Development and Validation of a Parent-Report Measure Assessing Child Safety-Related Impulses and Motivations (CSIM)

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BACKGROUND

- Parents often underestimate children's impulsivity and curiosity that can increase hazard exposure.[1]
- Parents' accurate perception of risk may be critical to preventing unintentional injuries, which are a leading cause of morbidity and mortality in youth.[2,3]
- Inadequate measures exist to measure parental perceptions of children's risk.
- The Child Safety-Related Impulses & Motivations (CSIM) scale was developed to assess parental perceptions of their children's risk of unsafe behaviors as related to their impulsivity and curiosity.

Objective

- Establish the reliability, validity (for intended inferences), and measurement invariance of the CSIM in parents under age 18, and refine the scale using Item Response Theory (IRT).

METHOD

Item Development

- A pool of **33 items** was created based on a literature review and refined based on expert feedback.
- Parents were asked to rate their agreement with each statement based on the typical behavior of their child (ages 2–17) "most in need of support in staying safe".
- Response options range from ***Strongly Disagree*** to ***Strongly Agree*** on a 5-point Likert scale.

Procedures

- 629 parents (38% male, 62% female) of children aged 2-17 (51% male, 49% female) were administered all items along with the age appropriate form of the **Strengths and and Difficulties Questionnaire (SDQ)**.

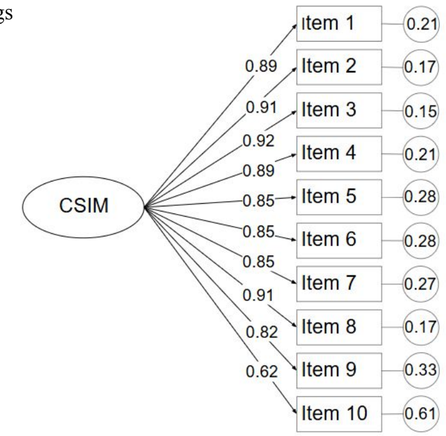
Data Analysis

- **Exploratory factor analysis** (EFA; polychoric correlations, Principal Axis Factoring with Promax Rotation) to identify structure
- **Confirmatory Factor Analysis** (CFA) to cross-validate structure identified by EFA (polychoric correlations, WLMSV estimation)
- **IRT** (Graded Response Model) for item trimming
- Multi-group CFA to assess measurement invariance by child age group (2–4 [*n*=177], 5–10 [*n*=239], 11–17 years [n=213])
- **Internal consistency reliability**
- **Convergent/discriminant validity** with the SDQ

Abbreviations: CFA, Confirmatory Factor Analysis; Comparative Fit Index; CSIM, Child Safety-Related Impulses and Motivations; TLI, Tucker Lewis Index; ECV, explained common variance; EFA, Exploratory Factor Analysis; IRT, Item Response Theory; RMSEA, Root Mean Square Error of Approximation; SDQ, Strengths and Difficulties Questionnaire, WLMSV, weighted least squares with robust standard errors.

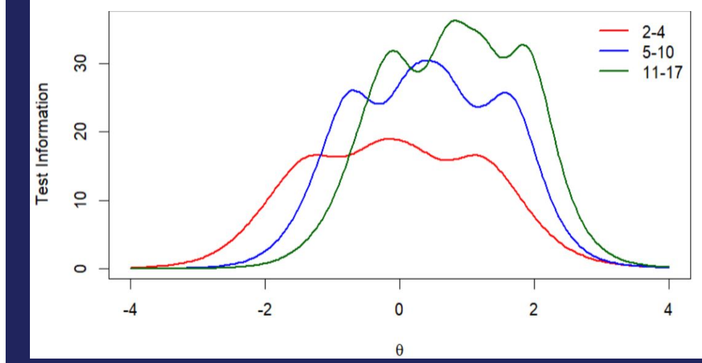
[1]Connor, S. M., & Wesolowski, K. L. (2003). "They're too smart for that": predicting what children would do in the presence of guns. *Pediatrics*, *111*(2), E109–E114. https://doi.org/10.1542/peds.111.2.e109
[2]Ablewhite, J., Peel, I., McDaid, L., Hawkins, A., Goodenough, T., Deave, T., Stewart, J., & Kendrick, D. (2015). Parental perceptions of barriers and facilitators to preventing child unintentional injuries within the home: a qualitative study. BMC public health, 15, 280. https://doi.org/10.1186/s12889-015-1547-2
[3]DeGeorge, K. C., Neltner, C. E., & Neltner, B. T. (2020). Prevention of Unintentional Childhood Injury. *American family physician*, *102*(7), 411–417.

Figure 1. CSIM unidimensional CFA factor structure with standardized loadings



CSIM Items
1. **My child's impulsivity could cause them harm.**
2. **My child's impulsivity prevents them from following my instructions.**
3. **My child's curiosity makes it difficult for them to follow my instructions.**
4. **My child's curiosity is likely to get them into trouble.**
5. **My child would seek excitement even if it meant them getting into trouble.**
6. **My child will break a rule I set for them if I'm not actively supervising them.**
7. **My child is more likely than their peers to act without thinking**
8. **My child engages in risky behaviors that are likely to result in harm.**
9. **My child purposely disregards safety rules I set for them.**
10. **My child would access medicines they are not supposed to take.**

Figure 2. Test Information Function curves by age group



RESULTS

- EFA of the item pool suggested a 2-factor solution (impulsive/curiosity-related risk & hazard access) with 64% variance explained.
- Contrary to EFA, CFA bifactor model showed that a general factor accounted for most variance and reliability (ω ≈ .94, ωH ≈ .87, ECV=0.90) **supporting unidimensional scoring.**
- Items with strong discrimination (a) and thresholds (b) spanning the latent trait (θ) were selected to **maximize information across the construct rang**e (see Figure 2 and table below).

	***a* (slope)**	***b* range**
Item 1	3.57	−0.95 → 1.27
Item 2	4.13	−0.66 → 1.65
Item 3	4.12	−0.75 → 1.473
Item 4	3.15	−1.32 → 1.33
Item 5	3.29	−0.87 → 1.66
Item 6	2.73	−0.98 → 1.61
Item 7	2.88	−0.49 → 1.81
Item 8	3.69	−0.49 → 1.72
Item 9	2.57	−0.40 → 1.40
Item 10	1.55	0.03 → 1.56

- Unidimensional CFA on final item set (Figure 1) showed **good fit** (RMSEA=0.022, CFI=0.995, TLI=0.993).
- Across age groups evidence was found of invariance:
  - **Configural** (RMSEA=0.026, CFI=0.990, TLI=0.988),
  - **Metric** (△RMSEA=-0.009, △CFI=-0.003),
  - **Scalar** (△RMSEA=0.015, △CFI=-0.005)
- The CSIM showed **good reliability** (ω/α=0.94).
- **Stronger correlations** were observed with constructs hypothesized to be more related - **conduct problems** (r=0.65) and **hyperactivity/inattention** (r=0.57) - compared to other constructs - peer relations (0.26), emotional symptoms (0.25), prosocial behaviors (-0.38).

DISCUSSION

- The CSIM is a reliable measure of parental perceptions of children's risk of unsafe behaviors related to their impulsivity and curiosity, with validity evidence supporting its intended use.
- It enables examination of how these perceptions influence safety practices and align with children's actual behaviors, providing insights to guide parent education and improve child safety.

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