**Supplemental Materials**

**Boolean Phrase**

*Cortisol AND (SES OR social class OR socioeconomic OR socio-economic OR socio-demographic OR income OR depriv\* OR “social correlates” OR economic\* OR affluence OR inequality OR “standard of living” OR poverty OR disadvantaged OR wealth OR financial OR welfare OR “social status” OR “social inequity” OR “social gradient” OR maltreat\* OR abus\* OR neglect\* OR CPS OR adopt\* OR (physical\* AND abus\*) OR (sexual\* AND abus\*) OR (emotional\* AND abus\*) OR “early experience” OR “family conflict” OR trauma\* OR violen\* OR assault\* OR institution\* OR “foster care” OR (foster AND child\*) OR orphan\* OR ((foster OR group OR charity OR baby) AND (home\* OR house\*)) OR boarding OR “residential institution” OR “residential institutions” OR “residential care” OR “social services” OR “child welfare” OR child-care OR “children in care” OR “group care” OR education OR (educational AND (status OR level OR attainment OR achievement)) OR “level of education” OR minority OR race OR discrimin\* OR (racial AND (bias OR disparity OR discrimination)) OR ethnic\* OR “African American” OR black OR raci\* OR stigma\* OR prejudice\* OR stereotyp\* OR “ethnic discrimination” OR “perceived discrimination” OR “race-related stress” OR micro-aggress\* OR ((lone OR single OR divorc\* OR separat\*) AND parent\*) OR divorc\* OR attachment OR rearing OR socializ\* OR parent-child OR child-rearing OR “early life stress” OR (famil\* AND stress) OR bereavement OR ((prenatal OR maternal OR pregnancy OR gestation\* OR foetal OR fetal OR birth OR labor OR labour) AND (stress OR complication\*)) OR gestation\* OR “birth weight” OR “neonatal stress” OR premature OR preeclampsia OR ((pregnancy OR prenatal) AND (addict\* OR abus\* OR substance OR smoking OR cigarette\* OR tobacco OR alchol\* OR drinking OR cocaine OR heroin OR marijuana)) OR FASD OR FAS OR pFAS OR ARND OR ARBD OR “fetal alcohol” OR “in utero alcohol” OR risk OR advers\* OR risk OR ((Parent\* OR mother\* OR father\* OR maternal\* OR paternal\*) AND (imprison\* OR jail\* OR incarcerat\* OR detention OR employ\* OR unemploy\* OR labor OR occupation OR profession OR vocation OR salary OR wage OR “occupational prestige” OR disorder OR depress\* OR mood OR affect\* OR mental OR psychiatric OR “mood disorder” OR MDD OR “mental health” OR “psychological problem” OR “psychological problems” OR psychopatho\* OR sensitiv\* OR warmth OR addict\* OR abus\* OR substance OR smoking OR cigarette\* OR tobacco OR alchol\* OR drinking OR cocaine OR heroin OR marijuana OR stress OR disability))) NOT “brain injury”*

**Adversity Category Definitions and Effect Size Decision Rules**

The types of environmental risk are defined as follows:

1. **Community-level stressors** – any indicator of stressors within the environment (may be related to socioeconomic status but is not necessarily a direct indicator of socioeconomic status), such as neighborhood violence or population density
2. **Cumulative adversity** - studies that measure adversity as a variable that encompasses multiple adversity factors
   1. This includes measures that add together multiple significant family or child stressors that would fall into other adversity categories (e.g., Life Events Checklist)
3. **Difficulties in parenting and parent-child relationships** – includes measures of parental insensitivity, including observed insensitivity, lack of responsiveness, lack of warmth, etc.[[1]](#footnote-1)
   1. Note: Effect size should be coded to capture the effect of insensitive parenting; be sure to reverse direction of effect if sensitive parenting is measured
   2. Decision rule: If both insensitive and sensitive parenting are measured, prioritize measure of insensitive parenting. If multiple measures of difficulties in parenting and parent-child relationships are included, prioritize the measure that is closest to critical/negative/hostile parenting.
4. **Discrimination** –any indicator of discrimination based on minority status as a child[[2]](#footnote-2)
5. **Financial strain** – any indicator of financial strain during childhood, including income below the poverty line, financial need, etc.[[3]](#footnote-3)
6. **Maltreatment** – physical, sexual, or emotional abuse or neglect
7. **Parental status** – parental status characteristics that would increase early adversity, such as having a parent who is a single parent, young parent (less than 21 years old), incarcerated parent, etc.
   1. Note: For young parent variable, must be comparing a group of young mothers to other mothers. The cutoff age for the young mothers group must be 21 years or younger. Continuous age will not be used
8. **Other family/parenting stress** – stressors within the family, general measures of family stress, and parenting stress
   1. Note: This also includes parental loss or bereavement. This does not include measures of general life stress or general negative events.
   2. Decision rule: When there are multiple measures of family/parenting stress, the measure that most clearly assesses stress is prioritized. If both measures clearly assess stress, choose the measure that captures family/parenting stress most broadly (e.g., select Confusion, Hubbub, and Order Scale (CHAOS) over family conflict because CHAOS includes more domains including family conflict).
9. **Parental mental health** – whether parent is experiencing psychological disorder(s)
   1. Decision rule: Prioritize measures of anxiety and depression over other specific disorders.
10. **Parental substance use** – parental uses of substances including drugs and alcohol
    1. This does not include tobacco/smoking cigarettes
    2. This does not include prenatal substance use
11. **Surrogate care** – being adopted, being in foster care, time spent in a group home, other surrogate care arrangements
    1. Note: If there are multiple surrogate care groups (e.g., adoption and foster care), lump them together for comparison with non-surrogate care group
12. **Other** – list what other early environmental adversity is for discussion with other coder

Risk factor must occur during child’s lifetime. If a risk factor is measured before the child was conceived or across the parent’s lifetime without specifying whether it existed during the child’s lifetime, it will be excluded (e.g., lifetime parental depression)

Risk factors cannot be acute (i.e., should not include daily measures of risk factors)

Supplemental Table 1. Moderation analyses results

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| --- | --- | --- | --- | --- |
| Moderator variables | Intercept  (95% CI) | Estimate (95% CI) | Omnibus test | *p*-value |
| Wake | | | | |
| Type of childhood adversity | -0.035 (-0.076, 0.007) | Multiple | *F*(6, 126) = 1.911 | 0.084 |
| Age at time of adversity | -0.008 (-0.028, 0.012) | Multiple | *F*(4, 143) = 1.064 | 0.377 |
| Mean age at time of cortisol collection | -0.010 (-0.033, 0.012) | 0.000 (-0.001, 0.001) | *F*(1, 142) = 0.122 | 0.727 |
| Threat versus deprivation | -0.010 (-0.115, 0.094) | 0.047 (-0.084, 0.178) | *F*(1, 16) = 0.581 | 0.457 |
| **Study quality** | **-0.012 (-0.069, 0.045)** | **0.001 (-0.009, 0.010)** | ***F*(1, 146) = 0.024** | **0.876** |
| CAR | | | | |
| Type of childhood adversity | 0.049 (-0.031, 0.128) | Multiple | *F*(5, 60) = 0.674 | 0.645 |
| Age at time of adversity | 0.017 (-0.019, 0.052) | Multiple | *F*(4, 71) = 1.129 | 0.350 |
| Mean age at time of cortisol collection | 0.030 (-0.025, 0.085) | -0.000 (-0.003, 0.002) | *F*(1, 73) = 0.174 | 0.678 |
| Threat versus deprivation | 0.135 (-0.030, 0.301) | -0.075 (-0.412, 0.261) | *F*(1, 7) = 0.279 | 0.613 |
| Percent of sample identified as female | 0.040 (-0.069, 0.148) | -0.000 (-0.002, 0.001) | *F*(1, 70) = 0.173 | 0.679 |
| Racial/ethnic minority status (all studies) | 0.052 (0.004, 0.099) | -0.001  (-0.002, 0.000) | *F*(1, 56) = 2.298 | 0.135 |
| Racial/ethnic minority status (U.S. only) | 0.113 (0.005, 0.220) | -0.001 (-0.003, 0.000) | *F*(1, 36) = 3.133 | 0.085 |
| Number of days of cortisol collection | -0.002 (-0.064, 0.061) | 0.032 (-0.043, 0.107) | *F*(1, 74) = 0.740 | 0.393 |
| Whether cortisol data were transformed | 0.025 (-0.015, 0.064) | -0.009 (-0.061, 0.042) | *F*(1, 74) = 0.133 | 0.716 |
| Study quality | 0.100 (-0.017, 0.218) | -0.014 (-0.034, 0.006) | *F*(1, 74) = 1.979 | 0.164 |
| Whether included data received from authors | 0.054 (-0.020, 0.127) | -0.042 (-0.125, 0.041) | *F*(1, 74) = 1.008 | 0.319 |
| Publication year (mean centered) | 0.019 (-0.015, 0.054) | 0.002 (-0.005, 0.010) | *F*(1, 74) = 0.377 | 0.541 |
| Diurnal Cortisol Change | | | | |
| Type of childhood adversity | 0.008 (-0.052, 0.067) | Multiple | *F*(7, 122) = 0.321 | 0.943 |
| Age at time of adversity | 0.028 (0.000, 0.055) | Multiple | *F*(4, 132) = 2.402 | 0.053 |
| Mean age at time of cortisol collection | 0.001 (-0.037, 0.038) | 0.001 (-0.001, 0.003) | *F*(1, 134) = 1.351 | 0.247 |
| Threat versus deprivation | 0.018 (-0.173, 0.209) | -0.030 (-0.276, 0.215) | *F*(1, 13) = 0.072 | 0.793 |
| Percent of sample identified as female | -0.060 (-0.159, 0.038) | 0.001 (-0.000, 0.003) | *F*(1, 133) = 2.545 | 0.113 |
| Racial/ethnic minority status (all studies) | 0.049 (0.004, 0.094) | -0.001  (-0.002, 0.000) | *F*(1, 104) = 3.409 | 0.068 |
| Racial/ethnic minority status (U.S. only) | 0.064 (0.001, 0.127) | -0.001 (-0.002, 0.000) | *F*(1, 77) = 3.849 | 0.053 |
| Number of days of cortisol collection | -0.003 (-0.072, 0.066) | 0.023 (-0.052, 0.098) | *F*(1, 135) = 0.373 | 0.542 |
| Whether cortisol data were transformed | 0.023 (-0.017, 0.062) | -0.011 (-0.065, 0.042) | *F*(1, 135) = 0.166 | 0.685 |
| Timing of diurnal cortisol samples | 0.021 (-0.009, 0.052) | -0.020 (-0.083, 0.043) | *F*(1, 135) = 0.389 | 0.534 |
| Study quality | -0.022 (-0.108, 0.065) | 0.007 (-0.008, 0.023) | *F*(1, 135) = 0.838 | 0.362 |
| Whether included data received from authors | 0.059 (-0.010, 0.129) | -0.050 (-0.125, 0.025) | *F*(1, 135) = 1.711 | 0.193 |
| Publication year (mean centered) | 0.019 (-0.008, 0.045) | 0.003 (-0.002, 0.009) | *F*(1, 135) = 1.367 | 0.244 |
| Cortisol Bedtime Levels | | | | |
| Type of childhood adversity | 0.001 (-0.078, 0.079) | Multiple | *F*(6, 68) = 0.877 | 0.516 |
| Age at time of adversity | 0.061 (0.017, 0.106) | Multiple | *F*(3, 76) = 1.175 | 0.325 |
| Mean age at time of cortisol collection | 0.033 (-0.033, 0.099) | 0.002 (-0.003, 0.007) | *F*(1, 76) = 0.513 | 0.476 |
| Threat versus deprivation | -0.054 (-0.381, 0.274) | 0.093 (-0.276, 0.462) | *F*(1, 7) = 0.355 | 0.570 |
| Percent of sample identified as female | 0.075 (-0.083, 0.233) | -0.000 (-0.003, 0.002) | *F*(1, 77) = 0.118 | 0.732 |
| Racial/ethnic minority status (all studies) | 0.077 (-0.005, 0.160) | -0.001 (-0.002, 0.001) | *F*(1, 56) = 0.683 | 0.413 |
| Racial/ethnic minority status (U.S. only) | 0.039 (-0.069, 0.148) | -0.000 (-0.002, 0.002) | *F*(1, 47) = 0.007 | 0.935 |
| Number of days of cortisol collection | 0.057 (-0.040, 0.155) | -0.013 (-0.121, 0.095) | *F*(1, 78) = 0.057 | 0.813 |
| Whether cortisol data were transformed | 0.054 (-0.016, 0.124) | -0.011 (-0.099, 0.077) | *F*(1, 78) = 0.061 | 0.806 |
| Study quality | 0.030 (-0.093, 0.152) | 0.003 (-0.019, 0.026) | *F*(1, 78) = 0.090 | 0.765 |
| Whether included data received from authors | 0.050 (-0.034, 0.135) | -0.095 (-0.102, 0.093) | *F*(1, 78) = 0.009 | 0.925 |
| Publication year (mean centered) | 0.047 (0.004, 0.090) | -0.000 (-0.010, 0.010) | *F*(1, 78) = 0.000 | 0.992 |

*Note.* A Bonferroni correction was applied to the alpha level by dividing by the number of moderators, yielding a significance cutoff of *p* < 0.004 for analyses related to wake levels and diurnal cortisol change and *p* < 0.005 for analyses related to the CAR and bedtime levels

Supplemental Figure 1. Forest plot for meta-analysis of childhood adversity and cortisol wake levels



Supplemental Figure 1 (cont’d). Forest plot for meta-analysis of childhood adversity and cortisol wake levels



Supplemental Figure 2. Forest plot for meta-analysis of childhood adversity and the cortisol awakening response

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Supplemental Figure 3. Forest plot for meta-analysis of childhood adversity and diurnal cortisol change

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Supplemental Figure 3 (cont’d). Forest plot for meta-analysis of childhood adversity and diurnal cortisol change

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Supplemental Figure 4. Forest plot for meta-analysis of childhood adversity and cortisol bedtime levels

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**Additional Moderation Analyses Examining Indicators of Methodological Quality**

Note: Each of the variables below represents whether the covariate was accounted for at any point within the original authors’ study (e.g., excluding participants based on the covariate, controlling for the covariate, conducting follow-up analyses related to the covariate). These variables do not reflect whether the variables were accounted for in the effect sizes reported in the present meta-analysis.

Objective monitoring of awakening:

*F*(1, 146) = 0.410, *p* = 0.523 for wake

*F*(1, 74) = 0.356, *p* =0.552 for CAR

*F*(1, 135) = 0.274, *p* = 0.601 for diurnal change

*F*(1, 78) = 0.271, *p* = 0.604 for bedtime

Accounted for self/parent-report of awakening time:

*F*(1, 146) = 0.205, *p* = 0.651 for wake

*F*(1, 74) = 0.004, *p* = 0.948 for CAR

*F*(1, 135) = 1.976, *p* = 0.162 for diurnal change

*F*(1, 78) = 0.619, *p* = 0.434 for bedtime

Compliance monitoring of cortisol sampling:

*F*(1, 146) = 1.098, *p* = 0.296 for wake

*F*(1, 74) = 1.452, *p* = 0.232 for CAR

*F*(1, 135) = 0.817, *p* = 0.368 for diurnal change

*F*(1, 78) = 0.645, *p* = 0.425 for bedtime

Accounted for self/parent-report of sample timing:

*F*(1, 146) = 0.097, *p* = 0.756 for wake

*F*(1, 74) = 1.450, *p* = 0.232 for CAR

*F*(1, 135) = 0.212, *p* = 0.646 for diurnal change

*F*(1, 78) = 1.010, *p* = 0.318 for bedtime

Whether participants were instructed not to eat, drink, and/or brush their teeth prior to sampling:

*F*(1, 146) = 2.979, *p* = 0.086 for wake

*F*(1, 74) = 0.073, *p* = 0.787 for CAR

*F*(1, 135) = 0.431, *p* = 0.513 for diurnal change

*F*(1, 78) = 0.555, *p* = 0.459

Assessment of pregnancy:

(Note: Excluded studies in which all participants were identified as male or were younger than 8 years old at time of cortisol collection)

*F*(1, 91) = 0.079, *p* = 0.779 for wake

*F*(1, 59) = 0.375, *p* = 0.542 for CAR

*F*(1, 76) = 0.000, *p* = 0.987 for diurnal change

*F*(1, 35) = 0.597, *p* = 0.445 for bedtime

Assessment of birth control:

(Note: Excluded studies in which all participants were identified as male or were younger than 8 years old at time of cortisol collection)

*F*(1, 91) = 0.692, *p* = 0.408 for wake

*F*(1, 59) = 0.182, *p* = 0.671 for CAR

*F*(1, 76) = 1.249, *p* = 0.267 for diurnal change

*F*(1, 35) = 0.154, *p* = 0.697 for bedtime

Assessment of endocrine conditions:

*F*(1, 146) = 1.073, *p* = 0.302 for wake

*F*(1, 73) = 1.072, *p* = 0.304 for CAR

*F*(1, 135) = 0.678, *p* = 0.412 for diurnal change

*F*(1, 78) = 0.093, *p* = 0.761 for bedtime

Number of samples collected for the CAR:

*F*(1, 74) = 2.802, *p* = 0.098

Number of samples used for diurnal cortisol change effect size (2, 3, or 4+):

*F*(2, 134) = 0.081, *p* = 0.922

Accounted for quality of sleep:

*F*(1, 146) = 0.168, *p* = 0.682 for wake

*F*(1, 74) = 0.688, *p* = 0.410 for CAR

*F*(1, 135) = 0.035, *p* = 0.851 for diurnal change

*F*(1, 78) = 0.198, *p* = 0.658 for bedtime

Accounted for wake time:

*F*(1, 146) = 0.205, *p* = 0.651 for wake

*F*(1, 74) = 0.004, *p* = 0.948 for CAR

*F*(1, 135) = 1.976, *p* = 0.162 for diurnal change

*F*(1, 78) = 0.619, *p* = 0.434 for bedtime

Accounted for sex:

*F*(1, 146) = 0.012, *p* = 0.913 for wake

*F*(1, 74) = 2.287, *p* = 0.135 for CAR

*F*(1, 135) = 0.066, *p* = 0.798 for diurnal change

*F*(1, 78) = 0.118, *p* = 0.732 for bedtime

Accounted for weekday vs. weekend:

*F*(1, 146) = 0.101, *p* = 0.751 for wake

*F*(1, 74) = 0.007, *p* = 0.932 for CAR

*F*(1, 135) = 0.610, *p* = 0.436 for diurnal change

*F*(1, 78) = 1.919, *p* = 0.170 for bedtime

Accounted for menstrual cycle:

(Note: Excluded studies in which all participants were identified as male or were younger than 8 years old at time of cortisol collection)

*F*(1, 91) = 0.219, *p* = 0.641 for wake

*F*(1, 59) = 0.131, *p* = 0.719 for CAR

*F*(1, 76) = 1.234, *p* = 0.270 for diurnal change

*F*(1, 35) = 4.996, *p* = 0.032 for bedtime

Accounted for pubertal status:

(Note: Excluded studies in which all participants were younger than 8 years old at time of cortisol collection)

*F*(1, 92) = 0.064, *p* = 0.801 for wake

*F*(1, 60) = 0.501, *p* = 0.482 for CAR

*F*(1, 77) = 0.116, *p* = 0.509 for diurnal change

*F*(1, 35) = 1.609, *p* = 0.213 for bedtime

1. Note: Our initial coding included insecure attachment within this category; however, we removed those effect sizes based on feedback and suggestions from reviewers when this manuscript was under review to better reflect adversities external to the child (rather than a potential outcome of those adversities). [↑](#footnote-ref-1)
2. Note: In our initial coding, this category also included status as a racial/ethnic minority as a proxy for discrimination; however, we refined this category to direct measures of discrimination based on feedback and suggestions from reviewers when this manuscript was under review [↑](#footnote-ref-2)
3. Note: In our initial coding, this category was labeled as socioeconomic status and included broader measures of SES such as income or parental education level; however, we refined this category specifically to measures of financial strain to reflect adversity more accurately based on feedback and suggestions from reviewers when this manuscript was under review. [↑](#footnote-ref-3)