response modulation [14]. In the individual-differences literature, habitual use of expressive suppression has been associated with less favourable affective and social outcomes than reappraisal [22], and a broad meta-analysis links reliance on suppression and avoidance with symptoms of psychopathology [13].

Operational conditions complicate this picture. Under severe time pressure a demanding cognitive strategy such as reappraisal may be difficult to apply on the spot, whereas brief suppression of outward emotional expression can be functional in the moment, although its costs accumulate if it becomes the dominant habit. This implies, as an interpretation rather than as an established finding, that for tactical personnel the most useful regulation resources are those that can be prepared in advance and then executed with little effort: attentional focusing, arousal control through breathing, and a pre-learned appraisal of bodily arousal as a sign of readiness. Evidence from police research is consistent with the importance of anxiety management: an integrated model of anxiety and perceptual-motor performance describes how anxiety changes attention and movement control [23], and police officers who trained under anxiety-inducing conditions performed better under pressure than those who trained without such conditions, with benefits retained at follow-up [24]. Heart rate variability is frequently used as a physiological index of self-regulatory capacity [25, 26], which makes it a candidate indicator for training and research.

3.4. Individual moderators

Individual differences influence how the same stressor is appraised and handled. Appraisal theory distinguishes between appraising a demand as a threat, when perceived resources are insufficient, and as a challenge, when resources are seen as adequate [27]. In military samples, hardiness, defined by commitment, control and challenge, has been identified as a resilience-related characteristic that can be supported by leadership practices [28]. Longitudinal research on responses to aversive events shows that resilience, understood as a stable trajectory of healthy functioning, is the most common outcome and not an exception [29]. Experience is a further moderator, since a richer repertoire of learned patterns allows recognition-based decisions to be made with less effort [7, 9].

3.5. Training and intervention approaches

Stress inoculation training, which combines education about stress reactions, skill acquisition and rehearsal, and application under graded stress, is a well-established framework for building regulation skills [30]. Experimental evidence indicates that training under stress can generalise to novel stressors and settings [31], and the police study described above shows that anxiety-inducing practice can improve performance under pressure [24]. Mindfulness-based interventions have also been examined in military cohorts. In a high-stress pre-deployment cohort, working-memory capacity declined over the stressful interval in participants with little mindfulness practice but was maintained in those who practised more [32], and a controlled study of Marines preparing for deployment reported effects of mindfulness training on selected measures of stress recovery [33]. These results are encouraging, but they come from a limited number of studies and should be treated as preliminary for tactical decision performance specifically.

Table 1. Summary of principal findings and strength of evidence

Domain	Principal finding	Evidence*	Sources
A. Cognition under stress	Attention narrows; inhibition and flexibility decline; control shifts toward habitual responding	Strong	[1, 6, 17, 19]
A. Cognition under stress	Risk preferences change in a context-dependent way	Moderate	[20, 21]
A. Expert decisions	Recognition-based decisions are effective in familiar, regular environments and vulnerable to atypical cues	Strong (theory); moderate (stress-specific tests)	[7, 9]
B. Emotion regulation	Strategies differ in cognitive cost and effectiveness; habitual suppression is less favourable than reappraisal	Moderate	[13, 14, 22]

B. Emotion regulation	Anxiety alters attention and motor control; HRV indexes regulatory capacity	Moderate	[23, 25]
C. Moderators	Appraisal, hardiness, resilience and experience shape stress responses	Moderate	[27–29]
C. Training	Graded stress exposure and anxiety-inducing practice improve performance under pressure	Moderate	[24, 30, 31]
C. Training	Mindfulness training supports working memory and stress recovery in military cohorts	Preliminary	[32, 33]

*Qualitative rating by the author (see Section 2.3).

3.6. An integrative model: Appraisal–Regulation–Decision (ARD)

Integrating the findings, the Appraisal–Regulation–Decision (ARD) model describes how an extreme situation is transformed into an action (Figure 1). The extreme stressor is first appraised as a threat or a challenge, depending on the perceived balance between demands and resources [27]. The appraisal produces an emotional-physiological response of a given intensity. Regulation processes, both prepared in advance and applied in the moment, then determine whether the cognitive-attentional state remains within a functional range or deteriorates toward narrowed attention and habitual responding [6, 12]. This state, in turn, conditions the decision: recognition-based decisions are expected to be reliable in familiar situations and error-prone in atypical ones [9]. The outcome of the action feeds back into the person's sense of resources and thus into later appraisals. The model leads to four propositions that can be empirically tested.

P1. The appraisal of an extreme situation as a challenge rather than a threat, determined by perceived resources and experience, is associated with a lower intensity of dysfunctional emotional-physiological arousal. P2. Given the same arousal, better regulatory capacity is associated with a more functional cognitive-attentional state, which in turn predicts higher decision quality. P3. The relation between decision mode and decision quality depends on the familiarity of the situation, so that recognition-based decisions are protective in familiar situations but less so in atypical ones. P4. Training that combines graded stress exposure, explicit regulation skills and varied decision drills improves decision quality by acting on appraisal, regulation and pattern recognition simultaneously.

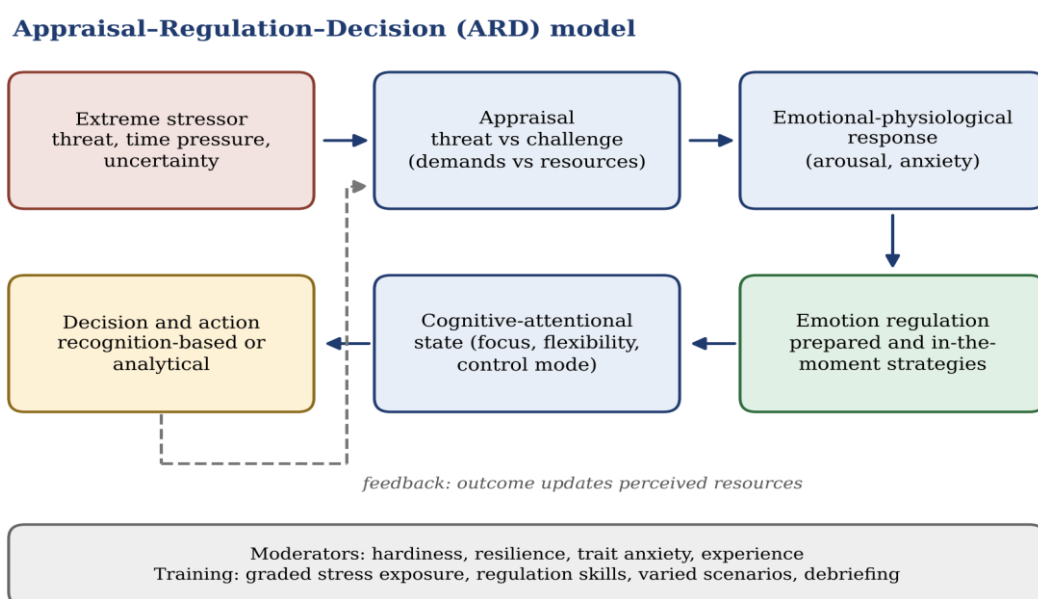


Figure 1. The Appraisal–Regulation–Decision (ARD) model.

4. Discussion

4.1. Principal findings

The review indicates that the decisive factor in extreme situations is not stress itself but the way in which stress-induced arousal is processed before it reaches the decision. Stress consistently narrows attention and favours habitual control [17, 19], and the vulnerability of recognition-based expertise to atypical cues explains why even experienced personnel may err in novel conditions [9]. Emotion-regulation capacity appears to be the process that links the emotional response to the cognitive state, which justifies treating regulation as a trainable component of tactical preparation and not as a separate, purely therapeutic topic [12, 24]. The ARD model expresses this logic in a form that can be used for both teaching and research.

4.2. Implications for special tactical training

Five practical principles follow from the synthesis. First, stress exposure should be graded and realistic: practice that gradually approximates operational pressure has been shown to generalise and to improve performance under pressure [24, 31]. Second, regulation skills should be taught explicitly and rehearsed before exposure, in line with the structure of stress inoculation training [30]; attentional focusing, breathing-based arousal control and the functional reappraisal of arousal are suitable candidates, and mindfulness-based training may be considered as a supplementary approach [32, 33]. Third, scenario design should deliberately vary cue patterns and include atypical elements in order to build a broad repertoire for recognition and to prevent over-reliance on standard responses [7, 9]. Fourth, each scenario should be followed by a structured debriefing in which trainees review their appraisal, emotional reaction and decision, because feedback updates perceived resources and supports learning. Fifth, monitoring of regulation, for instance through self-report and heart rate variability, can support individualised feedback [25], provided that the data are used for development and not for punitive selection and are protected according to ethical standards.

4.3. Proposed protocol for empirical validation

Because the ARD model has not yet been tested empirically, a quasi-experimental pre-test/post-test design with an intervention group and a comparison group is proposed. Participants would be military cadets or personnel of tactical units who give voluntary informed consent. An a priori power analysis for a between-group comparison of a medium effect ($d = 0.50$, $\alpha = .05$, power = .80) indicates approximately 64 participants per group. The intervention group would complete an eight-week programme combining regulation skills training, graded stress exposure and varied scenario drills, whereas the comparison group would follow the standard programme. Measurements would be taken at baseline, immediately after the programme and at a three-month follow-up (Table 2). Decision performance would be assessed in standardised scenarios by raters who are blind to group membership, using indicators such as accuracy of the decision, time to decision and number of critical errors. Data would be analysed with mixed-design analysis of variance or linear mixed models, and the mediating role of regulation (P2) would be tested with mediation analysis. The study would be submitted to an institutional ethics committee before data collection, and participation would have no disciplinary consequences.

Table 2. Proposed measures for empirical validation of the ARD model

Construct	Instrument / indicator	Source
Habitual emotion-regulation strategies	Emotion Regulation Questionnaire (reappraisal, suppression)	[22]
Difficulties in emotion regulation	Difficulties in Emotion Regulation Scale (DERS)	[34]
Decision-making style under conflict	Melbourne Decision Making Questionnaire	[35]
Resilience	Connor–Davidson Resilience Scale (CD-RISC)	[36]

Physiological regulatory capacity	Heart rate variability (resting and during scenarios)	[25, 26]
Decision performance	Blind-rated scenario outcomes: accuracy, time to decision, critical errors	Study-specific rating protocol

4.4. Limitations

Several limitations should be noted. The review is narrative and not systematic, so the selection of sources may be affected by the author's judgement, and some relevant studies may not have been included. The strength-of-evidence ratings are interpretive. Much of the evidence originates from military and police samples in other countries, and from laboratory studies with civilians, so its transferability to the cultural, organisational and training context of national public-safety institutions needs to be tested. Finally, the ARD model is a conceptual synthesis; its propositions have not yet been examined with primary data.

4.5. Directions for future research

Future studies should test the ARD propositions in samples of cadets and tactical personnel, compare different regulation techniques under time pressure, examine the interaction between decision mode and situational familiarity in simulation-based research, and evaluate the long-term retention of trained skills. The development and validation of Uzbek-language versions of the instruments listed in Table 2 would also facilitate research in the national context.

5. Conclusion

Decision-making in extreme conditions is shaped by the interaction of appraisal, emotional arousal, regulation and the familiarity of the situation. Stress narrows attention and shifts control toward habit, but the extent of this effect depends on how well arousal is regulated and on how broad the person's repertoire of recognised patterns is. The Appraisal–Regulation–Decision model proposed here suggests that tactical training should simultaneously provide realistic graded stress exposure, explicit emotion-regulation skills and varied decision-making practice. The proposed validation protocol offers a framework for testing this approach in national training institutions.

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