Thinking About Chess as a Mechanism for Executive Function Development

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Overview

• Executive Function & Chess

• The Mind MATCH Chess Program

• Methods & Study Design

• Influence of Chess on Executive Function Development

• Implications & Limitations

• Future Directions
Executive Function & Chess

Executive Function

- Planning
- Inhibitory Control
- Shifting
- Working Memory

Inhibitory control:
Control impulses, regulate behaviour

Planning:
Sequence and coordinate actions
Why is executive function important?

• Related to academic achievement and positive adjustment

• Continues to develop in late childhood and adolescence

• Can be improved through intervention
  → Engage social and emotional factors
  → Opportunities to repeat, practice, and advance
Chess & Executive Function

Intuitive Associations

• Plan your moves

• Build a strategy

• Switch strategies when needed

• Forego small wins for bigger victories

• Remember how the pieces move

Demonstrated Associations

• Intervention for clinical populations
The Mind MATCH Chess Program

Overview

- Two cohorts of 8- to 11-year-old children followed over two academic years
- Intervention: 1-year afterschool chess club

Overarching Goal

Does a chess intervention promote improvement in executive function?
Methods & Study Design

**Procedure:**

- **T1** Pre (Sept.)
- **T2** Mid (Jan.)
- **T3** Post (May)

$n = 203$ Children

**Measures:**

- Inhibitory Control
- Planning
- Chess Knowledge

![Diagrams illustrating the procedure and measures](image_url)
Influence of Chess on Executive Function Development

- Average improvement over time

Chess Knowledge

Inhibitory Control

Planning

- Latent Growth Models: Does chess knowledge predict the slopes of these two lines?
Chess & Inhibitory Control

Inhibitory Control Improvement

Inhibitory Control At T3

T1 Inhibitory
T2 Inhibitory
T3 Inhibitory

Model Fit:
RMSEA = .00
CFI = 1.00
TLI = 1.12
SRMR = .02
Chess & Inhibitory Control

Child Age

Inhibitory Control Improvement

Inhibitory Control At T3

T1 Inhibitory

T2 Inhibitory

T3 Inhibitory

Model Fit:
RMSEA = .00
CFI = 1.00
TLI = 1.12
SRMR = .02
Chess & Inhibitory Control

Model Fit:
RMSEA = .00
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Chess & Planning

Planning Improvement

Planning At T3

Model Fit:
RMSEA = .00
CFI = 1.00
TLI = 1.17
SRMR = .02
Chess & Planning

Model Fit:
RMSEA = .00
CFI = 1.00
TLI = 1.17
SRMR = .02
Chess & Planning

Child Age

Child Gender

Planning Improvement

Planning At T3

T1 Planning

T2 Planning

T3 Planning

Model Fit:
RMSEA = .00
CFI = 1.00
TLI = 1.17
SRMR = .02
Chess & Planning

Child Age

Child Gender

Reasoning Skills

Planning Improvement

Planning At T3

T1 Planning

T2 Planning

T3 Planning

Model Fit:
RMSEA = .00
CFI = 1.00
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Chess & Planning

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Implications & Limitations

Applications:

- Informs education practices and interventions
- Guides public policy-making

Limitations:

- Generalizability of the results
- Unforeseeable extraneous variables
Future Directions

Where do we go from here?

• Does this prediction hold in our 6- and 12-month follow-ups?

• Benefits seen in other executive abilities?
  → In school performance?
  → Social skills and behaviour regulation?

• Fine-grained analysis of trial-by-trial data

• Currently have over 14,000 participant events and 125 million cells of data – we’re just getting started!
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