Supplementary Online Material (SOM) for

Preschoolers' Everyday Conflict at Home and Diurnal Cortisol Patterns

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This file includes:

Supplementary Methods

Supplementary Results

Figure S1

Supplementary References

Supplementary Methods

Multilevel Modeling (MLM) Equations Used in Diurnal Cortisol Analyses

In line with previous diurnal cortisol studies (e.g., Adam, Hawkley, Kudielka, & Cacioppo, 2006), Time Since Waking, Time Since Waking^2, and Cortisol Awakening Response (CAR; dummy coded 0 or 1) were modeled at Level-1 to provide estimates of each child's diurnal cortisol rhythm.

Level 1: Cortisol = $\pi 1_i$Intercept + $\pi 2_i$ Time$_{ij}$ + $\pi 3_i$ Time$^2_{ij}$ + $\pi 4_i$ CAR$_{ij}$) + ε_{ij}

Second, we estimated Level-2 (person-level) effects of EAR-assessed conflict on cortisol:

Level 2: $\pi 1$ to $\pi 4$ = β_{i0} to β_{ij} x EAR-Assessed Child Conflict + r_{ij}

Third, we controlled for demographic characteristics (age and gender), wakeup time, parent reports of the target child's externalizing behavior, and daily parent reports of child conflict (aggregated across the two saliva sampling days) at Level-2 (person-level):

Level 2: $\pi 1$ to $\pi 4$ = β_{i0} to β_{ij} x Control Variables + r_{ij}

Effect sizes were computed from t values and are reported in tables in the results (effect size r = sqrt(t^2/t^2+df) (Rosenthal, Rosnow, & Rubin, 2000)).

Supplementary Results

The diurnal cortisol slopes of children above and below the median in EAR-measured conflict are depicted in Figure S1.

Additional Cortisol Analyses

In subsequent analyses, also tested the effects of conflict on afternoon-evening cortisol slopes, evening cortisol nadir, and area under the curve (AUC).

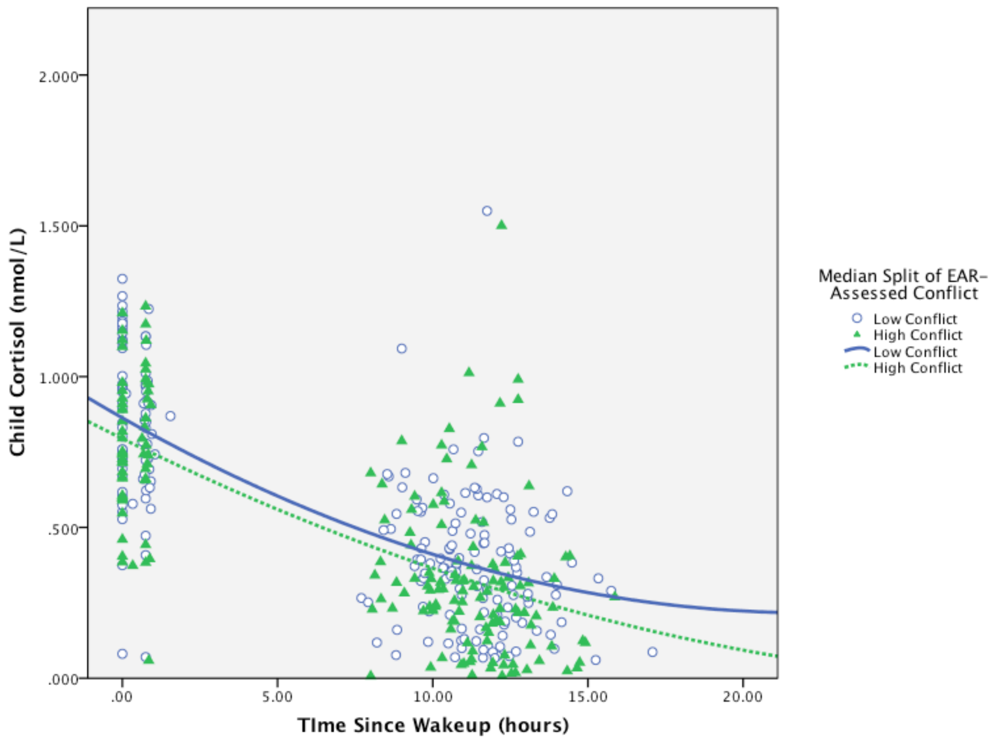
Afternoon-evening cortisol slope. To test the effects of conflict on afternoon-evening cortisol slope, we re-ran the MLM analyses described above in the Supplementary Methods section, including only afternoon and evening cortisol values (approximately 5 pm, 6 pm and 7 pm and at bedtime). This approach allows one to test the effects of EAR-measured conflict on both the late afternoon-evening cortisol intercept, as well as the late afternoon-evening cortisol slope. The effect of conflict on the afternoon-evening intercept was not significant (β_{01} = .07, *SE* = .09, *p* = .23), nor was the effect of conflict on afternoon-evening slope (β_{11} = -.006, *SE* = .008 *p* = .18). Including the covariates assessed in the study (child age, gender, wakeup time, parent reports of the target child's externalizing behavior, and daily parent reports of child conflict) did not substantially strengthen the effects of conflict on afternoon-evening cortisol intercept (β_{01} = .09, *SE* = .07, *p* = .19) or cortisol slope (β_{11} = -.008, *SE* = .005, *p* = .15). Thus, the effects of family conflict on young children's diurnal cortisol slopes appear to be driven by lower morning and higher afternoon levels, rather than elevated evening level (5 pm and after).

Evening cortisol nadir. We next tested the effects of EAR-measured conflict on evening cortisol nadir. Evening nadir values were computed by averaging the bedtime cortisol values across the two days of sampling for each participant. We then used standard linear regression in SPSS (Version 18.0, SPSS, 2010) to regress evening nadir values on EAR-measured conflict. Conflict did not significantly predict evening nadir values when entered by itself as a predictor (*b* = -1.23, *SE* = 1.52, *p* = .43), nor when entered along with bedtime and time since waking (*b* = -1.04, *SE* = 1.58, *p* = .52), nor when adding the other covariates in the study, including child age, gender, parent reports of externalizing behaviors, and daily reports of child conflict (*b* = -1.35, *SE* = 1.86, *p* = .47).

Area Under the Curve. Finally, we examined the effects of EAR-measured conflict on cortisol area under the curve with respect to ground (AUC_g) and area under the curve with respect to increase (AUC_i) across the two days of cortisol sampling for each participant. We used standard formulae for computing AUC_g and AUC_i described in Pruessner et al. (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). We then used linear regression to regress AUC_g and AUC_i on EAR-measured conflict. Conflict did not significantly predict AUC_g when entered by itself (*b* = -12.93, *SE* = 12.84, *p* = .32), or when entered with the covariates (*b* = -22.50, *SE* = 13.27, *p* = .10). Conflict marginally predicted AUC_i when entered by itself (*b* =

34.83, *SE* = 20.15, *p* = .09), but not when entered with the covariates (*b* = 25.82, *SE* = 23.03, *p* = .27).

Figure S1. Median split of the effect of preschoolers' everyday conflict at home on their own diurnal cortisol rhythms. High values for EAR-measured conflict are plotted at above the median and low values plotted at below the median.



Supplementary References

Adam, E. K., Hawkley, L. C., Kudielka, B. M., & Cacioppo, J. T. (2006). Day-to-day dynamics of experience-cortisol associations in a population-based sample of older adults. *Proceedings of the National Academy of Sciences of the United States of America, 103*, 17058-17063. doi: 10.1073/pnas.0605053103

Pruessner, J. C., Kirschbaum, C., Meinlschmid, G., & Hellhammer, D. H. (2003). Two formulas for computation of the area under the curve represent measures of total hormone concentration versus time-dependent change. *Psychoneuroendocrinology, 28*, 916-931.

Rosenthal, R., Rosnow, R. L., & Rubin, D. B. (2000). *Contrasts and effect sizes in behavioral research: A correlational approach*. Cambridge, UK: Cambridge University Press. SPSS. (2010). IBM SPSS Statistics 18.0 for Mac. Chicago, IL: SPSS.