

Mental Health of Refugee Children: New Findings on Syrian Refugees in Lebanon (BIOPATH Study)



Programme

- | | |
|----------------------|---|
| 14:00 – 14.10 | Welcome and Introduction to the Webinar and BIOPATH: Prof Michael Pluess (QMUL) |
| 14:10 – 14:22 | Prevalence, comorbidity, and predictors of common mental disorders: Dr Fiona McEwen & Dr Claudinei Biazoli (QMUL) |
| 14:22 – 14:34 | Predictors of psychological risk and resilience among Syrian refugee children: Ms Cassandra Popham (QMUL) |
| 14:34 – 14:46 | War Exposure, Post-Traumatic Stress Symptoms and Hair Cortisol Concentrations in Syrian Refugee Children: Dr Demelza Smeeth (QMUL) |
| 14:46 – 14:52 | Discussion: Prof Elie Karam (IDRAAC) |
| 14:52 – 15:00 | Q&A, Final Comments and End: Prof Michael Pluess (QMUL) |

Background

▪ Syrian Civil War

- Armed conflict which **began in 2011** related to political unrest of the Arab spring across the Middle East
- Initially conflict between Syrian government and rebel groups, developed into complex proxy war
- Detrimental consequences:
 - Approx. 500,000 casualties
 - **6.7 million** Syrians displaced internally within Syria
 - **6.6 million** Syrians displayed externally
 - Most remain in the Middle East
 - About **50%** of Syrian refugees are children
 - At risk of becoming ill, abused, exploited, no access to school



Image credit: © AP Photo/SANA, File

Biological Pathways of Risk and Resilience in Syrian Refugee Children Based in Lebanon (BIOPATH)



NIH

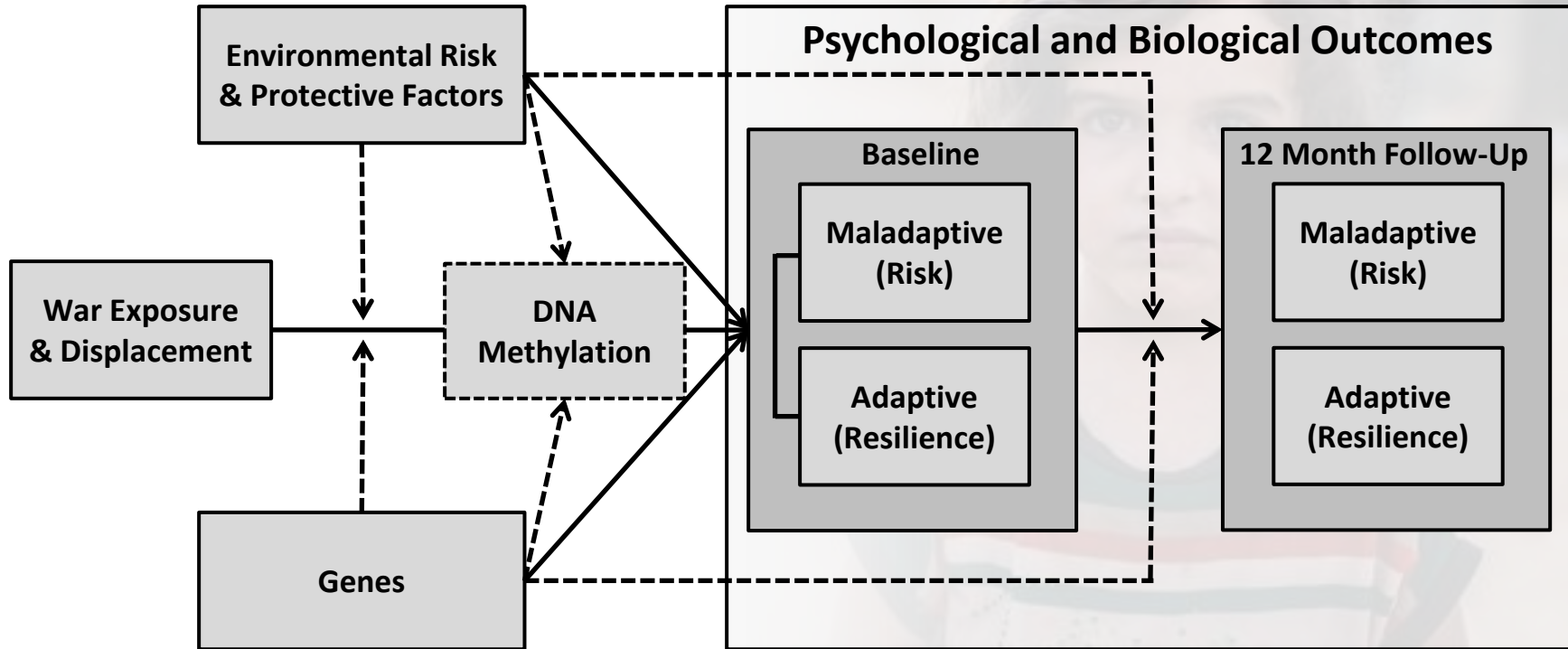
Eunice Kennedy Shriver National Institute of Child Health and Human Development

BIOPATH Study

- Millions of children are affected by war and displacement
 - Some develop psychological problems
 - Some show remarkable resilience
- We investigate the **biological underpinnings** of individual differences in response to war and displacement
 - **Multiple settings**
 - Family, school, community, neighbourhood, services
 - **Multilevel approach**
 - Environmental, social, psychological, neuroendocrine, epigenetic and genetic factors
 - Focus on both **risk and protective** factors as well as **adaptive and maladaptive** outcomes
 - **Longitudinal design**

BIOPATH Study

■ Study Design



■ Sample

- $N = 1,600$ Syrian refugee children (age 8-16 years) and their primary caregiver (Oct 2017 – Jan 2018)
 - 1,009 were followed-up (Oct 2018 – Jan 2019)

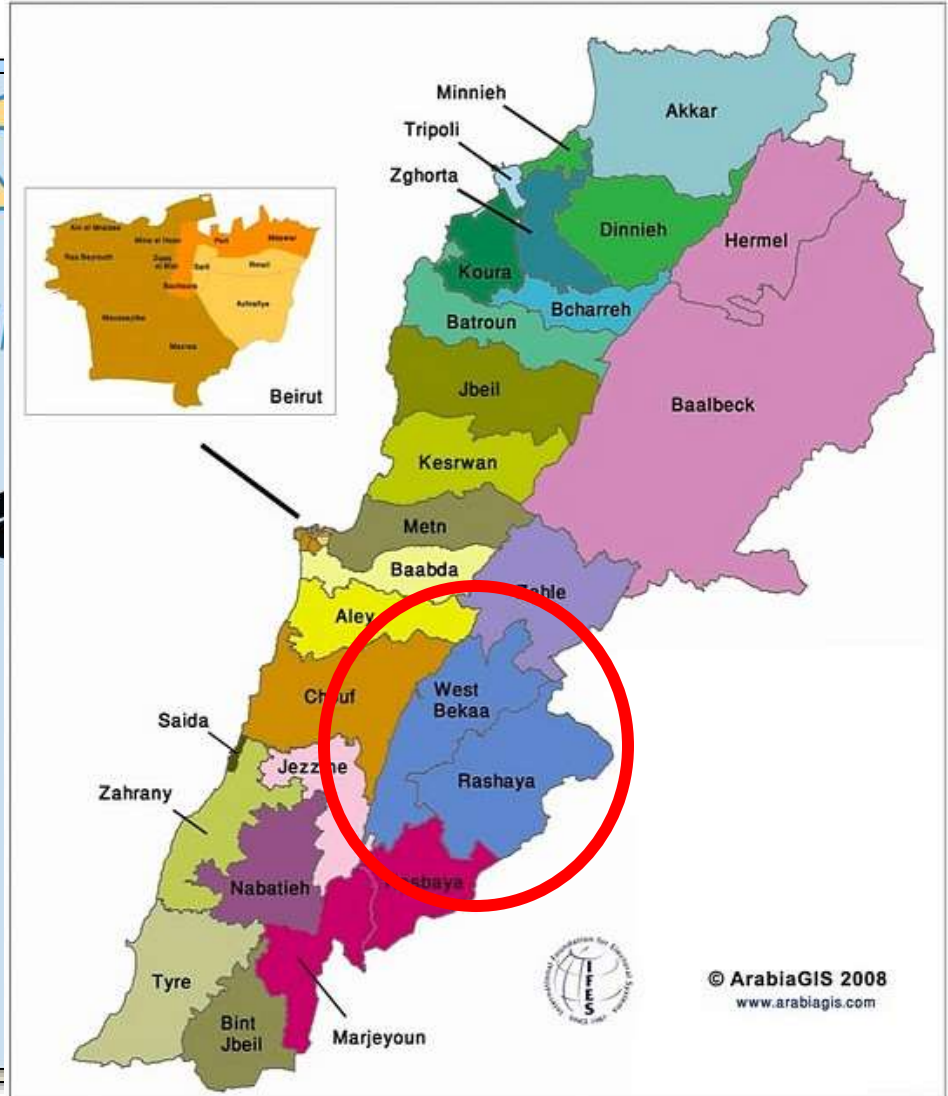
BIOPATH Study

■ Measures

- Range of questionnaires for child and caregiver
 - Psychopathology outcomes
 - Well-being outcomes
 - Individual, social and environmental **protective factors**
 - ❑ Across the various developmental contexts
 - Individual, social and environmental **risk factors**
 - ❑ Across the various developmental contexts
- Biological samples
 - **Saliva for molecular variables**
 - ❑ Genome-wide genetic information (for GWAS approaches)
 - ❑ Genome-wide epigenetic information (DNA methylation)
 - **Hair for neuroendocrine variables**
 - ❑ Cortisol
 - ❑ DHEA-S
 - ❑ Testosterone

BIOPATH Study

- Location











هلا
به الحرام
تقبيل

Publications

▪ **BIOPATH publications related to this webinar**

- McEwen, F. S., Popham, C., Moghames, P., Smeeth, D., de Villiers, B., Saab, D., Karam, G., Fayyad, J., Karam, E., & Pluess, M. (2022, Apr). **Cohort profile: biological pathways of risk and resilience in Syrian refugee children (BIOPATH)**. *Social Psychiatry and Psychiatric Epidemiology*, 57(4), 873-883.
<https://doi.org/10.1007/s00127-022-02228-8>
- McEwen, F. S., Biazoli, C., Popham, C., Moghames, P., Saab, D., Fayyad, J., Bosqui, T., Karam, E., & Pluess, M. (2022). **Prevalence and Predictors of Mental Health Problems in Refugee Children Living in Humanitarian Settings**. Available at SSRN 4047879.
- Popham, C. M., McEwen, F. S., Karam, E., Fayyad, J., Karam, G., Saab, D., Moghames, P., & Pluess, M. (2022). **Predictors of psychological risk and resilience among Syrian refugee children**. *Journal of Child Psychology and Psychiatry*.
<https://doi.org/10.1111/jcpp.13670>
- Smeeth, D., McEwen, F., Popham, C., Karam, E., Fayyad, J., Saab, D., Rieder, M. J., Elzagallaai, A. A., van Uum, S., & Pluess, M. (In Press). **War Exposure, Post-Traumatic Stress Symptoms and Hair Cortisol Concentrations in Syrian Refugee Children**. *Molecular Psychiatry*.

Prevalence, comorbidity, and predictors of mental disorders in refugee children

Dr Fiona McEwen & Dr Claudinei Biazoli

Cassandra M. Popham, Patricia Moghames, Dahlia Saab, John Fayyad, Elie Karam, Tania Bosqui, Michael Pluess

Outline

Previous evidence

New and improved estimates of common mental disorders in Syrian refugee children living in Lebanon

Comorbidity between common mental disorders

Multilevel predictors for symptom burden



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Previous evidence and gaps in refugee children mental health epidemiology

2 meta-analyses of prevalence & 1 of predictors *

PTSD: 22.7–52.0%

Anxiety: 15.8–32.0%

Depression: 13.8–28.0%

Externalising behaviour problems:

- ODD: 1.7%
- ADHD: 8.6%

Risk factors: exposure to trauma, daily stressors, family separation, parent mental health, low SES, bullying, etc.

Gaps:

Most data from HIC, lacking data from camps and informal settlements in LMIC

Large variability in estimates between studies

Cross-sectional designs and non-probabilistic sampling

Transcultural measurement errors

Reliance on screening tools with limited data from clinical interviews

* Henkelmann et al. (2020), BJPsych Open, 6: e68; Blackmore et al. (2020), JAACAP, 59:6; Scharpf et al. (2021), Clin. Psych. Rev, 83

Estimating prevalence of common mental disorders in the BIOPATH cohort

Settlement-based probabilistic sampling

Longitudinal data

Culturally adapted structured clinical interviews

- MINI Kid 6.0
- Diagnoses agreed by consensus after clinical supervision
- Contextual, cultural, and linguistic factors that might impact the diagnostic process were taken into account
- Clinical Global Impression–severity score (CGI-s) ≥ 4 for case definition

Locally validated screening tools for mental health problems



Informal tented settlement in Bekaa, Lebanon



Interview as part of the BIOPATH study
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Measures

Children's mental health symptoms

Depression: CES-DC, abridged (self-report)

Anxiety: SCARED, abridged (self-report)

PTSD: CPSS (self-report)

Externalising behaviour problems: SDQ + CD/ODD items (caregiver-report)

Risk factors

War events: WEQ (combined self- and caregiver-report)

Daily stressors: PREI, developed for BIOPATH (caregiver report)

Child maltreatment: ICAST, abridged (self-report)

Caregiver-child conflict: Parent-Adolescent Conflict scale (self-report)

Caregiver mental health: PTSD, PCL-5; anxiety, DASS-21; depression, CES-D 10; Impulsiveness, ABIS

Point prevalence estimation

Cohort-specific cut-offs on screening tools

ROC curve analysis to estimate optimal cut-off for cohort – compares screening tools to clinical interview (reference standard)

Calculate rate of false positives and false negatives when using screening tool

Adjusted prevalence for rate of false positives and false negatives:

$$\text{Adj. prevalence} = (\text{raw prevalence} * \text{PPV}) + (1 - \text{raw prevalence} * (1 - \text{NPV}))$$

PPV = Positive predictive value
NPV = Negative predictive value



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Prevalence – clinical interviews (N=134)

PTSD: 39.6 [31.3–47.9]

Anxiety: 47.8 [39.3–56.3]

Depression: 20.1 [13.3–26.9]

Externalising: 26.9 [19.4–34.4]



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Prevalence – whole sample

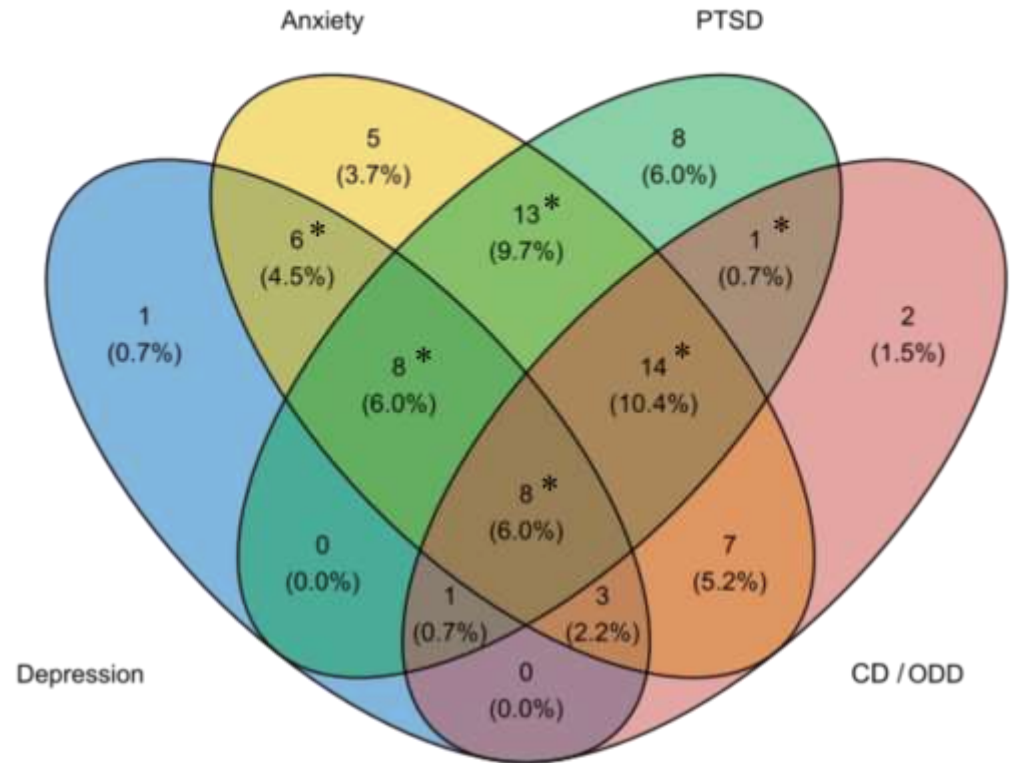
	Baseline (N=1594)		Follow-up (N=1001)	
	Raw	Adjusted	Raw	Adjusted
PTSD	55.8	36.1 [33.7 - 38.5]	34.7	30.4 [27.5 - 33.3]
Anxiety	78.5	54.3 [51.9 - 56.7]	68.8	50.8 [47.7 - 53.9]
Depression	38.6	19.0 [17.1 - 20.9]	27.2	16.1 [13.8 - 18.4]
Externalizing	42.7	27.6 [25.4 - 29.8]	41.6	27.2 [24.4 - 30.0]
Any CMD	92.1	58.7 [56.3 - 61.1]	85.6	55.1 [52.0 - 58.2]

Comorbidity

Frequency of overlapping diagnoses

Assigned by clinical interview

Odds ratios calculated to evaluate association between each pair of overlapping disorders



Predictor analysis

Linear mixed-effects models (LMMs) adjusted for subjects clustered by settlement

Outcomes: total scores for each symptom scale (PTSD, depression, anxiety, externalising)

Covariates: child and caregiver age, child gender, time since leaving Syria as predictors

Sensitivity analyses: only cases with follow-up data; only cases with complete data; in subgroups defined by gender, age, and time since leaving Syria

Predictors

	Depression		Anxiety		PTSD		Externalizing	
Predictor	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value
<i>Time (Follow up)</i>	-.263	<.001	-.287	<.001	-.387	<.001	-.079	.011
<i>Demographic</i>								
Age	.083	<.001	-.019	.032	.061	<.001	-.052	<.001
Gender (Female)	.099	.018	.371	<.001	.058	.154	-.415	<.001
Time since leaving Syria	-.027	.022	-.019	.113	-.033	.003	.034	.005
<i>War events</i>	.033	<.001	.022	<.001	.044	<.001	.023	<.001
<i>Perceived environment</i>	-.208	<.001	-.070	.082	-.198	<.001	-.282	<.001

Predictors

	Depression		Anxiety		PTSD		Externalizing	
Predictor	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value	Effect Size	<i>p</i> -Value
Maltreatment	·024	<·001	·018	<·001	·030	<·001	·010	<·001
Conflict	·030	<·001	·007	·236	·044	<·001	·025	<·001
<i>Caregiver symptoms</i>								
Depression	·031	<·001	·019	<·001	·024	<·001	·045	<·001
Anxiety	·036	<·001	·017	<·001	·022	<·001	·041	<·001
PTSD	·013	<·001	·006	<·001	·007	<·001	·015	<·001
Impulsivity	·023	<·001	·013	<·001	·019	<·001	·034	<·001

Summary and implications

The burden of common mental health problems in refugee children is high

Comorbidity is common, providing support for transdiagnostic approaches

- See also Kyrillos et al. (2022), *Transcultural Psychiatry*

The relative importance of the quality of the environment (daily stressors) highlights the significance of addressing social determinants of mental health

Integrating mental health with other services (e.g. schools) is important

Ultimately policy change aimed at reducing social inequities will be essential



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Tania Bosqui (*American University of Beirut, Lebanon; Trinity College Dublin, Ireland*)

Elie Karam^{1,2,3}, John Fayyad^{1,2,3}, Georges Karam^{1,2,3}, Dahlia Saab¹ (¹*IDRAAC, Lebanon;* ²*St George Hospital University Medical Center, Lebanon;* ³*Balamand University, Lebanon*)

And all other members of the BIOPATH team: <https://www.qmul.ac.uk/sbbs/about-us/our-departments/psychology/global-mental-health/meet-the-team/>

We warmly thank all participating families for their participation

This paper is dedicated to John Fayyad, who sadly passed away during the study



Thank you



Queen Mary
University of London



Photo credit: Nour Taveh,
18/08/2017

Risk and Resilience among Syrian Refugee Children in Lebanon

Cassandra M. Popham, Fiona S. McEwen, Elie Karam, John Fayyad, Georges Karam, Dahlia Saab, Patricia Moghames, Michael Pluess

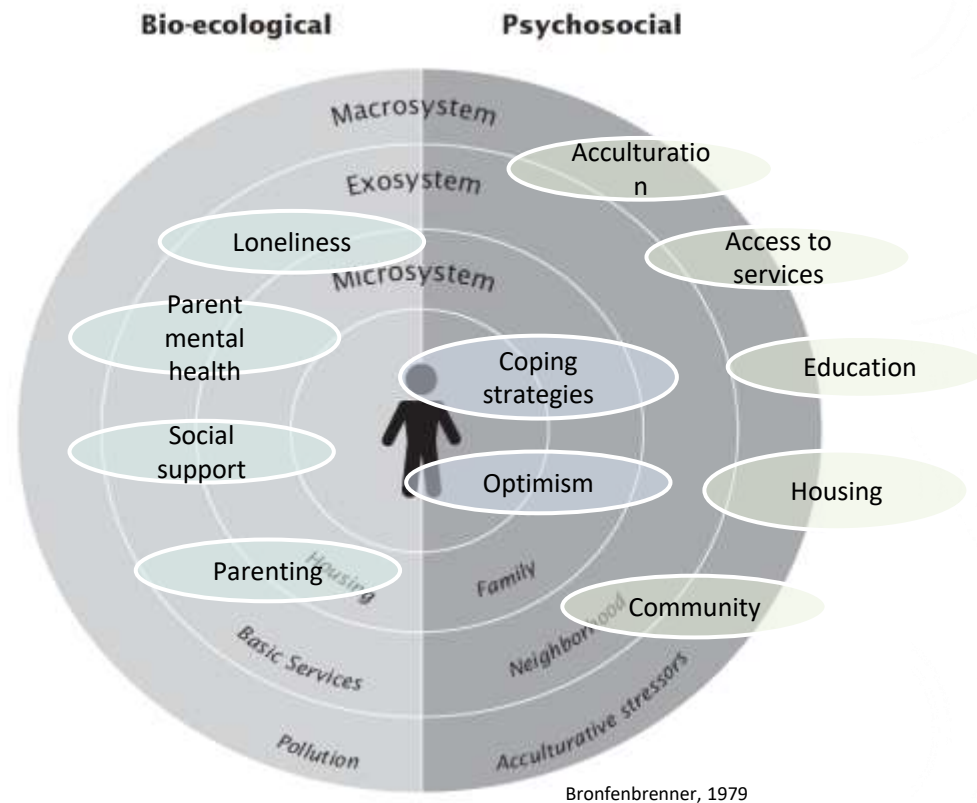
<https://acamh.onlinelibrary.wiley.com/doi/10.1111/jcpp.13670>



BACKGROUND

- Syrian refugee children are at increased risk of mental health problems
- But some show no evidence of problems, i.e., appear to be resilient
- Many potential predictors (e.g., optimism, coping strategies, parent-child relationship, caregiver mental health, etc)
- But
 - Multiple outcome dimensions
 - Effects of war exposure

RQs: How many children are resilient? What differentiates them from children exposed to the same war events but doing poorly?



METHODS

1. Operationalise resilience: create low/high symptom groups
2. Match each low symptom child with a high symptom child with similar war exposure, age, gender, time since leaving Syria
3. Predictors of group membership



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18/10/2017

SAMPLE

- Wave 1 BIOPATH sample
- Exclusions:
 - No reported war exposure ($n = 49$)
 - Missing demographic/symptom data
- 1,528 child-caregiver pairs (590 matched children)
- Mean age = 11.48 (SD = 2.43)
- 52.6% children female
- 89.5% caregivers mother
- $M = 9.90$ war events (SD = 5.34)
 - 84% witnessed explosions
 - 36.6% witnessed torture
 - 44.4% person close to them killed

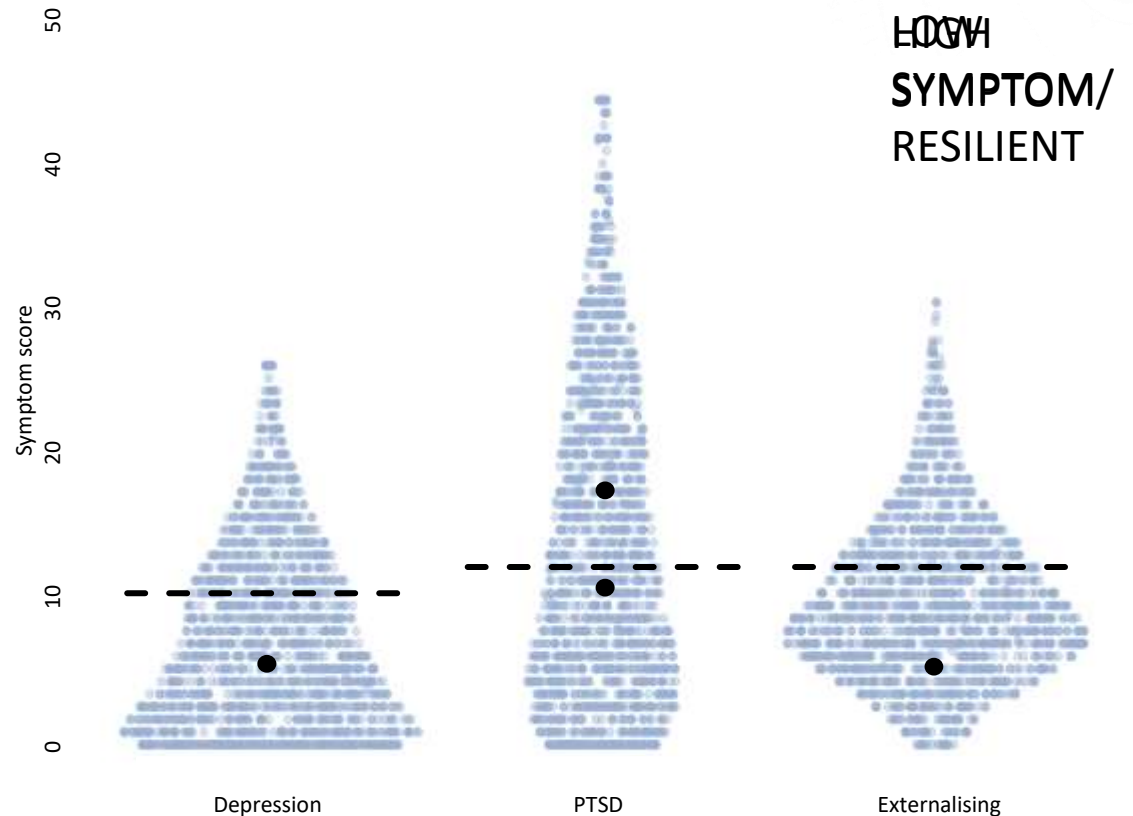


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MANIFESTED RESILIENCE

Evidence of functioning better than expected in the context of adversity

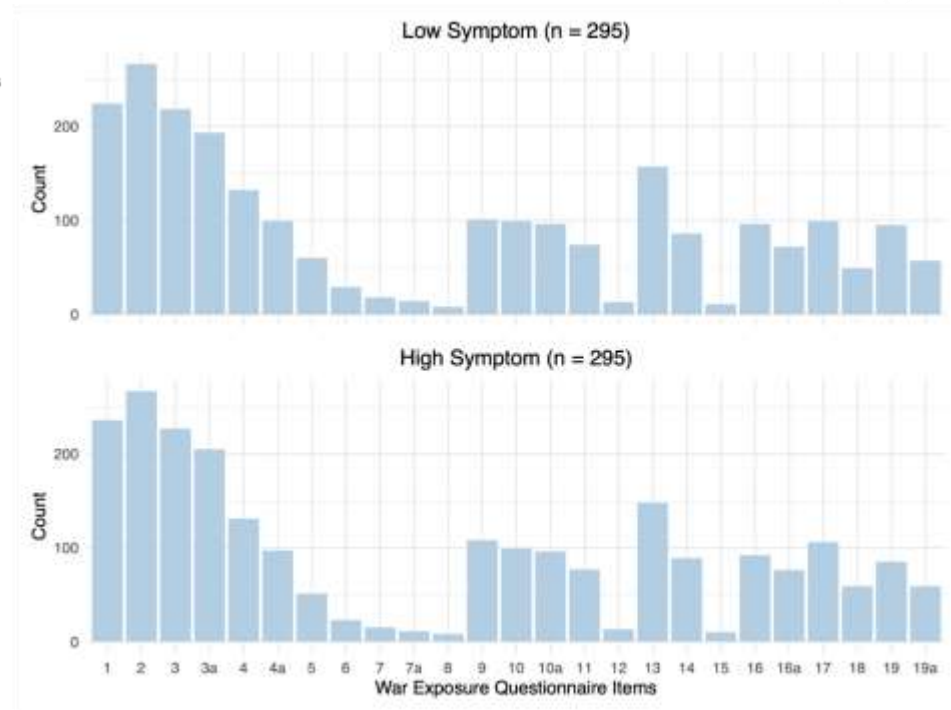
295 (19.3%) children met low symptom criteria



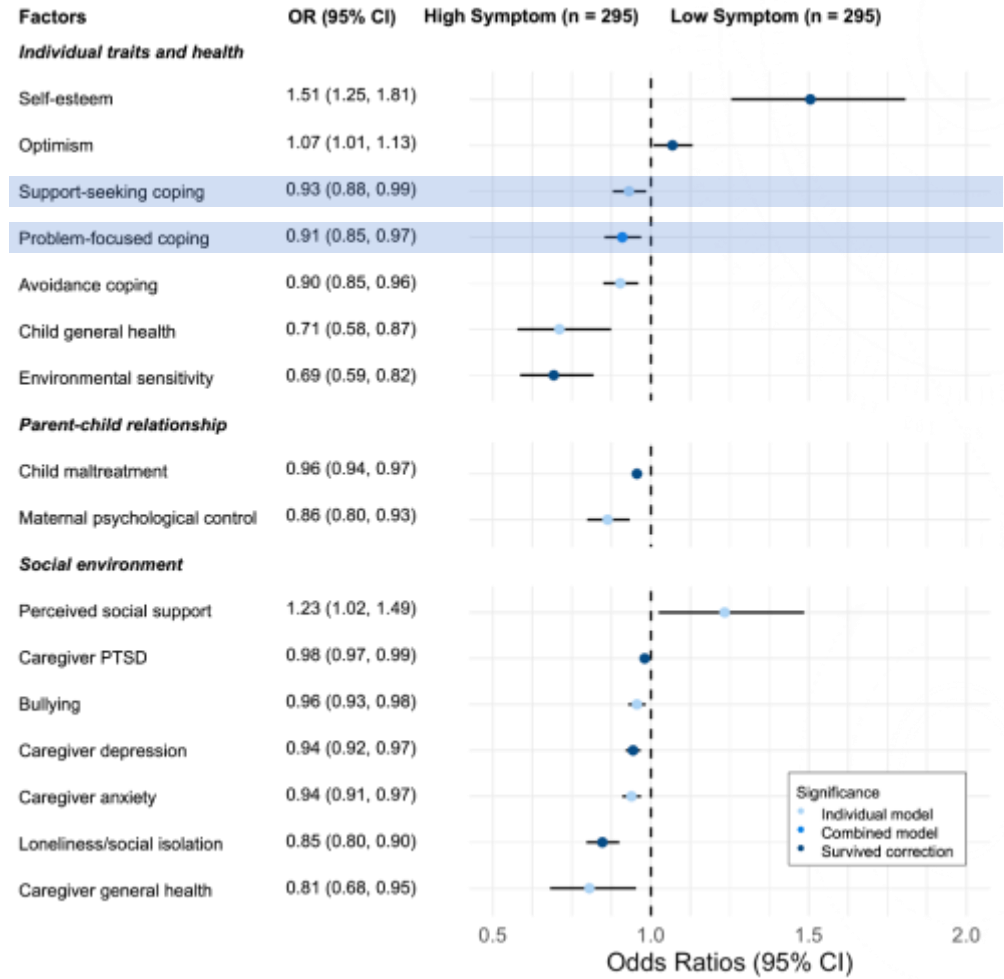
MATCHED GROUPS

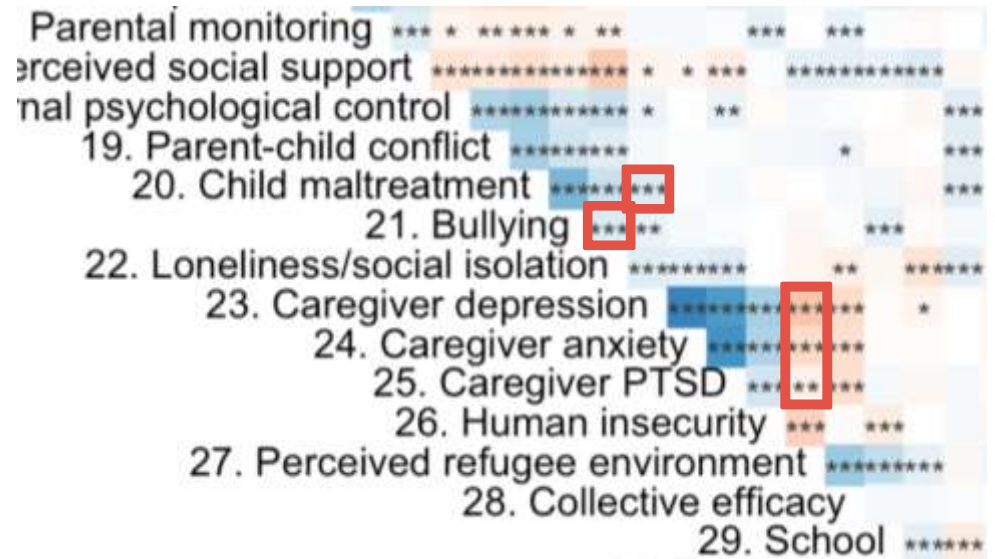
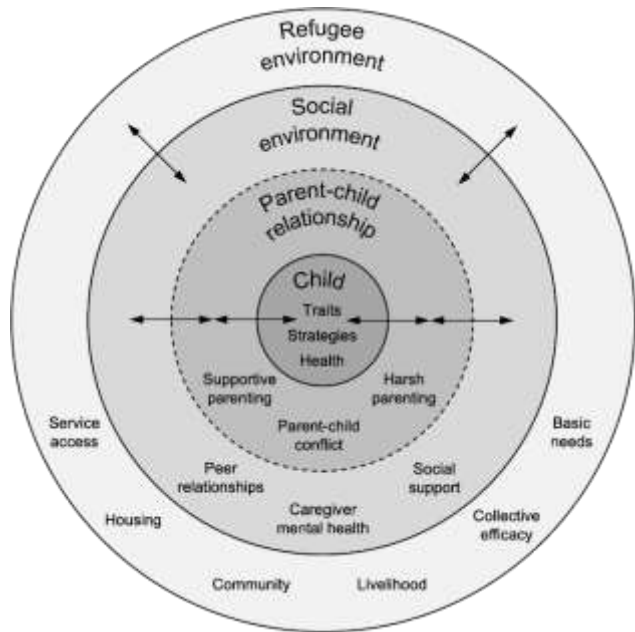
War Exposure Item

- 1 Did you witness explosions close to you
- 2 Were you not able to go outside the house because of bullets or bombardment
- 3 Were houses of people you know destroyed
- 3a Did you witness it
- 4 Did your house get completely destroyed or part of it
- 4a Did you witness it
- 5 Were you inside your house when it got bombarded
- 6 Did you witness the kidnapping of someone
- 7 Did any member of your family get kidnapped
- 7a Did you witness it
- 8 Did armed persons try to kidnap you
- 9 Did you witness someone getting beaten up
- 10 Did armed people enter your house
- 10a Did you witness it
- 11 Did you witness persons getting tortured
- 12 Did you get beaten to give information about your parents
- 13 Did you see an injured person (not on TV)
- 14 Did you see armed persons shooting people
- 15 Were you injured from explosions or bombarding
- 16 Was any close person to you injured in war
- 16a Did you witness it
- 17 Did you see a dead person (not on TV)
- 18 Did you witness armed people killing someone
- 19 Did a close person to you get killed
- 19a Did you witness it



RESULTS





TO SUMMARISE...

- 19.3% children meet low symptom/resilient criteria
 - But number may be higher
- Several factors predict group membership
 - Parent-child relationship and caregiver mental health important
 - Individual factors (e.g., self-esteem, environmental sensitivity) also important
 - Coping strategies opposite effect than expected
- Correlations between predictors indicate importance of looking at whole context



Photo credit: Nour Tayeh,
18/10/2017

THANK YOU!

And credit to:

Michael Pluess

Fiona McEwen

Elie Karam

John Fayyad

Dahlia Saab

Patricia Moghames

Demelza Smeeth

Claudinei Biazoli

Candace Black

Child and Youth Development Lab

IDRAAC

NIH

Fieldwork partners

& our participants

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Photo credit: Nour Tayeh,
18/10/2017

War Exposure, Post-Traumatic Stress Symptoms and Hair Cortisol in Syrian Refugee Children



In Press, Molecular Psychiatry

Demelza Smeeth¹, Cassandra Popham¹, Fiona S. McEwen¹, Elie Karam², John Fayyad², Dahlia Saab², Patricia Moghames², Michael J. Rieder³, Abdelbaset Elzagallaai³, Stan van Uum³, Michael Pluess¹

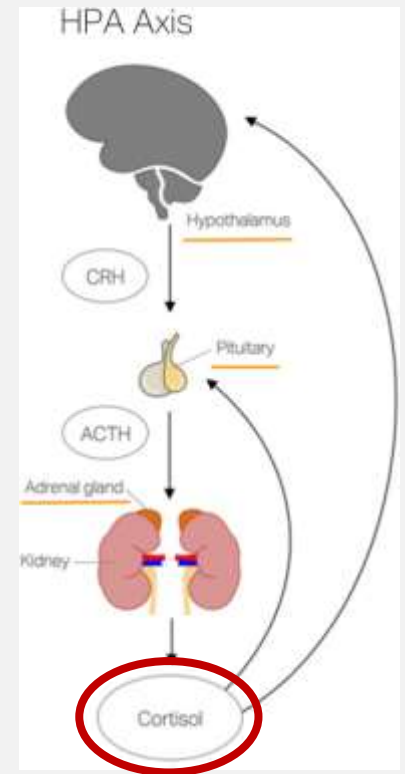
¹ Queen Mary University of London, UK

² Institute for Development, Research, Advocacy and Applied Care, Lebanon

³ Northwestern University, Canada

Cortisol, adversity & mental health

- ▶ Adverse events (e.g. war exposure) increases risk of poor mental health
- ▶ HPA axis dysregulation a common feature of adversity and/or poor mental health
 - Elevated cortisol, lowered cortisol, altered reactivity, altered trajectories over time
 - Dependent on study design
 - Initial hypersecretion reverts to longer-term hyposecretion
- ▶ Potential as an biomarker of war exposure and PTSD
 - Mixed evidence from adults and adolescents
- ▶ Gaps in current literature:
 - Few studies looking at cortisol as a biomarker of war exposure or PTSD in children
 - Few studies on individuals still in adverse environments
 - Studies are often small

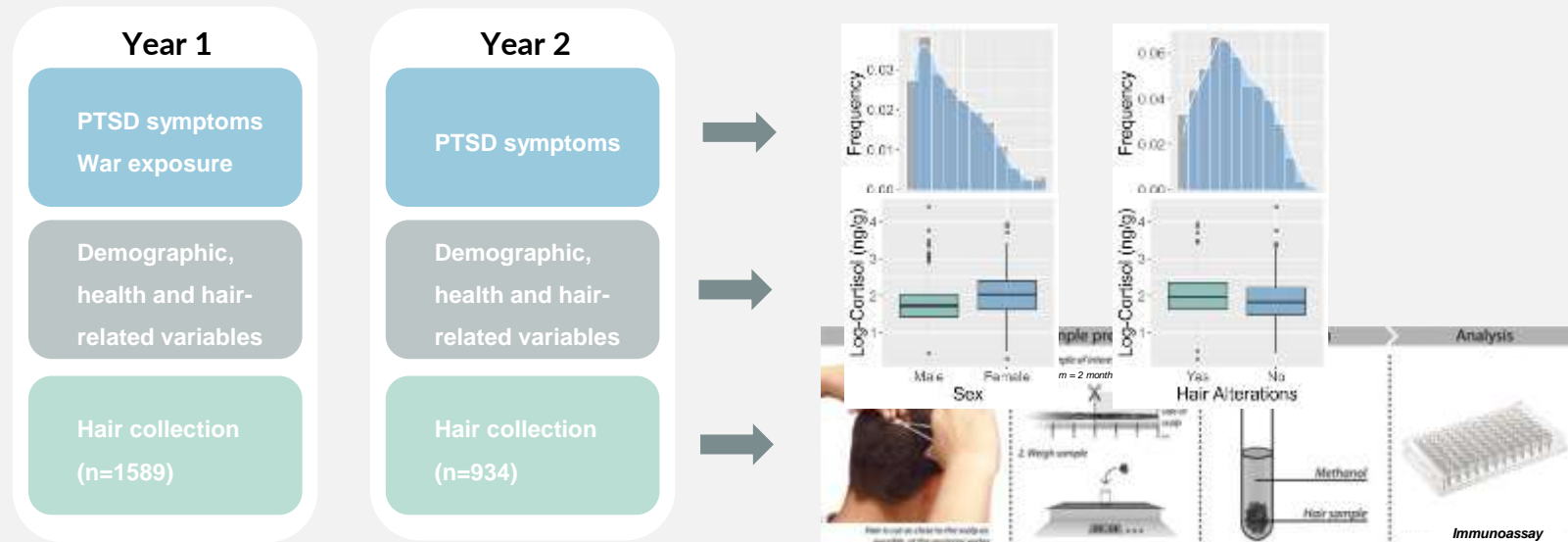


Jones, C, Gwenin, C. (2020) *Physiological Reports*

Research questions

1. Is hair cortisol (as a measure of basal cortisol secretion) associated with war exposure?
2. Is hair cortisol associated with PTSD symptoms in war-exposed children and adolescents?
3. Does hair cortisol mediate the relationship between war exposure and PTSD symptoms?

Project outline & methodology

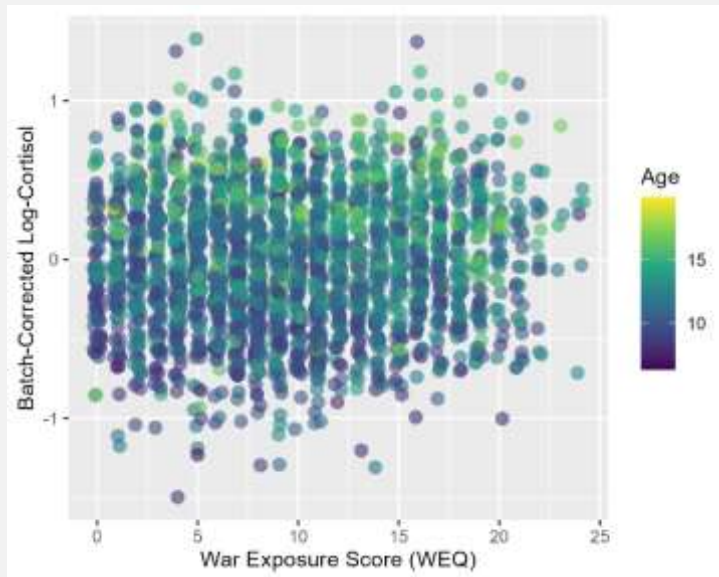


Final sample: Y1: n=1579, Y2: n= 933

Adapted from Van Manen, M., et al. PLoS ONE (2019)

Q1: Is hair cortisol associated with war exposure?

Hair cortisol is associated with war exposure score

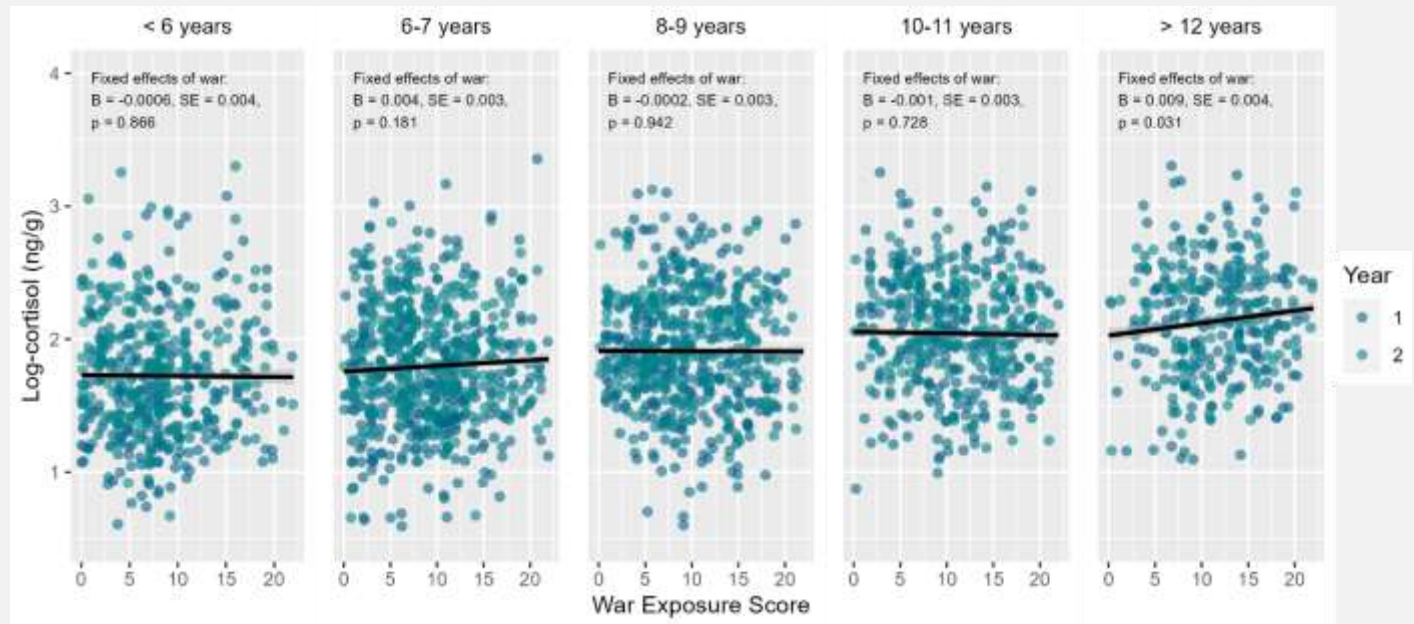


Linear mixed model specification: $\log_{10}\text{cortisol} \sim \text{war} + \text{batch} + (1|\text{participant}) + \text{covariates}$

Model	Covariates	B (SE)	% Change	p
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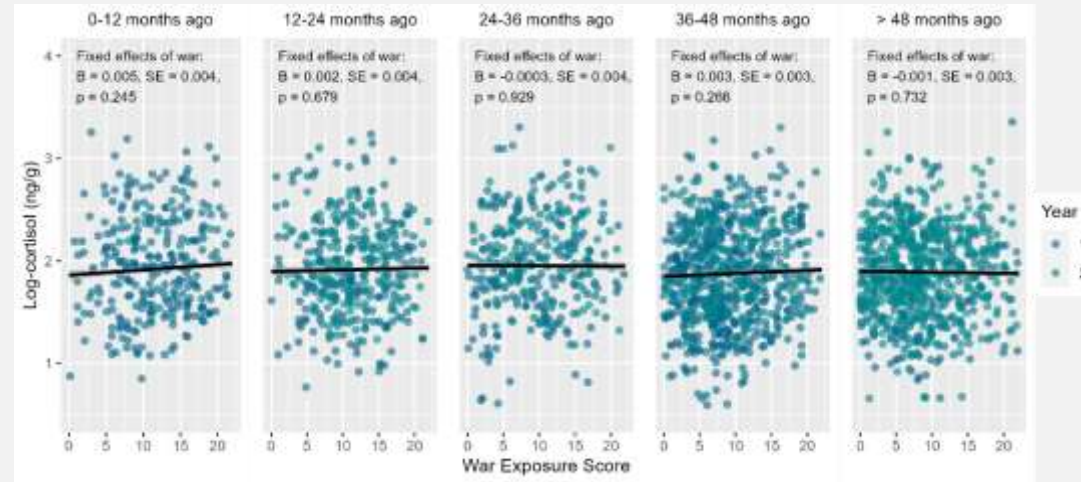
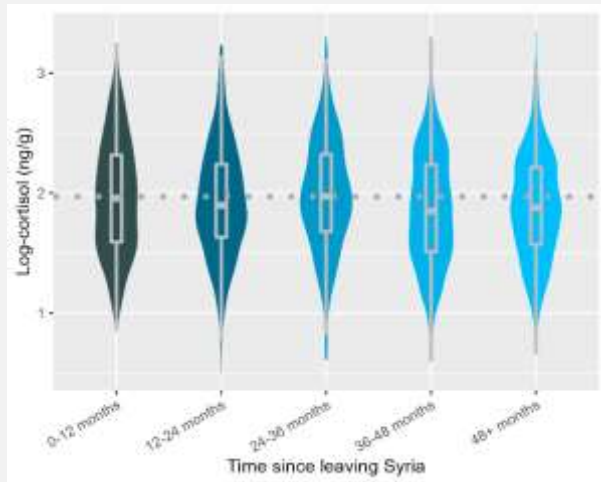
Age at time of war exposure impacts response to war exposure

Age at war exposure



Linear mixed model specification: $\log_{10}\text{cortisol} \sim \text{war} + \text{batch} + (1|\text{participant}) + \text{sex} + \text{age at interview}$

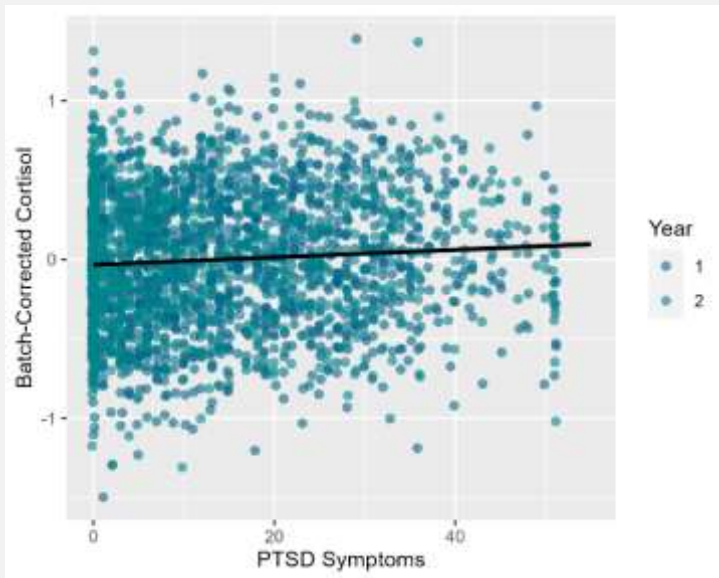
Hair cortisol decreases with time since leaving Syria



Linear mixed model specification: $\log_{10}\text{cortisol} \sim \text{war} + \text{batch} + (1|\text{participant}) + \text{sex} + \text{age}$

Q2: Is hair cortisol associated with PTSD symptoms?

Hair cortisol is associated with PTSD symptoms



Linear mixed model specification: $\log_{10}\text{cortisol} \sim \text{war} + \text{batch} + (1|\text{participant}) + \text{covariates}$

Model	Covariates	B (SE)	% Change	p
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Q3: Does hair cortisol mediate the relationship between war exposure and PTSD symptoms?

War exposure, PTSD symptoms and hair cortisol



▶ Both potential mediation models exhibit partial mediation

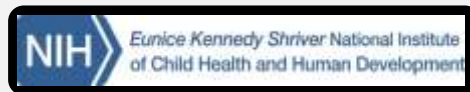
Coefficients = standardized regression betas. c: non-mediated direct path, c': mediated direct path. **: $p < 0.01$, ***: $p < 0.001$

Conclusions & future directions

- ▶ Hair cortisol is weakly associated with war exposure but is confounded by age
 - Future work to disentangle age from war exposure
- ▶ Early adolescence may be a particularly sensitive time period
 - Planned replication needed
- ▶ Hair cortisol is also weakly associated with PTSD symptoms
- ▶ Partial mediation relationships between war exposure, PTSD symptoms and hair cortisol
 - Future work to identify temporal/causal relationships
- ▶ Demographic and technical variables more strongly associated with hair cortisol
 - 39.3% increase in HCC from min to max war exposure, 62.7% higher HCC in females

Thank you for listening

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Cassandra Popham
Claudinei Biazoli

IDRAAQ

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John Fayyad
Dahlia Saab
Patricia Moghames

Northwestern

Michael J. Rieder
Abdelbaset Elzagallaai
Stan van Uum
Thu Chau
Meaghan Stolk

NIH

Fieldwork partners
& our participants



BIOPATH webinar

26 October 2022

Discussion

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³ Department of Psychiatry and Clinical Psychology, St George Hospital University Medical Center, Beirut, Lebanon.

The uniqueness of the Biopath Study

- Wars (and similar massive catastrophes) are occasions to investigate the effects of trauma on a large scale on humans.
- We were able to watch individual responses to war in refugees and crucially gather the enormous volume of data **prospectively** in an effort to appreciate the intricate nature of environmental, biological and unique personal journeys of each child and adolescent

Clinical Applications

It is obvious that we are finding that the Biopath Study has huge implications in the clinical fields:

- Who gets affected and what happens on follow up ?
- What are the biological reflections of trauma ?
- What might be the long-term sequelae of trauma ?
- What factors affect the response to trauma beyond the trauma itself ?

Lessons learned so far

- This is a serious enterprise and a very thrilling scientific journey which has required meticulous attention to a myriad of details not the least being official clearance, local powers, etc...
- Humans look like they are the same everywhere and similar applications abound being in diagnosis or in prediction
- Getting people to engage in treatment is a major challenge in large refugee populations
- The environment where war refugees settle is at least as important as the war trauma they were subjected to.

Thank you!



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