

Clarifying the role of maternal childhood
trauma on offspring behavioral outcomes: A
systematic review of genetic and
environmental contributions to trans-
generational associations

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Trans generational mechanisms linking maternal childhood trauma (MCT) to offspring behavioral outcome (OBO)

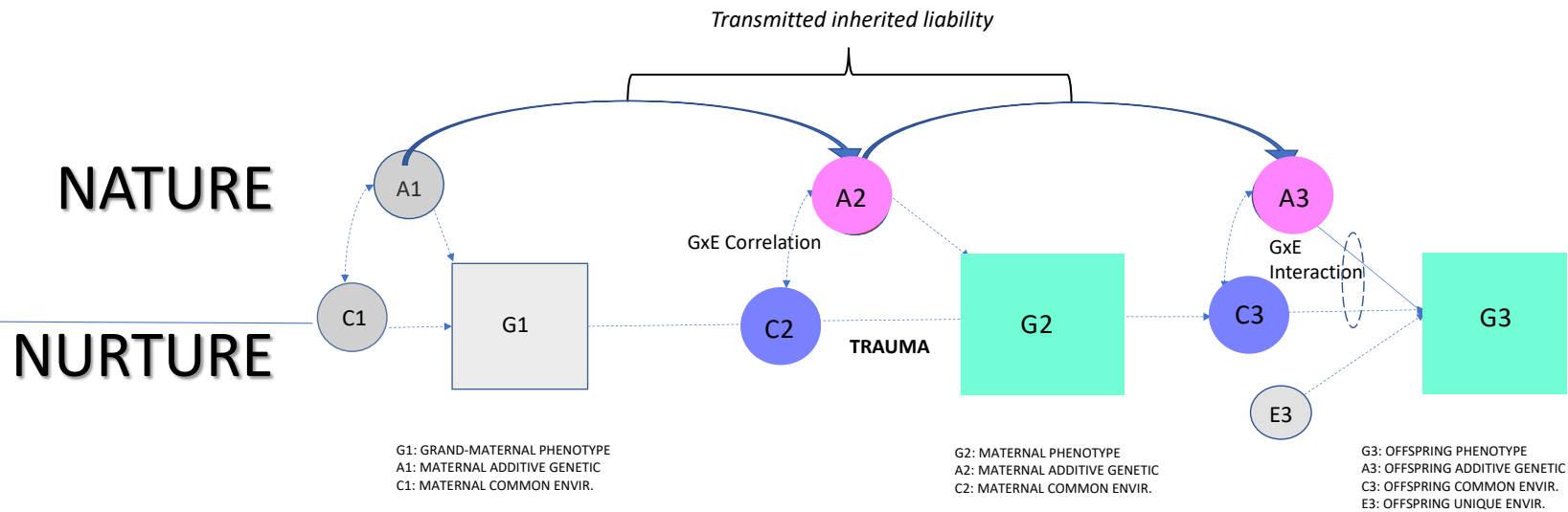


FIGURE 1. Causal influences on the association between maternal childhood trauma and offspring behavior

Dashed arrows: Environmental pathway

Solid arrows: Genetic pathway

Variables measured or indexed in color, unmeasured causal influences in gray

Transmission operating through environmental pathways alone:

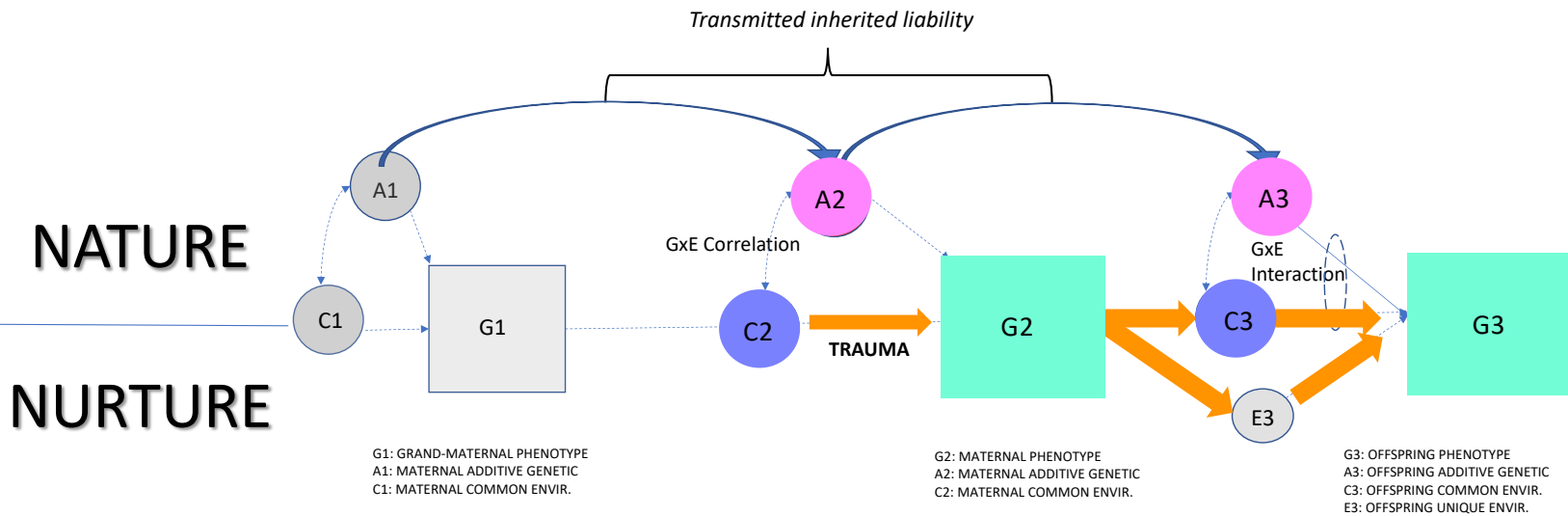


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Layering in consideration of genetic influences

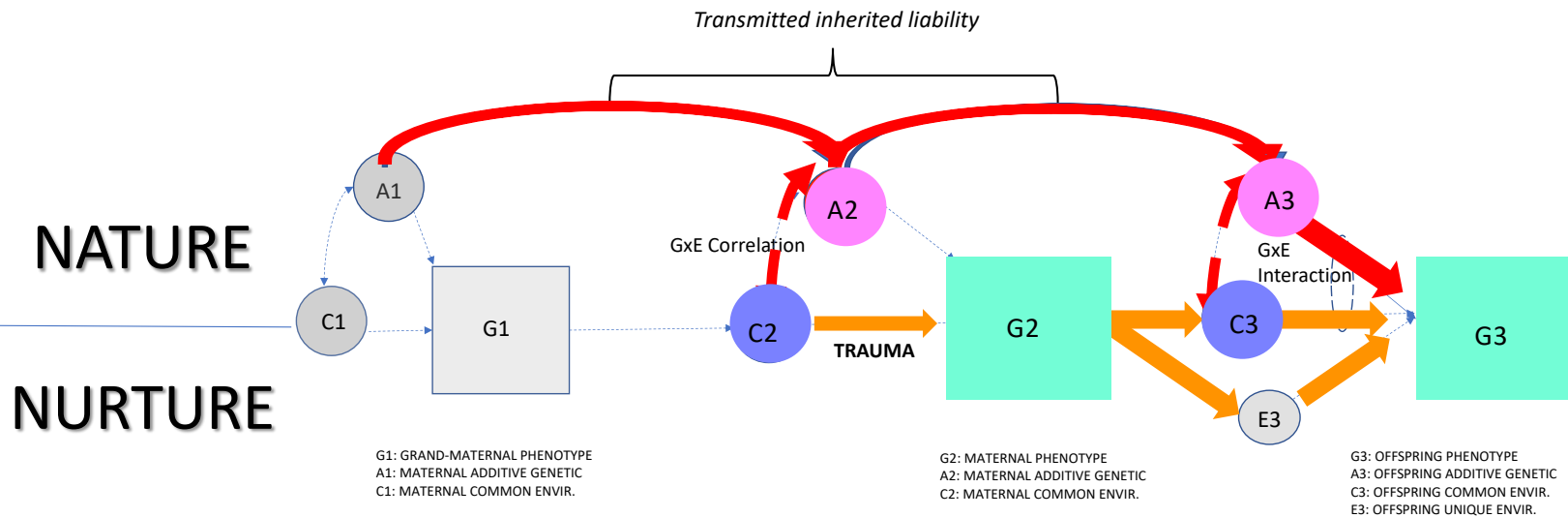


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Research Question

What is the state of the literature on the role of genetic and environmental factors in the trans-generational association between maternal childhood trauma (MCT) and offspring behavioral outcome (OBO)?

Method

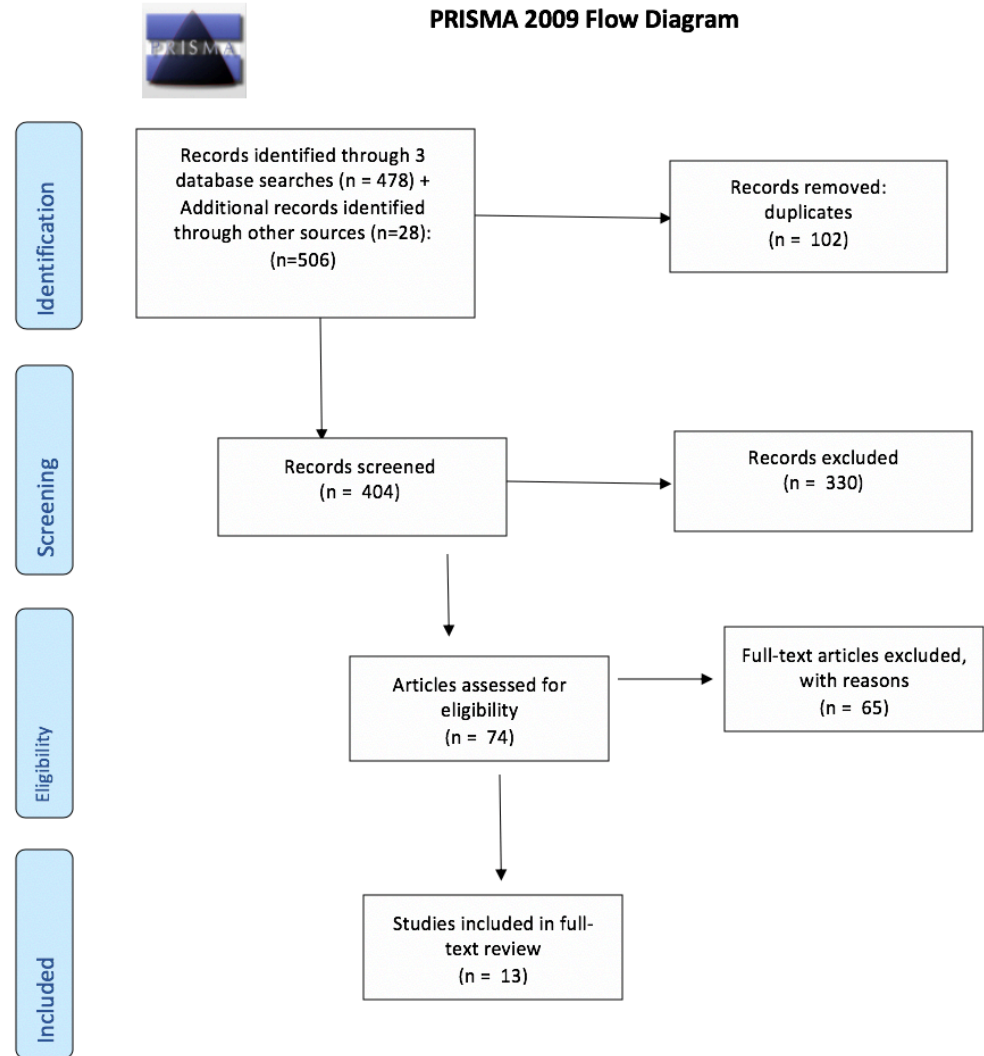
- Systematic review: goal is to synthesize findings of all relevant studies on a certain topic/issue in order to make findings more digestible / accessible for other researchers or practitioners
- Followed the Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) reporting guidelines (2015)
- Registered the review with the International Prospective Register of Systematic Reviews (PROSPERO) in October 2019

Eligibility criteria

- (1) published in a peer-reviewed journal in English
- (2) included measurement of maternal childhood trauma
- (3) included measurement of child variation in emotional and behavioral outcomes from six months to six years of age, and
- (4) inclusion of control for a genetic contribution to the association between (2) and (3).

Search Strategy & Screening Process

Figure 2



Author (Year)	Study Design	Sample Characteristics	Measure of MCT	Measure of OBO	Genetic Contribution	Analytic Methods	Baseline Association between MCT and OBO	Genetic Attenuation
Boukate Turcot AA et al. (2015)	<ul style="list-style-type: none"> Longitudinal, <u>clinically-ascertained</u> sample (Maternal Adversity, Vulnerability, and Neurodevelopment Study, MAVAN) 	<ul style="list-style-type: none"> Sample size: n=154 mothers-infant dyads, recruited 13-20 weeks gestation to offspring age 36 months Cohort Demographics: 88.7% European/Caucasian, 8.1% African descent/African American, 3.2% Hispanic/Latino 	<ul style="list-style-type: none"> Measures used: Childhood Trauma Questionnaire (CTQ; Bernstein et al. 1994); Parental Bonding Instrument (PBI, Parker et al. 1979) Used previously validated principal component analysis to reduce measures from the two scales 	<ul style="list-style-type: none"> Measures used: Early Childhood Behaviour Questionnaire (ECBQ; Putnam et al. 2006); Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) at 60 months Principal component analysis done for ECBQ results to derive infant negative emotionality/behavioral dysregulation (NE/BR) at 18 and 36 months 	<ul style="list-style-type: none"> Measures used: Center for Epidemiologic Studies Depression Scale (CES-D, Radloff, 1997) at 6 and 36 months postpartum Genetic data? Y/N Genetic data: Infant buccal swabs obtained at 36 months; Maternal buccal swabs obtained at 36 months 	<ul style="list-style-type: none"> Statistical method: Multiple linear hierarchical regression Genetic analysis: DNA extraction and 5-HTTLPR genotyping; Compared L_A/L_A homozygote infants to S/L_A allele carriers Other covariates: demographic data 	Effect of maternal adversity on child NE/BR (r = .20, p < .01)	Significant interaction effect of maternal adversity and offspring genotype on child NE/BR (B=1.03, p<.05)
Boukate Turcot AA et al. (2019)	<ul style="list-style-type: none"> Longitudinal, <u>clinically-ascertained</u> sample (MAVAN) 	<ul style="list-style-type: none"> Sample size: n=239 mothers-infant dyads, recruited 13-20 weeks gestation to offspring age 36 months Cohort Demographics: 88.7% European/Caucasian, 8.1% African descent/African American, 3.2% Hispanic/Latino 	<ul style="list-style-type: none"> Measures used: Childhood Trauma Questionnaire (CTQ; Bernstein et al. 1994); Parental Bonding Instrument (PBI, Parker et al. 1979) Used previously validated principal 	<ul style="list-style-type: none"> Measures used: ECBQ at 36 months Principal component analysis done for ECBQ results to derive infant negative emotionality/behavioral dysregulation (NE/BR) 	<ul style="list-style-type: none"> Measures used: Edinburgh Postnatal Depression Scale (EPDS, Cox, Holden, & Saevsky, 1987) at 6 months Genetic data? Y/N 	<ul style="list-style-type: none"> Statistical method: Mediation analyses (direct and indirect effects with bootstrapped confidence intervals) Other covariates: maternal sensitivity (<u>20-minute</u> nonfeeding mother-infant 	Significant total effect of maternal adversity on child NE/BR (B = .13, p < .05)	Indirect effect for maternal adversity on child NE/BR via maternal depression: B = .033, p < .05

Results

Finding 1: Baseline association between MCT and OBO

- 10 studies reported significant baseline associations between MCT and OBO
- 3 articles did not report or find a significant baseline association
 - Racine et al. (2018) – infant outcomes subdivided into five different domains of the Ages and Stages Questionnaire
 - Madigan et al. (2017) – ascertainment of infant outcomes based on scales that rated frequency of 8 behaviors on a 3-point scale (never, sometimes, often) with only adequate internal consistency
 - Hipwell et al. (2019) – infant temperament measured on 6 items of fussy/difficult subscale with only adequate convergent validity; did find an association with infant negative reactivity during Still Face Paradigm

Finding 2: Genetic Attenuation of the Association between MCT and OBO

- Of the 10 articles that reported a significant baseline association between MCT and OBO, 7 articles reported attenuated effects when taking genetic influences into account
- 2 additional studies (Madigan et al. 2017, Racine et al) reported that the association operated exclusively through the indirect genetic pathway
- 3 studies did not find improved association between MCT and OBO
 - Choi et al. (2017): maternal depression attenuated relationship between MCT and bonding, but not offspring behavior specifically
 - McDonnell (2016): mediation model was not significant
 - Hipwell (2019): also did not find a baseline association

Discussion / Conclusion

- Observed associations between MCT and OBO may be at least partially mediated by genetic factors, in addition to environmental factors
- Current state of the literature demonstrates there is still a bit of a schism between environmental research in the social sciences vs genetic research
- In both cases, I believe articles would be enriched if they borrowed from one another - increasing environmental considerations in genomics research and vice versa
- Next steps: use some of the methodological limitations of the papers included in this review to apply this question in a new secondary data analysis asking virtually the same question



Thank You &
Questions