Supplementary Materials for

**Longitudinal Understanding of Child Maltreatment Report Risks**

This file includes:

Appendix A, Table S1

Appendix B, Table S2

Appendix C

**Appendix A**

**Level-1 Predictors**

**TANF lifetime limit**. This variable was a binary measure, coded “1” for age-year observations after reaching the TANF lifetime limit (i.e., 60 months) and “0” otherwise. This variable was used to control for age-year observations which might have no welfare receipt due to the lifetime limit.

**TANF no limit**. Some children continued receiving TANF beyond the 60-month lifetime limit. This variable was coded “1” for those age-year observations and “0” otherwise. This can happen for two different reasons. First, a child’s caregiver can be exempted from the lifetime limit if the caregiver is “under age 18 attending school, age 60 or over, is disabled or is needed in the home to care for a disabled family member” (Missouri Department of Social Services, 2015, p. 2). Second, a child may continue receiving TANF over 60 months if a child moves into another household whose householder has not yet reached the lifetime limit. This is because the lifetime limit of the Missouri TANF program is applied to a household, but not to a child (U.S. Department of Health and Human Services, 1998). In either case, the risk of maltreatment reporting for those receiving TANF beyond the lifetime limit may be different from that for others.

**Prior CPS report**. This variable measured the number of prior child maltreatment reports, indicating the cumulative history of prior exposure to reported maltreatment. The number of prior maltreatment reports by the current age was ranged from 1 to 9 for the CAN sample and from 0 to 6 for the AFDC sample. This variable was categorized into “1”, “2”, “3”, and “4 or more” for the CAN sample and “0”, “1”, “2”, “3 or more” for the AFDC sample as a few children had more than three or four prior reports at an age.

CPS often offers in-home preventive services to intact families after investigating (or assessing) maltreatment reports. Broadly, there are two sorts of services for intact families. More common services are Family Centered Services (FCS), which are less intensive case management services provided over a longer-term period (3 months or longer). Less common but more intensive services are Intensive In-home Services (IIS), which are offered to families in crisis to prevent foster care placement of their children and are usually provided in a short period (within 4 to 6 weeks). The current study measured these services separately as prior studies suggested that FCS generally acted as a protective factor, while IIS sometimes acted as a risk indicator in analyses.

**Family Centered Services (FCS) only**. FCS are usually provided without IIS, while IIS typically take place with FCS. For this reason, this variable measured prior participation of FCS only, coded “1” for having FCS only and “0” otherwise.

**Intensive In-home Services (IIS) with or without FCS**. This variable was coded “1” for any prior participation in IIS with or without FCS and “0” otherwise.

Child’s medical and mental health problems were captured by six predictors based on Missouri emergency room (ER) records (1997-2009). It is worth noting that the problems captured in ER records may be relatively only those that require urgent medical attention. On the other hand, in many cases low income families may use emergency rooms for a source of regular medical care (Halfon, Newacheck, Wood, & St Peter, 1996; Orr, Charney, Straus, & Bloom, 1991). Table S1 exhibits the specific ER diagnoses and corresponding ICD-9 codes.

**Child current injury**. This variable measured any current ER visit for injury, coded “1” for having an ER visit with an injury diagnosis at the current age and “0” otherwise.

**Child prior injury**. This variable measured any prior ER visit for injury. This variable was coded “1” for having any ER injury diagnosis prior to the current age and “0” otherwise.

**Child current mental health**. This variable measured any current ER visit for mental health, coded “1” for any ER visit with a mental health diagnosis at the current age and “0” otherwise.

**Child prior mental health**. This variable measured any prior ER visit for mental health, coded “1” for any ER diagnosis for mental health prior to the current age and “0” otherwise.

**Child mental delay**. This variable was a binary measure of ever having any ER visit for mental delay. This variable was coded “1” for any ER diagnosis for mental delay at or prior to the current age and “0” otherwise.

**Child chronic health problem**. This variable was a binary measure of ever having any ER visit for chronic or serious health problems. This variable was coded “1” for any ER diagnosis for such problems at or prior to the current age and “0” otherwise.

**Child’s Behavioral Problems**

Child’s behavioral problems were captured by two predictors based on delinquency records. The data sources were Missouri juvenile court records (1993-2009), Missouri Division of Youth Services records (1992-2010), and Missouri highway patrol records (1988-2009).

**Child current delinquency**. This variable was a binary measure of a current delinquency problem, coded “1” for having a delinquency record at the current age and “0” otherwise.

**Child prior delinquency**. This variable was a binary measure of any prior delinquency problem, coded “1” for having a delinquency record prior to the current age and “0” otherwise.

**Child’s Special Education**. This variable was used as a proxy for child’s educational needs. This variable was measured at a binary scale, coded “1” for ever having an eligibility record for special education services and “0” otherwise. The data source was St Louis City Schools and St Louis Special School District special education eligibility records (1991-2006).

**Parent current conviction**. This variable measured a parent’s current involvement of the criminal justice system due to a conviction, coded “1” for having any active probation, parole, or incarceration at the subject child’s current age and “0” otherwise. A small proportion of the current convictions resulted in incarceration, while about 90% received probation or parole. This suggested that most parents with a current conviction were still able to be with their children.

**Parent prior conviction**. This variable measured a parent’s prior involvement of criminal justice system due to a conviction, coded “1” for having any prior history of probation, parole, or incarceration which ended prior to the subject child’s current age and “0” otherwise.

**Parent current arrest**. This variable measured a parent’s current arrest, coded “1” for having any arrest record at the subject child’s current age and “0” otherwise.

**Parent prior arrest**. This variable measured a parent’s prior arrest, coded “1” for having any arrest record prior to the subject child’s current age and “0” otherwise.

**Level-2 Predictors**

**Child sex**. This variable measured the subject child’s sex, coded “1” for female and “0” for male.

**Birth year**. To control for any birth cohort effect, the current study measured the subject child’s birth year at a categorical scale: “1991”, “1992”, “1993”, and “1994”.

**Child birth weight**. This variable measured the subject child’s birthweight. This variable was categorized based on the clinical thresholds: “normal” for the birthweight ≥ 2.5kg, “low” for the birthweight < 2.5kg and ≥ 1.5kg, and “very low” for the birthweight < 1.5kg.

**Medicaid at birth**. This variable was a binary measure, coded “1” for receiving Medicaid at the subject child’s birth and “0” otherwise. This variable was used to capture the family socioeconomic status at the subject child’s birth.

**Mom teen birth**. This variable was a binary measure of maternal age at the subject child’s birth, coded “1” when a mother was a teenager (< age 20) at that moment and “0” otherwise.

**Mom no high school**. This variable measured maternal education level at the subject child’s birth, coded “1” for those with an education level below high school graduation or equivalent and “0” otherwise.

**Mom foster care**. This variable measured a mother’s history of foster care placement as a minor during adolescence, coded “1” for having a placement and “0” otherwise.

**Baseline no AFDC**. This variable was applicable only to the CAN sample. This variable was a binary measure, coded “1” for children who had no AFDC record before their index report (i.e., the first-time ever report to be selected in the CAN sample) and “0” otherwise. The underlying idea was that children who started their lives with a maltreatment report but without welfare (AFDC) might be fundamentally different from those starting with experiencing both reported maltreatment and welfare.

**Level-3 Predictors**

To consider neighborhood contexts at the baseline (i.e., the sampling period from 1993-1994), we used the following three baseline neighborhood variables: (1) **poverty rate** = % persons whose income below the federal poverty level; (2) **mobility rate** = % households that moved within the last 5 years; and (3) **child/adult ratio** = ratio of the number of children aged 13 or younger to the number of adults aged 21 or older. The parent study geocoded and linked data with Census information for the baseline census tract.

**Table S1**. Emergency Room Diagnoses and ICD-9 Codes.

|  |  |
| --- | --- |
| Emergency Room Diagnosis | ICD-9 Code |
| **Child Injury** |  |
| Poisoning (drug/alcohol) | 969, 980, 965.0 |
| Child abuse/neglect | 783.41, 995.5, V200 |
| Poisoning (not drug/alcohol) | 960-968, 970-979, 981-989 |
| Burns | 940-949 |
| Fractures (not skull/brain), Dislocation | 805-829, 830-839 |
| Skull/brain injuries | 800-804, 850-854 |
| Open wounds, blood vessel injuries, late effect of injuries, cellulitis, abscess | 870-909, 682 |
| Sprain | 840-848 |
| Internal injury | 860-869 |
| Crush, contusion | 920-929 |
| Superficial injuries | 910-919 |
| Exposure (heat or cold) | 991-992, 994.4 |
| Hunger/thirst | 994.2, 994.3 |
| Suffocation/drown | 994.1, 994.7 |
| Accidental injuries | E810-E829, E880-E888, E900-E919 |
| **Child Mental Health** |  |
| Mental health general | V40, V79, 648.4 |
| Psychoses | 294-298, 296.0-296.1, 296.4-296.9, 299.9 |
| Anxiety/personality | 300-302 |
| Conduct, attention deficit, other MH specific to child/adolescent | 312, 313, 314.0, 314.2 |
| Depression | 296.2, 296.3, 311 |
| Other mental health | 293, 306-310, 316 |
| **Child Mental Delay** |  |
| Developmental delay/disorder, Mental retardation | 299.1, 299.8, 314.1, 315, 317-319 |
| Autism | 299.0 |
| **Child Chronic/Serious Health Problem** |  |
| Paralysis, epilepsy, recurrent seizures, spina bifida, nervous system/heart/circulatory system/hemolytic anomalies, Cystic fibrosis | 344-345, 741-742, 745-747, 282, 277.0 |

**Appendix B**

The likelihood ratio (LR) test provided a formal significance test of model fit improvement by adding parameters including interaction terms. First, we estimated the relationship between child age and the CMR likelihood with no other predictor. Adding child age improved model fit in both samples. We further examined polynomial growth models by adding the quadratic and cubic terms of child age in turn, but none improved model fit. This suggested a logit-linear relationship between child age and the CMR likelihood.

After defining the growth curve (i.e., a logit-linear curve), we examined other predictors. We included only predictors with meaningful improvement of model fit based on the likelihood ratio (LR) test without considering interactions between predictors (Model 1 in Table S2).

Then, we examined interaction effects (Table S2). In the CAN sample, adding the current welfare ×prior welfare interaction significantly improved the model fit (Model 1 → Model 2; = 17.154, *df* = 1, *p* < .0001), whereas adding other interactions show no significant improvement in model fit. In the AFDC sample, model fit increased significantly when adding the current welfare ×prior welfare interaction (Model 1 → Model 2; = 16.204, *df* = 1, *p* < .0001) and the child age ×current welfare interaction (Model 2 → Model 3; = 14.775 *df* = 1, *p* = .0001) in turn. No other interactions were statistically significant. Based on these results, we selected Model 2 as the final model for the CAN sample and Model 3 as the final model for the AFDC sample. The final models are reported in Table 2 of the main text.

Finally, we examined random slope models. Adding the level-2 random slope of *current welfare* improved model fit for both samples. This indicated that the effect size of current welfare differed between children, which was not explained by predictors in the model. Other random slopes were explored but none increased model fit.

**Table S2**. The Likelihood Ratio Tests of Interaction Effects.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CAN sample | | | |  | AFDC sample | | | |
| Model | | | |  | Model | | | |
| Model 1: Final model (Table 2) with no interaction | | | |  | Model 1: Final model (Table 2) with no interaction | | | |
| **Model 2: Model 1 + CW×PW** | | | |  | Model 2: Model 1 + CW×PW | | | |
| Model 3: Model 1 + CW×PW + Age×CW | | | |  | **Model 3: Model 1 + CW×PW + Age×CW** | | | |
| Model 4: Model 1 + CW×PW + Age×PW | | | |  | Model 4: Model 1 + CW×PW + Age×CW + Age×PW | | | |
| Model 5: Model 1 + CW×PW + Age×Race | | | |  | Model 5: Model 1 + CW×PW + Age×CW + Age×Race | | | |
| Model 6: Model 1 + CW×PW + CW×Race | | | |  | Model 6: Model 1 + CW×PW + Age×CW + CW×Race | | | |
| Model 7: Model 1 + CW×PW + PW×Race | | | |  | Model 7: Model 1 + CW×PW + Age×CW + PW×Race | | | |
| LR test of |  | df | *p* |  | LR test of |  | df | *p* |
| **Model 1 to 2** | **17.154** | **1** | **< .0001** |  | **Model 1 to 2** | **16.204** | **1** | **< .0001** |
| Model 2 to 3 | 2.077 | 1 | .1495 |  | **Model 2 to 3** | **14.775** | **1** | **.0001** |
| Model 2 to 4 | 0.150 | 1 | .6983 |  | Model 3 to 4 | 0.000 | 1 | .9999 |
| Model 2 to 5 | 0.240 | 2 | .8867 |  | Model 3 to 5 | 1.383 | 2 | .5008 |
| Model 2 to 6 | 0.529 | 2 | .7674 |  | Model 3 to 6 | 2.251 | 2 | .3246 |
| Model 2 to 7 | 4.781 | 2 | .0916 |  | Model 3 to 7 | 4.688 | 2 | .0960 |

*Note*. LR test = Likelihood ratio test. CW = current welfare. PW = prior welfare. df = degrees of freedom. Significant LR tests and final models are in boldface.

**Appendix C**

**Child Age × Current Welfare Interaction in the AFDC Sample**

The odds ratio (*OR*) and its confidence interval (*CI*) of child age by current welfare (i.e., on welfare vs. not on welfare) can be calculated based on the coefficients (*r*) and standard errors (*SE*) of the main and interaction terms:

* The main term of child age: r = −0.0125, SE = 0.0147, OR = 0.99 (95% CI = 0.96-1.02)
* The “child age × current welfare” term: r = −0.0704, SE = 0.0183, OR = 0.93 (95% CI = 0.90-0.97)

Since “not on welfare” is the reference category of current welfare, the main term of child age indicates the estimates while currently not on welfare. The estimates while currently on welfare is calculated based on the sum of the main and interaction terms. Formulas for the sum of two coefficients and its standard error can be used for this calculation:

* Coefficient:
* SE:

where is the covariance between and

Corresponding OR and 95% CI can be calculated as follows:

* OR:
* 95% CI:

The coefficient, SE, OR and 95% CI of child age while currently on welfare are therefore:

**Current Welfare × Prior Welfare Interaction in the CAN Sample**

The main term of prior welfare indicate the estimates while currently not on welfare:

The coefficient, SE, OR, and 95% CI of prior welfare while currently on welfare are (as calculated by the above formulas):

**Current Welfare × Prior Welfare Interaction in the AFDC Sample**

The main term of prior welfare indicate the estimates while currently not on welfare:

The coefficient, SE, OR, and 95% CI of prior welfare while currently on welfare are (as calculated by the above formulas):

**References**

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