Late-Life Health Consequences of Exposure to Trauma in a General Elderly Population: The Mediating Role of Reexperiencing Posttraumatic Symptoms

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Objective: A history of trauma is associated with poor mental and physical health, but the specific impact of posttraumatic stress disorder (PTSD) symptoms on physical health using objective indicators of health status has rarely been evaluated in elderly civilians. This study investigates the long-term consequences of a lifetime exposure to trauma on health in a French elderly general population.

Method: Data from this retrospective study were derived from a longitudinal study (the Enquête de Santé Psychologique-Risques, Incidence et Traitement [ESPRIT]) of community-dwelling participants. Psychiatric health, medical history, and clinical examination (*ICD-10* criteria) were assessed in 1,662 subjects (mean [SD] age = 72.5 [5.2] years). Lifetime traumatic exposure, PTSD, and psychiatric diagnoses were obtained using the Watson PTSD Inventory and the Mini-International Neuropsychiatric Interview. The outcome measures used were the Mini-International Neuropsychiatric Interview, Center for Epidemiologic Studies Depression Scale, Mini-Mental State Examination, and measures of physical health.

Results: We observed an increase in the number and severity of health-related outcomes between groups, with nontraumatized subjects having the lowest risk and those with trauma leading to recurrent reexperiencing of events (nonresilient subjects) having the highest risk. Traumatized persons who did not report reexperiencing symptoms (resilient subjects) showed better current mental health than traumatized subjects who did and nontraumatized subjects. Nonresilient subjects were more likely to have current depressive symptoms ($P = .003$), current major depression ($P < .0001$), current anxiety disorder ($P = .032$), and psychiatric comorbidity ($P = .002$) than nontraumatized subjects. Resilient subjects differed from nontraumatized subjects in having significantly less current suicidal ideation ($P = .054$) and psychiatric comorbidity ($P = .035$). Both groups of traumatized subjects showed a higher rate of cardio-ischemic diseases, notably current angina pectoris (multivariate, adjusted OR = 2.27; 95% CI, 1.31–3.91; and OR = 2.34; 95% CI, 1.22–4.49; for resilient and nonresilient groups, respectively). Traumatized persons, specifically those nonresilient, showed a higher waist-hip ratio, higher triglyceride levels, and a greater frequency of hypertension.

Conclusions: Our findings suggest that trauma could be associated with cardio-ischemic diseases independently of PTSD symptoms expression. However, the presence of these symptoms appears associated with additional metabolic risk factors.

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Several psychiatric studies have shown that exposure to a traumatic event induces a high level of psychological distress in a large majority of people. A history of trauma has been associated not only with higher levels of depression and posttraumatic stress disorder (PTSD) but also with poor physical health. Little is currently known about the precise mechanism underlying the relationship between trauma and physical health, particularly the possible intermediary role of PTSD. A number of studies have explored PTSD in relation to self-reported health status, eg, in veterans and bus drivers who have experienced work-related accidents, sexual assault survivors, and primary care patients.[1–4] Such studies are open to a number of biases, including secondary gain and the confounding effects of depression. Very few studies to date have used objective indicators of health status. The most important study[5] concerned male veterans in whom PTSD symptoms were associated with risk of onset for several medical problems: arterial, gastrointestinal, and musculoskeletal disorders and dermatologic problems. However, the specific impact of PTSD on physical health has been examined in only a small number of studies of civilians exposed to a much broader array of traumatic events, with inconsistent results.[6,7] There has been no study to date on the impact of trauma in the elderly, a particularly vulnerable group given their increased vulnerability to disease and disability and a lifetime accumulation of stressful events. This study addresses 2 important clinical questions: does the experience of trauma have long-term health effects persisting into old age? and, are elderly persons who have experienced traumatic events with subsequent PTSD symptoms at particularly high risk of certain physical disorders? In terms of treatment, this questioning would require addressing the pathophysiologic manifestations associated with trauma and PTSD symptoms.

For Clinical Use

- Elderly persons with a history of exposure to traumatic events should be carefully monitored for vascular pathology, irrespective of reexperiencing symptoms.
- Elderly persons with a history of exposure to traumatic events that has led to reexperiencing symptoms should be carefully monitored for metabolic risk factors, hypertension, and thyroid dysfunction as well as psychiatric disorders.

The present study examines physical and psychiatric health correlates of traumatic exposure in an elderly general population, taking into account the development of recurrent reexperiencing symptoms, as a central indicator of PTSD while controlling for multiple confounding factors.

METHOD

Study Population

The data were derived from a longitudinal study of neuropsychiatric disorders in 1,873 community-dwelling French elderly, the Enquête de Santé Psychologique-Risques, Incidence et Traitement (ESPRIT) study.[8] Participants aged 65 years and over and noninstitutionalized were recruited by random selection from electoral rolls of Montpellier, France, between 1999 and 2001. Refusals (27.3%) were slightly older and more likely to be living alone than those who agreed to participate. Ethics approval for the study was given by the National Ethics Committee, and all participants gave written consent.

This article reports results obtained at baseline. Participants underwent a standardized *International Classification of Diseases, Tenth Revision*[9] criteria–based examination carried out by a neurologist. The present study was conducted on the 1,662 dementia-free subjects for whom data on trauma status were available and with no missing data for the main covariates. The subjects included in the analyses did not differ from the whole ESPRIT cohort with regard to the principal sociodemographic variables.

Medical History and Clinical Examination

A detailed standardized health interview covered sociodemographic characteristics, height, weight, waist-to-hip ratio, smoking and alcohol consumption, medical history, and medication use (participants were asked to bring prescription or drugs used regularly during the preceding month to the center). Blood samples were collected on the day of the examination after a 12-hour fast. The health interview covered the self-report history of vascular disease, including age at onset, with additional medical information obtained from the patient general practitioner. This information concerned cardio-ischemic disease (angina pectoris, myocardial infarction, and coronary heart disease), stroke and posterior limb arteritis, and nonischemic pathologies (arrhythmia and congestive heart failure). Other chronic illnesses were also recorded, including asthma, diabetes, hypercholesterolemia, elevated triglycerides, hypertension, and hyperthyroidism or hypothyroidism. The metabolic syndrome was defined according to the National Cholesterol Education Program Adult Treatment Panel III criteria.[10–12] Cognitive function was assessed using the Mini-Mental State Examination (MMSE).[13]

Psychiatric Interview

The Watson PTSD Inventory (PTSD-I [based on *DSM-III-R* criteria,[14] internal consistency, $\alpha = .92$ and test-retest reliability total score = 0.95])[15] was used to obtain lifetime and current (last month) PTSD diagnoses, using the validated French self-report version.[16,17] The first question identifies past traumatic events spontaneously evoked by the participants. The second question, concerning the subject's most frightening lifetime personal experience, is to be completed only if no traumatic event is spontaneously reported. The most severe traumatic event or frightening experience is then explored in the next 17 items, which correspond to specific symptoms. Only reported traumatic events or reported frightening personal experiences that were defined according to PTSD criterion A1 in *DSM-IV*[18] were considered traumatic. The main advantages of PTSD-I are its capacity to provide continuous measures of the severity of the disorder for every symptom and to allow the measurement of subsyndromic PTSD.

Lifetime *DSM-IV* diagnoses of other Axis I disorders were made using a standardized psychiatric examination, the Mini-International Neuropsychiatric Interview (French version 5.00) validated in the general population (κ coefficients for interrater and test-retest reliabilities, 0.88–1.0 and 0.76–0.93, respectively).[19] Positive cases were reviewed by a panel of psychiatrists. We explored major depressive disorder, dysthymia, mania, hypomania, phobia, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, and suicide (current ideation and lifetime attempt). Severity of depressive symptoms was examined using the Center for Epidemiologic Studies Depression Scale (a score ≥ 16 was considered severe).[20]

Statistical Analysis

Unadjusted analyses were carried out using χ^2 tests. Simple and multinomial logistic regression models were used to study the association between trauma (categorized as "no trauma" [comparison group], "trauma without reexperiencing symptoms," and "trauma with reexperiencing symptoms") and sociodemographic variables and between trauma and current mental health, physical health, and life-style habits, adjusted for age, gender, and educational level. Three multivariate analyses were performed to study the association between trauma and angina pectoris (model 1), hypertension (model 2), and depressive symptomatology (model 3). Multivariate logistic regression included covariates that were commonly

Table 1. Demographic Characteristics According to Trauma Status (N = 1,662)

Variable	No Trauma (0), %	Trauma Without Reexperiencing Symptoms (1), %	Trauma With Reexperiencing Symptoms (2), %	*P* Value			
				Global Test[a]	1 Versus 0[a,b]	2 Versus 0[a,b]	2 Versus 1[a,b]
n	792	612	258				
Age, y							
65–69	40.28	32.68	35.66	.002	…	…	…
70–74	35.23	33.66	32.56		.226	.715	.606
75+	24.49	33.66	31.78		<.0001	.032	.398
Female gender	61.94	49.36	72.66	<.0001	<.0001	.001	<.0001
School education, y							
≤5	26.39	18.49	23.60	.007	…	…	…
6–9	30.77	27.01	29.21		.081	.964	.217
>9	42.84	54.50	47.19		.0003	.262	.109

[a]Adjusted for other variables in the table.
[b]*P* Value for 2-by-2 intergroup comparisons.

Table 2. Current Mental Health According to Trauma Status (N = 1,662)

Variable	No Trauma (0), %	Trauma Without Reexperiencing Symptoms (1), %	Trauma With Reexperiencing Symptoms (2), %	*P* Value (global test)[a]	1 Versus 0		2 Versus 0	
					OR (95% CI)[a]	*P* Value	OR (95% CI)[a]	*P* Value
Major depressive disorder								
Never	77.13	78.61	56.97	<.0001				
Past	21.54	19.65	36.48		1.01 (0.77–1.34)	.924	2.18 (1.57–3.02)	<.0001
Current	1.33	1.74	6.56		1.44 (0.59–3.53)	.427	6.00 (2.64–13.62)	<.0001
At least 1 current anxious disorder	14.34	9.67	20.66	.005	0.75 (0.53–1.07)	.111	1.52 (1.04–2.22)	.032
No. of current psychiatric disorders								
0	78.63	82.33	67.22	.0002				
1–2	15.75	14.87	20.43		1.01 (0.74–1.38)	.964	1.46 (1.00–2.15)	.053
3+	5.62	2.69	11.91		0.52 (0.28–0.96)	.035	2.28 (1.35–3.83)	.002
Current depressive symptoms	26.81	23.43	38.82	.001	0.88 (0.69–1.14)	.338	1.59 (1.17–2.15)	.003
Current suicidal ideation	9.31	6.09	13.93	.011	0.66 (0.43–1.01)	.054	1.42 (0.91–2.21)	.122
Lifetime suicide attempt	2.96	2.46	7.47	.013	0.94 (0.47–1.87)	.851	2.36 (1.23–4.51)	.009
Cognitive impairment								
MMSE score <26	14.97	9.85	18.43	.033	0.72 (0.51–1.01)	.060	1.25 (0.85–1.85)	.254

[a]Adjusted for age, gender, and education.
Abbreviations: MMSE = Mini-Mental State Examination, OR = odds ratio.

reported in the literature and found to be associated with each outcome in our sample ($P < .15$). SAS version 9.1 was used for the statistical analyses with a significance level of $P < .05$ (SAS Institute Inc, Cary, North Carolina).

RESULTS

PTSD Prevalence

The mean (SD) age of the subjects was 72.5 (5.2) years, and 59% were women. More than half of the men (59.3%) and women (53.7%) reported a traumatic event. The most frequent traumatic events were linked to war (experiencing bombing, witnessing serious injury or unnatural death of another person due to torture or war combat, death threats; 52.9%), learning of the sudden, unexpected death of a family member or a close friend (20.3%), and a serious/near fatal accident of the person or a loved one (8.0%). The interview took place at a median period of 54.6 years (interquartile ratio = 20.2) after the exposure to the traumatic event.

The lifetime and current prevalence of PTSD in the sample was 2.4% and 1.2%, respectively. These rates were significantly higher in women than in men (3.8% vs 0.4%, $P = .001$, and 2.0% vs 0.2%, $P = .02$, respectively). Due to the low number of PTSD cases in our sample, we focused on the category of subjects having expressed reexperiencing symptoms, the most common type of PTSD symptom associated with trauma (16.8%) and one of the most clinically relevant.

Demographic Characteristics According to Trauma Status

Subjects aged 75 years and over reported more traumatic events with or without reexperiencing symptoms than younger participants (Table 1). Among the subjects who were exposed to a traumatic event, women were significantly more likely to have reexperiencing symptoms than men. Persons with a high school education level more frequently reported trauma without reexperiencing symptoms, whereas no significant association was observed between education and the presence of reexperiencing symptoms.

Mental Health as a Function of Traumatic Event and Reexperiencing Symptoms

Subjects expressing reexperiencing symptoms were significantly more likely to have depressive symptoms and to be diagnosed with past or current major depression, current anxious disorder, and psychiatric comorbidity than subjects without trauma (Table 2). They also declared more lifetime suicide attempts. In contrast, subjects exposed to a traumatic event but who did not report reexperiencing

Table 3. Current Physical Health According to Trauma Status (N = 1,662)

Variable	No Trauma (0), %	Trauma Without Reexperiencing Symptoms (1), %	Trauma With Reexperiencing Symptoms (2), %	*P* Value (global test)[a]	1 Versus 0		2 Versus 0	
					OR (95% CI)[a]	*P* Value	OR (95% CI)[a]	*P* Value
Ischemic diseases								
Cardio-ischemic diseases	6.90	11.65	13.55	.002	1.55 (1.05–2.27)	.026	2.28 (1.43–3.64)	.001
Angina pectoris	4.29	8.14	10.59	.002	1.78 (1.12–2.83)	.015	2.56 (1.50–4.38)	.001
Myocardial infarction	2.78	4.77	4.30	.195	1.36 (0.76–2.43)	.298	1.72 (0.81–3.65)	.157
Coronary heart disease	2.28	4.20	3.45	.296	1.49 (0.79–2.81)	.215	1.87 (0.81–4.32)	.144
Stroke	2.28	2.92	2.28	.986	0.99 (0.50–1.98)	.985	1.07 (0.41–2.77)	.895
Lower limb arteritis	3.76	2.42	3.08	.677	0.53 (0.28–1.01)	.054	0.82 (0.36–1.84)	.625
Nonischemic diseases								
Arrhythmia	10.53	12.75	13.15	.571	1.16 (0.83–1.62)	.390	1.22 (0.79–1.88)	.377
Congestive heart failure	1.82	2.33	4.17	.155	1.23 (0.58–2.64)	.592	2.25 (0.98–5.17)	.057
Metabolic risk factors[b]								
Hypercholesterolemia	46.51	44.55	41.80	.177	1.23 (0.99–1.53)	.067	1.14 (0.85–1.53)	.368
Elevated triglycerides	15.88	18.51	20.31	.144	1.14 (0.86–1.52)	.367	1.44 (1.00–2.07)	.050
Waist-to-hip ratio (medium or high)	63.14	73.37	63.71	.071	1.29 (0.96–1.73)	.088	1.43 (1.01–2.03)	.043
Metabolic syndrome	13.71	13.76	17.23	.298	1.03 (0.74–1.42)	.878	1.36 (0.91–2.04)	.132
Glycemia				.211				
Elevated	3.30	2.47	5.08		0.76 (0.39–1.45)	.399	0.98 (0.56–1.73)	.173
Diabetes	7.50	9.88	6.64		1.28 (0.87–1.88)	.208	1.61 (0.81–3.21)	.954
Other chronic conditions[c]								
Hypertension	44.83	44.97	52.05	.054	0.92 (0.74–1.16)	.486	1.35 (1.00–1.81)	.049
Thyroid dysfunction	6.20	5.94	10.94	.113	1.14 (0.72–1.80)	.565	1.69 (1.03–2.78)	.038
Life habits[d]								
Lifetime cigarette smoking	37.67	49.10	38.13	.038	1.33 (1.05–1.70)	.020	1.34 (0.97–1.86)	.075
Current heavy alcohol drinking	18.28	21.26	17.21	.410	1.19 (0.90–1.57)	.214	0.99 (0.67–1.45)	.948

[a]Adjusted for age, gender, and education.
[b]Hypercholesterolemia equals total cholesterol ≥ 236 mg/dL or treatment, elevated triglycerides equals ≥ 150 mg/dL, waist-to-hip ratio is categorized as tertile, elevated fasting glucose equals ≥ 110 mg/dL, and diabetes equals fasting glucose ≥ 126 mg/dL or antidiabetic medication. The metabolic syndrome was defined according to the National Cholesterol Education Program Adult Treatment Panel III criteria, which requires the presence of 3 or more alterations among the following: abnormal waist circumference (> 88 cm for women and > 102 cm in men), elevated triglycerides (≥ 150 mg/dL), low high-density lipoprotein cholesterol (< 50 mg/dL in women and < 40 mg/dL in men), elevated fasting glucose (≥ 110 mg/dL), and elevated systolic (≥ 130 mm Hg) or diastolic blood pressure (≥ 85 mm Hg) or use of antihypertensive treatment.[10–12]
[c]Hypertension: resting blood pressure ≥ 160/95 mm Hg or treatment.
[d]Alcohol consumption: heavy drinking > 20 g/d for women and > 40 g/d for men.

symptoms differed from subjects without trauma in having significantly less current suicidal ideation or psychiatric comorbidity and marginally less global cognitive dysfunction. They were also less cognitively impaired than traumatized subjects with reexperiencing symptoms (OR = 0.57; 95% CI, 0.37–0.88; *P* = .01). By contrast, no significant difference in cognitive functioning was observed between subjects with reexperiencing symptoms and comparison subjects.

Physical Health as a Function of Traumatic Event and Reexperiencing Symptoms

Table 3 describes the current physical health of persons having been exposed to a lifetime traumatic event, focusing on vascular diseases and metabolic risk factors. Regardless of the presence of reexperiencing symptoms, exposure to trauma was associated with current cardio-ischemic disease, particularly angina pectoris. Reexperiencing symptoms were specifically associated with higher waist-to-hip ratio, elevated triglycerides, hypertension, and thyroid dysfunction. The subjects who reported a traumatic event without reexperiencing symptoms were more likely to be past or current smokers than the subjects unexposed to trauma. A similar tendency, although not significant, was observed in the group who reported traumatic events in presence of reexperiencing symptoms.

Association of Trauma Status With Angina Pectoris, Hypertension, and Current Depressive Symptoms

In the multivariate model, the association between trauma and angina pectoris persisted for the 2 traumatized groups (OR = 2.27; 95% CI, 1.31–3.91 [without reexperiencing symptoms] and OR = 2.34; 95% CI, 1.22–4.49 [with reexperiencing symptoms]), suggesting that trauma is associated with angina pectoris independently of reexperiencing posttraumatic symptoms (Table 4). For all subjects except 1, age at the onset of angina pectoris was greater than age at the traumatic event. Likewise, multivariate analyses confirmed the independent and significant association between the exposure to reexperiencing symptoms in traumatized subjects and hypertension and the same marginal association with current depressive symptoms.

DISCUSSION

Exposure to Traumatic Experiences and PTSD Prevalence

This general population survey of community-dwelling French elderly reveals that 55.9% of the sample had experienced at least 1 lifetime traumatic event. This rate is comparable to that recently reported in noninstitutionalized elderly general populations in Europe (55.5%–76.5%)[21–24] and Australia (52.5%).[25] Exposure to lifetime traumatic

Table 4. Multiple Logistic Regression Analyses of Trauma Status Predicting the Presence of Angina Pectoris, Hypertension, and Current Depressive Symptoms

Outcome	No. of Cases	OR (95% CI)	*P* Value
Angina pectoris (n = 1,281)[a]			
No trauma	23	1	.006
Trauma without reexperiencing symptoms	41	2.27 (1.31–3.91)	
Trauma with reexperiencing symptoms	20	2.34 (1.22–4.49)	
Hypertension (n = 1,424)[b]			
No trauma	296	1	.047
Trauma without reexperiencing symptoms	220	0.86 (0.68–1.10)	
Trauma with reexperiencing symptoms	109	1.32 (0.96–1.82)	
CES-D score ≥ 16 (n = 1,421)[c]			
No trauma	183	1	.061
Trauma without reexperiencing symptoms	126	0.91 (0.69–1.20)	
Trauma with reexperiencing symptoms	83	1.39 (0.99–1.95)	

[a]Model 1: adjusted for age, gender, education, alcohol intake, waist-to-hip ratio, hypertension, elevated triglycerides, glycemia, physical activity, and living alone. The variables current CES-D score ≥16, lifetime major depressive disorder, or lifetime smoking were not associated with the outcome in our sample ($P = .569$, $P = .563$, and $P = .250$, respectively).
[b]Model 2: adjusted for age, gender, education, lifetime smoking, alcohol intake, body mass index (kg/m^2) > 25, and physical activity.
[c]Model 3: adjusted for age, gender, education, lifetime smoking, physical activity, living alone, cognitive impairment, at least 1 somatic disease, current antidepressant, and anxiolytic use.
Abbreviations: CES-D = Center for Epidemiologic Studies-Depression scale, OR = odds ratio.

events was associated with a wide range of psychiatric symptoms even long after the traumatic event (median = 54.6 years). The rates of lifetime (2.4%) and current (1.2%) PTSD are also in agreement with other studies in elderly people (3.1%–3.9%[21,22] and 0.7%–3.4%[22,24,26,27] for lifetime and current prevalence, respectively). In our study, women compared to men were at 10-fold higher risk of current and lifetime PTSD, although they were less frequently exposed to traumatic events. This gender difference has been described in adult general populations,[21,23,28,29] but the data on elderly populations[22,25,26,30] are less consistent.

Mental Health as a Function of Exposure to Trauma and Recurrent Reexperiencing Symptoms

Although the association of trauma with major depressive disorder and anxiety disorders has already been reported,[29] the association with suicidal behavior has not been previously examined. We observed a higher rate of lifetime suicide attempts only in subjects exposed to trauma with reexperiencing symptoms. Although the study design did not allow the inclusion of fatal suicides, this finding is consistent with recent data on lifetime suicide attempts in a community sample of American young adults.[31] Interestingly, our results further showed that elderly subjects who have not developed reexperiencing symptoms following trauma had generally a lower rate of current psychiatric comorbidity as well as less suicidal ideation and global cognitive dysfunction (even after adjustment for current depressive symptoms; data not shown) than the comparison group, suggesting compensatory strategies and resilience capacities. Such compensatory strategies have already been described in neglected children without physical abuse who demonstrate a greater capacity for problem solving, abstraction, and planning[32] as well as in foster children whose capacity for everyday functioning has been observed to be positively associated with the number of maltreatment types.[33] In the elderly, we have also reported within the same population that some childhood traumatic experiences could be associated with a lower risk of cognitive impairment.[34] In none of these studies, however, has the link with PTSD symptoms been examined.

Physical Health as a Function of Traumatic Exposure and Reexperiencing Symptoms

We were able to distinguish physical disorders, such as angina pectoris, associated with exposure to a lifetime traumatic event independently of PTSD symptoms from disorders, such as hypertension and thyroid dysfunction, more specifically associated with the expression of reexperiencing symptoms subsequent to trauma. Some studies have shown an association between full or partial PTSD and cardiovascular disease in male war veterans.[2,5,35,36] Of the 4 studies in civilian men and women or disaster survivors,[6,7,37,38] only 2 reported a mediating role of PTSD.[7,37] Sledjeski et al[6] suggested that the relationship between PTSD symptomatology and chronic medical conditions (including cardiovascular disorders) could be explained by the number rather than by the severity of lifetime traumas, as is often considered Thus, the mediating effect of PTSD in the relationship between trauma and physical health, though supported by a dose-response relationship between PTSD symptoms and cardiovascular diseases in some studies,[36,37,39] remains to be clarified. Our findings suggest that a distinct pattern may coexist according to the type of chronic disorder developed after trauma, which may or may not be mediated by PTSD symptoms, cardio-ischemic disease in elderly persons appearing independently of PTSD symptoms in contrast with other chronic conditions (thyroid dysfunction), or other vascular factors, such higher triglyceride levels, waist-to-hip ratio, and hypertension. Overall, our findings on anthropomorphic, metabolic, and hemodynamic risk factors indicate an increase in cardiovascular risk associated with the expression of posttraumatic symptoms and thus severity.

Mental Resilience as Protective Factor Against Somatic Disorders

To our knowledge, very few studies have examined both biologic and clinical characteristics of individuals who do not develop posttraumatic symptoms following the exposure to a traumatic event. Our data show that these exposed but nontraumatized persons not only have better overall mental health than those who reexperience the event but also may have acquired some form of positive protective effect compared to those who never experienced a traumatic event. Concerning physical health, this mentally resilient group had lower rates of hypertension (OR = 0.68; 95% CI, 0.50–0.93)

compared to other exposed persons. It was not possible to examine the biologic mechanisms leading to psychological and physiologic protection or dysfunction. It is, however, interesting to note a dose effect with an increase in the number and severity of health-related outcomes between groups, with nontraumatized subjects having the lowest risk, traumatized subjects without reexperiencing symptoms having an intermediary pattern of risk (lifetime smoking and a tendency for higher waist-to-hip ratio), and those with trauma leading to reexperiencing symptoms having the highest risk level (lifetime smoking tendency, higher waist-to-hip ratio, hypertension, higher triglyceride levels). In a subsample of 201 elderly subjects from the ESPRIT study, we also observed lower basal cortisol levels, specifically in the group of traumatized subjects with reexperiencing symptoms but not in nontraumatized subjects or in traumatized subjects without reexperiencing symptoms.[40] Together these observations suggest that the observed pathophysiological "gradient" as a function of reexperiencing symptom expression and severity could reflect an increasing allostatic load, which could be considered as a marker of PTSD.[41] Finally, genetic vulnerability associated with certain stress-related genes, notably the glucocorticoid receptor, might also contribute to this resilience profile. Indeed, certain polymorphisms have been associated with a healthier metabolic profile and better cognitive function, whereas other functional polymorphisms in the same gene were associated with worse vascular profile and modified cortisol response to a psychosocial stressor.[42] The pleiotropic effects of glucocorticoids on lipid and glucose metabolism, their immunosuppressive and anti-inflammatory actions, and their effects on brain function also support the hypothesis for their involvement in the balance between physical and mental health and in resilience profile, which may be modulated by distinct genetic vulnerability.

Limitations and Strength

Retrospective reports of traumatic events are subject to recall bias, especially when considering that some traumatic events lie in the distant past from the perspective of our elderly sample. There is also a potential bias due to exclusion of demented persons or those with missing data as well as a survival bias, so some associations might be underestimated. Posttraumatic stress disorder was diagnosed using a *DSM-III-R*–based questionnaire in which the definition of a traumatic event is linked to a normative objective standard, whereas *DSM-IV* focuses on a subjective standard, the emotional response of the individual exposed to the event. If this subjective definition, where *trauma* is defined as any event an individual found intensely distressing, offers an advantage in terms of sensitivity of clinical diagnosis, the objective definition is better adapted to the study of resilience. We did not collect information on the number of lifetime traumatic events and could not study the impact of cumulated burden of lifetime trauma on the long-term development of cardio-ischemic diseases. In addition, the data on health symptoms were collected at baseline and we cannot firmly conclude that a traumatic event is a risk factor for current physical disorders, although, in most cases, the trauma occurred more than 50 years before the clinical evaluation. The same results were, however, obtained including only subjects for whom we could confirm that the traumatic event preceded the onset of cardio-ischemic disease. Finally, multiple analyses have been performed, which may have induced some chance associations, and, although results are overall consistent with previous studies, our findings require replication within a larger sample.

This research was based on a large, randomized, community-dwelling elderly sample, for which a large number of biologic, clinical, and life-style risk factors of vascular and metabolic diseases were collected. The information on physical health used predominantly objective indicators obtained from different sources: standardized clinical examinations, medications validated by prescriptions, and blood analysis. Finally, we have distinguished the effects of trauma exposure from those of PTSD symptom expression.

Our results suggest that lifetime traumatic exposure may induce long-term vascular consequences, which appear to be modulated by mental resilience. In clinical terms, our results suggest that elderly persons with a history of exposure to traumatic events should be carefully monitored for vascular pathology, notably where this exposure has led to reexperiencing symptoms. Further large longitudinal studies (ideally birth cohorts) are needed to better understand the biophysiological mechanisms associated with trauma accumulation and mental resilience. Clinical studies are also required to assess the potential protective effect of pharmaceutical and cognitive-behavioral intervention to terminate reexperiencing of traumatic events in exposed subjects in order to reduce their risk of future cardiovascular disorders.

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