

9 ORIGINAL RESEARCH REPORT

10 **The hidden price and possible benefit of repeated traumatic exposure**

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16 **Abstract**

17 There is a growing evidence showing that first-responders who are frequently exposed to
18 traumatic events as part of their occupational routine may pay a hidden price. Although they
19 display low to moderate levels of post-traumatic stress disorder (PTSD) symptoms, similar to
20 individuals with full-blown PTSD, they show impaired ability to process and react according to
21 contextual demands. We aimed to test whether this impairment affects performance on simple
22 unrelated tasks and its association with cumulative traumatic exposure and level of PTSD
23 symptoms. Thirty-nine trauma-exposed criminal scene investigator police and 35 unexposed
24 civilians matched for age, gender, and education performed a simple discrimination task in the
25 presence of aversive pictures with low or high intensity. We predicted and found that trauma-
26 exposed individuals failed to modify their behavior in accordance with levels of negative
27 intensity. Hence they were equally distracted in both low and high negative intensity
28 conditions, compared to unexposed controls who showed improved performance in low
29 intensity conditions. Importantly, performance of trauma-exposed individuals on conditions of
30 low intensity negatively correlated with their levels of PTSD symptoms. These results highlight
31 the maladaptive tendency of individuals with repeated traumatic exposure to maintain
32 the same behavior in low-intensity contextual conditions when it is no longer adequate.
33 Interestingly however, in high-intensity conditions trauma-exposed individuals outperformed
34 unexposed controls. Specifically, when completing simple tasks in high intensity conditions.
35 The results suggest that repeated traumatic exposure has both positive and negative
36 consequences on the way individuals interpret and react to their environment.

37 **Introduction**

38 While there is an abundant of research on the short- and long-
39 term effects of stress (Betts et al., 2014; Nakai et al., 2014; for
40 review, see Crestani et al., 2013; Paykel, 2003), little is known
41 about the possible consequences of repeated traumatic
42 exposure. Interestingly, many studies on active-duty first-
43 responders who are frequently exposed to traumatic events as
44 part of their daily routine report low to moderate levels of
45 post-traumatic stress disorder (PTSD) symptoms (e.g.
46 Fushimi, 2012; Inslicht et al., 2010; Meyer et al., 2012; Orr
47 et al., 2012). On the other hand, neuroimaging studies show
48 that independent of PTSD diagnosis trauma-exposed individ-
49 uals display deficits in hippocampal function and structure
50 compared to trauma-unexposed controls (see Karl et al., 2006;
51 Woon et al., 2010 for meta-analysis).

52 Animal and human models suggest that these hippocampal
53 deficits impair the ability to process and integrate contextual
54 information (Desmedt et al., 2015; Dickerson & Eichenbaum,

37 **Keywords**

38 Context, repeated traumatic exposure,
39 hippocampus, negative intensity,
40 functioning, first-responders

41 **History**

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46 [2010; Rudy, 2009](#)). Possible support for such claim comes
47 from a growing number of studies showing that after repeated
48 traumatic exposure, both individuals with and without PTSD
49 fail to behave in accordance with contextual demands
50 (Hennig-Fast et al., 2009; Levy-Gigi & Richter-Levin, 2014;
51 Levy-Gigi et al., 2014,2015a). For example, once trauma-
52 exposed individuals learn that a specific context is negative
53 they struggle to learn that the same context becomes positive,
54 and hence fail to modify their behavior accordingly.

55 The aim of the present study is to test the effect of repeated
56 traumatic exposure on the ability to function in contextual
57 conditions with different aversive intensities and its associ-
58 ation with levels of cumulative traumatic exposure and levels
59 of PTSD symptoms. To that end we tested the ability of non-
60 PTSD active-duty criminal scene investigator (CSI) police and
61 unexposed civilians matched for age, gender, and education to
62 perform simple target discrimination tasks in aversive context-
63 ual conditions with low and high intensity.

64 Previous studies report that, in general, task performance
65 is impaired when conducted in aversive compared to neutral
66 contextual conditions (Gronau et al., 2003; Hartikainen et al.,
67 2000). More specifically, studies of healthy individuals,
68 which used a similar paradigm, revealed decreased target

121 discrimination in aversive compared to neutral contextual
122 conditions (Okon-Singer et al., 2007,2014). In line with these
123 findings we expect that unexposed controls will show better
124 performance in aversive conditions with low compared to
125 high intensity. On the other hand, we predict that individuals
126 with repeated traumatic exposure will fail to flexibly modify
127 their behavior and hence show a relatively poor performance
128 not only in contextual conditions with high intensity but also
129 in contextual conditions with low intensity.

131 Methods and materials

132 Participants

134 Thirty-nine active-duty CSI police who are repeatedly exposed
135 to trauma as part of their daily routine and 35 unexposed
136 civilians matched for age, gender, and years of education
137 volunteered to participate in the study (see Table 1 for a
138 detailed description of the sample). All participants were
139 interviewed using the Clinical Interview for Diagnostic and
140 Statistical Manual for Mental Disorders-Forth Edition (DSM-
141 IV) Axis I Disorders (SCID-CV) (First et al., 1996). Exclusion
142 criteria included any current DSM-IV psychopathology
143 including PTSD, and any history of psychiatric or neurological
144 disorders, alcohol abuse or dependence. CSI police were
145 randomly recruited from six different police stations in central
146 Israel, which are all located in a similar setting within a radius
147 of 20 miles. All CSI police reported multiple exposures to
148 DSM-5 Criterion A events (see more details in the following
149 section on traumatic exposure). Since the present study aims to
150 test the effect of repeated traumatic exposure independent of
151 PTSD, three CSI police with a clear diagnosis of PTSD were
152 excluded from the sample. The remaining 36 non-PTSD CSI
153 police were interviewed to assess levels of subclinical PTSD
154 symptoms. We used the Clinician Administrated PTSD Scale
155 (CAPS) for DSM-IV-TR (Blake et al., 1995) since the new
156 version of the interview (CAPS-5) was not yet available at the
157 beginning of the study. All interviews were conducted by a
158 trained and regularly supervised clinical psychologist.
159 Participants in the unexposed control group were civilians
160 who work in a production line in an industrial factory and
161 trained to pay close attention to detail. They were recruited by a

162
163
164 Table 1. Demographic characteristics of the trauma-exposed CSI police
165 and the trauma-unexposed matched-controls.

	Trauma-exposed CSI (N = 36)	Unexposed-controls (N = 30)
168 Age (years)	39.19 (9.36)	35.13 (10.03)
169 Male/female	29/7	25/5
170 Years of education	14.25 (1.48)	13.9 (1.88)
171 Medications ^a (N)	2/36	1/30
172 Years in police service	10.03	N/A
173 Individuals exposed to person- ally threatening incidents	36/36	0/30
174 Average critical incidents per person per year	60.5 (22.42)	N/A

176 ^aTwo trauma-exposed participants and 1 unexposed control participant
177 received benzodiazepine.

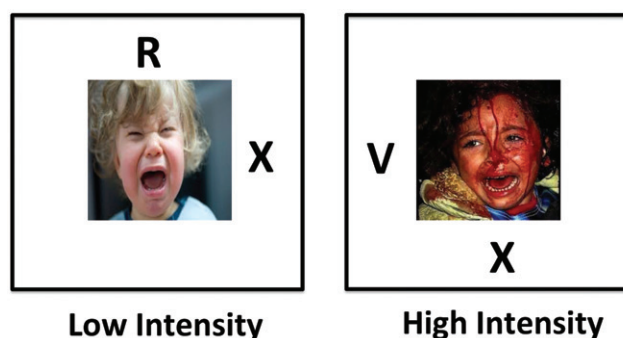
178 PTSD symptoms as measured by the Clinician Administrated PTSD
179 Scale (CAPS) for DSM-IV-TR (Blake et al., 1995). Average critical
180 incidents per person per year as measured by the modified version of
the CIHQ (Weiss et al., 2010).

181 clinical psychologist that interviewed them to ensure no recall
182 of significant past exposure to DSM-5 criterion A events. Five
183 participants from this group were excluded from the study due
184 to past exposure to a potential traumatic event. Individuals in
185 both groups had high rates of consent; approximately 95%
186 of the people we sampled agreed to participate in the study.
187 The investigation was approved by The University of Haifa
188 human subject review panel and carried out in accordance with
189 the Declaration of Helsinki. All participants provided a written
190 informed consent at the beginning of the experiment after the
191 nature of the procedures had been fully explained.

192 Measures

193 The aversive context paradigm

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195 We developed a paradigm based on an affective perceptual
196 paradigm (Lavie, 1995; Okon-Singer et al., 2007). In this
197 paradigm participants need to discriminate a target letter
198 among several distractor letters, while ignoring negative
199 pictures with low or high intensity that were presented
200 simultaneously (Figure 1). We used color real-life pictures
201 from the International Affective Picture System (IAPS; Lang
202 et al., 2008). Similar to other studies (Sheppes et al.,
203 2011,2014) we applied the IAPS normative ratings for arousal
204 (1 = low; 9 = high) and valence (1 = very unpleasant; 9 =
205 highly pleasant) to determine pictures' intensity. According to
206 the rating in these two scales we selected 80 IAPS pictures; 40
207 with low and 40 with high negative intensity. In order to
208 further validate the intensity of these pictures we asked a
209 sample of 50 police and 50 trauma-unexposed controls that
210 were not part of the main study, to rate the negative intensity
211 of these pictures on a 1–9 Likert scale. We compared the
212 rating and excluded three pictures that were rated differently
213 by the two groups (more than $\pm 1SD$ difference in mean
214 negative rating). From the remaining 77 pictures, we chose 20
215 low-intensity pictures (mean IAPS arousal = 4.89; mean IAPS
216 valence = 3.72) and 20 high-intensity pictures (mean IAPS
217 arousal = 6.29; mean IAPS valence = 1.75). Further analyses
218 confirmed significant differences between both the arousal
219 and the balance of the low and high intensity pictures,
220 $F_s(1,38) > 21.03$, $p_s < 0.001$. The content of the low- and
221 high-intensity pictures was related to a wide range of aversive
222 situations including sadness, disgust, threat, fear, and muti-
223 lations. Importantly, as illustrated in Figure 1, the pictures'
224 general content, was roughly matched across the low- and
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Figure 1. Illustration of pictures with low and high intensities surrounded by target and distractor letters as appear in the aversive context paradigm.

241 high-intensity categories. *T*-test showed no difference in
 242 luminance, contrast, or dominant spatial frequency between
 243 the high- and low-intensity pictures (all *t*-values < 1, all
 244 *p* values > 0.6). An experimental trial started with a fixation
 245 cross, presented for 1 s, followed by a low- or high-intensity
 246 picture in the center of the screen for 2 s and surrounded by
 247 two letters. The letters always included a target letter (i.e.
 248 “X” or “N”) and a distracting letter (Figure 1). Participants
 249 were asked to ignore the picture and discriminate the target
 250 letter by pressing the appropriate button (“X” or “N”) on the
 251 keyboard. They were requested to respond as fast and
 252 accurately as possible. At the beginning of the experiment
 253 participants performed a short practice session to familiarize
 254 them with the task. The experiment was presented in short
 255 blocks separated by “null trials” to control for habituation
 256 and expectancy effects. The trials were presented in a
 257 pseudorandomized order, with the criterion that no more
 258 than three consecutive short blocks of the same intensity (i.e.
 259 low or high) were presented. A subsequent part of the task,
 260 comprising other experimental conditions, is not included in
 261 the current report.

262 Cumulative traumatic exposure

264 Traumatic exposure was measured by the Critical Incident
 265 History Questionnaire (CIHQ), which is a 39-item self-report
 266 scale designed to produce a measure of cumulative exposure
 267 to critical incidents (Weiss et al., 2010). Similar to previous
 268 studies that used 14 items out of this list (e.g. Inslicht et al.,
 269 2010), we selected 14 items that were considered as personally
 270 life threatening to CSI police and confirmed as the most
 271 relevant items by the unit commander. CSI police were asked
 272 to rate the frequency they have personally experienced each of
 273 these items on an average year. Cumulative traumatic exposure
 274 was estimated by multiplying the number of years in service by
 275 the number of traumatic events on an average year.

277 Self-report questionnaires and cognitive assessment

279 All participants completed self-report questionnaires in order
 280 to control for possible effects of depression and anxiety
 281 symptoms. Depressive symptoms over the past 2 weeks were
 282 assessed using the revised version of the Beck Depression
 283 Inventory (BDI-II; Beck et al., 1996). Anxiety was measured
 284 using the STAI (State-Trait Anxiety Inventory; Spielberger et al.,
 285 1983) questionnaire. In addition, we used the Childhood Trauma
 286 Questionnaire (Bernstein & Fink, 1998), a 28-item questionnaire
 287 in which participants need to rank any experience of emotional,
 288 physical, and sexual abuse and emotional and physical neglect
 289 during childhood on a 5-point Likert scale. While none of our
 290 participants reported any significant traumatic experience during
 291 childhood, we used this careful screening to ensure no
 292 significant differences between the groups even in mild aversive
 293 experiences during childhood. Finally, we used the scaled scores
 294 of the Wechsler Adult Intelligence Scale III (WAIS-III) blocks
 295 design subtest to estimate and control for possible effects of IQ
 296 levels (Wechsler, 1997).

297 Data analysis

299 All data were checked for normality of distribution using
 300 Kolmogorov–Smirnov tests. Data from trials in which the

reaction time was faster than 100 ms or slower than 3000 ms
 (less than 0.1% of the trials) were excluded from the analysis.

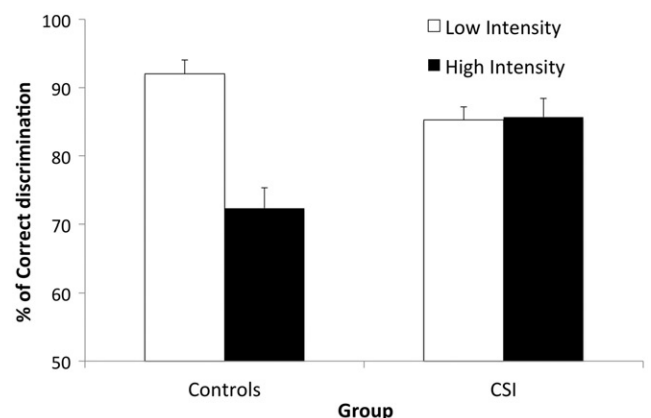
304 Results

305 The aversive context paradigm

307 We conducted a Group (trauma-exposed CSI police vs. unexposed controls) by Negative Intensity (low vs. high) mixed-model ANOVA on both reaction time and percentage of correct responses. In this model, Group was the between-participants factor while Negative Intensity was the within-participant factors. There were no effects on reaction time (all *ps* > 0.28) but robust effects on the percentage of correct response. Specifically, we found a significant main effect of Negative Intensity, $F(1,64) = 24.38$, $p < 0.001$, $\eta_p^2 = 0.28$, indicating that the percentage of correct responses in low intensity was significantly higher compared to high-intensity conditions. In addition, we found a significant Group by Negative Intensity interaction, $F(1,62) = 26.54$, $p < 0.001$, $\eta_p^2 = 0.29$ (Figure 2). Follow-up paired-samples *t*-tests revealed that as expected unexposed controls performed significantly better in the low compared to the high intensity condition, $t(29) = 5.95$, $p < 0.001$, while CSI police performed similarly in both conditions, $t(35) = -0.19$, $p = 0.86$. Moreover, when we compared the performance of the two groups in each of the intensity conditions we found that while in the low-intensity conditions unexposed participants outperformed CSI police, $t(64) = -2.38$, $p < 0.05$, in the high-intensity conditions CSI police outperformed the unexposed participants, $t(64) = 3.30$, $p < 0.005$. These results suggest that, as expected, unexposed individuals are affected by the intensity of the contextual conditions. Hence they perform better in conditions of low compared to high intensity. On the other hand, in high-intensity conditions, individuals with repeated traumatic exposure showed an advantage and performed better than unexposed individuals, while in low-intensity conditions they show poor performance compared to unexposed individuals.

340 Self-report questionnaires and cognitive assessment

341 Table 2 depicts the comparison of trauma-exposed individuals
 342 and unexposed controls on the BDI-II (Beck et al., 1996), the



358 Figure 2. Percentage of correct discrimination in the aversive context
 359 paradigm as a function of Group (trauma exposed CSI police vs. trauma
 360 unexposed controls) and Negative Intensity (low vs. high).

361 STAI (Spielberger et al., 1983), the Childhood Trauma
362 Questionnaire, and the IQ assessment (WAIS-III, Wechsler,
363 1997). There were no significant differences in childhood
364 trauma, anxiety, and IQ scores between trauma-exposed
365 individuals and the unexposed controls. Similar to previous
366 reports trauma-exposed individuals exhibited lower levels of
367 depressive symptoms compared to unexposed controls (e.g.
368 Berg et al., 2006; Levy-Gigi & Richter-Levin, 2014; Levy-
369 Gigi et al., 2014; van der Velden et al., 2013).

371 Correlation between performance, PTSD symptoms, 372 and traumatic exposure

373 Tables 3 and 4 report Pearson's correlations between
374 performance on conditions of low- and high negative intensity
375 and levels of PTSD symptoms and cumulative traumatic
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378 Table 2. Questionnaires and cognitive assessment (means and standard
379 deviation) of trauma exposed firefighters and trauma unexposed matched
380 controls.

	Trauma-exposed CSI (N = 34)	Unexposed controls (N = 30)
383 Depression	3.33 (3.94)*	6.07 (4.53)*
384 Anxiety	58.06 (13.16)	56.60 (12.08)
385 Childhood trauma	35.83 (6.12)	34.76 (4.51)
386 PTSD symptoms	10.58 (10.01)	N/A
387 IQ scaled scores	11.94 (1.35)	12.13 (1.70)

388 * $p < 0.05$.

389 Depression as measured by the BDI-II – The Beck Depression Inventory
390 (Beck et al., 1996); anxiety as measured by the STAI – State-Trait
391 Anxiety Inventory (Spielberger et al., 1983); childhood trauma as
392 measured by the Childhood Trauma Questionnaire (Bernstein & Fink,
393 1998); IQ scores as estimated by the WAIS-III block-design subtest
394 (Wechsler, 1997).

395 Table 3. Correlations between performance on the low- and high-
396 intensity conditions, PTSD symptoms, cumulative traumatic exposure,
397 depression, and anxiety symptoms in the trauma-exposed group.

	Low intensity	High intensity	PTSD	Cumulative exposure	Depression	Anxiety
400 Low intensity	1					
401 High intensity	0.46**	1				
402 PTSD	-0.61***	-0.18	1			
403 Cumulative exposure	0.31	0.42*	-0.13	1		
404 Depression	-0.14	0.06	0.35*	0.19	1	
405 Anxiety	-0.19	0.03	0.53**	0.22	0.48**	1

406 * $p < 0.05$

407 ** $p < 0.005$

408 *** $p < 0.001$.

411 Table 4. Correlations between performance on the low- and high-
412 intensity conditions, depression, and anxiety symptoms in the unexposed
413 control group.

	Low intensity	High intensity	Depression	Anxiety
415 Low intensity	1			
416 High intensity	0.39*	1		
417 Depression	0.14	0.22	1	
418 Anxiety	-0.07	0.26	0.24	1

419 * $p < 0.05$

420 ** $p < 0.001$.

421 exposure (when applicable), as well as depression and anxiety
422 symptoms for the trauma-exposed participants and unexposed
423 matched controls respectively. The results show a significant
424 negative correlation between the performance of trauma-
425 exposed individuals in low-intensity conditions and their level
426 of PTSD symptoms, and a significant positive correlation
427 between performance of trauma-exposed individuals in high-
428 intensity conditions and levels of traumatic exposure. Hence,
429 for trauma-exposed individuals, higher PTSD symptoms meant
430 lower ability to perform tasks in aversive conditions with low
431 intensity, while greater traumatic exposure meant better ability
432 to perform tasks in aversive conditions with high intensity.

433 Discussion

434 The goal of the present study was to test the ability of
435 individuals with repeated traumatic exposure to function in
436 different aversive contextual conditions and its association
437 with levels of cumulative traumatic exposure and PTSD
438 symptoms. A unique population of active-duty, non-PTSD
439 CSI police, and a matched group of civilians with no history
440 of traumatic exposure underwent clinical interviews and
441 completed a discrimination task in aversive contextual
442 conditions with low and high intensity.

443 As predicted we found that trauma-unexposed controls
444 performed better in low relative to high aversive conditions.
445 These findings are in line with previous studies in healthy
446 individuals, which compared performance in neutral and
447 aversive conditions (Okon-Singer et al., 2007,2014), suggest-
448 ing that conditions of both neutral and low intensity result in
449 better performance compared to conditions of high intensity.
450 Importantly, our findings demonstrated that unexposed indi-
451 viduals are affected by the intensity of the contextual
452 condition and their functioning level is changed accordingly.
453

454 By the same token, individuals with repeated traumatic
455 exposure reached similar level of performance in both
456 contextual conditions. These results add to a growing amount
457 of evidence demonstrating a noteworthy price of repeated
458 traumatic exposure (Hennig-Fast et al., 2009; Levy-Gigi &
459 Richter-Levin, 2014; Levy-Gigi et al., 2014,2015a; Steudte-
460 Schmiedgen et al., 2014). Specifically, despite the relatively
461 low levels of PTSD symptoms and diagnosis in first-responders
462 (e.g. Admon et al., 2013; Chang et al., 2008; Del Ben et al.,
463 2006; Fushimi, 2012; Guthrie & Bryant, 2006; Meyer et al.,
464 2012; Orr et al., 2012; Soo et al., 2011), these individuals
465 appear to have impaired processing of contextual information.
466 Interestingly, similar patterns were found in individuals with
467 PTSD (Levy-Gigi & Kéri, 2012; Levy-Gigi et al., 2012,2015b),
468 indicating that despite categorically different symptom levels,
469 the two groups share similar deficits.

470 These results are also in line with neuroimaging studies
471 that demonstrate deficit in hippocampal structure and func-
472 tion in both trauma-exposed individuals with and without
473 PTSD (for meta-analyses, see Karl et al., 2006; Woon et al.,
474 2010) and provide further support for animal and human
475 models of PTSD suggesting that such hippocampal deficits
476 may result in inappropriate processing of contextual infor-
477 mation, and may affect the way trauma-exposed individuals
478 interpret and react to their environment (e.g. Acheson et al.,
479 2012; Desmedt et al., 2015; Maren et al., 2013).

481 Importantly, when we compared the performance of indi-
482 viduals with repeated traumatic exposure to the performance of
483 unexposed matched controls in conditions of low intensity, as
484 expected, we found poorer performance of the trauma exposed
485 group. Moreover, there was a significant negative correlation
486 between their performance in these conditions and levels of
487 PTSD symptoms. Hence, poorer performance in aversive
488 conditions with low intensity was associated with higher levels
489 of PTSD symptoms. This finding emphasizes the price of
490 repeated traumatic exposure, suggesting that such behavior is
491 not merely a by-product of traumatic exposure. Rather it may
492 reflect a tendency to be highly alerted and use extra caution in
493 mild aversive conditions when there is no substantial life threat
494 (Acheson et al., 2015; McKibben et al., 2010).

495 When we compared the performance of the two groups in
496 conditions of high intensity we found that, in opposed to our
497 expectation, individuals with repeated traumatic exposure
498 performed better than unexposed individuals. Our results are
499 in line with previous studies, which showed strong connection
500 between the ability to suppress emotions in high-intensity
501 aversive conditions and general adjustment (Bonanno et al.,
502 2004; Bonanno & Burton, 2013). It may suggest that such
503 ability allows first-responders to keep doing their job and face
504 traumatic events over and over again. This finding may reflect
505 a possible benefit of frequent exposure and training to cope
506 and function in intense aversive conditions. Specifically, it is
507 possible that the professional training together with the
508 frequent encounter with high aversive conditions improve the
509 ability of CSI police to successfully function in such
510 conditions. Additional support for such view can be found
511 in the positive correlation between level of cumulative
512 traumatic exposure and functioning in aversive conditions
513 with high intensity, suggesting that increased traumatic
514 exposure is associated with better performance.

515 The current study has several limitations. First, it was
516 designed to detect possible effects of repeated traumatic
517 exposure among active-duty, highly functioning first-respon-
518 ders. Therefore we excluded individuals who were diagnosed
519 with PTSD. Previous studies suggest that individuals with
520 PTSD show similar impairments in contextual processing
521 (Acheson et al., 2012; Levy-Gigi et al., 2012; Levy-Gigi &
522 Kéri, 2012). However, this is the first study, which tested the
523 ability to function in different contextual conditions with low
524 and high intensity. Future studies may aim to directly compare
525 first-responders with and without PTSD to test whether they
526 show similar functioning pattern.

527 In addition, due to the size of our sample and the relatively
528 low level of PTSD symptoms we could not evaluate the
529 possible associations between performance in conditions of
530 low and high intensity and specific clusters of PTSD
531 symptoms (see, for example, Levy-Gigi & Kéri, 2012;
532 Kostek et al., 2014). The nature of the results suggests that
533 such impairment would be associated with symptoms of
534 alterations in arousal and reactivity (DSM-V, Criterion E).
535 Future studies with larger enrollment may aim to further
536 investigate this connection.

537 Another possible limitation is that for trauma-exposed
538 individuals highly intense stimuli have little meaning.
539 However, this seems unlikely given that prior to the study
540 they rated the high-intensity pictures as significantly more

negative than the low-intensity pictures. Therefore, it is not
reasonable to assume that their similar performance in
conditions of low and high intensity is due to impaired
ability to distinguish between them or to a tendency to under
estimate the negativity of high-intensity pictures.

Finally, since we compared CSI police and unexposed
civilians it is possible that variables related to job selection
and professional training affected our results. In order to
minimize possible effects of job selection the unexposed
participants in the current study were product line workers
who were recruited from an industrial factory. Hence they
share similar basic professional characteristics with CSI
police such as attention to detail, accuracy, and through
exploration. Controlling for possible effects of training is
highly challenging within a population of active-duty service-
men due to the difficulty to distinguish between training and
traumatic exposure. Specifically, each time CSI police are out
in the field they gain more experience and become more
trained. Moreover, testing these individuals at the end of their
training course is not a potential solution since the training
process itself includes working in real scenes with real
evidence, and hence might be experienced as traumatic.
Therefore, we believe that in order to test possible effects of
training, future studies may wish to compare first-responders
and civilians with repeated traumatic exposure (e.g. refugees
or civilians who live in a continuous war zone). This
comparison will allow teasing apart effects of job related
factors and repeated traumatic exposure.

Conclusions

In conclusion, the present study supports a proposal of a
hidden price in non-PTSD individuals with repeated traumatic
exposure. Specifically, it shows that active-duty CSI police
who are repeatedly exposed to traumatic events as part of their
occupational routine fail to modify their behavior in accord-
ance with changing contextual demands. Specifically, they
react in a similar way in aversive conditions with both high
and low intensity. In low-intensity conditions their perform-
ance is worse than unexposed individuals and negatively
correlates with their levels of PTSD symptoms. This impaired
performance may account for their tendency to be highly
alerted and use extra caution not only in emergency situations
but also in safe environments when such a response is no
longer adequate. However, the study shows that repeated
traumatic exposure may also have a value. Specifically, in high
intensity conditions CSI police perform better than unexposed
controls. Moreover, their performance significantly improves
with levels of cumulative traumatic exposure. Hence, the study
illuminates the multifaceted effects of repeated traumatic
exposure, suggesting that such exposure may have diverged
impact on the way trauma-exposed individuals interpret and
react to their environment.

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601 Declaration of interest

602 The authors report no conflicts of interest. This study was
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