Work- and Job-related Stress, Emotions, and Performance in Critical Situations
An interdisciplinary study in the context of airport security

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Abstract

In this paper we present an interdisciplinary approach to inquire the effects of stress in job environments, which integrates a cognitive psychology experiment and an ethnographic study, both conducted with the security guards of an International airport.

Keywords: airport security; decision-making; ethnography; emotion management; work-related stress; job-related stress; work engagement.

Introduction

The studies and reflections presented in this article are part of the work conducted within the project VisCoSo[1]. It is an interdisciplinary project, involving members with heterogeneous expertise. Its case study is an International airport, with a focus on specific areas where risk and emergency concerns are particularly present: security and surveillance. In this paper we will concentrate on the work carried out, using different disciplinary approaches, with the personnel in charge of security checkpoints, namely private security guards (about 90 in total). Employees of a private security firm, after specific training they serve as "public officers" in the context of airport security, under the supervision of the Police.

From April 2013 to May 2014, an ethnographer has conducted 380 hours of participant observation (e.g. Agar, 1996), distributed over different seasons, weekdays and time slots. After that, from July 2014 until March 2015, she has conducted audio-recorded qualitative interviews (38) with some of the guards and the policemen. The ethnography has produced more than 1000 pages of fieldnotes and 700 ca. pages of interview transcriptions. On the other hand, in 2014, also a cognitive psychology experiment, aimed at studying the correlation between situated stress and risky attitude in professionals working in a complex and safety-critical environment, has been conducted over 36 security guards. The analytical outcomes resulting from the application of these two approaches will constitute the basis upon which an ontological model of the airport and a more general one of socio-material systems will be built, which is the final goal of the VisCoSo project (Bassetti et al. 2015).

In this paper we will analyse the relationship between stress and emotions, on one side, and performance, on the other, in a specific professional setting, that of airport security, looking at it from two different perspectives: the one of cognitive psychology and that of ethnographic studies. We will show the primary results of the two approaches, but we will also show how very interesting insights and future directions for research can emerge from the encounter of the two.

[1] Detection of crisis in socio-material systems via VISual-COgnitive-SOcial processes. www.loa.istc.cnr.it/projects/viscoso/

The experiment: stress and decision-making

In this section we illustrate the experiment. Stress is the cognitive perception that a situation is uncontrollable and unpredictable and elicits psychological, physiological and behavioural reactions (e.g., Dickerson & Kemeny, 2004). Several individual factors may help individuals to cope with stress, such as social support, self-efficacy, and coping style (Taylor & Stanton, 2007; Bakker & Leiter, 2010). Since decision-making is the ability to select the most adaptive course of action for the organism among all possible alternatives (Bechara et al., 2000), decision-making may represent one of the coping resources available for the stressful situation. On the other side, Janis and Mann (1977) claimed that high stress levels can lead to make a decision before all options have been taken into account and their possible outcome estimated (premature closure) – this is riskier behaviour. Only recently researchers have started to study the interaction between decision-making and stress with different, and sometimes contrasting, results. However, no studies have investigated how stress affects risky decision-making in individuals that are frequently exposed to stressful situations. Therefore, within a specific professional setting, i.e., airport security, our experiment aims at investigating risky behaviour when facing stressful situations as compared with non stressful ones.

Method and Experimental Procedures

Participants. The experiment has involved 36 participants, recruited from the International airport that has been chosen as case study for the project. They are employed with the role of security guards. They have been randomly assigned to one of the two experimental conditions: stressful vs. relaxed situations (exposure to a video). The two groups were matched (p=N.S. for all the comparisons) for demographic and personality characteristics (see Table 1 for

details). All participants provided written informed consent.

Personality Assessment. At the beginning of the study participants have been asked to answer questionnaires investigating the degree to which people perceive their life as stressful (by using the Perceived Stress Scale – PSS; Cohen et al., 1988) and negative emotional status (Negative Affective scale – PANAS; Watson et al., 1999). PANAS has again been administered after the video presentation, in order to check whether and how it affected participants' emotion. At the end of the task the impulsiveness traits questionnaire (Barratt Impulsiveness Scale – BIS11; Patton et al., 1995) was administered to make sure that differences in impulsiveness did not affect participants' risky choices.

Table 1: Demographic and personality assessment[2]

	Relaxed Situation Group	Stressful Situation Group
Number	18	18
Sex	10 M, 8 F	8 M, 10F
Age	37.67 (10.92)	35.78 (10.48)
Education (years)	13.58 (1.83)	13.22 (1.73)
Work experience (months)	90.39 (57.1)	87.22 (56.01)
Perceived Stress Scale	13.78 (7.51)	14.72 (6.68)
Pre-video PANAS	16.39 (7.34)	16.55 (4.12)
Post-video PANAS	12.94 (6.61)	14.11 (4.54)
Emotional involvement	7.75 (1.6)	6.97 (1.81)

Video presentation. Before participants performed the experimental task they watched a video (about 3 min). The videos were chosen after an assessment of typical situations lived by guards at the airport. In one condition (Relaxed Situation; RS), the video represented a very relaxing situation in an airport hall. In the other condition (Stressful Situation; SS), participants were instead presented with a video showing passengers posing several problems. The level of emotional involvement with the video was also measured (see Table 1) in both conditions, on a 9-points scale, ranging from 1 (not at all) to 9 (definitely yes).

Task. We have used a gambling task, similar to a previous one (Giorgetta et al., 2012), in which participants had to choose between a *safer* and a *riskier* option. Participants sat comfortably in front of a computer to perform the task. On each trial of the experiment, participants first were asked to look at a fixation point, which lasted for 500 msec, and then were presented with two gambles displayed on either side of the screen. Participants were asked to choose one of these options. In one of the choices they could win more but also lose more (riskier option), whereas in the other they could win less but also lose less (safer option). For both gambles, the probability of winning and losing was the same (p=0.5). The pair of gambles remained on the screen until the participant selected one of them by pressing the corresponding button. After their response a fixation point was again presented for 500 msec.; the chosen gamble was then presented in the centre of the screen. In case of win the arrow stopped on the white side of the gamble and a label "You win!" appeared; in case of loss the arrow stopped on the grey side and a label "You lose!" appeared. After this, participants were asked to answer both an "Emotional" (How do you feel about the outcome?) and a "Choice" (Would you like to change your choice?) ratings on a 9-point scale, ranging from 1 (happy/definitely yes) to 9 (sad/not at all). The outcome of each trial was determined pseudorandomly, with the overall constraint that each participant experienced an equal number of wins and losses. The number of small or large outcomes depended on the participants' safe or risky choices and thus was not controlled. Participants were instructed to earn as many points as possible. To enhance participants' motivation at the task, they were told they would be monetarily compensated depending on the outcomes of their choices in 10 trials (out of 32), randomly selected by the computer at the end of the experiment. For ethical reasons, all participants received the same compensation (5€). There were 32 trials in total, divided into 2 equal blocks. Stimulus presentation and data acquisition have been controlled using the E-prime software package (PST, Inc., Pittsburgh, PA), running on a Windows computer. Instructions were presented in written form and the entire experiment lasted about 40 minutes.

Results

Emotional Assessment. Data have been analysed by independent-samples T-test, where the responses to the questionnaires were used as dependent variables and the two groups as the grouping variable. The two groups of participants did not show significant differences either on their perceived stress (PSS) [$t(39)=.41$, $p=.68$] or on their impulsivity (BIS11) [$p>.1$], or in the negative affective scale (PANAS) [$t(34)=.08$, $p=.93$]. Therefore, any difference in the performance at the task between the two groups can be ascribed to the video presentation. Notably, the means recorded in the PSS, for both groups, were above that of Caucasian population (M=12.8; Cohen et al., 1988) In order to check for the effect of the experimental conditions we used, we performed within each group a T-test on the Negative Affective scale of the PANAS, administered pre and post the video presentation. Findings showed that only participants in RS reduced their negative affectivity after the video presentation [$t(1, 18)=2.9$, $p<.01$], whereas participants in SS did not [$t(1, 18)=1.8$, $p=.1$]. The emotional involvement with the video between the two experimental conditions do not differ [$t(34)=1.36$, $p=.2$]. See Table 1 for details.

Decision under risk. In order to assess whether there was a shift in risk-taking behaviour between the two groups due to the experimental condition (relaxed vs. stressful situation),

[2] Data report average and, in brackets, standard deviation.

the mean percentage of riskier choices for each participant was determined for the two groups. Data were analysed by independent-samples T-test, with the participants' choice and the average response time as the two dependent variables and the two groups as the grouping variable. Results showed that participants made a statistically significant [t(34)=2.24, p<.05] higher number of risky choices in the RS than in the SS condition [Figure 1a]. The average time for riskier choices was not significantly different [t(34)=0.31; p=.76] between participants in RS and SS conditions [Figure 1b].

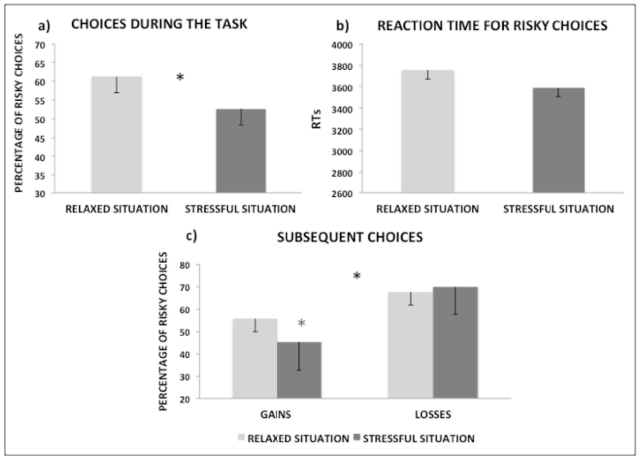

Figure1. Data represent the average of risky choices (a); reaction time spent to make these choices (b); the effect of the outcome on the subsequent choices (c) [* = p<.05]

In order to check whether participants in the two experimental conditions were differently sensitive to the outcome of their gambles, we compared the percentage of risky choices that followed losses (smaller and larger) to those that followed gains (smaller and larger), in both conditions [See figure 1c]. Therefore, we performed a mixed ANOVA analysis on risky choices, with outcome (losses vs. gains) as a within factor and condition (RS vs. SS) as a between factor. Results showed a main effect for the outcome [F(1, 34)=31.45, p<.001] and a significant interaction between outcome and experimental condition [F(1, 34)=3.88; p<.05]. In particular, post-hoc analyses (Duncan test) showed that in both conditions participants chose a lower number of risky choices after gains than losses (p<.01) and, interestingly, that in the SS condition participants chose a lower number of risky choices after gains than in the RS condition (p<.05).

Subjective ratings on emotion and choices. We performed two mixed ANOVA analyses with outcome (losses vs. gains) and choices (safer vs. riskier) as within factors and experimental conditions (RS vs. SS) as between factor, respectively, on "emotion" and "choice" ratings. Results on "emotion" ratings showed a main effect of outcome [F(1,33)=103.66, p<.001] and an interaction effect between outcome and experimental condition [F(1,33)=5.47, p<.05]. Post-hoc analyses showed that, even though in both conditions participants were happier (p<.001) after gains (M=3.75; SD=1.38) than losses (M=7.5; SD=1.59), however participants in the RS condition (M=8.14; SD=1.11) were happier than those in the SS condition (M=7.07; SD=1.77) after gains (p<.05). Findings on "choice" ratings showed also a main effect of outcome [F(1,33)=63.16, p<.001], i.e., that participants in both experimental conditions wanted more to change their choices after losses (M=4.39; SD=2.7) than after gains (M=8.24; SD=1.23). No other meaningful effect was found.

Discussion

About the effectiveness of the experimental manipulation, tested by the PANAS, participants in SS condition didn't show a higher rating after having viewed the video than before it. However, both groups were already in a stressful situation (PSS findings). Thus, the lower rating at the PANAS in participants in RS condition suggests indeed that the experimental manipulation lowered the level of stress. Our findings show that situated stress affects decision-making, as participants had a distinct un/risky behaviour after viewing the two videos. Although all participants looked equally involved in the task (as shown by their reaction times and by "emotional" and "choice" ratings), those in SS were more risk-averse than those in RS, less happy after gains (although happier than after losses) and became even more risk-averse after gains. Altogether, these findings show that situated stress affects the interaction between emotions and risky behaviour. Particularly, following the mood maintenance hypothesis (e.g., Isen, 1987), our findings highlight that individuals in positive mood (after gains) but experiencing stress become even more risk-averse. By this experiment we are able to show how stress affects risky decision-making in individuals trained in facing stressful situations.

Job- and Work-related stress and emotion management: an ethnographic approach

In this section we introduce some theoretical definitions, and then show, through the results of the ethnographic case study, how the defined concepts apply to the context at hand. First, a distinction should be drawn between the notions of job-related and work-related stress (JS and WS), as we will use them in the following. Whereas the former concerns the (general) work environment (e.g., physical and sensorial; economic and contractual aspects; work control), the latter relates to (situated) work activities and their fluctuating "demandingness". In studying work engagement and its impact on performance (e.g., Bakker & Demerouti, 2007; Bakker & Leiter, 2010), researchers underlined the role of both job (autonomy, performance feedback, social support, etc.) and personal (optimism, self-efficacy, resilience, etc.) resources, on the one hand, and, on the other, of job demands (work pressure, emotional, physical, and/or mental demands, etc.). The latter should be further distinguished in *challenging* demands/stressors, exerting a positive influence on work engagement and performance, and *hindrance* ones, producing instead negative effects and

leading to burnout (e.g., Hakanen & Roodt, 2010). We regard challenging demands as WS-producing factors, and hindrance ones as JS-producing. See, for instance, the following interview excerpt.

> *There are times at which you do nothing, and times at which you process 20 flights in one hour. And you wear yourself out with stress 'cause the structure is lacking.* [Xavier, 10 /10/14]

The problem is not the line or the crowded moment (WS), it is the lack of job resources (JS).

Second, it is important to highlight the crucial role of emotions and emotion management. Psychological studies found positive emotions mediating work engagement, and negative ones associated with burnout and hindrance job demands (e.g., Sweetman & Luthans, 2010). From a sociological point of view, a distinction should be drawn between "emotional labour" and "emotion work" (Hochshild, 1983), where the former concerns *displayed* emotions and the latter *felt* ones, with the consequent possibility of emotional dissonance (a stressor in itself – cf. e.g., Hakanen et al., 2005).

Turning to the empirical context at hand, ethnographic research found security guards' work environment as sensorially distressing; characterized by overtimes, low wages, and diffused job insecurity, as well as by contradictory pressures, high responsibility (both legal and felt), and elevated work control.

> *It's tough for the tension, for the management you must– I mean, you have one thousand control procedures, it's not that you say "It's like working as a bar-tender, I make coffee, I greet Tony, I wash". And we're controlled for everything.* [Joan, 11/05/14]

Furthermore, guards have to deal with passengers' resistance to control procedures, and this means engaging in emotional labour and refraining oneself from answering in kind to resisting and/or rude ("unruly") passengers.

Pressure, responsibility, control and related emotion management, alongside interaction with passengers, make airport security a deeply emotionally-charged context —not only for passengers (e.g., Redden, 2012), but also for security operators. The cognitive and the emotive dimensions are deeply intertwined, and impact work engagement and performance, entangled as they are.

Contradictory pressures, control, responsibility and (lack of) autonomy

On the one hand, guards should be accurate and thorough in controlling passengers and their belongings but, at the same time, they should provide a nice, possibly brief experience for airport *customers*. A first contradiction, therefore, has to do with (public) security's vs. (private) profit's logics and ends. Salter (2007: 61) talks of detection vs. flow.

> "They tell you: 'There's the line, go on!' What does it mean go on?!!", Leonard rhetorically asks me. Pressure for avoiding line formation, he explains, starts from airport management and descends towards private security managers, shift-chiefs, supervisors, until screening guards. [fieldnotes, 05/15/13]

Another contradiction has to do with the role of passengers *per se*. Until further proof, they are citizens to be protected, customers to satisfy, but they can also be potential threats to the system. And what does constitute such proofs? Here issues of discretion, autonomy and expertise are pivotal (cf. also Salter 2007, 2008).

> Olive describes the job as subject to much pressure […] and endowed with very little autonomy. *Personal initiative, and the consequent use the guard may make of her/his experience, competence and expertise, are discouraged*, she explains. [...] *If somebody makes something click in me, maybe he has an attitude- I don't know, that I see something, I notice something, I cannot anyway decide to manually search him.* [...] She says that the same goes for patting: [a middle manager] *wants us to pat in only one and the same way. He wants little soldiers, only the procedure counts. On the contrary, we should pat as we think it's better, for using one's experience and for feeling at ease in performing a task which, anyway, is embarrassing. [...]* "This is certainly not the way to work well!", she repeats several times, and adds that the [middle manager] even writes you a note if he sees you're patting in a different way. [fieldnotes, 05/04/13][3]

Such a control is heavily felt, and –even for those most engaged with their work (trait engagement, cf. Sonnentag et al., 2010)– this is aggravated by several conditions, such as usually long work shifts and mandatory overtimes[4].

> *Like I've always said, I like the job. The only thing are the hours [...] the shifts, they're the only thing that make us feel bad sometimes.* [Lucretia, 10/07/14]

> "I like the job, but the wage is low and, especially, there's much pressure —and for even 11 or 12 hours per day!" [...] she explains pressure means responsibility, but also and especially (a) control by managers and (b) mandatory overtimes: "honestly, at the tenth hour, I make everything pass, I don't give a shit anymore! After 10 hours that you repeat the same sentences, that you press this button...". [fieldnotes, 05/28/13]

A further job-related stressor consists in sanctions like the notes mentioned by Olive, or "contestation letters":

> *The guards*, Peter says, *are too much controlled, and receive contestation letters for whatever.* He adds that *any trust by the employer is missing, and this doesn't help.* [fieldnotes. 10/23/13]

Such letters, which have actual impact on guards' earnings and career, may be sent by the employer for various reasons, among which "unkindness" towards passengers.

(Unruly) Passengers and emotion management

The contradiction between detection and flow, security culture and consumer/customer one, comes in plain sight in presence of the so-called "unruly" passengers: *i.e.*, passengers who are unwilling to be checked, who do not collaborate and/or protest, who are rude and variously offend or insult guards. Most of "unruly behaviours" can be seen as practices of resistance on the part of the passengers. Records range from nonverbal conduct:

> He was grumbling with his nose; he had printed on his face and bodily posture an air of superiority with respect to everything around him; he was parading —I would dare saying— boredom,

[3] In fieldnotes excerpts, direct speech between inverted commas and indirect speech in italics.

[4] They are mandatory since the airport security service is normatively framed as a public service (like police work).

annoyance and contempt for the procedures people around him were engaged in. [fieldnotes, 04/24/13]

To the passive-aggressive passenger:

Besides me an elderly heterosexual couple quarrels while packing after the security check. A hostess who is waiting for conducting them to the gate (they are the last passengers of their flight to embark), solicits them. The man swiftly replies: "Tell that to the Custom, here!", and points with his chin towards the security guards behind him. [fieldnotes, 05/09/13]

To the various fans of communicative triangulation:

A woman says loudly to her husband, in Italian, with disgusted voice: "In Moldavia there's no such thing, only in Italy!". [fieldnotes, 05/09/13]

While passing through, passengers of a private flight complain about, and make fun of security control: e.g., "Then one should pass naked." "Eh, we're close." [fieldnotes, 07/16/13]

To rude, coarse, offensive passenger:

The man refuses [to undergo a procedure] and pretends he knows the norm and the guard is wrong. The guard stays calm and eventually succeeds in having the man doing what she asked. At the end of that, he asks with ironic and paternalistic tone: "That's okay?". "That's okay, thank you. Next time remember to separate liquids", she answers in a robot-like manner. "Next time I will bring you the regulation!" he replies raising his voice while walking away. [fieldnotes, 07/06/2013]

Alan has to trash the 150 ml. bottle of perfume of a British passenger who [...] merely replies with a "Fuck off" in his mother tongue. [fieldnotes, 08/01/13]

In front of all these behaviours, security operators feel unprotected: "We're nobody, therefore we must suffer in silence the rudeness of some passengers". The only chance is learning to manage one's emotions.

It happens also to those who are kind: you find the passenger who insults and offends you […] You try to act as if nothing has happened, you let it go, even if maybe you feel bad, I mean, at the beginning I felt bad when they... Then you must grin and bear it, though. [Leon, 07/31/14]

Finally, it is worth noticing that issues of *felt* responsibility and connected emotion work are pivotal not only with regard to threat detection, but also with respect to passenger-guard interaction and related decision-making.

If there's an aspirin, and I see there's an old lady, then the question is: Do you let her pass with the aspirin or do you act "rigidly"? So, maybe you let her bring it after asking some questions, having understood if and why she deems important to carry the aspirin with her, and maybe you also make her taste it. There, in making such decisions, the emotional aspect becomes heavier, precisely in taking such judgement calls. And maybe there are colleagues who slavishly follow norms, but I prefer to judge case by case, because, I mean, I definitely have to manage this emotional aspect of... humanity. Maybe the passenger is going to a funeral, maybe she has never flown out, she is scared... [Lucretia 10/07/14]

Conclusions: Comparing the two approaches

What we have defined as WS in the previous section pretty much equals what has been defined situated stress in the experiment. As for JS, the latter was not designed to distinguish job-related vs. extra-job stress. Further research is needed to clearly assess the import of the two. However, since ethnographic research was conducted with the very same subjects of the experiment, we can reasonably say that, for most of them, non-situated stress stems from job-related aspects (even when there are personal stressors, their effect is exacerbated by the interaction with job-related factors). With this is mind, we analysed data on Perceived Stress Scale of each participant and divided them in two further groups: those with the average on PSS above (high stress, HJS) and below (low stress; LJS) the mean of Caucasian population (Cohen, 1988; M=12.8 and SD=6.2). Thus, we analysed again data of the experiment by taking into consideration 4 different groups divided by the two conditions: WS (RS vs. SS) X JS (HJS vs. LJS) (Table 2). Findings allowed us to develop some interesting insights.

Table 2: Demographic / personality assessment (4 groups)

	A: HJS +SS	B: HJS +RS	C: LJS +SS	D: LJS +RS
N. of subjects	11	8	7	10
Sex	3M 8F	3M 5F	5M 2F	7M 3F
Age	30.82	35.25	45.57	39.6
Months of work	76.18	61.62	104.57	113.4
Perceived Stress	18.91	20.63	8.14	8.3
Pre-PANAS	18.73	22.37	13.14	11.6
Post-PANAS	15.54	16.37	11.86	10.2
Risky Choices (%)	56.82	66.01	45.98	57.5
Time for RC msec	3059	3646.7	4421.6	3839.1
"Emotional" rating				
loss on risky choice	4.45	3.21	3.03	3.29
on safe choice	4.31	3.65	4.01	3.68
"Emotional" rating				
win on risky choice	6.41	8.2	8.11	8.08
on safe choice	6.06	8.3	7.81	8.02

First, independently from the WS conditions, participants in HJS showed higher scores to the PANAS, both pre and post the video presentation. Between the two, those in RS (condition B) seem to reduce more their negative emotions (PANAS) after the video presentation. Also, HJS appears to be related to other variables such as sex, age and work experience (more females, lesser age and work experience).

Second, the amount of risky choices –that we may consider an issue in the context of security– is higher with HJS (conditions A, B), when, moreover, the time of choice is shorter; instead, risky choices are at the lowest and decision time is longer when there is WS but not JS (condition C). Thus, there seems to be a *positive effect of WS –intended as situated, critical-situation-grounded stress– on work performance –intended as considered choices– that vanishes, however, when JS is present too*. In this case, and WS comes into play, decisions are made with the typical "rush" of the unexperienced who faces critical situations: in highly risky and less pondered ways.

Third, as for emotional response with respect to choice outcome –whose effects we can fairly assume on learning as

well as future choice behaviour–, we see once more the negative effect of JS, especially in critical situations: condition A presents the highest level of task detachment (possibly extendable to work disengagement, further research needed), whereas condition C shows the highest level of task involvement. In the latter case, indeed, positive vs. negative outcomes produce clearly distinct positive vs. negative emotions accordingly, with higher happiness for wins if the choice was risky (*I've guessed right*) rather than safe (*It went as expected*), and lesser sadness after losses if it was safe (*I've done my part anyway*) instead of risky (*I'm guilty*). On the contrary, when WS adds to already existing JS, outcomes produce the least degree of emotions, no matter the choice riskiness; the distance between after-win vs. after-loss emotional status is the least in this condition.

Unfortunately, we were not able to perform statistical analyses on these data, given the unbalanced and reduced number of participants in each group. However, we believe these preliminary insights open an interesting research avenue thanks to the interdisciplinary integration of experimental data and ethnographic analysis. Further studies should distinguish job-related from extra-job stress, better control for the four conditions, enlarge the sample, compare work settings to improve generalizability, and consider work performance also beyond decision-making.

In summary, this study highlighted the interaction between stress and risky decision-making in individuals trained to face stress in their daily work, and importantly, it suggested promising new avenues of research on the interaction between different kinds of stress and decisional processes. For instance, even when people are trained to face WS, when JS is also present, it can encumber their preparedness to react. This is an aspect that should be taken into serious consideration by policy makers.

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