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## ► To cite this version:

Olivier Chanel, Stéphanie Vincent Lyk-Jensen, Jean-Christophe Vergnaud. Does Affective Forecasting Error Induce Changes in Preferences? Lessons from Danish Soldiers Anticipating Combat in Afghanistan. Defence and Peace Economics, 2023, 34 (5), pp.660-683. 10.1080/10242694.2022.2037829 . hal-03620348

**HAL Id: hal-03620348**

**<https://amu.hal.science/hal-03620348>**

Submitted on 30 Nov 2022

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# Does Affective Forecasting Error Induce Changes in Preferences? Lessons from Danish Soldiers Anticipating Combat in Afghanistan

The Version of Record of this manuscript has been published and is available in *Defence and Peace Economics* 5 March 2022:

<https://www.tandfonline.com/doi/abs/10.1080/10242694.2022.2037829>

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## Abstract

This paper investigates how affective forecasting errors (A.F.E.s), the difference between anticipated emotion and the emotion actually experienced, may induce changes in preferences on time, risk and occupation after combat. Building on psychological theories incorporating the role of emotion in decision-making, we designed a before-and-after-mission survey for Danish soldiers deployed to Afghanistan in 2011. Our hypothesis of an effect from A.F.E.s is tested by controlling for other mechanisms that may also change preferences: immediate emotion, trauma effect – proxied by post-traumatic stress disorder (P.T.S.D.) – and changes in wealth and risk perception. At the aggregate level, results show stable preferences before and after mission. We find positive A.F.E.s for all three emotions studied (fear, anxiety and excitement), with anticipated emotions stronger than those actually experienced. We provide evidence that positive A.F.E.s regarding fear significantly increase risk tolerance and impatience, while positive A.F.E.s regarding excitement strengthen the will to stay in the military. Trauma has no impact on these preferences.

**Keywords:** Risk Preferences; Time Preferences; Affective Forecasting Errors; P.T.S.D.; Afghanistan; Combat

## Introduction

Combat experiences are known to produce trauma, but can they also change individual preferences on time, risk and occupation? Given that preferences, cognitive ability and personality traits are fundamental determinants of decision-making in economic theory,<sup>1</sup> and generally considered stable and exogenous in standard economic models (Friedman 1962; Stigler and Becker 1977), substantial changes in preferences should affect future decisions.

Although a number of studies have explored the stability of preferences or personality traits after life events, the results remain mixed.<sup>2</sup> Recent studies on the impact of extreme events (E.E.) suggest that the experience of such violent events could explain psychological changes. These studies cover large economic shocks (Arrondel and Masson 2014; Brunnermeier and Nagel 2008; Krupka and Stephens 2013; Malmendier and Nagel 2011), and also include natural disasters (Akesaka 2019; Bernile, Bhagwat, and Rau 2017; Callen 2015; Cameron and Shah 2015; Cassar, Healy, and Von Kessler 2017; de Blasio et al. 2021; Eckel, El-Gamal, and Wilson 2009; Hanaoka, Shigeoka, and Watanabe 2018; Van den Berg, Fort, and Burger 2009; Willinger, Bchir, and Heitz 2013) and violence (Brown et al. 2019; Callen et al. 2014; Jakiela and Ozier 2019; Kim and Lee 2014; Moya 2018; Voors et al. 2012). Moreover, Hanaoka, Shigeoka and Watanabe (2018) and Akesaka (2019) find that changes in preferences persist even five years after an earthquake, and Bernile, Bhagwat and Rau (2017) obtain similar results for chief executive officers who experienced extreme fatal disasters in early life. However, there is no consensus regarding the direction of change in risk-taking behaviour: risk-taking can either increase (Garyn-Tal and Shahrabani 2021; Strom et al. 2012), potentially explained by coping mechanisms (Ben-Zur and Zeidner 2009), or decrease (Bernile, Bhagwat and Rau 2017; de Blasio et al. 2021), as might be expected after exposure to major risks.

Being in the military constitutes a way of life, and differences in risk preferences between military personnel and civilians have been observed (Haerem et al. 2011). Indeed, Lahav, Benzion, and Shavit (2011) find that young Israelis doing their military service show relatively higher subjective discount rates than their peers living in a more peaceful environment. The persistent impact on risk-taking behaviour makes understanding the potential consequences of military deployments on preferences critical, not only for society as a whole but also for individual soldiers before deployment and on return to civilian life.

Research in economics and psychology points to several potential mechanisms that may explain how E.E.s change behaviours. Changes in individuals' risk perception or health status following E.E.s (Aubert and Reynaud 2020; Beaud and Willinger 2014; Gollier and Pratt 1996) or wealth constraints induced by the resulting economic shocks (Brunnermeier and Nagel 2008) could be involved. Moreover, trauma following exposure to an E.E. can also induce behavioural changes (Callen et al. 2014) or changes in emotional affect, for example from being neutral to becoming anxious (Lerner and Keltner 2000, 2001).

We propose a new mechanism explaining how the experience of an E.E. can change preferences. We hypothesise that affective forecasting error (A.F.E.), i.e. the difference between the emotion anticipated regarding an E.E. and the emotion actually felt during it, helps predict changes in individual preferences.<sup>3</sup> The rationale is as follows: in a decision problem such as a risky choice, anticipated emotions help people to evaluate consequences and hence guide their

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<sup>1</sup> See, e.g. Anderson and Mellor (2008); Barsky et al. (1997); Borghans et al. (2009); Dohmen et al. (2010); Golsteyn and Schildberg-Hörisch (2017); Heckman, Stixrud, and Urzua (2006).

<sup>2</sup> For findings on stability of preferences, see Galizzi, Machado, and Miniaci (2016); Guiso, Sapienza, and Zingales (2018); Salamanca (2018); Schildberg-Hörisch (2018); Woelbert and Riedl (2013). On the impact of life events, see Anger, Camehl, and Peter (2017); Bleidorn, Hopwood, and Lucas (2018); Preuß (2019).

<sup>3</sup> A.F.E is also called impact bias in the literature (Miloyan and Suddendorf 2015).

decision. In anticipation of an E.E., people apply affective forecasting and, after experiencing the E.E., can compare the emotions actually felt with those anticipated, thus learning about the accuracy of their forecasts. An A.F.E. may then make people change the way they predict their emotions and consequently modify their choices in a decision problem. Our hypothesis is based on theories such as the appraisal-tendency framework (Lerner and Keltner 2000, 2001), which links evaluation processes with specific emotions, thereby placing accurate affective forecasting – anticipating future emotions – at the heart of effective decision-making (Loewenstein 2007; Loewenstein et al. 2001; Wilson and Gilbert 2003). Several studies reveal systematic prediction errors in affective forecasting (Gilbert et al. 1998; Gilbert and Wilson 2009).

This paper investigates whether A.F.E.s affect soldiers' preferences after the E.E. of combat. We measure three types of preferences: (i) preferences in making rational choices over time (time preferences), (ii) preferences in making rational choices under uncertainty (risk preferences) and (iii) preferences in a career perspective (occupational preferences). Information on such preferences is of obvious value for policy, theory and empirical analysis when measuring the welfare impacts of deployment, as changes in preferences may lie behind a behavioural change that could substantially impact both individuals and society at large.

In addition, we contribute to the methodological and empirical literature on affective forecasting by specifically testing the impact of A.F.E.s on preferences in an E.E., while controlling for other mechanisms that may also explain changes in preferences. We exploit a before-and-after comprehensive survey conducted among Danish soldiers deployed to Afghanistan in spring 2011 and hence likely to experience the E.E. of combat situations. Of the 51 countries engaged in the North Atlantic Treaty Organization (N.A.T.O.) forces and participating in the International Security Assistance Force (I.S.A.F.) since 2001, Denmark has had the highest casualties per capita.

Our paper is the first to elicit both soldiers' before-mission anticipated emotions in the event of combat (the E.E.) and – seven months later – the after-mission emotions experienced by those who were actually involved in combat. Unlike other types of E.E., soldiers' potential exposure to combat is expected, making it possible to measure emotions both beforehand and afterwards and to analyse soldiers' subsequent behavioural change. Since the literature on the behavioural consequences of E.E.s focuses mainly on victims of violence or natural disasters, where A.F.E.s are not involved, our findings contribute new insights into behavioural changes. Given that inaccurate forecasts of emotional consequences can affect decision-making, we exploit this before-after framework to study the impact of A.F.E.s on future decision-making through a change in preferences. Examining the reactions of this group of soldiers deployed to Afghanistan in spring 2011 on experiencing stronger or weaker emotions than they anticipated may shed light on whether this learning changes their risk, time and occupational preferences in general.

We build our analysis on how different variables may affect the soldiers' preferences and control for possible traumatic experience, risk perception and change in wealth. For each soldier, we have detailed background information, measures of degree of exposure to combat from validated survey questions, information on preferences and on the emotions of fear, anxiety and excitement before and after the military mission.

First, we check the between-soldier validity and within-soldier consistency of the answers. Then we explore both within- and between-soldier stability in preferences and emotions before and after combat. Second, we empirically test whether A.F.E.s in a combat setting predict changes in individual preferences and control for other potential mechanisms.

We find aggregate stable risk tolerance, time and occupational preferences before and after the mission. Moreover, we find significant positive A.F.E.s: stronger emotions were

anticipated than those actually experienced. Testing for individual forecasting error adjustment with econometric models, we show that positive A.F.E. regarding fear increases risk tolerance and impatience, while positive A.F.E. regarding excitement strengthens the will to stay in the military. In our study, a direct effect of trauma on soldiers' changes in preferences can be ruled out.

In the remainder of the paper, we briefly review the literature relevant to our hypothesis, describe the data, explain our empirical strategy and present the results. We conclude with both research and policy implications.

## **Literature and hypothesis**

In a decision problem, emotions intervene in several ways (see Rick and Loewenstein 2008 for a synthetic presentation). First, when choosing between different options, evaluating future consequences is important, and psychological theories (Caplin and Leahy 2001; Lerner and Keltner 2000, 2001; Loewenstein et al. 2001) suggest that emotions play a crucial role in this assessment. Rational individuals try to obtain outcomes that will make them happy and to prevent outcomes that will make them miserable. The higher the intensity of anticipated emotions, the more effort individuals invest in feeling or suppressing the emotion (Mellers and McGraw 2001). Indeed, an individual who feels anxious about a potential outcome of a risky choice may choose a sure option (Hartley and Phelps 2012; Maner et al. 2007). This central role of anticipated emotions in decision making is nicely highlighted by Charpentier et al. (2016), who show that computational models that use anticipated feelings about monetary gains and losses better predict choices in a gambling task than standard value-based models.

In addition to the anticipated emotions, several types of immediate emotions can affect decision-making. First, the very process of previewing anticipated emotions can instantly create an emotional state and have a priming effect. These anticipatory emotions, such as anxiety induced by having to make a risky choice, are known to influence choices. Second, emotions may be induced by factors external to the decision problem. For example, we expect the before-mission phase (i.e. before leaving for Afghanistan) to be a stressful period filled with negative emotions (anxiety, fear), especially for first-timers. Many studies report that when individuals are primed for a particular situation, those sensitive to fear become more risk-averse, while those sensitive to anger become less risk-averse (Callen et al. 2014; Kugler, Connolly, and Ordóñez 2012; Lerner and Keltner 2000, 2001; Meier 2022). Similarly, the psychological state of the soldiers after the mission may be affected by the potentially traumatic combat experience, thereby inducing immediate emotions. Indeed, Callen et al. (2014) observed that, when primed to recall fear, Afghan civilians exposed to violence exhibited an increased preference for certainty.

Our A.F.E. hypothesis is rooted in the crucial role of anticipated emotions in decision-making and the questionable accuracy of these predictions. Empirical evidence indicates that people predict their future emotions poorly (Gilbert et al. 1998), with both positive and negative emotions systematically overestimated (Wilson and Gilbert 2003). This overestimation may have consequences on preferences: Kermer et al. (2006) suggest that loss aversion could result from such A.F.E., as individuals anticipate that stronger negative emotions will arise from a loss, whereas the emotions actually felt are far weaker. Hence, when considering emotions as an informational system that guides decision-making, researchers need to investigate how accuracy in affective forecasting affects choices and whether persistent A.F.E. might be a factor in detrimental decision-making (Miloyan and Suddendorf 2015).

In contrast to natural disasters, or other violent situations where the event comes (almost) as a surprise, soldiers anticipate their military mission and forecast their feelings under

combat, which enables them to observe their A.F.E.s. Our hypothesis is that A.F.E.s may induce changes in preferences in the specific case of an expected E.E., through a learning process. The effect of A.F.E. on behaviour could be similar to that in standard reinforcement learning, with prediction errors viewed as the main driver of adaptation (Sutton and Barto 1998).

One possible mechanism supporting our hypothesis is a learning effect on how anticipated emotions are formed. Gilbert and Wilson (2009) propose several mechanisms explaining prediction errors, suggesting that forecasting errors come from individuals' previewing their emotions based on an inaccurate representation of the future event. In our case, soldiers may discover that combat is not what they imagined. This learning will make them change the way they predict their emotions, both for future combat and for other events involving similar affective forecasting. Indeed, by observing their A.F.E.s regarding combat, they may identify the sources of forecasting errors that are common to their anticipated emotions in general.

Another learning mechanism may be revising the perception of emotional sensitivity. In predicting an emotion, people try to guess their future reaction (feeling) to a stimulus, and their affective forecasting will depend on how they perceive their own emotional sensitivity. However, people's perceptions of their own sensitivity may differ from the real sensitivity that determines true emotions. Hence, A.F.E. can serve to revise individuals' beliefs about their own sensitivity; and because they use affective forecasting for decision-making, this revision (the learning effect) may induce changes in preferences. We would expect soldiers to learn that they are not as sensitive to fear as they thought and thus to become more risk-tolerant regarding any decisions involving anticipated fear, either hypothetically or in real life.

Figure 1 summarises our framework and the different mechanisms that can influence choices. We assume that both affective forecasting and psychological state influence the decision process. Psychological state is determined by sociodemographic characteristics, wealth, risk perception, anticipatory emotions and trauma. Some of these determinants differ before and after the mission: anticipatory emotions generated by combat expectations before the mission, intensity of combat, trauma and changes in risk perception and wealth after the mission. Affective forecasting generates anticipated emotions both when evaluating the future consequences of the decision process and in combat. Our hypothesis is that A.F.E. changes subsequent affective forecasting. Our data allow us to test (i) whether A.F.E.s change soldiers' choices, while accounting for changes in psychological state; and (ii) whether there is a direct effect from trauma.

[Figure 1 about here]

## **Materials and Methods**

### ***Materials***

The data come from a before-and-after survey combined with records from the Danish Ministry of Defence. The respondents were Danish soldiers deployed to Afghanistan in spring 2011 within the N.A.T.O.-led International Security Assistance Force (I.S.A.F.) 11 mission. To facilitate data collection and increase the response rate, we asked the soldiers to fill out a paper and pencil survey questionnaire during both before-mission preparation (January 2011) and after-mission debriefing (August 2011). In all, 487 soldiers (465 male and 22 female) completed the before-mission questionnaire and 371 (355 men and 16 women) completed both questionnaires.<sup>4</sup> The method chosen for data collection explains the high average before-after

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<sup>4</sup> As the number of women is too small for reliable statistical inference, we focus on the 355 male soldiers deployed to Afghanistan in combat and logistics units.

response rate (almost 95%).<sup>5</sup>

The data was collected at different military forts, the first being Fort Oksbøl in January 2011, a few days before the mission started. Then, after the mission, between 17 and 25 August 2011, we collected data at the following forts: Aalborg, Fredericia, Holstebro, Skive, Slagelse, Oksbøl/Varde and Vordingborg. The soldiers were not allowed to communicate with one another during data collection, and the questionnaires were collected immediately after completion. Answering the questionnaire took an average of 25 minutes. Identical questions on time, risk, occupational preferences and (anticipated and experienced) emotions were used in both questionnaires.

To ensure that potential differences were not due to differences in populations, we only considered responses from soldiers who answered both before- and after-mission questionnaires and provided a valid employee identifier.<sup>6</sup> The questionnaire covered before- and after-mission variables (largely inspired by the literature), the latter with the suffix ‘\_after’.

### *Socio-Demographics and Military Variables*

Appendix Table 1 shows respondents’ reported socio-demographic characteristics, and military variables (see also supplementary appendix Table S.3 for the subsamples of those exposed or not exposed to combat, and sample comparison tests).<sup>7</sup> Also included are some military background characteristics: respondents’ length of employment in the Army (*Seniority*), previously deployed or first-timers (*FirstTimer*), and previous deployment (or not) of other family members (*FamDeployed*).

In the before-mission questionnaire, we asked the soldiers to give their subjective evaluation of the probability of experiencing combat during the mission, recorded in the variable *ProbSub* ranging from 0 to 100. The military administrative records indicated whether soldiers had returned before the end of any previous mission for any reasons, e.g. being wounded or having psychological problems (*Returnee\_previous*), and their average monthly gross earnings during the mission (*Earnings*). The intensity of combat exposure was measured via the Deployment Risk and Resilience Inventory (D.R.R.I.) (King et al. 2006), whose combat items were scored and summed, so that a higher score reflects higher intensity during any previous missions (*Intensity\_previous*).

Finally, in the ‘after’ questionnaire, the D.R.R.I. is used to measure the *Intensity* of combat exposure for the current mission and to define the variable *Combat* if soldiers positively

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<sup>5</sup> The before-mission response rate is approximately 82-86% and the after-mission rate is 99%. Danish soldiers’ average mission lasts six months. However, differing deployment periods mean that some soldiers may be absent at mission preparation, debriefing, or both – e.g. while most soldiers are deployed for six months, mechanics return after only four months. Furthermore, some of our soldiers returned earlier for medical or personal reasons, and one was killed in action (K.I.A.). Most returned to Denmark less than one month before responding.

<sup>6</sup> Although experiencing combat could have prevented soldiers from answering both questionnaires, 75% of the wounded answered them. In Tables S.1 and S.2 in Supplementary Appendix A, we test for the bias in non-answering the ‘after’ questionnaire (attrition) and find no differences in the central variables of our analysis. While t-tests show that the variables age, seniority in the army and having children are significant, the F-test for joint significance cannot reject the null hypothesis that attrition is random. Furthermore, an attrition probit model test (Fitzgerald, Gottschalk, and Moffit 1998) cannot reject the null hypothesis that attrition is random for the variables in Tables S1 (p-value=.331) and S2 (p-value=.2147). Finally, the pooling tests (according to Beckett et al. 1988) similarly show that we cannot reject the null hypothesis that attrition is random (with respective p-values of .41 and .21). Thus we do not expect attrition to constitute a major threat for our findings.

<sup>7</sup> As expected, the equality tests between average characteristics of exposed and non-exposed soldiers show very significant differences, ruling out the exogeneity of combat exposure. As Table S.4 in Supplementary Appendix A shows, soldiers can predict the probability of combat but not its intensity.

answer one of its combat items. We measured P.T.S.D. symptom severity by using the P.T.S.D. checklist (P.C.L. 4, Weathers et al. 1996) of 17 items directly adapted from the Diagnostic and Statistical Manual of Mental Disorders IV, P.T.S.D. Criteria B-D (see Supplementary Appendix B). On a 5-point scale with anchors ranging from 1 ('not at all') to 5 ('extremely'), respondents are asked to rate how severely the problem has affected them in the last month. We summed all 17 items for a total P.T.S.D. severity score ranging from 17 to 85.

Appendix Table 1 shows that respondents are about 29 years old on average; 60% have a partner but only 21% have children; less than one-third have completed basic education (9th grade U.S. or first cycle secondary school); and almost 40% come from a family with divorced parents. The soldiers have been in the armed forces for six years on average, 27% have previously deployed family members, 1.4% are previous returnees, 33% are first-timers and their before-mission subjective evaluation of the probability of combat involvement is 74%. The soldiers declare an average P.T.S.D. of 26 for this mission, 56% have experienced combat and the average anticipated combat intensity for this mission is lower than the intensity of previous combat experienced (2.094 vs. 2.552). Figure S.1 in Supplementary Appendix A shows that the number of dead or wounded soldiers from missions in Afghanistan since 2002 far exceeds the number from the I.S.A.F. 11 mission.

#### *Before-and-After Control Variables*

We also applied before-and-after measurements to two personality traits from the Big Five Inventory (John, Donahue, and Kentle 1991; John, Naumann, and Soto 2008): neuroticism, a tendency to worry excessively (*Neuroticism*, on a 1-5 scale), and conscientiousness, a tendency to plan and think carefully before acting and to be self-disciplined, punctual, reliable and competent (*Conscientiousness*, on a 1-5 scale). We also included a variable indicating degree of control over life events (*Control*, on a 0-4 scale) (Rotter 1966). Appendix Table 2 shows that the personality trait variables are on average relatively stable.

Finally, we collected data on the self-reported risk attitude and *Wealth* variables before-and-after-mission. We asked the soldiers whether, compared to the general Danish population, they saw themselves as more or less exposed to five different types of risk in their daily lives in Denmark: traffic accidents, physical assault, disease, unemployment and natural disasters (Chanel et al. 2001). Each risk assessment ranges from 'much less exposed' to 'much more exposed' (on a 1-5 scale), and the variable *RiskExposure* sums up these 5 scores (on a 5-25 scale). The variable *PhysicalRiskExposure* is a sub-variable only for the risk of physical assault (on a 1-5 scale). Appendix Table 2 shows an increase in both the *Wealth* and the risk attitude variables on average.

#### *Risk, Time and Occupational Preferences*

We collected risk, time and occupational preference variables (see Table 1 for summary statistics). Given the self-completed paper and pencil questionnaire, overly complex or interactive elicitation designs were not feasible. In the spirit of Falk et al. (2018), we employed both quantitative choice questions and qualitative self-assessment.

[Table 1 about here]

Risk aversion is measured in two ways. First, with a certainty equivalent task in the following lottery (see Etchart-Vincent and l'Haridon 2011; or Kachelmeier and Shehata 1992):

"You get the opportunity to buy a ticket in a lottery. There are 10 people in the lottery. The prize is worth DKK 20,000 (EUR 2,667) and the winner of the lottery is found by drawing lots, i.e. everyone has an equal chance of winning. What price are you willing to pay for a ticket in this lottery?"



The variable *RiskAver* categorises the soldiers according to their willingness to pay (W.T.P.) for a ticket compared to the expected gain (EUR 266.7), from 1 (low risk-aversion, W.T.P. higher than expected gain) to 4 (high risk-aversion, W.T.P. lower than 2.5% of the expected gain).

Second, we also asked soldiers whether they perceived themselves more as someone who wants to avoid risks or as someone who does not mind taking risks to achieve something in life (see Arrondel, Masson, and Verger 2005; or the qualitative assessment of Falk et al. 2018). The variable *RiskLover* ranks answers from 1 ('I'd rather avoid risks') to 10 ('I do not mind taking risks'). Falk et al. (2018) reported that this measure is a valid predictor of risk-taking behaviour in the field and in experiments.

To measure the soldiers' attitude towards risk tolerance, we used the following gains-and-losses question (see Grable and Lytton 1999):

"Given the best and worst case returns on the four investment choices below, which would you prefer?"

**Check one box only**

A 50% chance of winning DKK 1,500 and a 50% chance of winning nothing.....	1
A 50% chance of winning DKK 6,000 and a 50% chance of losing DKK 1,500 ....	2
A 50% chance of winning DKK 19,500 and a 50% chance of losing DKK 6,000.....	3
A 50% chance of winning DKK 36,000 and a 50% chance of losing DKK 18,000....	4

The variable *RiskTolerance* ranks answers on a scale from 1 to 4, with 1 meaning low risk tolerance and 4 meaning high risk tolerance.

To measure time preferences, we used an intertemporal ascending choice sequence with 7 levels, simpler than the staircase method used in Falk et al. (2018) but very similar to the questions used in Barsky et al. (1997), Dohmen et al. (2010) and Fuchs (1982):

"Imagine that when you come back from your mission, you receive a tax-free bonus, DKK100,000 (EUR 13,333) in your bank. You have two options. A) You can withdraw the money immediately, or B) you can leave the money in the bank for one year more. Which option would you choose in each of the seven lines, A or B?

Check A or B

-

Only one  
check per line

	Amount paid immediately	Amount paid in 12 months	A	B
1.	DKK 100,000	DKK 102,000		
2.	DKK 100,000	DKK 105,000		
3.	DKK 100,000	DKK 108,000		
4.	DKK 100,000	DKK 110,000		
5.	DKK 100,000	DKK 120,000		
6.	DKK 100,000	DKK 130,000		
7.	DKK 100,000.	DKK 150,000		

The variable *Impatience* is ranked from 0 to 7, 0 being a low preference for the present (patience, option B always checked) and 7 being a high preference for the present (high impatience, option A always checked).

Finally, we measure preferences for future career in the military by asking the following in both questionnaires: “As for the future, where will you be in your working life in 5 years?”

The variable *CareerPerspective* ranks answers as do not know or other (coded 0), return to civilian life (education or job, coded 1), short-term contract in the army (coded 2), military education (coded 3), and long-term contract in the army (coded 4), and indicates the will to stay in the military. We ranked a military education higher than a short-term contract because seeking longer military training presumably reflects greater commitment to the military.

### *Emotion-related and A.F.E. Variables*

The before-and-after survey data also yielded information on anticipated, and – for those exposed to combat – experienced emotions relative to combat (see Table 2 for summary statistics). We collected data for three emotions known to be related to risk aversion and valuable in the military context: *Fear*, *Anxiety* and *Excitement*. All three are measured on a 0-4 scale ranging from 0 (‘not at all’) to 4 (‘certainly’). *Excitement* may capture a form of arousal similar to that of anger but more pertinent to the combat situation (Brænder 2016). Hence, according to psychological classifications, we have two unpleasant emotions and one pleasant emotion (Russell 1980). For each of them, the A.F.E. is computed as the difference between anticipated emotion and emotion actually experienced. On average, we find positive A.F.E. regarding the three emotions, the highest for *Fear* and the lowest for *Excitement*.

[Table 2 about here]

Figure 2 indicates that tiny aggregate before-and-after changes can hide noticeable individual changes in preference as well as emotion variables. However, the modal category is 0 (i.e. no change), except for *AFE\_Fear* with a modal category of 2 (i.e. a small overestimation).

[Figure 2 about here]

### *Soldier-level Validity, Consistency and Correlations*

We now investigate the soldier-level validity of the between-soldier responses (see Appendix A), the consistency of the within-soldier responses (see Appendix B) and the correlations in A.F.E.s and changes in preferences (see Appendix C).

We find pairwise correlation coefficients consistent with expectations among the four variables related to time and risk preferences as well as among the personality trait variables, both before- and after-mission (see Tables A.3 and A.4 in Appendix). To assess the consistency of the answers over the seven-month period (January to August 2011), we investigate individual changes at soldier level for preferences (see Table B.5 in Appendix). We find positive and significant correlations for risk preference variables (between .46 and .49) and *Impatience* (.35) – in the same range as those found in the literature – and for *CareerPerspective* (.65). Before- and after-mission equality tests consistently show non-significant changes in *RiskTolerance*, *Impatience* and *CareerPerspective*, an increase in *RiskAver* and mixed results for *RiskLover*.

The three emotion variables show positive A.F.E., with lower correlation (around .21) for *Fear* and *Excitement* than for *Anxiety* (.35) (lower part of Table B.5 in Appendix B). These values, of the same order of magnitude as those reported by Coteț and David (2016), provide evidence that after-mission emotions are both imperfectly predicted and largely overestimated. The magnitude of the values suggests that the I.S.A.F. 11 mission apparently went better than the soldiers expected, producing fewer negative emotions.

Finally, we provide results based on the pairwise correlation matrix between the A.F.E.s and the changes in preferences (Appendix C). As expected, we find some significant correlations among the A.F.E.s, as well as among the changes in preferences. For example, changes in *RiskTolerance* and *RiskAver* are significantly negatively correlated. The correlation between A.F.E. and changes in preferences is significantly negative between *AFE\_Excitement* and *RiskAver\_dif* (p-value=.0415), and positive between *AFE\_Fear* and *RiskAver\_dif* (p-value=.0715) and *RiskTolerance\_dif* (p-value=.0967).

Overall, in line with the literature, the soldiers' answers are found to be consistent with expectations, their preferences are stable over the seven-month period and sufficient before-and-after changes appear for the A.F.E. hypothesis to be tested.

## Methods

We test our hypothesis that A.F.E.s predict changes in individual preferences by investigating the stability of preferences under an E.E: combat exposure. We use a within-subject design in which preferences are elicited for the same individual before and after the mission.

Since A.F.E.s are defined as differences, we explore their relationship with changes in preferences as:

$$\Delta P = \phi AFE\_E + \delta X + \varepsilon \quad \text{with } E[\varepsilon | X, AFE\_E] = 0$$

where  $P$  denotes preferences (*Impatience*, *RiskAver*, *RiskTolerance*, *RiskLover* and *CareerPerspective*),  $AFE\_E$  denotes A.F.E. regarding emotions  $E$  (*Fear*, *Anxiety* and *Excitement*),  $X$  controls for soldiers' characteristics,  $\Delta$  is the after-and-before mission difference and  $E[.]$  the conditional expectation operator. However, if  $AFE\_E$  is not exogeneous conditional on  $X$ ,  $E[AFE\_E | X] \neq 0$  which makes  $E[\varepsilon | X] \neq 0$  and standard estimates of  $\phi$  are biased.

Because  $X$  may simultaneously affect  $\Delta P$  and  $AFE\_E$  with potential endogenous issues, we test the A.F.E. hypothesis in a three-step procedure inspired by Robinson (1988)'s partially linear regression.<sup>8</sup> In the first two steps of this residual-on-residual approach, the effect of  $X$  is successively removed ('partialled out') from  $\Delta P$  and  $AFE\_E$ . The third step explores the relation between  $\Delta P$  and  $AFE\_E$  based on the residuals computed from the first two step regressions, which are by construction uncorrelated with  $X$ .<sup>9</sup>

Based on the emotional process (see Figure 1), a first step explains preferences before and preferences after by factors likely to influence preferences, in a simultaneous equation model. These factors include individual characteristics and personality traits (which come into both equations), a covariance term to account for correlation between the two dependent variables and equation-specific controls. First, as immediate emotions (e.g. anticipatory emotions) influencing preferences before and after a mission may be different due to a change in the soldiers' psychological state, we use expectations of exposure to combat (*ProbSub*) and anticipated emotions ( $E$ ) about combat as proxies for the psychological state before the mission, while we use the P.T.S.D. score (*PTSD*) and a dummy for having been exposed to combat (*Combat*) as measures of the psychological state after the mission. Second, changes in wealth and risk perception may affect preferences. We thus add *Wealth* and *PhysicalRiskExposure* to

<sup>8</sup>This residual-on-residual approach has since been applied in several causal inference analyses to tackle non-linearity (Banerjee and Duflo 2003), simultaneity (Graham 1999) and endogeneity issues in parametric models (Gallegati et al. 2014), or more recently as double/debiased machine learning in non-parametric models accounting for high dimensional settings (Chernozhukov et al. 2018).

<sup>9</sup> This approach is also in the spirit of Wooldridge (2015)'s interpretation of the control function approach to make endogenous explanatory variables appropriately exogeneous.

the equation explaining preferences before and add the after-before change in these variables to the equation explaining preferences after. The following system corresponding to the first step is estimated for the full sample at soldier level:

$$\text{Step 1} \quad P = a_0 + a_1 \text{ProbSub} + a_2 E + a_3 \text{PhysicalRiskExposure} + a_4 W_i + a_5 X + \varepsilon_1 \quad (1a)$$

$$P_{\text{after}} = b_0 + b_1 \text{PTSD} + b_2 \text{Combat} + b_3 \Delta \text{PhysicalRiskExposure} + b_4 \Delta W_i + b_5 X + \varepsilon_2 \quad (1b)$$

where  $P$  is the preference,  $E$  is the emotion,  $X$  controls for soldiers' characteristics measured before the mission, and  $\varepsilon_1$  and  $\varepsilon_2$  are error terms with covariance  $\sigma_{\varepsilon_1 \varepsilon_2}$ .

We then compute the residuals of the change in preferences  $\hat{e}(\Delta P) \equiv (\hat{\varepsilon}_2 - \hat{\varepsilon}_1)$  from (1a)-(1b) for the whole sample, for use as dependent variable in the third step.

The second step regresses  $AFE\_E$  on actual intensity of combat exposure and soldiers' characteristics  $X$ .<sup>10</sup> Indeed, the change in emotion is based on i)  $E_{\text{after}}$ , which depends on the intensity of the combat exposure, and ii) the anticipated emotion  $E$ , which was based on expected intensity of combat exposure rather than actual intensity. Consequently, we estimate the following equation for those soldiers involved in combat (because  $E_{\text{after}}$  is unknown for non-combatants).

$$\text{Step 2:} \quad AFE\_E = c_0 + c_1 \text{Intensity} + c_2 X + \eta \quad (2)$$

We then compute the residuals of the change in emotions for combatants,  $\hat{e}(AFE\_E) \equiv \hat{\eta}$  and set residuals to zero for non-combatants (because their A.F.E. is null).<sup>11</sup>

The third step uses the residuals estimated in steps 1 and 2 to account for endogeneity by estimating the following residual-on-residual regression for the entire sample:

$$\text{Step 3:} \quad \hat{e}(\Delta P) = d_0 + d_1 \hat{e}(AFE\_E) + d_2 \text{Combat} + \xi \quad (3)$$

with the variables as previously defined and where  $\xi$  is the error term. The parameter of interest is  $\hat{d}_1$ , whose sign and significance represent A.F.E.'s impact on the change in preferences. Figure 3 summarises the empirical approach.

[Figure 3 about here]

To account for the additional variances of the first- and second-step estimates, which feed the third step with estimated rather than measured variables, we need to correct the standard errors of the third-step estimates (see details in Supplementary Appendix C).

Finally, we consider the possibility that the change in preferences is due to a direct effect of trauma for which we use the P.T.S.D. score as a proxy. Because *PTSD* could result from selection, an Instrumental Variable (I.V.) approach in which combat intensity would only affect changes in preferences through *PTSD* is conceivable (*Intensity* and *PTSD* are indeed significantly and positively correlated, with p-value=.0002). However, we cannot rule out the possibility that *Intensity* affects preferences in ways other than via *PTSD* (exclusion restriction). We therefore favour a reduced form model of an effect of trauma on the change in preferences and use *Intensity*, to test a direct effect of *PTSD*.

We first test whether combat intensity is exogenously distributed in the sample. According to high-ranking Danish officers, forecasting the probability of the soldiers' being involved in an exchange of shots or a rocket attack, along with the intensity of this exposure, is

<sup>10</sup> As the post-emotions ( $E_{\text{after}}$ ) are known only for combatants, we cannot estimate a system of equations on the entire sample, with instrumental variables to account for the endogeneity issues. Excluding  $X$  from Eq. (2) does not change our results (not shown).

<sup>11</sup> To check the robustness of our results to this assumption of null A.F.E. for non-combatants, we will also estimate step 3 on combatants alone (see results in Table 3).

very difficult for those assigning soldiers to daily missions. The random aspect of high combat intensity exposure is explained mainly by the unpredictability of the war against the Taliban: combat exposure in the form of ambush, improvised explosive devices, or an exchange of shots is as good as randomly distributed within and between units. Moreover, soldiers are not on duty every day, and both daily missions and leave schedules are rotated among the troops. All these factors make the risk of exposure to intense combat – resulting in being K.I.A., wounded or a returnee – exogenous. We estimate a linear probability model explaining the intensity of combat (*Intensity*) with several explanatory variables, including military variables:

$$Intensity = \alpha_0 + \alpha_1 ProbSub + \alpha_3 X + \omega \quad (4a)$$

Second, we test whether trauma (proxied by after-mission soldiers' P.T.S.D. score or *Intensity* of combat score) affects preferences for the full sample:

$$\Delta P = \beta_0 + \beta_1 PTSD + \beta_2 X + u \quad (4b)$$

$$\Delta P = \gamma_0 + \gamma_1 Intensity + \gamma_2 X + v \quad (4c)$$

where  $u$  and  $v$  are error terms.

## Results

### Testing the A.F.E. Hypothesis

To test how A.F.E.s impact changes in preferences, we apply the three-step strategy for each of the 15 pairs of emotions and preferences, for two sets of soldiers' characteristics  $X$  (including or not including personality traits) and for two samples (combatants only or all soldiers with A.F.E. set to zero for non-combatants).

Table 3 shows the results for the pairs for which the A.F.E. hypothesis was verified. We find a significant and positive effect of A.F.E. regarding *Fear* on *RiskTolerance* (p-value between .0084 and .0315): the more a soldier has over-estimated being afraid, the more his *RiskTolerance* increases after the mission. We find a significant and positive effect of A.F.E. regarding *Fear* on *Impatience* (p-value between .0373 and .0689): over-estimating *Fear* increases *Impatience* after the mission. Finally, we find a significant and positive effect of A.F.E. regarding *Excitement* on *CareerPerspective* (p-value between .0211 and .0408): over-estimating *Excitement* increases *CareerPerspective* after the mission, i.e. the will to stay in the military.

To test whether first-timers react differently to A.F.E.s, we also apply the three-step strategy separately to first-timers and non-first-timers. As expected, compared to soldiers previously deployed, first-timers' *RiskTolerance* and *Impatience* are consistently impacted more by A.F.E.s in absolute terms. However, the results are never significant, likely because the smaller sample sizes ( $n = 72$  to  $75$  observations in step 3) yield lower precision. Nevertheless, this finding suggests a greater impact of A.F.E. for the first-timers, unable to take advantage of a learning effect. Overall, we consistently find that A.F.E. plays a significant role in explaining changes in preferences: A.F.E.s regarding fear affect risk tolerance and impatience while A.F.E.s regarding excitement affect career perspectives.

[Table 3 about here]

Our estimates in Table 3 fulfil the standard OLS requirements (exogeneity by construction, use of robust variance estimates in the presence of heteroscedasticity and verified normality of the residuals). Their consistency and asymptotic normality rely on accurate estimates in equations (1) and (2) (see formal condition in Wager 2021). Estimates in Table 3

are coherent with the signs of the pairwise correlations in Appendix C.<sup>12</sup>

### ***Testing a Direct Effect of Trauma on Preferences***

The changes in preferences could be due to the relief of experiencing less intense combat and no trauma. We therefore test the direct effect of trauma, proxied by the post-mission intensity of combat / P.T.S.D. score, on the changes in preferences.

The exogeneity of combat intensity (*Intensity*) among soldiers' characteristics is shown in Table S.4 in the supplementary Appendix: the F-statistics for combat intensity are small and the p-value > .2, thereby confirming that before-mission soldiers' characteristics cannot predict the intensity of combat.

Table 4 then presents regression coefficients for the relations among combat intensity, PTSD and changes in preferences. OLS regressions (Panel A) and reduced-form regressions (Panel B) show no significant effect on preferences. The absence of a direct effect of trauma on the changes in preferences is likely due to the low scores for P.T.S.D.<sup>13</sup> As previously mentioned, combat exposure and number of casualties for the I.S.A.F. 11 mission were relatively lower than in earlier and later missions. We therefore estimated equation (4b) replacing the P.T.S.D. score by binary variables based on different thresholds for PTSD (e.g. greater than 30, corresponding to 28% of the sample). The effect remains insignificant.

[Table 4 about here]

## **Discussion**

Using a sample of combat soldiers deployed to Afghanistan in 2011, we test the hypothesis that A.F.E. affects time, risk and occupational preferences under E.E.s. We find very significant positive before-and-after mission correlations for preferences and emotions. These results confirm the stability of these variables at the individual level, at least in the short term. We observe significant positive A.F.E., suggesting that soldiers learn that they are not as sensitive to emotion as they thought. As a result, they become more risk-tolerant and impatient, and are more likely to plan to stay in the military. A.F.E. regarding combat apparently affects behaviour with respect not only to the military, but also to risk and time preferences. Moreover, we do not find evidence supporting a direct impact of trauma on changes in preferences.

While empirical findings on preference stability after an E.E. (natural disasters or violent conflicts) are mixed (Golsteyn and Schildberg-Hörisch 2017; Schildberg-Hörisch 2018), our paper exploits an elicitation of emotions before and after an E.E. to shed light on the emotional origin of changes in preference: A.F.E. Our findings enhance scholarly understanding of preference changes due to exposure to other E.E.s, whether naturally caused (e.g. by flood or earthquake) or human-caused (e.g. by auto accidents or terrorist attacks). However, we acknowledge that a combat mission is undertaken voluntarily, while most other E.E.s do not usually involve choice.

In many countries, however, an increasing number of soldiers and private security forces are participating in international security operations. Hence information on preferences is of

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<sup>12</sup> The differences between pairwise correlations and estimates in Table 3 may be driven by two factors. First, pairwise correlations could not properly account for the complex empirical strategy presented in Figure 3 (particularly the endogeneity problem and the learning effect on the anticipatory emotions). Second, estimates in equation (3) may suffer from a lack of accuracy in equations (1) and (2) as pointed out in Wagner (2021).

<sup>13</sup> A total score of at least 50 is considered to be P.T.S.D.-positive in military populations (44 in the general population).

obvious value for policy, theory and empirical analysis when measuring the welfare impacts of such operations. Policy applications including cost-benefit analysis of military deployments often involve making welfare calculations over life paths, with uncertain impacts spread over time. The impact of military experience may change the daily behaviours and preferences of recruits, and explain differences in veterans' and non-veterans' later achievements. Moreover, a number of other studies have found long-lasting effects on decision-making after exposure to combat (Elder and Clipp 1989; Malmendier, Tate, and Yan 2011), violence (Buccioli and Zarri 2015; Kim and Lee 2014) or natural fatal disasters (Bernile, Bhagwat, and Rau 2017; de Blasio et al. 2021). Such changes may lie behind a behavioural change that could substantially impact both individuals and society at large.

Our analysis has several limitations. First, in addition to anticipation errors and potential adjustments, soldiers may also be subject to a recall bias about their emotions during combat. Particular episodes during the mission, e.g. peaks or end-of-mission events, may dominate the memory of the emotion experienced (Fredrickson and Kahneman 1993; Ochsner 2000; Redelmeier, Katz, and Kahneman 2003).<sup>14</sup> Second, as soldiers are not necessarily representative of the general population, the results may not be generalisable to other groups, or our findings could be specific to I.S.A.F.11 soldiers, whose P.T.S.D. scores were not high. Nevertheless, soldiers constitute a useful sample for studying stability in preferences, because the stakes (particularly where combat is involved) are much higher than for participants in laboratory experiments, where stimuli do not necessarily mimic real life (Al-Ubaydli, List, and Suskind 2017). Moreover, despite the absence of incentives, our survey should yield reliable answers because it was conducted in a formal setting (military fort) in the presence of high-ranking officers, thereby imparting a certain solemnity and commitment to the task. Furthermore, given that the survey forms were anonymized, the soldiers had no motivation to lie about their own emotions and decisions. The consistency of our results with those of previous studies also confirms this reliability. A third limitation is that these soldiers were clearly expecting the E.E., which raises the question of whether the A.F.E. hypothesis is generalisable to an unexpected E.E. In other words, can people also anticipate the emotions they would feel in an unexpected E.E., and can these emotions be compared with those they actually feel when it occurs?

A valuable future step would be to identify the mechanism underlying the A.F.E. effect. We have suggested two possible learning effects. First, soldiers may have discovered that they were mistaken when predicting future events and that they had forecast their emotions on inaccurate stimuli. Second, soldiers may have discovered that their emotional response to an E.E was not what they expected, leading them to revise their self-perception of emotional sensitivity. Another possibility is that A.F.E. may change the evaluation criteria. This explanation is in line with Braender (2020)'s observation that, while the thrill of the danger appeared the most important motivating factor before the mission, the experience of actual combat became the most important on return. Thus, after discovering that combat did not produce the anticipated level of excitement, soldiers may have reduced the importance of this excitement criterion and perhaps increased the value of other criteria motivating them to remain in the army. However, we cannot exclude a non-A.F.E. mechanism: since soldiers recall their most recent emotions when they forecast their emotions, changes in preference might depend directly on the emotions experienced rather than on A.F.E.s. Unfortunately, our data do not permit us to disentangle all these mechanisms.

It would also be interesting to directly test change in affective forecasting after an A.F.E., as the learning mechanism we propose should go hand in hand with reduced A.F.E. due to experience. This suggestion is borne out by the higher A.F.E.s for our subsample of first-timers, although not significant because of a lack of statistical power. Previous results suggest

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<sup>14</sup> For example, a soldier was K.I.A. less than one month before the end of the I.S.A.F. 11.

the persistence of A.F.E.s, as people are unable to remember their forecasts; however, those findings concerned events far less extreme than combat (Meyvis, Ratner, and Levav 2010).

Finally, soldiers may not be the only people whose preferences are affected by inaccurate affective forecasting. Since learning through E.E is costly, finding less extreme ways to make people better at forecasting their emotions would be a valuable subject for future research.

## Acknowledgements

This work was supported by the Agence Nationale de la Recherche [grants RISKEMOTION, ANR-2008RISKMAT00701 and ANR-17-EURE-0020] and by the Excellence Initiative of Aix-Marseille University - A\*MIDEX; *Soldaterlegatet* with financial support from Tryg [grant ID119562], Lundbeck, Novo Nordisk, and Aase and Ejnar Danielsen's funds. We thank Dean Lillard and Vincent de Gardelle and an anonymous reviewer for their numerous and valuable comments and suggestions, which helped improve the paper. We also thank participants in the SFI Advisory Research Board Conference, the 2014 Annual Meeting of the Association of Southern European Economic Theorists (ASSET), the 6th Conference of the French Experimental Economics Association (ASFEE) and participants in the CEEM seminar in Montpellier for suggestions on an earlier version, and Marjorie Sweetko and Natalie Reid for their thorough re-reading of the English. We are grateful to the Danish Armed Forces for facilitating data collection.

## Declaration of interest statement

No potential conflict of interest was reported by the authors.

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Table 1 Time and Risk Preference Characteristics of the Sample (n=355)

Variables	Obs	Mean	St. Dev.
<i>RiskTolerance</i> (1-4: low-high risk tolerance)	332	1.991	0.997
<i>RiskTolerance_after</i> (1-4: low-high risk tolerance)	328	2.037	0.985
<i>RiskTolerance_dif</i> (-3 to 3: change in risk tolerance)	316	.0253	1.026
<i>RiskAver</i> (1-4: low-high risk aversion)	344	2.951	1.025
<i>RiskAver_after</i> (1-4: low-high risk aversion)	337	2.849	0.993
<i>RiskAver_dif</i> (-3 to 3: change in risk aversion)	330	-0.094	1.0286
<i>Impatience</i> (0-7: patient-impatient)	340	3.200	2.237
<i>Impatience_after</i> (0-7: patient-impatient)	334	3.192	2.142
<i>Impatience_dif</i> (-6 to 6: change in impatience)	324	-.0123	2.476
<i>RiskLover</i> (1-10: feel less-more risk lover)	351	7.085	1.940
<i>RiskLover_after</i> (1-10: feel less-more risk lover)	350	6.954	1.935
<i>RiskLover_dif</i> (-9 to 9: Change in risk loving feeling)	347	-.133	1.947
<i>CareerPerspective</i> (0-4: low-high will to stay in the military)	347	2.516	1.331
<i>CareerPerspective_after</i> (0-4: low-high will to stay in the military)	347	2.425	1.334
<i>CareerPerspective_dif</i> (-4 to 4: Change in will to stay in the military)	333	-.072	1.114

Note: Obs.: Observations, St. Dev.: Standard deviation.

Table 2 Emotion Characteristics of the Sample (n=355)

Variables	Obs.	Mean	St. Dev.
<i>Fear (0-4)</i>	294	2.558	1.026
<i>Fear (0-4) if combat=1</i>	189	2.582	1.082
<i>Fear_after (0-4) if combat=1</i>	199	1.116	1.296
<i>AFE_Fear (-2 to 4)</i>	189	1.439	1.503
<i>Anxiety (0-4)</i>	294	1.224	1.202
<i>Anxiety (0-4) if combat=1</i>	189	1.101	1.210
<i>Anxiety_after (0-4) if combat=1</i>	196	0.520	0.989
<i>AFE Anxiety (-2 to 4)</i>	186	0.591	1.254
<i>Excitement (0-4)</i>	294	1.068	1.040
<i>Excitement (0-4) if combat=1</i>	189	0.995	1.024
<i>Excitement_after (0-4) if combat=1</i>	199	0.774	1.148
<i>AFE Excitement (-4 to 4)</i>	189	0.286	1.314

Note: Obs.: Observations, St. Dev.: Standard deviation.

Table 3 Testing Affective Forecasting Error Effect on Changes in Risk, Time and Occupational Preference Variables

	<i>RiskTolerance and AFE_Fear</i>				<i>Impatience and AFE_Fear</i>				<i>CareerPerspective and AFE_Excitement</i>			
<i>AFE</i> (d <sub>1</sub> )	.1402**	.1850***	.1413**	.1823**	.3553	.4118**	.3548	.4130**	.1772**	.2021**	.1752**	.2020**
	(.0292)	(.0084)	(.0315)	(.0121)	(.0574)	(.0373)	(.0689)	(.0481)	(.0334)	(.0211)	(.0408)	(.0251)
<i>Combat</i> (d <sub>2</sub> )	.0960	.0807	-	-	.01157	.0571	-	-	.0758	.0560	-	-
	(.5341)	(.6210)	-	-	(.9769)	(.8892)	-	-	(.6957)	(.7747)	-	-
Soldiers' characteristics ( <i>X</i> )	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personality traits	-	Yes	-	Yes	-	Yes	-	Yes	-	Yes	-	Yes
Combatants only	-	-	Yes	Yes	-	-	Yes	Yes	-	-	Yes	Yes
F-statistic	3.083**	2.179	5.705***	8.074***	4.423**	2.767*	4.203**	5.326***	2.751*	3.171***	5.053***	6.011***
	(.0482)	(.116)	(.0043)	(.0005)	(.0133)	(.0655)	(.0173)	(.0062)	(.0664)	(.0044)	(.0079)	(.0033)
Adjusted-R2	.01695	.0157	.0268	.0461	.0307	.0244	.0377	.0509	.0139	.0173	.0283	.0345
Observations	191	182	118	113	191	182	116	111	190	183	116	111

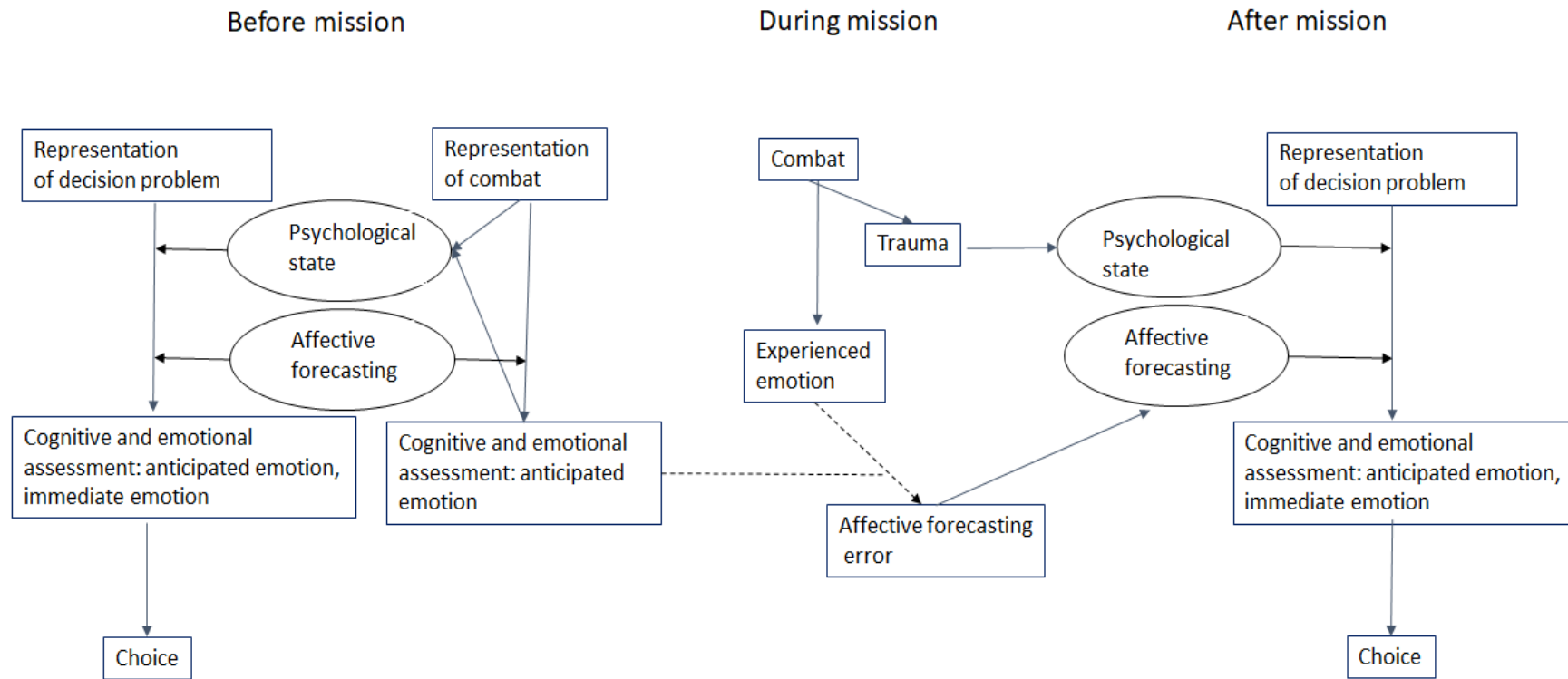
*Note:* P-values in parentheses: \*\*\* p<.01, \*\* p<.05, \* p<.10. Soldiers' characteristics *X* are: earnings, age, age square, couple, parent divorced, children, education (3 modalities), first-timer, family deployed member, seniority and unit level (8 modalities). Personality traits are conscientiousness, neuroticism and control. Robust standard errors in parentheses have been corrected for both 2-step estimations and predicted dependent variable (see Supplementary Appendix C for details).



Table 4 Combat Intensity. P.T.S.D. and change in Time, Risk and Occupational Preferences

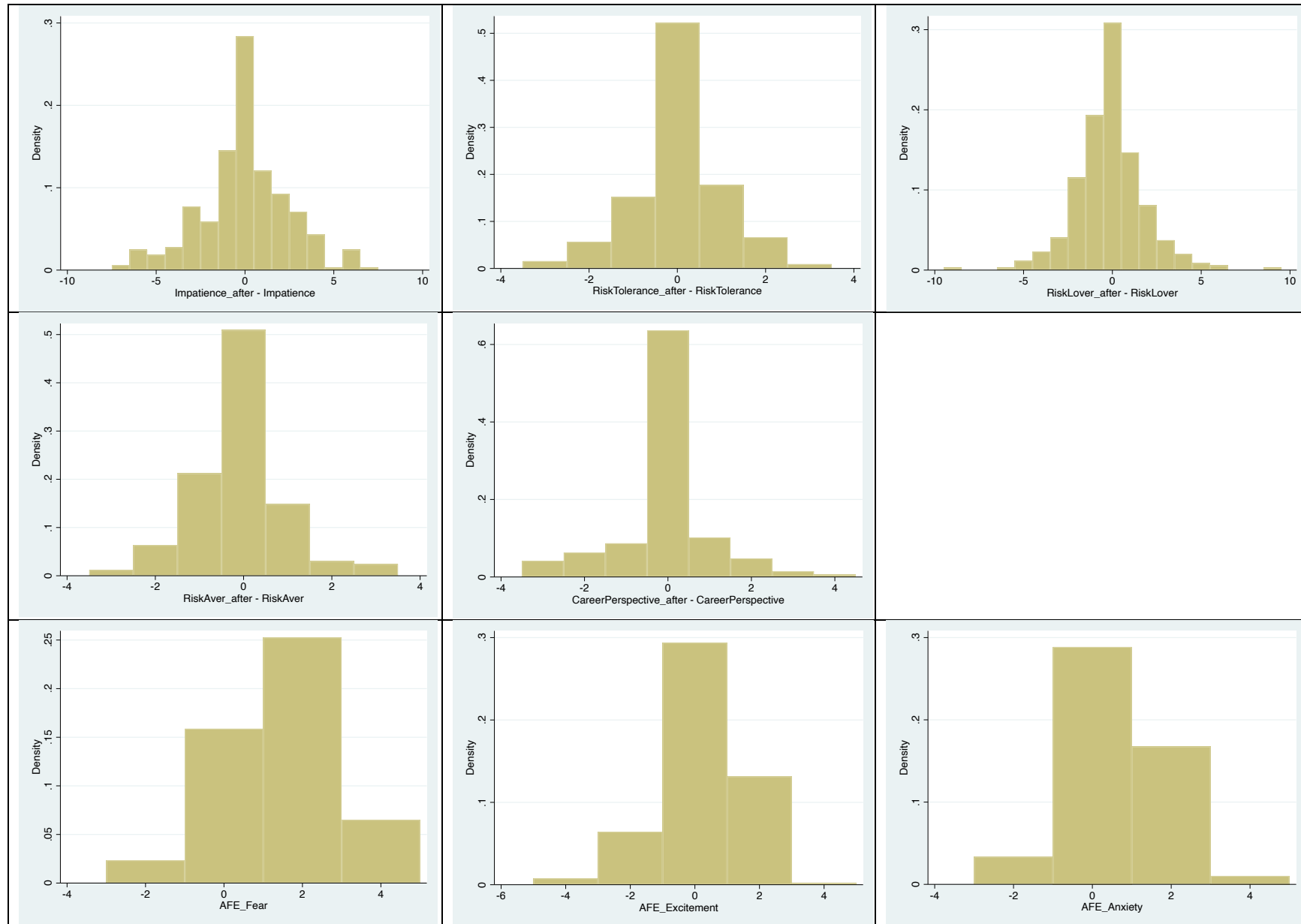
Preferences	<i>RiskAver</i>	<i>RiskToleran</i> <i>ce</i>	<i>Impatienc</i> <i>e</i>	<i>RiskLover</i>	<i>CareerPerspe</i> <i>ctive</i>
A. O.L.S. Regressions: Dependent is change in preferences					
P.T.S.D. score (17-85)	-0.0031 (.769)	-0.0025 (.779)	0.0030 (.872)	-0.0172 (.210)	-0.0167 (.110)
Adjusted R2	0.0554	0.0292	-0.0108	0.0062	-0.0519
B. Reduced-Form regressions: Dependent is change in preferences					
<i>Intensity</i>	0.0169 (.694)	-0.0228 (.617)	-0.0265 (.850)	0.1643 (.191)	0.0027 (.961)
Adjusted R2	0.0254	0.0349	-0.0303	-0.0001	-0.0684

*Note:* p-value in parentheses: \*\*\* p<.01. Soldiers' characteristics are: earnings, age, age square, couple, parent divorced, children, education (3 modalities), first-timer, family deployed member, seniority, changes in wealth and risk perception, conscientiousness, neuroticism, control, and unit level (8 modalities). An I.V. model instrumenting *PTSD* with *Intensity* leads to similar conclusions (details available upon request).

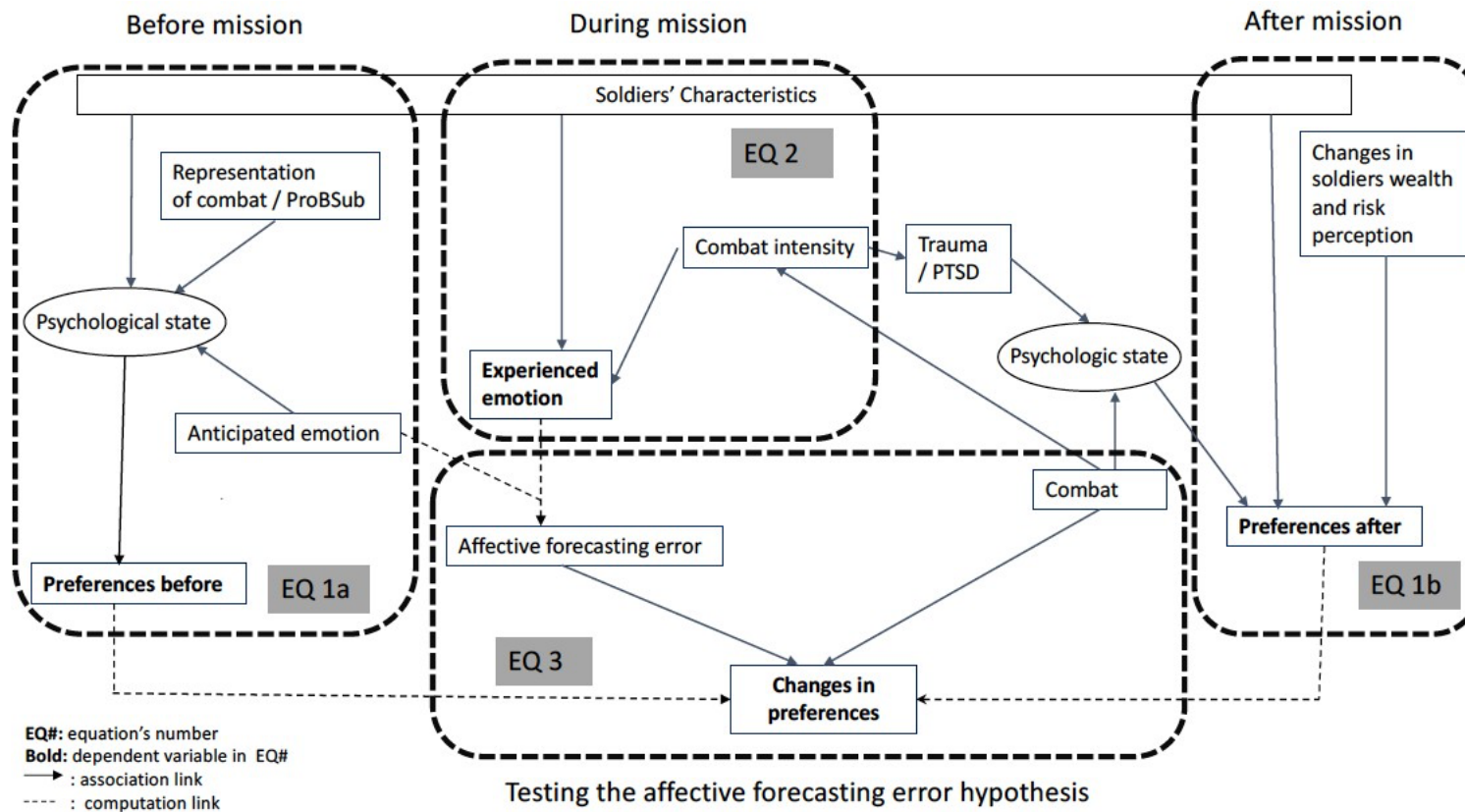


*Note:* Rectangles represent events, mental states and decisions, while ovals represent psychological processes. The continuous lines indicate relationship and the dotted lines show how the A.F.E. is formed.

**Figure 1 Summary of the Different Emotional Processes Considered**



**Figure 2 Distribution of the Before-and-After Changes in Preferences and Emotional Variables**



*Note.* Rectangles represent variables, while ovals represent psychological processes.

**Figure 3 Summary of the Empirical Strategy**

APPENDIX Table 1 Socio-Demographic and Military Characteristics of the Sample (n=355)

Variables	Mean	St. Dev.
<i>Age</i> (years)	28.617	7.310
<i>Couple</i> (share: in a relationship)	0.603	0.490
<i>Children</i> (share: has a child)	0.206	0.405
<i>EducBasic</i> (share: basic education)	0.287	0.453
<i>EducYouth</i> (share: youth education)	0.344	0.476
<i>EducVocat</i> (share: vocational education)	0.234	0.424
<i>EducFurther</i> (share: further education)	0.124	0.330
<i>ParentDiv</i> (share: parents divorced)	0.375	0.485
<i>Earnings</i> (Euros: monthly gross earnings)	6,816	1,947
<i>Seniority</i> (years: seniority in the armed forces)	6.309	6.212
<i>FamDeployed</i> (share: having previously deployed family members)	0.270	0.445
<i>FirstTimer</i> (share: not previously deployed)	0.327	0.470
<i>Returnee_previous</i> (share: previously returnee)	0.014	0.118
<i>ProbSub</i> (%: Subjective probability of combat involvement)	74.270	34.762
<i>Combat</i> (share: who experienced combat in this mission)	0.561	0.497
<i>PTSD</i> (17-85: P.T.S.D. score for the mission)	26.288	9.046
<i>Intensity</i> (0-10: Severity score of this mission)	2.094	1.716
<i>Intensity_previous</i> (0-10: Severity score of the previous mission) <sup>a</sup>	2.552	2.540

Note: St. Dev.: Standard deviation. <sup>a</sup> This score is computed for 190 previously deployed soldiers.

APPENDIX Table 2 Other Before- After- Control Variables of the Sample (n=355)

Variables	Obs.	Mean	St. Dev.
<i>Neuroticism</i> (1-5)	345	2.272	0.537
<i>Neuroticism_after</i> (1-5)	345	2.224	0.576
<i>Conscientiousness</i> (1-5)	345	3.831	0.377
<i>Conscientiousness_after</i> (1-5)	347	3.632	0.293
<i>Control</i> (0-4)	346	3.139	0.992
<i>Control_after</i> (0-4)	337	3.071	0.976
<i>RiskExposure</i> (5-25: less-more exposed to risks in daily life)	318	11.981	3.352
<i>RiskExposure_after</i> (5-25: less-more exposed to risks in daily life)	318	13.538	2.099
<i>PhysicalRiskExposure</i> (1-5: less-more exposed to risk of physical assault)	349	2.364	1.010
<i>PhysicalRiskExposure_after</i> (1-5: less-more exposed to risk of physical assault)	322	2.767	0.764
<i>Wealth</i> (Euros, before the mission)	326	14,636	30,219
<i>Wealth_after</i> (Euros, after the mission)	310	55,785	34,609

Note: Obs.: Observations, St. Dev.: Standard deviation.

### Appendix A Between-Soldier Validity Check

To determine whether the soldiers provide valid answers, we compute before-and-after-mission pairwise correlation coefficients for the four variables related to time and risk preferences (*RiskTolerance*, *RiskAver*, *RiskLover*, *Impatience*), and the three personality trait variables (*Neuroticism*, *Conscientiousness* and *Control*).

Results for before-mission correlations are consistent with expectations (see Table A.3): negative and significant correlations among *RiskAver* and *RiskTolerance* – as well as positive correlations between *RiskLover* and *RiskTolerance* – indicate the validity of the risk measures. That *Neuroticism* is negatively correlated with both *Conscientiousness* and *Control*, and that we find a significant positive correlation between *Conscientiousness* and *Control*, confirms the validity of the personality variables.

All these results also hold for the after-mission correlations (see Table A.4). In addition, *Impatience* shows a significant positive correlation with *RiskLover* (see Dohmen et al. 2010) and a negative correlation with *Control*. Of the personality variables, *Conscientiousness* is positively correlated with *Impatience*. Finally, we obtain comparable results from sub-sample computations for both before- and after-mission pairwise correlations: first-timers vs. previously deployed soldiers (results available upon request).

Table A.3 Before-mission Pairwise Correlations among Risk and Time Behavioural Variables

	<i>RiskTolerance</i>	<i>Impatience</i>	<i>RiskAver</i>	<i>RiskLover</i>	<i>Conscientiousness</i>	<i>Neuroticism</i>
<i>Impatience</i>	0.0745 (0.1796) 326					
<i>RiskAver</i>	-0.2229*** (0.0000) 327	-0.0866 (0.1146) 333				
<i>RiskLover</i>	0.2386*** (0.0000) 329	0.0953* (0.0805) 337	-0.0925* (0.0881) 341			
<i>Conscientiousness</i>	0.0250 (0.6529) 325	-0.0381 (0.4895) 332	0.0238 (0.6639) 336	0.0672 (0.2139) 344		
<i>Neuroticism</i>	-0.0580 (0.2991) 323	0.0992* (0.0714) 331	-0.0916* (0.0941) 335	-0.1308** (0.0152) 344	-0.3823*** (0.0000) 340	
<i>Control</i>	-0.0243 (0.6637) 323	-0.0423 (0.4431) 331	0.0600 (0.2718) 337	0.0127 (0.8154) 342	0.2784*** (0.0000) 337	-0.2879*** (0.0000) 339

Note: P-values in parentheses, number of observations in italics. \*\*\* p<.01, \*\* p<.05, \* p<.10.

Table A.4 After-mission Pairwise Correlations among Risk and Time Behavioural Variables

	<i>RiskTolerance</i>	<i>Impatience</i>	<i>RiskAver</i>	<i>RiskLover</i>	<i>Conscientiousness</i>	<i>Neuroticism</i>
<i>Impatience</i>	0.1066* (0.0561) 322					
<i>RiskAver</i>	-0.2155*** (0.0001) 321	-0.0574 (0.3019) 326				
<i>RiskLover</i>	0.2060*** (0.0002) 324	0.1165** (0.0344) 330	-0.0385 (0.4830) 334			
<i>Conscientiousness</i>	0.0069 (0.9023) 323	-0.1006* (0.0687) 328	-0.0648 (0.2396) 331	0.0813 (0.1313) 346		
<i>Neuroticism</i>	-0.0461 (0.4107) 321	0.0731 (0.1874) 327	0.0528 (0.3380) 331	-0.1488*** (0.0057) 344	-0.4408*** (0.0000) 342	
<i>Control</i>	0.0626 (0.2659) 318	-0.1198** (0.0316) 322	-0.1033* (0.0632) 324	-0.0557 (0.3106) 333	0.1892*** (0.0005) 331	-0.3040*** (0.0000) 329

Note: P-values in parentheses, number of observations in italics. \*\*\* p<.01, \*\* p<.05, \* p<.10.



## Appendix B Within-Soldier Consistency Check

We investigate individual changes at the soldier level for preferences and emotions. The upper part of Table B.5 shows that the correlation and regression parameters of the preference variables before and after the mission are all positive and significantly different from zero. The correlations are in the same range as those found in the literature. We find .35 for time preferences, with Meier and Sprenger (2015) finding around .46, and we find around .47 for risk preferences (for seven studies with sample size larger than 100, cited in Chuang and Schechter 2015; with results ranging from .13 to .55).

[Table B.5 about here]

Before- and after-mission equality tests consistently reveal non-significant changes for the *RiskTolerance* and *Impatience* variables, in line with standard results (e.g. Dürsch, Roemer, and Roth 2017, find that the aggregate stability of risk preferences over a 2-month period is 85%). No significant change is observed for *Career Perspective*. We also find an increase for *RiskAver* in line with results from studies examining the impact of war, civil conflict or drug-related violence (Brown et al. 2019; Jakiela and Ozier 2019; Callen et al. 2014; Kim and Lee 2014, Moya 2018), whereas other studies such as Voors et al. (2012) find a decrease in risk aversion and an increase in impatience. Our results for *RiskLover* are mixed.

For each of the three emotion variables, before-after correlations and A.F.E. are consistently significant and positive. These values are in the same order of magnitude as those reported in a meta-analysis on the relation between anticipated and experienced emotions (Coteț and David 2016). The average correlation computed from 34 studies is .39, with values ranging from .12 to .79. The difference computed from 94 studies shows for a large part of the studies a similar overestimation of anticipated emotions with a mean *Cohen's d* (the difference between the means divided by pooled standard deviation) of .42 and extreme values ranging from -.726 to 3.925. Our *Cohen's d* are 1.026 for *Fear*, .257 for *Excitement* and .519 for *Anxiety*.

Finally, note that for the personality trait variables, we observe a significant decrease in *Conscientiousness* and *Neuroticism* – less worried and less conscientious – but no significant change in *Control* (not shown). For the risk attitudinal variables all four equality tests reveal a very significant increase (not shown): after a mission, the soldiers consider themselves more exposed than before to risks in their daily lives (*RiskExposure*) and to the risk of physical assault (*PhysicalRiskExposure*). This finding confirms the need to account for changes in risk perception, changes that may affect preferences when one tests for A.F.E.s.

Table B.5 Stability Between Before-and-After Mission Variables

Variables	Before-and-after mission correlation		Before-and-after mission equality tests of ...			
	Pairwise Correlation	Regression coefficient <sup>a</sup>	Mean (paired data)	Median	Mean rank (Wilcoxon)	KS test
<b>Risk, Time and Occupational Preferences</b>						
<i>RiskTolerance</i> n=316	.4647*** (<.0001)	.4649*** (<.0001)	Non Rej. (1.000)	Non Rej. (.5152)	Non Rej. (.5078)	Non Rej. (.937)
<i>Impatience</i> n=324	.3544*** (<.0001)	.3579*** (<.0001)	Non Rej. (.9285)	Non Rej. (.9999)	Non Rej. (.9405)	Non Rej. (.813)
<i>RiskAver</i> n=330	.4732*** (<.0001)	.4715*** (<.0001)	Higher** (.0490)	Higher** (.0168)	Higher** (.0335)	Non Rej. (.275)
<i>RiskLover</i> n=347	.4912*** (<.0001)	.4645*** (<.0001)	Non Rej. (.1028)	Higher** (.0305)	Higher* (.0801)	Non Rej. (.435)
<i>CareerPerspective</i> n=333	.6489*** (<.0001)	.4627*** (<.0001)	Non Rej. (.2388)	Non Rej. (.5856)	Non Rej. (.4115)	Non Rej. (.581)
<b>Emotions</b>						
<i>Fear</i> n=189	.2193*** (.0024)	.2705*** (.003)	Lower*** (<.0001)	Lower*** (<.0001)	Lower*** (<.0001)	Lower*** (<.0001)
<i>Anxiety</i> n=186	.3549*** (<.0001)	.3093*** (<.0001)	Lower*** (<.0001)	Lower*** (<.0001)	Lower*** (<.0001)	Lower*** (<.0001)
<i>Excitement</i> n=189	.2085*** (.0040)	.0945 (.288)	Lower*** (.0016)	Lower*** (.0009)	Lower*** (.0016)	Lower** (.012)

*Note:* In each cell, the result of the test is given along with p-values in parentheses (bilateral for correlation and equality tests when equality is not rejected, unilateral otherwise). KS for Kolmogorov-Smirnov. Non Rej. for non-rejection of equality test. \*\*\* p<.01, \*\* p<.05, \* p<.10. <sup>a</sup> Controls in regressions explaining the after-mission variable by the corresponding before-mission variable include earnings, age, age square, couple, parent divorced, children, education (3 modalities), first-timer, family deployed member, seniority and unit level (8 modalities). Regressions are estimated with robust standard errors.

### Appendix C Pairwise Correlation Matrix Between the A.F.E.s and the Changes in Preferences

*AFE\_Fear* and *AFE\_Anxiety* (two unpleasant emotions) are significantly and positively correlated, while *AFE\_Fear* and *AFE\_Excitement* (one unpleasant and one pleasant emotion) are significantly and negatively correlated, as expected. Changes in *RiskTolerance* and *RiskAver* are significantly negatively correlated, while changes in *RiskLover* and *CareerPerspective* are significantly positively correlated, as expected given their construction. *AFE\_Excitement* and *RiskAver\_dif* are significantly negatively correlated (p-value=.0415), while *AFE\_Fear* is positively correlated with *RiskAver\_dif* (p-value=.0715) and *RiskTolerance\_dif* (p-value=.0967). However, *AFE\_Anxiety* is never significantly correlated with changes in preferences.

[Table C.6 about here]

Table C.6 Pairwise Correlations among Changes in Emotion and Risk and Time Behavioural Variables

	<i>AFE_Fear</i>	<i>AFE_Anxiety</i>	<i>AFE_Excitem ent</i>	<i>RiskTolerance_ dif</i>	<i>Impatience_ dif</i>	<i>RiskAver_ dif</i>	<i>RiskLover_ dif</i>
<i>AFE_Anxiety</i>	0.1833** (0.0123) <i>186</i>						
<i>AFE_Excitement</i>	-0.1770** (0.0148) <i>189</i>	-0.0693 (0.3472) <i>186</i>					
<i>RiskTolerance_ dif</i>	0.1267* (0.0967) <i>173</i>	0.0475 (0.5382) <i>170</i>	0.0094 (0.9022) <i>173</i>				
<i>Impatience_ dif</i>	0.0627 (0.4073) <i>177</i>	0.1069 (0.1604) <i>174</i>	0.0738 (0.3287) <i>177</i>	0.1679** (0.0255) <i>177</i>			
<i>RiskAver_ dif</i>	0.1370* (0.0715) <i>174</i>	0.0607 (0.4301) <i>171</i>	-0.1547** (0.0415) <i>174</i>	-0.1686** (0.0262) <i>174</i>	-0.1072 (0.1557) <i>177</i>		
<i>RiskLover_ dif</i>	0.0721 (0.3268) <i>187</i>	0.0013 (0.9863) <i>184</i>	-0.0246 (0.7379) <i>187</i>	-0.0029 (0.9697) <i>178</i>	-0.0819 (0.2702) <i>183</i>	0.0725 (0.3318) <i>181</i>	
<i>CareerPerspective_ dif</i>	0.0708 (0.3452) <i>180</i>	0.0735 (0.3295) <i>178</i>	0.0690 (0.3573) <i>180</i>	0.0349 (0.6473) <i>174</i>	-0.0226 (0.7654) <i>177</i>	0.0325 (0.6696) <i>175</i>	0.1393* (0.0586) <i>185</i>

Note: P-values in parentheses, number of observations in italics. \*\*\* p<.01, \*\* p<.05, \* p<.10.

# SUPPLEMENTARY APPENDIX

## Appendix A

Table S.1 Socio-demographic (all Before-mission) and Military Characteristics of the Database

	All soldiers (n=465) (1)		Answer only before (n=110) (2)		Answer before and after (n=355) (3)		Equality test (3) vs. (2) <sup>a</sup>
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	
<i>Age</i> (years)	29.166	7.727	30.936	8.744	28.617	7.310	.013**
<i>Couple</i> (share: in a relationship)	0.611	0.488	0.636	0.483	0.603	0.490	.527
<i>Children</i> (share: has a child)	0.230	0.421	0.309	0.464	0.206	0.405	.037**
<i>EducBasic</i> (share: basic education)	0.280	0.449	0.255	0.438	0.287	0.453	.497
<i>EducYouth</i> (share: youth education)	0.344	0.476	0.345	0.478	0.344	0.476	.973
<i>EducVocat</i> (share: vocational education)	0.234	0.424	0.236	0.427	0.234	0.424	.956
<i>EducFurther</i> (share: further education)	0.129	0.336	0.145	0.354	0.124	0.330	.572
<i>ParentDiv</i> (share: parents divorced)	0.378	0.486	0.391	0.490	0.375	0.485	.761
<i>Seniority</i> (years: seniority in the armed forces)	6.993	6.865	9.041	8.287	6.392	6.277	.004***
<i>FamDeployed</i> (share: having previously deployed family members)	0.282	0.450	0.318	0.468	0.270	0.445	.345
<i>FirstTimer</i> (share: not previously deployed)	0.323	0.468	0.309	0.464	0.327	0.470	.728
<i>Returnee_previous</i> (share: has been returnee before this mission)	0.034	0.182	0.073	0.261	0.023	0.149	.057*
<i>Earnings</i> (Euros: monthly gross earnings)	6,879	1,964	7,081	2,013	6,816	1,947	.226
<i>Wealth</i> (Euros, before the mission)	13,890	27,360	11,484	14,610	14,636	30,219	.156
Wounded or killed in combat	0.019	0.138	0.027	0.164	0.017	0.129	.544

Note: <sup>a</sup> P-value of bilateral equality test with unequal variance, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . We estimated an OLS with all the variables and a dummy for ‘answering only “before”’ as the dependent variable and we obtain an F-test for joint nullity of 1.16 (p-value = .30). We estimate an attrition probit model (Fitzgerald, Gottschalk, and Moffit 1998) explaining the attrition variable (only answering ‘before’) with all the variables from Table S1. The Wald test of joint nullity of all coefficients Chi-squared (15)=16.80 (p-value=.3310) cannot reject the randomness of attrition. The pooling test due to Beckett et al. (1988) also confirms that we cannot reject the null hypothesis of attrition being random (p-value=.41).

Table S.2 Other variables (all Before-mission) of the Database

	All soldiers (n=465) (1)		Answer only before (n=110) (2)		Answer before and after (n=355) (3)		Equality test (3) vs. (2) <sup>a</sup>
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	
<i>ProbSub</i> (%: Subjective probability of combat involvement)	74.731	34.591	76.231	34.178	74.270	34.762	.634
<i>RiskTolerance</i> (1-4: low-high risk tolerance)	1.991	0.998	1.990	1.005	1.991	0.997	.997
<i>RiskAver</i> (1-4: low-high risk aversion)	2.927	1.028	2.852	1.040	2.951	1.025	.389
<i>Impatience</i> (0-7: patient-impatient)	3.285	2.249	3.557	2.277	3.200	2.237	.159
<i>RiskLover</i> (1-10: feel less-more risk lover)	7.126	1.924	7.255	1.874	7.085	1.940	.414
<i>CareerPerspective</i> (0-4: low-high will to stay in the military)	2.570	1.332	2.748	1.325	2.516	1.331	.116
<i>RiskExposure</i> (5-25: less-more exposed to risks in daily life)	11.990	3.313	12.020	3.200	11.981	3.352	.917
<i>PhysicalRiskExposure</i> (1-5: less-more exposed to risk of physical assault)	2.389	1.009	2.472	1.009	2.364	1.010	.331
<i>Neuroticism</i> (1-5)	2.273	0.536	2.276	0.535	2.272	0.537	.944
<i>Conscientiousness</i> (1-5)	3.832	0.378	3.838	0.383	3.831	0.377	.875
<i>Control</i> (0-4)	3.106	0.991	3.000	0.986	3.139	0.992	.204

Note: <sup>a</sup> P-value of bilateral equality test with unequal variance, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . We estimated an OLS with all the variables and a dummy for ‘answering only “before”’ as the dependent variable and we obtain an F-test for joint nullity of 1.32 (p-value= .21). We estimate an attrition probit model (Fitzgerald, Gottschalk, and Moffit 1998) explaining the attrition variable (answering only ‘before’) with all the variables from Table S2. The Wald test of joint nullity of all coefficients Chi-squared (11)=14.34 (p-value=.2147) cannot reject the randomness of attrition, as does the pooling test due to Beckett et al. (1988) (p-value=.214).

Table S.3 Socio-demographic (all Before-mission) and Military Characteristics of the Sample

Variables	Full Sample (n=355)		Not exposed to combat (n=156)		Exposed to combat (n=199)		Equality test Exposed vs. Not exposed <sup>b</sup>
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	
<i>Age</i> (years)	28.617	7.310	26.633	5.558	31.147	8.432	<.0001***
<i>Couple</i> (share: in a relationship)	0.603	0.490	0.533	0.500	0.692	0.463	.002***
<i>Children</i> (share: has a child)	0.206	0.405	0.111	0.314	0.327	0.471	<.0001***
<i>EducBasic</i> (share: basic education)	0.287	0.453	0.307	0.462	0.263	0.442	.365
<i>EducYouth</i> (share: youth education)	0.344	0.476	0.362	0.482	0.321	0.468	.416
<i>EducVocat</i> (share: vocational education)	0.234	0.424	0.216	0.413	0.256	0.438	.378
<i>EducFurther</i> (share: further education)	0.124	0.330	0.101	0.301	0.154	0.362	.140
<i>ParentDiv</i> (share: parents divorced)	0.375	0.485	0.372	0.485	0.378	0.487	.903
<i>Seniority</i> (years: seniority in the armed forces)	6.309	6.212	4.729	4.240	8.318	7.606	<.0001***
<i>FamDeployed</i> (share: having previously deployed family members)	0.270	0.445	0.312	0.464	0.218	0.414	.046**
<i>FirstTimer</i> (share: not previously deployed)	0.327	0.470	0.397	0.491	0.237	0.427	.001***
<i>Returnee_previous</i> (share: has been returnee before this mission)	0.014	0.118	0.015	0.122	0.013	0.113	.857
<i>Earnings</i> (Euros: monthly gross earnings)	6,816	1,947	7,209	2,294	6,403	1,387	.0018***
<i>Wealth</i> (Euros, before the mission)	14,636	30,219	19,170	37,475	9,814	18,739	.0043***
<i>Wealth_after</i> (Euros, after the mission)	55,785	34,609	62,648	42,174	48,488	21,989	.013**
<i>Intensity</i> (0-10: Severity score of this mission)	1.539	1.924	0.839	1.028	3.125	1.462	<.0001***
<i>Intensity_previous</i> (0-10: Severity score of the previous mission) <sup>a</sup>	2.552	2.540	1.679	2.068	3.501	2.672	<.0001***

Note: <sup>a</sup> This score is computed for 190 previously deployed soldiers. <sup>b</sup> P-value of bilateral equality test with unequal variance, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table S.4 Regression Results for Combat Exposure and Intensity of Combat

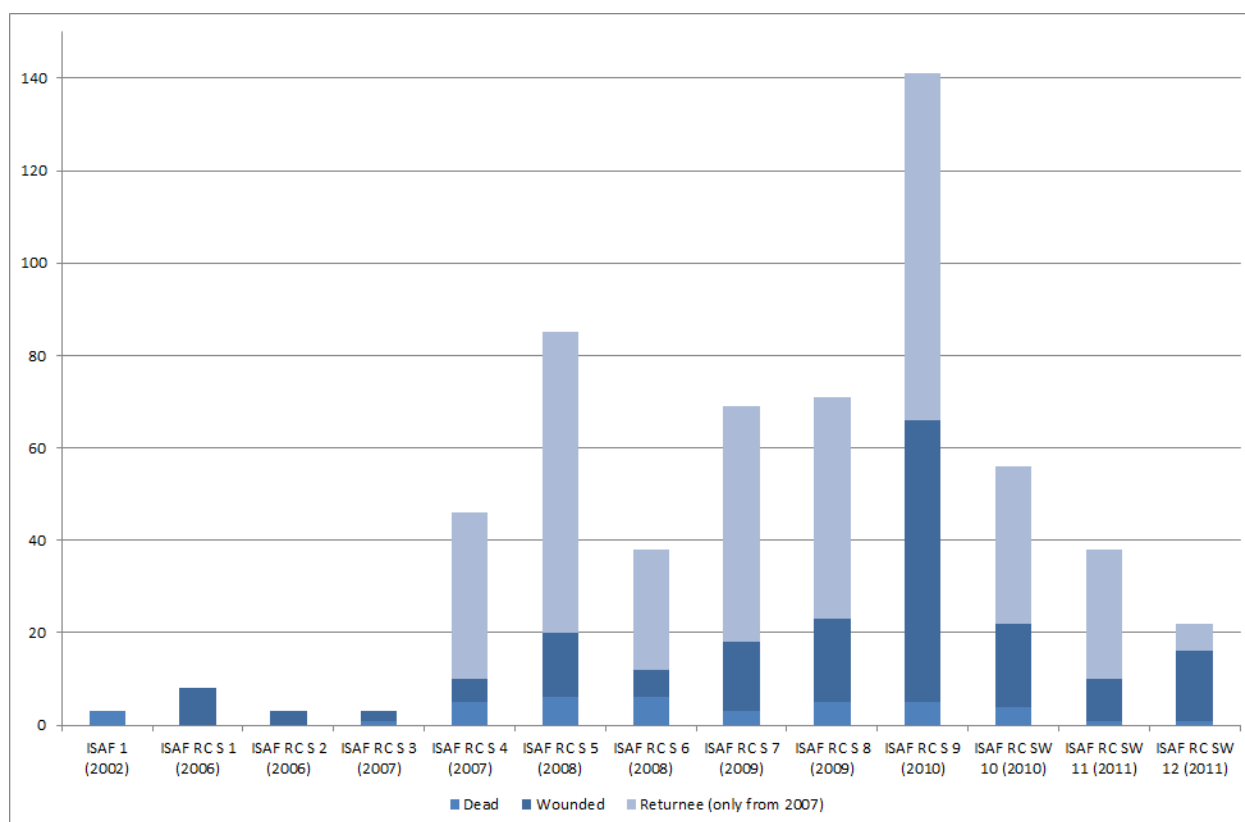
	<i>Intensity</i> of combat exposure		Exposure to <i>Combat</i> (0/1)	
	Coefficient (Standard error)	Coefficient (Standard error)	Coefficient (Standard error)	Coefficient (Standard error)
<i>Age</i>	0.3162 (0.2032)	0.3444 (0.2085)	0.0239 (0.0287)	0.0070 (0.0289)
<i>Age*Age</i>	-0.0069* (0.0034)	-0.0075* (0.0034)	-0.0004 (0.0004)	-0.0002 (0.0004)
<i>ParentDiv</i>	0.0790 (0.2594)	0.0300 (0.2652)	0.0110 (0.0532)	0.0147 (0.0549)
<i>Couple</i>	0.0255 (0.2445)	0.0710 (0.2628)	0.0337 (0.0555)	0.0385 (0.0582)
<i>Children</i>	0.2277 (0.4495)	0.2545 (0.4532)	-0.0993 (0.0999)	-0.0776 (0.1018)
<i>EducBasic</i>	0.1797 (0.3871)	0.1984 (0.4078)	0.0283 (0.1058)	0.0220 (0.1121)
<i>EducYouth</i>	0.0898 (0.3884)	0.1250 (0.3967)	-0.0513 (0.1001)	-0.0937 (0.1049)
<i>EducVocat</i>	-0.0707 (0.3960)	-0.0203 (0.4122)	-0.0796 (0.0980)	-0.0754 (0.1029)
<i>FirstTimer</i>	0.0603 (0.3139)	0.1003 (0.3065)	0.0333 (0.0675)	0.0293 (0.0687)
<i>Seniority</i>	0.1118 (0.0614)	0.1168 (0.0623)	0.0081 (0.0110)	0.0087 (0.0119)
<i>FamDeployed</i>	0.5563* (0.2421)	0.5615* (0.2431)	0.0870 (0.0528)	0.0987 (0.0539)
<i>ProbSub</i>	0.0116* (0.0034)	0.0099 (0.0034)	0.0064*** (0.0018)	0.0066*** (0.0018)



	(0.0046)	(0.0051)	(0.0009)	(0.0010)
<i>Neuroticism</i>		-0.3481 (0.2553)		0.0779 (0.0534)
<i>Conscientiousness</i>		-0.4551 (0.3577)		0.0372 (0.0781)
<i>Control</i>		0.1697 (0.1283)		0.0434 (0.0283)
F-statistic	1.3378	1.1207	4.6478	4.1538
F-Stat p-value	0.2046	0.3451	0.0000	0.0000
Partial-R2	0.1077	0.1202	0.1824	0.2117
Observations	159	152	284	267

*Note:* The F-statistics test the hypothesis that all explanatory variables are jointly non-significant. P-values of the F-statistics are reported. The columns contain coefficients and robust standard errors (in parentheses) from OLS regressions. Similar results are obtained with a logistic regression for *Combat* (details upon request). All the variables are before-mission and the regressions also control for the soldier's unit. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Figure S.1 Number of dead, wounded, returnees from Danish participation in ISAF missions since 2001.



Source: Danish Defence

## Appendix B

### P.T.S.D. checklist

Below is a list of problems and complaints that veterans sometimes have in response to stressful military experiences. Please read each one carefully, then put an X to one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

		Not at all	A little bit	Moderately	Quite a bit	Extremely
1.	Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2.	Repeated, disturbing <i>dreams</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3.	Suddenly <i>acting or feeling</i> as if a stressful military experience <i>were happening again</i> (as if you were reliving it)?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4.	Feeling <i>very upset</i> when <i>something reminded you</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5.	Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, sweating) when <i>something reminded you</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6.	Avoiding <i>thinking about or talking about</i> a stressful military experience or <i>avoiding having feelings</i> related to it?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7.	Avoiding <i>activities or situations</i> because <i>they reminded you</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8.	Trouble <i>remembering important parts</i> of a stressful military experience?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9.	<i>Loss of interest</i> in activities that you used to enjoy?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11.	Feeling <i>emotionally numb</i> or being- unable to have loving feelings for those close to you?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12.	Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13.	Trouble <i>falling or staying asleep</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
14.	Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15.	Having <i>difficulty concentrating</i> ?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16.	Being " <i>super-alert</i> " or watchful or on guard?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17.	Feeling <i>jumpy</i> or easily startled?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

### Appendix C Standard error correction procedure

Corrections related to a predicted regressor are standard practice (Murphy and Topel 1985; Greene 2012), and those related to a predicted dependent variable have been proposed by, for example, Dumont et al. (2005) or Chen et al. (2018). However, our three-step modelling makes corrections tricky, especially because of the simultaneous equation system in step 1 and the need for both corrections in step 3. To obtain the corrected standard errors, we, thus proceed in two phases.

First, after step 1, instead of computing  $\hat{e}(\Delta P)$  based on  $\hat{\varepsilon}_1 = Pref - \widehat{Pref}$  and on  $\hat{\varepsilon}_2 = Pref\_after - \widehat{Pref\_after}$ , we use the estimated standard errors of each observation prediction ( $\widehat{\sigma_\varepsilon}$ ) to generate predicted values, hence introducing additional variance. In practice, we compute  $\widehat{\varepsilon}_1 = Pref - N(\widehat{Pref}, \widehat{\sigma_{\varepsilon_1}^2})$  and  $\widehat{\varepsilon}_2 = Pref\_after - N(\widehat{Pref\_after}, \widehat{\sigma_{\varepsilon_2}^2})$ , by drawing 1000 i.i.d. samples in the respective normal distribution  $N(\cdot)$ . As each observation is only represented once in each of the 1,000 generated samples (no replacement), this sampling method is different from bootstrapping. Second, to provide mean estimates accounting for the additional variance of the dependent variable, we estimate equation (3) on the 1000 generated samples with  $\widehat{\hat{e}}(\Delta P) \equiv (\widehat{\varepsilon}_2 - \widehat{\varepsilon}_1)$  as the dependent variable.

The second phase consists in a correction of the standard error of the regressors implemented in step 3, based on their variance-covariance matrix (Greene 2012).

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