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Neuroendocrinology and Mental Health Consequences of War-Related Trauma: An Illustrative Review

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I. Background

The **objective** of the study is to summarize research on refugees and related immigrants in regards to stress-responses measured by cortisol levels and to identify physiological and psychological responses that promote and hinder the transition of resettlement.

- Refugees and similar immigrants experience traumatic events before and after resettlement.
- The Family Stress Model (Masarik & Conger, 2017) was used to describe the stress pathways that hinder educational outcomes in youth as well as factors that promote resilience (Figures 1 and 2).
- The variables being assessed: cortisol responses, coping strategies, PTSD (Posttraumatic Stress Disorder), and the type of trauma.

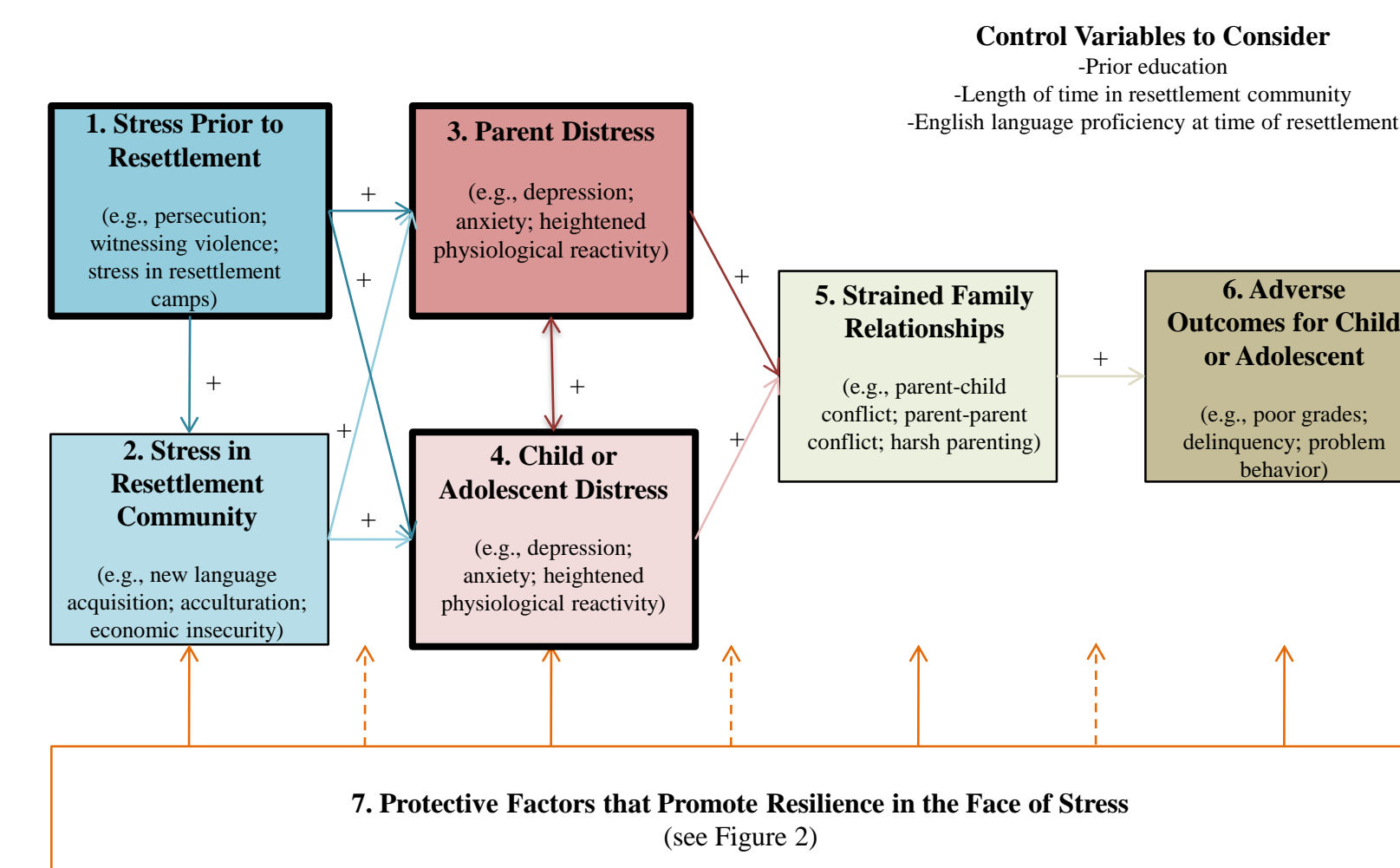


Figure 1. The family stress model, adapted for refugee youth and families, outlines a general hypothesized stress process by which stressors (Boxes 1 and 2) contribute to individual distress (Boxes 3 and 4) and strained family relationships (Box 5), ultimately contributing to adverse outcomes for children or adolescents in Box 6. Box 7 encompasses protective factors hypothesized to reduce the effect of stress on a specific process or outcome. This model was adapted from Conger, Conger, and Martin (2010) and Masarik and Conger (2017) to include stress relevant to the lives of refugee youth and their families.

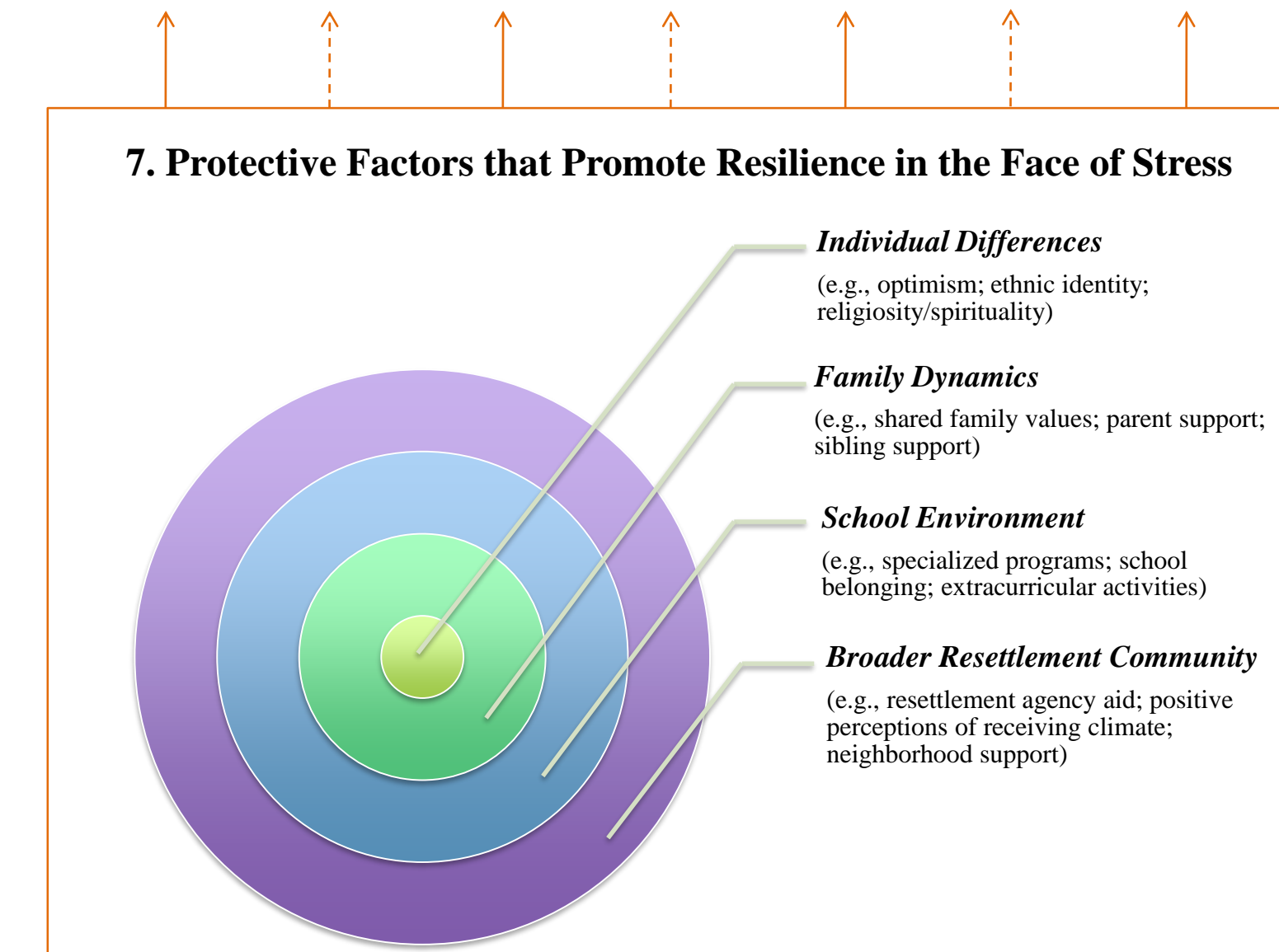
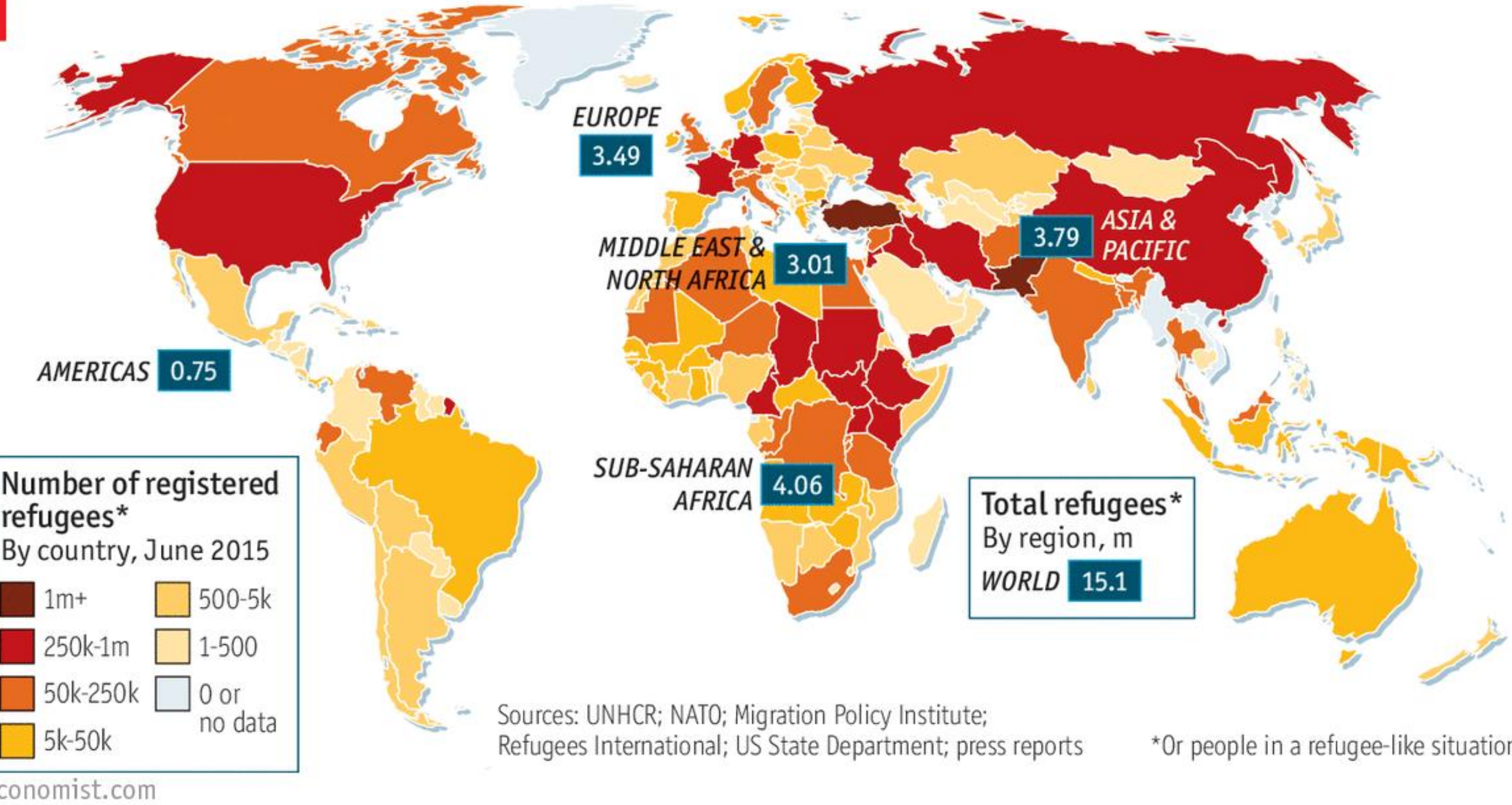


Figure 2. Protective factors that are hypothesized to promote resilience in the face of stress (see Figure 1). Dashed arrows represent moderating (interactive) effects whereas solid arrows represent direct (compensatory) effects.

IV. Issues in Research

- Timing of cortisol responses were measured inconsistently throughout the included research.
- There was a lack of control groups that matched the population samples.
- The issues that refugees and similar immigrants faced are often challenges encountered before as well as after the resettlement process.
- Refugees often rely on self-coping strategies as well as community support to overcome the obstacles of resettlement therefore, **community attitudes on refugee resettlement can act as powerful barriers or offer successful opportunities during transition** (Portes, 1995).
- There is a gap in research of trauma type (adult vs. child).



II. Method

- We searched and selected articles for review through scholarly databases (e.g., PsycINFO).
- Selection criteria:
 - Cortisol measurements (either saliva or plasma collections)
 - Psychological variables (e.g. coping styles, stress responses)
 - Victims of war-related trauma including refugees and other immigrants, but excluding war veterans

III. Key Points

- There were many inconsistencies within cortisol responses and coping strategies.
- Cortisol levels in participants that were diagnosed with PTSD, or met the PTSD classification were lowered or blunted in response to reminder cues.
- Inconsistent data was found in results regarding the type of trauma experienced and cortisol levels (i.e. different traumas sometimes showed lower/higher cortisol responses however some groups did not differ).
- Plasma and saliva collections differed in which plasma collection of cortisol levels typically did not detect immediate changes.

Author(s)	Year	Participants	Variables	Cortisol Collection	Assessment/Survey	Key Findings
Feldman, Vengrober, Eidelman-Rothman, & Zagooory-Sharon	2013	Sderot citizens (N = 464) Age range: 1.5 - 5 (children M = 33 months, experience mothers M = 31.27) Women = 54% Men = 46%	1. PTSD 2. Detailed trauma experience 3. Mother-child interaction 4. Fear regulation 5. Cortisol 6. sAA	1. Saliva collection (3x points)	1. Psychiatric Interview 2. Zero-to-Three (DC: 0-3R) 3. Formal Observation 4. Detailed evocation of traumatic history 5. Mother-Child free-play 6. Lab-TAB 7. Coding Interactive Behavior Manual	1. Differences between the children groups and control due to PTSD 2. PTSD children had consistently low cortisol and sAA levels throughout study 3. War-exposed children showed higher negative emotionality; PTSD group showed withdrawal and non-PTSD group showed comfort seeking strategies 4. Predictors of child cortisol included maternal cortisol, PTSD symptoms, low reciprocity, and negative emotionality
Gola, Engler, Schauer, Adenauer, Riether, Kolassa, & Kolassa	2012	African refugees (N = 9) Balkan refugees (N = 16) Middle East & Afghanistan refugees (N = 33) Age range: Not specified Women = 31 Men = 27	1. Trauma history 2. Somatic symptoms 3. PTSD symptoms 4. Depression 5. Torture events	1. Saliva collection (3x points) 2. Blood Collection (3x points)	1. Screening of Somatic Symptoms-7 (SOMS-7) 2. Traumatic Event checklist (CAPS) 3. Mini International Neuropsychiatric Interview (M.I.N.I.) 4. Hamilton Depression Rating Scale (HAM-D)	1. No difference in plasma and cortisol levels 2. PTSD participants that were raped had increased salivary levels during reminder cues 3. PTSD participants that had not been raped had decreased cortisol levels to reminder cues
Kocijan-Hercigonja, Sabioncello, Rijavec, Folnegović-Šmalc, & Matijević	1996	Balkan (N = 91) Age range: 18 - 59 (M = Not specified) Women = 30 Men = 61	1. Psychosomatic symptom severity 2. Cortisol 3. Prolactin 4. B-endorphin 5. Thyroxin 6. Triiodothyronine	1. Blood collection (1x point)	1. Cornell Index (COR-NEX2)	1. Levels of cortisol and prolactin decreased throughout study 2. Prolactin correlated with COR-NEX2 results 3. Endocrinal changes seemed to be from psychologically induced stressors and not trauma specifically
Matheson, Jorden, & Anisman	2008	Somali refugees (N = 90) Age Range: Not specified Women = 58 Men = 32	1. Trauma history 2. Coping strategies 3. Trauma symptoms 4. Depressive symptoms 5. Physical health 6. Cortisol	1. Saliva collection (4x points)	1. Traumatic Life Events Questionnaire (TLEQ) 2. The Survey of Coping Profile Endorsement (SCOPE) 3. Impact of Events Scale (IES-R) 4. Beck Depression Inventory (BDI)	1. Trauma history associated with poorer mental and physical health 2. Coping strategies mediated relationship between trauma history and health 3. Trauma history and symptoms associated with exaggerated morning cortisol rise, but blunted response to stressor reminders 4. Passive resignation (coping) mediated relationship between trauma and blunted cortisol
Muhtz, Godemann, von Alm, Wittekind, Goemann, Wiedemann, & Kellner	2011	Holocaust Refugees (Germany) (N = 50) Age range: 5 - 12 during/after WWII (M = 71) Women = 16 Men = 9	1. PTSD 2. Hormonal Changes 3. Metabolic Abnormalities 4. Endocrine Abnormalities 5. Resilience 6. Coping Style 7. Quality of Life	1. Saliva collection (4x points)	1. Posttraumatic Diagnostic Scale (PDS) 2. Structured Diagnostic Interview according to DSM-IV 3. German Questionnaire of Traumatic Events 4. Beck Depression Inventory (BDI) 5. Short-Form Health Survey (SF-36) 6. Brief COPE 7. Resilience Scale (RS-11)	1. PTSD did not mediate traumatic stress and physical illness 2. PTSD participants had lower levels of resilience than non-PTSD group 3. Both groups had decreased cortisol levels 4. No difference between groups in coping strategies
Sabioncello, Kocijan-Hercigonja, Rabatić, Tomašić, Jeren, Matijević, & Dekaris	2000	Croatian Refugees (N = 20) Age Range: 18-39 (M = 29) Women = 20	1. Psychosomatic symptom severity 2. Cortisol 3. Prolactin 4. B-endorphin 5. Immunophenotyping of Lymphocyte 6. Lymphocyte Proliferation	1. Blood collection (1x point)	1. Cornell Index (COR-NEX2)	1. Displaced women scored higher on COR-NEX2 2. Displaced women had higher baseline levels of cortisol and higher levels of prolactin, B-endorphin and activation in phenotypes
Søndergaard & Theorell	2003	Arabic Refugees (N = 86) Age range: 18 - 48 (M = 35) Women = 32 Men = 54	1. Trauma history 2. Hormonal changes	1. Blood collection (4x points)	1. Impact of Event Scale (IES-22) 2. Hopkins Symptoms Checklist (HSCL-25) 3. General Health Questionnaire (GHQ-28)	1. Increased cortisol levels in distress of family members and perception of high-demand life activities 2. Decreased prolactin on situations involving dependency on authority



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