Preventing Aggressive Behavior in Elementary School Children by Promoting Social Information-Processing Skills

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Acknowledgements

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and to statistical consultants, Chongming Yang and
Patrick Malone, at Duke University
Overall aims

1. To assess whether content delivered in Making Choices was responsible for reducing overt aggression.

2. To delineate potential social-cognitive risk mechanisms for aggression.

Why?

To inform the field of primary prevention to better understand what works and for whom.
Background
The Making Choices Program

Making Choices is a universal, school-based program that seeks to prevent and reduce aggression by promoting social cognitive skills in elementary school children.
Definition of Overt Aggression:
Confrontational, physical or verbal behavior that negatively affects others.

- Peer rejection
- Peer victimization
- Delinquency
- Drug and alcohol use
- Academic failure
- Teenage pregnancy
- Truancy and drop-out
Risk & Resilience Framework

Environmental
- Family
- Peers
- School
- Neighborhood

Personal
- Social-Cognitive
- Emotional
- Behavioral
- Intellectual
- Biological

Note. Making Choices targets domains highlighted in orange
Emotion-Integrated, Social Information Processing (SIP) Model

State the problem

- Interpret social cues
- Encode social cues

Emotion Regulation & Social Knowledge

- Assess outcomes

Set goal(s)

Generate potential solutions

Select & enact best solution(s)

Evaluate potential solutions

Note. Making Choices targets constructs in orange and evaluates constructs outlined in boxes.
The Making Choices Program

**Making Choices (MC)**
- Classroom curriculum
  - 7 units, 28 lessons
  - 1hr/week, during 1 year
  - Each lesson has research materials and activities

**Making Choices Plus (MC+)**
- Same as MC plus…
  - Family Nights program
  - Good Behavior Game
  - Supplemental classroom activities
Sequential Experimentation: Prior Studies

- Classroom-based, quasi-experimental study
  - Fraser et al. (2005) – *Journal of Consulting and Clinical Psychology*

- After-school experimental study
  - Fraser et al. (2004) – *Research on Social Work Practice*

- Classroom-based, quasi-experimental study
  - Smokowski et al. (2004) – *Journal of Primary Prevention*

- Pre-school quasi-experimental study
  - Conners et al. (in prep – dissertation)
Study Description
Follow-up to Fraser et al. (2005)

Fitted 3-Level HLM for Overt Aggression (Fraser et al., 2005)

<table>
<thead>
<tr>
<th>Level</th>
<th>Effect</th>
<th>Estimate</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>Conditional Mean (Intercept)</td>
<td>0.18 ***</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Pretest</td>
<td>0.83 ***</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>0.03</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Latino</td>
<td>-0.04</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Gender (male)</td>
<td>0.03</td>
<td>.02</td>
</tr>
<tr>
<td>Classroom</td>
<td>Making Choices</td>
<td>-0.08 *</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>Making Choices Plus</td>
<td>-0.08 *</td>
<td>.03</td>
</tr>
<tr>
<td>Teacher</td>
<td>School</td>
<td>0.05</td>
<td>.06</td>
</tr>
<tr>
<td>Student x Classroom Interaction</td>
<td>Gender x Making Choices</td>
<td>-0.10 *</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Gender x Making Choices Plus</td>
<td>-0.06</td>
<td>.05</td>
</tr>
</tbody>
</table>
Research Questions

**Main Effects**

Do $MC$ and $MC^+$ affect social cognition and behavior?

**Moderating Effects**

Do total, direct, and indirect effects vary by gender?

**Mediating Effects**

Do SIP skills explain effects on overt aggression at posttest?
Hypothesized Mediating & Moderating Effects

MC ($x_1$) or MC+ ($x_2$) → SIP Skill (t2) → TRF Overt Aggression (t2)

$a_1$ or $a_2$ (+)

$c_1'$ or $c_2'$ (-)

$b$ (-)

W
Research Design

- Quasi-experimental, pretest-posttest cohort design: (j=classrooms), with delayed treatment withdrawal
  - Cohort 1: *MC - Making Choices Only* (j=9)
  - Cohort 2: *MC+ - Making Choices Plus* (j=11)
  - Cohort 3: *CC - Comparison Condition* (j=8)

<table>
<thead>
<tr>
<th>Cohorts</th>
<th>N</th>
<th>2001-02</th>
<th>2002-03</th>
<th>2004-05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td><em>MC</em></td>
<td>185</td>
<td>T1</td>
<td>T2</td>
<td></td>
</tr>
<tr>
<td><em>MC+</em></td>
<td>202</td>
<td>T1</td>
<td>T2</td>
<td></td>
</tr>
<tr>
<td><em>CC</em></td>
<td>154</td>
<td>T1</td>
<td>T2</td>
<td></td>
</tr>
</tbody>
</table>

Total Sample=480

*Note.* Complicated nesting structure
Participants

Sample Size

- 480 third-grade students
  - 28 classrooms
  - 2 schools

Sociodemographic Characteristics

- Ethnically-diverse: 45% Latino; 34% White; 17% African American; and 4% Other

- Low- to middle-SES: 53% free/reduced lunch for entire school population
Description of Primary Measures

Overt Aggression
• *Teacher Report Form (TRF)*, narrow-band subscale of 24-item aggression scale

SIP Skills
• *Skill Level Activity (SLA)* Child rated encoding, hostile attribution, goal clarification, and response selection
• *Social Health Profile (SHP)*: Emotion Regulation subscale

*TRF and SHP scales are included in the Carolina Child Checklist (Macgowan et al., 2005) which was used in this analysis.*
Preliminary Analyses

- To evaluate internal validity of the study
  - Attrition analysis
  - Selection bias analysis

- To inform selection of analysis method
  - Estimation of intraclass correlations (ICCs)
Attrition Analysis

Significant differences on:
- Pretest encoding
  \( t(514) = -2.21, p < .05 \)
- Gender
  \( \chi^2(1, n=541) = 6.78, p < .01 \)

No Significant differences on:
- Race/ethnicity and other pretest measures
Selection Bias Analysis
Pairwise Multiple Comparisons

<table>
<thead>
<tr>
<th>Variable</th>
<th>CC v. MC (Sig.)</th>
<th>CC v. MC+ (Sig.)</th>
<th>MC v. MC+ (Sig.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>CC&lt;MC (***))</td>
<td>CC&lt;MC+ (***))</td>
<td>ns</td>
</tr>
<tr>
<td>Social Contact</td>
<td>CC&gt;MC (***))</td>
<td>ns</td>
<td>MC&gt;MC+ (***))</td>
</tr>
<tr>
<td>Hostile Attribution†</td>
<td>ns</td>
<td>CC&gt;MC+ (trend)</td>
<td>MC&gt;MC+ (***))</td>
</tr>
<tr>
<td>Encoding</td>
<td>CC&lt;MC (***))</td>
<td>CC&lt;MC+ (***))</td>
<td>MC&gt;MC+ (*)</td>
</tr>
<tr>
<td>Response Selection</td>
<td>CC&gt;MC (*)</td>
<td>ns</td>
<td>MC&lt;MC+ (***))</td>
</tr>
</tbody>
</table>

*Ethnic composition of comparison cohort was significantly different from intervention cohorts. $X^2 = 13.36$ (6, N=480) $p < .05$

Note. A dagger sign (†) is used to indicate scales with unequal variances; for these scales, the Tamhane T2 test is performed.
Intraclass Correlations

<table>
<thead>
<tr>
<th>Variable of Interest</th>
<th>ICC for Unconditional Model</th>
<th>ICC for Conditional Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2 Overt Aggression</td>
<td>.09</td>
<td>.12</td>
</tr>
<tr>
<td>T2 Emotion Regulation</td>
<td>.23</td>
<td>.21</td>
</tr>
<tr>
<td>T2 Encoding</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td>T2 Hostile Attribution</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>T2 Goal Clarification</td>
<td>.05</td>
<td>.01</td>
</tr>
<tr>
<td>T2 Response Selection</td>
<td>.04</td>
<td>.00</td>
</tr>
</tbody>
</table>

\[ \text{DEFF} = 1 + \text{ICC} \left( n - 1 \right) \]  
If DEFF >= 2.0, then use multilevel model

Current study: 2 = 1 + ICC(17-1); \text{ICC} = \frac{1}{16} = .063 (Shackman, 2001)
Analytic Methods & Findings

Main Effects:
--What were the effects of MC and MC+?

Moderating Effects:
--Did program effects vary by gender?

Mediating Effects:
--Did SIP mediators explain program effects?
Main & Moderating Effects
Baseline Multilevel Equation to Test Main Effects

Level 1: \( Y_{ij} \) (OVAGG2) = \( \beta_{0j} + \beta_{1j}(\text{MALE}) + \beta_{2j}(\text{BLACK}) + \beta_{3j}(\text{LATINO}) + \beta_{4j}(\text{OVAGG1}) + \beta_{c1j}(\text{MC}) + \beta_{c2j}(\text{MCP}) + e_{ij} \)

Level 2: \( \beta_{0j} = \gamma_{00} + u_{0j} \)

*Multilevel models were used to estimate main effects for:  
1) Emotion regulation  
2) Encoding  
3) Goal clarification  
4) Overt Aggression

*Single-level models included the same fixed effects.
Methods for Testing Moderating Effects

- Used Satorra-Bentler Chi-Squared Difference Test, to compare models with more than one degree of freedom.

- Used p-value associated with interaction terms, to compare a saturated model to a nested model.
Findings: Main Effects

**Effects of MC and MC+**
- Emotion regulation (+)
- Response selection (+)
- Goal clarification (+)
- Overt aggression (-)

**Effects of MC+ only**
- Hostile attribution (-)

**Effects of MC only**
- Encoding (+)

Findings: Moderating Effects

**Goal clarification**
- MC: Boys only
- MC+: Girls and boys

**Overt aggression**
- MC: Boys only
- MC+: Girls and Boys
# Findings: Main Effects

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Emotion Regulation</th>
<th>Encoding</th>
<th>Hostile Attribution†</th>
<th>Response Selection†</th>
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<tr>
<td></td>
<td>Est.</td>
<td>SE</td>
<td>Est.</td>
<td>SE</td>
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<tr>
<td>Intercept</td>
<td>1.12***</td>
<td>.20</td>
<td>.44***</td>
<td>.03</td>
</tr>
<tr>
<td>Pretest SIP skill</td>
<td>.62***</td>
<td>.04</td>
<td>.31***</td>
<td>.03</td>
</tr>
<tr>
<td>Male</td>
<td>-.16</td>
<td>.08</td>
<td>-.06**</td>
<td>.02</td>
</tr>
<tr>
<td>African American</td>
<td>-.14</td>
<td>.10</td>
<td>-.03</td>
<td>.02</td>
</tr>
<tr>
<td>Latino</td>
<td>.08</td>
<td>.06</td>
<td>-.00</td>
<td>.02</td>
</tr>
<tr>
<td>MC</td>
<td>.38***</td>
<td>.02</td>
<td>.03*</td>
<td>.01</td>
</tr>
<tr>
<td>MC+</td>
<td>.34***</td>
<td>.03</td>
<td>.01</td>
<td>.01</td>
</tr>
</tbody>
</table>

**Random Effects**

- L1 Variance(e): .344***
- L2 Variance(u11): .179***

Note. Dagger (†) indicates the use of a single-level model.

* \( p < .05 \)  ** \( p < .01 \)  *** \( p < .001 \)
## Findings: Main Effects

### Overt Aggression

<table>
<thead>
<tr>
<th></th>
<th>Males=1</th>
<th>Females=1</th>
<th>Males=1</th>
<th>Females=1</th>
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<tbody>
<tr>
<td><strong>Fixed Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.12***</td>
<td>.02</td>
<td>.30***</td>
<td>.06</td>
</tr>
<tr>
<td>Pretest</td>
<td>.69***</td>
<td>.08</td>
<td>.69***</td>
<td>.08</td>
</tr>
<tr>
<td>Gender</td>
<td>.18**</td>
<td>.05</td>
<td>-.18**</td>
<td>.05</td>
</tr>
<tr>
<td>African American</td>
<td>.03</td>
<td>.04</td>
<td>.03</td>
<td>.04</td>
</tr>
<tr>
<td>Latino</td>
<td>-.03</td>
<td>.03</td>
<td>-.03</td>
<td>.03</td>
</tr>
<tr>
<td>MC</td>
<td>-.02</td>
<td>.03</td>
<td>-.24**</td>
<td>.05</td>
</tr>
<tr>
<td>MCP</td>
<td>-.05*</td>
<td>.02</td>
<td>-.23**</td>
<td>.05</td>
</tr>
<tr>
<td>Gender*MC</td>
<td>-.22*</td>
<td>.07</td>
<td>-.22*</td>
<td>.07</td>
</tr>
<tr>
<td>Gender*MC+</td>
<td>-.18*</td>
<td>.07</td>
<td>-.18*</td>
<td>.0</td>
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</tbody>
</table>

### Goal Clarification

<table>
<thead>
<tr>
<th></th>
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<th>Females=1</th>
<th>Males=1</th>
<th>Females=1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.66***</td>
<td>.05</td>
<td>.45***</td>
<td>.05</td>
</tr>
<tr>
<td>Pretest</td>
<td>.30***</td>
<td>.05</td>
<td>.30***</td>
<td>.05</td>
</tr>
<tr>
<td>Gender</td>
<td>-.20**</td>
<td>.04</td>
<td>.20**</td>
<td>.04</td>
</tr>
<tr>
<td>African American</td>
<td>-.08*</td>
<td>.04</td>
<td>-.08*</td>
<td>.04</td>
</tr>
<tr>
<td>Latino</td>
<td>-.06*</td>
<td>.03</td>
<td>-.06*</td>
<td>.03</td>
</tr>
<tr>
<td>MC</td>
<td>-.01</td>
<td>.03</td>
<td>.13*</td>
<td>.05</td>
</tr>
<tr>
<td>MCP</td>
<td>.08**</td>
<td>.02</td>
<td>.18**</td>
<td>.04</td>
</tr>
<tr>
<td>Gender*MC</td>
<td>-.14*</td>
<td>.06</td>
<td>-.14*</td>
<td>.06</td>
</tr>
<tr>
<td>Gender*MC+</td>
<td>-.11*</td>
<td>.05</td>
<td>-.11*</td>
<td>.05</td>
</tr>
</tbody>
</table>

### Random Effects

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 Variance(e)</td>
<td>.061***</td>
<td></td>
</tr>
<tr>
<td>L2 Variance(u11)</td>
<td>.010*</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Note.* Est = unstandardized estimate. SE=Standard Error. L1=Level 1 and L2=Level 2.

*p < .05. ** p < .01. *** p < .001*
Effect Sizes

Note. Moderating effects for gender were not significant.
Effect Sizes

Effect Size Comparison

- Overt Aggression
  - MC Females: -0.07
  - MC Males: -0.89
  - MC+ Females: -0.18
  - MC+ Males: -0.84

- Goal Clarification
  - MC Females: 0.51
  - MC Males: 0.30
  - MC+ Females: -0.04
  - MC+ Males: 0.72
Mediating Effects

$MC (x_1)$ or $MC+ (x_2)$

SIP Skill (t2)

TRF Overt Aggression (t2)

$W$

$a_1$ or $a_2$

$b$

$c_1'$ or $c_2'$
Methods for Testing Mediating Effects

- Multilevel SEM model
  - Emotion Regulation, Goal Clarification, Encoding

- General SEM model (path model)
  - Hostile Attribution
  - Response Selection

...What did the models look like?
Findings: Mediating Effects

- Significant mediators
  - Emotion Regulation
  - Goal Clarification
  - Response Selection

- Nonsignificant mediators
  - Encoding
  - Hostile Attribution
MC & MC+ via Emotion Regulation

Note. Coefficients in parentheses are effects for females; others are effects for males.

CFI = .98; RMSEA = .09 (for males)
CFI = .96; RMSEA = .13 (for females)
MC & MC+ via Goal Clarification

Note. Coefficients in parentheses are effects for females; others are effects for males.

\[
\begin{align*}
\text{MC*} & \quad \text{Female} \\
\text{MC+*} & \quad \text{Female} \\
\text{MC} & \\
\text{MC+} & \\
\text{GOAL CLAR2} & \\
\text{OVERT AGG2} & \\
\end{align*}
\]

\[
\begin{align*}
.11^* (-.11^*) & \quad .21^* (-.21^*) \\
.14^* (-.14^*) & \quad .17^* (-.17^*) \\
.13^* (-.01) & \quad -.07 (-.07) \\
.18^* (0.08) & \quad -.23^* (0.02) \\
-.21^* (-.05^*) & \end{align*}
\]

CFI = .99; RMSEA = .04 (for males)
CFI = 1.0; RMSEA = .00 (for females)
MC & MC+ via Response Selection

Note. Coefficients in parentheses are effects for females; others are effects for males.

CFI= 1.0; RMSEA= .00 (for males)
CFI= 1.0; RMSEA= .00 (for females)
## Summary of Findings

<table>
<thead>
<tr>
<th>Main</th>
<th>Program effects on SIP skills and Overt Aggression at posttest. MCP tended to have more gender-balanced effects and larger effect sizes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderating</td>
<td>Moderating gender*program effects were detected for overt aggression and goal clarification, with boys having greater improvement than girls.</td>
</tr>
<tr>
<td>Mediating</td>
<td>Three out of five SIP skills mediated program effects on overt aggression.</td>
</tr>
</tbody>
</table>
Discussion
Study Limitations

- Research Design
  - Use of a convenience sample
  - Lack of random assignment and selection bias
  - Lack of triangulation b/w multiple informants & measures

- Measurement
  - Poor psychometric properties of SLA
Limitations (continued)

- Limitations of Multilevel SEM
  - Could not perform multiple group analysis to test whether indirect effects varied by gender
  - Could not utilize a latent variable approach to handle measurement error
  - Low statistical power to detect small effects

- Model Specification & Significance Testing
  - Temporal ordering of mediator and criterion variable prevents determination of true mediation
  - Use of Sobel Test
  - Does not account for dosage effects
Recommendations for Future Research (1)

Basic research should:

- Identify interrelationships between SIP skills
- Examine whether certain risk and protective factors differ in relevance across groups of different genders, race/ethnicities, and risk-levels
- Identify risk mechanisms and pathways associated with girls’ aggression
Intervention research should:

- Identify “critical ingredients” of interventions by testing mediating effects
- Identify moderating factors
- Use analytic methods that account for clustering when observations are nested into groups
- Better account for implementation characteristics such as dosage in evaluating effects
In Conclusion…

- Many evidence-based interventions are available to practitioners

- Practitioners need to know what to focus on for their particular population of children

- Researchers must work toward identifying what works for whom
QUESTIONS & DISCUSSION