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Shaping minds together: A pilot study of the cooperation council's impact on 8-year-olds' executive function

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ABSTRACT

Self-regulation, including executive function (EF), refers to essential processes that enable children to regulate their thoughts, emotions, and behaviors in alignment with environmental demands, particularly in school settings. While various interventions exist to enhance EF, there is a need for cost-effective, classroom-based approaches. This pilot study examined whether a nine-week cooperative council intervention could enhance EF performance in 8-year-old children. Seventy-six students from six fourth-grade classes were assigned to either an experimental group, which engaged in weekly structured cooperative councils, or a control group, which followed standard curriculum. EF was measured pre- and post-intervention using an adapted Head-Toes-Knees-Shoulders task. Results revealed a significant greater improvement in EF among the experimental group. We argue that cooperative councils support cognitive development by requiring inhibitory control, working memory, and cognitive flexibility during social interactions. These low-cost, classroom-based routines may offer a practical avenue to foster self-regulation and learning in everyday school settings. Future work should involve randomized designs, longitudinal follow-up, and exploration of mechanisms underlying EF improvement.

1. Introduction

Supporting children's executive function (EF) in the classroom is essential for successful adaptation to school demands. Self-regulation, encompassing EF such as working memory, cognitive flexibility, and inhibitory control, enables children to manage thoughts, emotions, and behaviors in academic contexts (Best & Miller, 2010; Miyake et al., 2000). These skills are closely linked to learning and social adjustment (Blair & Raver, 2015; Kenny et al., 2023). The present study examines whether a low-cost, classroom-based intervention—the cooperative council—can promote EF development. Although whole-class meetings have been shown to benefit social-emotional learning (Cipriano et al., 2023; Jennings & Greenberg, 2009), their direct impact on EF has rarely been assessed. We address this gap by evaluating the short-term effects of cooperative councils on children's EF performance using an adapted Head-Toes-Knees-Shoulders task (HTKS) (Ponitz et al., 2009; McClelland et al., 2007). The HTKS requires children to inhibit

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a prepotent response, flexibly switch between rules, and maintain task instructions in working memory. These EF demands overlap with those mobilized during cooperative council discussions, where children must wait their turn to speak, regulate emotional reactions, and adapt their responses to group norms. Such demands closely resemble classroom situations in which children must wait for permission to speak, inhibit impulsive reactions, and flexibly adjust their behavior to changing social rules (Blair & Raver, 2015; McClelland & Cameron, 2012).

1.1. Child development and EF

EF develops progressively throughout childhood, with inhibitory control, working memory, and cognitive flexibility becoming increasingly differentiated (Chevalier, 2010; Wiebe et al., 2011). Stronger EF in school-aged children are associated with better academic achievement (Spiegel et al., 2021) and social adjustment (Zeytinoglu et al., 2023), while difficulties in inhibitory control predict later behavioral problems (Suarez et al., 2024). Because these skills remain malleable during the school years, classroom-based interventions represent a cost-effective way to foster their development and support learning (Diamond & Ling, 2019; Raver et al., 2011).

Although early childhood is often emphasized as a sensitive period for EF development, evidence suggests that EF skills continue to develop throughout middle childhood and remain responsive to environmental and classroom-based influences (Diamond & Ling, 2019; Blair & Raver, 2015). Around the age of 8, children face increasing academic and social demands requiring sustained inhibitory control, cognitive flexibility, and working memory engagement, all of which are associated with school achievement and peer functioning (Spiegel et al., 2021; Zeytinoglu et al., 2023). This makes middle childhood a developmentally meaningful target for classroom-embedded EF interventions.

1.2. Impact of the environment on the development of EF

The environment plays a crucial role in EF development. While early interactions with parents are important, teacher–student relationships and classroom organization increasingly shape children’s self-regulation once they enter school (Berry, 2012; Vandenbergue et al., 2018). Supportive teacher behaviors, clear rules, and opportunities for cognitively engaging interactions promote EF growth (de Wilde et al., 2016; Hamre et al., 2013). Programs such as *Tools of the Mind* illustrate how classroom strategies can strengthen these skills by embedding self-regulation into daily routines (Bodrova & Leong, 2007; Nesbitt & Farran, 2021), for instance by requiring children to follow shared rules, monitor their behavior, and coordinate actions with peers during structured activities.

These findings suggest that EF may be supported not only through direct cognitive training, but also through socially embedded classroom practices that repeatedly engage inhibitory control, working memory, and cognitive flexibility.

1.3. The cooperation council and its role in social sharing

The cooperative council is a weekly class meeting in which students and the teacher collectively address classroom life, relationships, and projects (Jasmin, 2003). Its structure requires children to wait their turn, express emotions constructively, and consider others’ perspectives, thereby engaging inhibitory control, working memory, and cognitive flexibility (Diamond & Lee, 2011; Miyake et al., 2000). The ritualization of these meetings also provides a predictable context for emotional regulation and co-regulation, which may further support EF development (Diamond & Ling, 2019; Masaki, 2023), as children learn to delay or adapt their emotional responses with the assurance that conflicts or concerns will be addressed at a designated time. This process fosters self-regulation in a supportive environment, an effect reinforced by the teacher’s ability to make the activity enjoyable, instill confidence, and ensure that the experience remains meaningful and relevant (Diamond & Ling, 2019).

1.4. The current study

Building on these conceptual and empirical foundations, this pilot study investigated whether nine weeks of cooperative council sessions (compared to a control group) would improve 8-year-old children’s EF. The HTKS was selected because it provides an ecologically valid behavioral measure of EF that closely mirrors classroom demands, particularly inhibitory control, cognitive flexibility and working memory demands. Previous research indicates that the HTKS captures multiple executive processes within a single task and can be meaningfully interpreted as a global indicator of EF in childhood, especially in ecologically valid classroom contexts (Ponitz et al., 2009; McClelland et al., 2021). In the present study, the HTKS was adapted to better match the cognitive capacities of 8-year-old children and to avoid ceiling effects by using a modified “Simon says” format (see Measures). More specifically, inhibitory control is primarily assessed through a no-go rule, requiring children to remain still when no explicit authorization is given, whereas cognitive flexibility is engaged by adjusting motor responses depending on whether the instruction is preceded by an authorization cue (e.g., “Simon says”).

Although cooperative councils explicitly address social and emotional aspects of classroom life, EF was selected as the primary outcome because it constitutes a core cognitive mechanism underlying behavioral and emotional regulation (i.e., self-regulation) (Blair & Raver, 2015; Nigg, 2017).

2. Method

2.1. Participants

Eighty-one children (38 girls; 84–114 months) from six fourth-grade classes in rural Switzerland participated. Five were excluded for missing data, leaving 76 for analysis (43 experimental, 33 control). Groups did not differ in age ($t[72.4] = 0.691, p = .492$) or sex distribution ($\chi^2[4] = 5.58, p = .232$).

2.2. Measures

EF was assessed with an adapted version of the Head-Toes-Knees-Shoulders Task (HTKS) (Ponitz et al., 2009) modified to increase difficulty for 8-year-olds. Prior to the main study, we piloted the standard HTKS with three students aged 7–8. Results and teacher feedback indicated that the task was too easy for this age group. Therefore, we designed an adapted version to increase its cognitive demands by introducing additional inhibitory rules based on the “Simon says” format.

In this adapted version, each of the 25 items (see Appendix A) began with either the phrase “I say...” or no introductory phrase. When the instruction included “I say,” children were expected to perform a different action than the one stated (e.g., if the experimenter said “I say touch your head,” the child had to touch any body part except the head). When the instruction did not include “I say” (e.g., “Touch your head”), the child was required to inhibit any motor response and remain still.

Each of 25 items was scored on a three-point ordinal scale (0 = incorrect, 1 = incorrect response followed by spontaneous correction, 2 = correct response), following established scoring conventions (Ponitz et al., 2008, 2009). This scoring captures not only accuracy but also children’s capacity to regulate an initial incorrect response. Internal consistency of the adapted HTKS score was estimated at the item level using an ordinal reliability coefficient ($\omega = .85$), indicating acceptable reliability. Although this adaptation has not been validated, it showed sensitivity to individual differences in this sample. The full list of commands is provided in the [Supplementary Material](#) (Appendix B).

2.3. Procedure

The study was conducted in accordance with institutional ethical and legal guidelines. Written parental consent and verbal child assent were obtained in line with the 1964 Helsinki Declaration.

Six teachers volunteered, and their classes were assigned to the experimental or control group based on teacher preference (three per group). Teachers in the intervention group received a short training session and a written protocol outlining the cooperative council procedures (see [Supplementary Material](#), Appendix B).

In the experimental group, children participated in one 30-minute cooperative council per week for nine weeks, facilitated by their teacher using a standardized protocol (see [Supplementary Material](#)). Control classes continued with regular routines. Pre- and post-tests were conducted one week before and after the intervention period.

The Cooperation Council is a structured weekly classroom meeting lasting approximately 25–30 min. Between sessions, students and the teacher write notes on a wall journal regarding conflicts, compliments, requests for help, or other matters related to class life. The teacher organizes these contributions to prepare the agenda for each session. During the council, children sit in a circle, and the discussion is facilitated by the teacher using a talking stick to regulate turn-taking. Each session follows a structured sequence, including a review of previous decisions, the discussion of notes (e.g., congratulations, concerns, requests), and a segment during which students propose and collectively vote on solutions. The session concludes with a brief round-table reflection, allowing each child to express how they perceive the class climate.

A nine-week duration was selected to allow repeated exposure to structured council routines across several cycles, as sustained and repeated engagement has been identified as important for EF-related intervention effects (Diamond & Lee, 2011; Diamond & Ling, 2019). Weekly implementation reflected the regular rhythm of classroom routines and was designed to ensure both ecological validity and feasibility within the school context. During the nine-week intervention, they implemented one session per week. The cooperative council consist of “meeting of all the children in the class with the teacher, where together and in a circle, we manage class life, what is going well and what is not going well, that is to say: the organization of class life, interpersonal relations, and projects” (Jasmin, 2003, p. 4). Teachers in the control group continued with their regular curriculum without any additional intervention. Random assignment was not feasible due to practical constraints in school settings and teacher availability. This pragmatic design choice is consistent with the exploratory nature of school-based pilot studies and is addressed as a limitation (see below).

2.4. Data generation

The HTKS task was administered individually by a trained experimenter during regular school hours. Responses were scored live during task administration using a standardized scoring sheet. All assessments were conducted pre- and post-intervention by the same experimenter. As scoring was performed by a single trained rater, interrater reliability could not be assessed.

2.5. Data analyses

We analyzed HTKS item-level scores using cumulative link mixed models (CLMM) with fixed effects of group (experimental vs. control), time (pre- vs. post-test), and their interaction. Random intercepts accounted for participants, items, and classrooms. Post hoc comparisons were conducted, and effect sizes are reported as odds ratios (OR). In line with current recommendations (Hoinig & Heisey, 2001; Kumle et al., 2021) and given the exploratory nature of this pilot study, we report effect sizes (odds ratios) with confidence intervals as indicators of the magnitude and precision of the observed effects.

3. Results

At pretest, mean HTKS scores were similar in the control ($M = 34$; $SD = 0.352$) and experimental ($M = 37.5$; $SD = 0.331$) groups ($p = .91$). At post-test, scores increased to 36 in the control group ($SD = 0.231$) and 44 in the experimental group ($SD = 0.231$) (see Fig. 1).

The CLMM analysis confirmed a significant time \times group interaction ($z = 6.18$, $p < .001$, $OR = 0.78$, 95% CI = [0.72, 0.84]), indicating greater gains in the experimental group (see Table 1). Overall, participants improved from pre- to post-test ($z = 10.34$, $p < .001$, $OR = 1.51$, 95% CI = [1.40, 1.64]), with a marginal main effect of group ($z = 0.37$, $p = .058$, $OR = 0.70$, 95% CI = [0.55, 0.89]). These OR reflect small to medium effect sizes (Chen et al., 2010), with the interaction effect showing the strongest magnitude. Post hoc comparisons showed larger gains in the experimental group ($M_{diff} = 0.31$; on a scale ranging from 0 to 2) than in the control group ($M_{diff} = 0.09$, $z = 3.07$, $p < .001$).

4. Discussion

This pilot study provides preliminary evidence that cooperative councils may enhance EF in 8-year-old children. After nine weekly sessions, the experimental group improved significantly more than the control group, suggesting that low-cost, classroom-based routines may contribute to EF development and school readiness. These findings complement a growing body of work showing that self-regulation skills underpin both academic and social adjustment in school (Blair & Raver, 2015; Spiegel et al., 2021; Zeytinoglu et al., 2023).

One interpretation is that cooperative councils stimulate core EF through the demands of group discussion. With the support of the teacher, children must wait their turn to speak, regulate emotional reactions (e.g., during disagreements), and consider different viewpoints (i.e., flexibility and cognitive empathy skills), all of which require efficient inhibitory control. Working memory is also engaged when they remember and integrate previously shared information, while cognitive flexibility is strengthened as they consider alternative perspectives. These processes are sustained by co-regulation, which highlights the sociocultural developmental components of self-regulation, particularly important within the school environment (Masaki, 2023). Such authentic social interactions may provide richer training opportunities than decontextualized exercises, increasing the likelihood of transfer to everyday school functioning (Diamond & Lee, 2011; Raver et al., 2011). Moreover, the ritualization of weekly meetings as a structured social routine may offer a predictable and safe framework for emotional expression, allowing children to delay or regulate immediate reactions—a process consistent with co-regulation models of self-regulation (Masaki, 2023).

In particular, the HTKS task captures instructed non-compliance within a structured rule-based context, closely resembling the

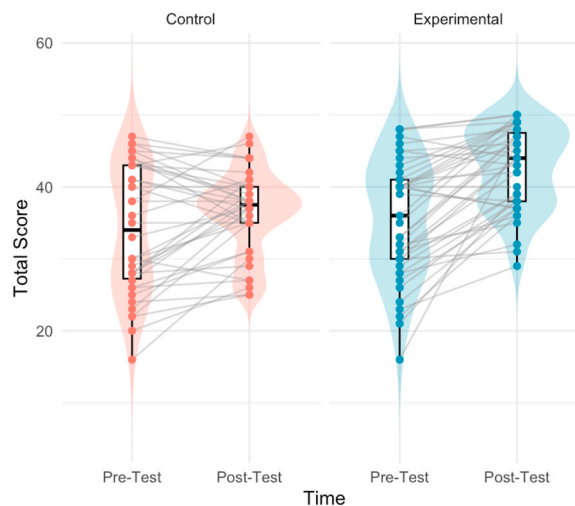


Fig. 1. Graphical representation of the sum score on 25 instructions by group (control vs. experimental) and measurement time (pre- vs. post-test). Note. Total scores are shown for interpretability, but statistical analyses were conducted at the item level using CLMM to model ordinal responses and account for within-participant variability.

Table 1

Results of the cumulative link mixed model (CLMM) assessing the effect of time and group on HTKS item-level scores (0–2).

	Estimate	Standard Error	z	p
Time	0.41	0.04	10.34	.001
Group	-0.37	0.19	-1.89	.058
Time*Group	0.24	0.04	6.18	.001

normative and turn-taking demands of cooperative council discussions. In both settings, children must override automatic responses in favor of collectively agreed rules. While the HTKS does not reproduce the social and emotional complexity of council interactions, it constitutes a conceptually coherent proxy measure of the regulatory skills potentially trained during the intervention.

Our findings are consistent with previous research suggesting that inhibitory control is associated with attention, classroom behavior, and peer relations (Vandenbroucke et al., 2018), although these outcomes were not directly measured in the present study. Importantly, the cooperative council does not target EF in isolation but integrates them into a socially meaningful context. This may explain why even a relatively brief intervention produced measurable improvements: when children are emotionally engaged and see the relevance of the activity, EF practice is likely more effective (Diamond & Ling, 2019).

From an educational perspective, cooperative councils may represent a practical and equitable tool for teachers. They require minimal resources, are easily embedded into existing routines, and simultaneously address cognitive, emotional, and social dimensions of learning. Such activities could therefore complement broader social-emotional learning programs (Cipriano et al., 2023), particularly in contexts where teachers seek low-cost strategies to foster classroom cohesion and autonomy.

Nevertheless, several limitations must be acknowledged. First, classes were not randomly assigned but grouped according to teacher interest, which may introduce selection bias and limits causal inference. Second, although fidelity of implementation was supported through a standardized written protocol and a preparatory training session for teachers, adherence to the protocol was not systematically monitored. Third, individual engagement during cooperative council sessions was not measured. Consequently, variability in participation levels may have contributed to individual differences in EF gains, limiting our ability to determine the extent to which observed improvements reflect uniform intervention effects. Fourth, only one EF measure was used to ensure feasibility and minimize assessment burden in a school-based pilot study, and this adapted HTKS measure has not yet been formally validated, although it demonstrated good sensitivity in the present sample. Future research should address these limitations by incorporating random assignment, fidelity checks, and validated age-appropriate EF measures. It would also be valuable to more directly examine and isolate the specific mechanisms through which cooperative councils foster EF, for instance by disentangling the respective roles of co-regulation, structured routines, and cognitive demands during discussions. Longitudinal follow-ups would also be valuable to test the durability of effects and to explore whether benefits extend to academic or socio-emotional outcomes.

In conclusion, this pilot study suggests that cooperative councils may represent a promising classroom practice for strengthening EF in 8-year-old children. By embedding structured peer discussions into everyday classroom life, teachers may help children develop self-regulation skills that support both learning and social participation. Although replication in more controlled and larger-scale designs is needed, these findings provide initial empirical support for the idea that democratic classroom practices can contribute not only to social cohesion but also to cognitive development.

CRediT authorship contribution statement

Nicolas Bressoud: Writing – review & editing, Validation, Supervision, Methodology, Data curation, Conceptualization. **Sébastien Urban:** Writing – review & editing, Validation. **Catherine Audrin:** Visualization, Formal analysis, Data curation. **Sylvie Richard:** Writing – review & editing, Validation. **Elena Lucciarini:** Writing – review & editing. **Amélie Cassaz:** Investigation, Conceptualization. **Philippe Gay:** Writing – review & editing, Writing – original draft, Validation, Supervision, Formal analysis.

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT (OpenAI) in order to assist with English language editing, grammar correction, and improving the clarity of scientific phrasing. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Appendix A

Commands

There are two types of commands.

- o I say touch your + body part

o Touch your + body part

- 1.Touch your toes
- 2.I say touch your shoulders
- 3.I say touch your head
- 4.Touch your knees
- 5.I say touch your knees
- 6.Touch your shoulder
- 7.I say touch your toes
- 8.I say touch your head
- 9.Touch your knees
- 10.Touch your shoulders
- 11.I say touch your toes
- 12.Touch your head
- 13.I say touch your knees
- 14.Touch your shoulders
- 15.Touch your toes
- 16.I say touch your head
- 17.Touch your shoulders
- 18.Touch your head
- 19.I say touch your knees
- 20.Touch your knees
- 21.I say touch your head
- 22.Touch your toes
- 23.I say touch your toes
- 24.Touch your shoulders
- 25.Touch your knees

Appendix B

Protocol

Cooperation Council Procedure

Frequency: Once a week

Duration: 25–30 min

Between each Cooperation Council session:

- Students and the teacher write notes and place them in the designated box (conflicts, compliments, etc.).
- Students and the teacher write down points on the wall journal.
- If children share elements with the teacher that can be addressed during the council (notes or wall journal), the teacher refers them to the Cooperation Council.

Before the council: The teacher gathers the notes and points from the wall journal and creates the agenda.

How?	What?	Materials
1 Students seated in a circle Teacher also seated in a circle with students	Welcome – The teacher gathers the students in a circle. – The teacher says, "I open the council." – The teacher presents the agenda. – Students listen to the teacher silently without fidgeting.	Agenda
2 same	Review of the previous council – The teacher recalls the laws and rules that were voted on and the assignments that were given. Students listen to the teacher silently without fidgeting. – The teacher asks the students if these have been respected and carried out since they were voted on/ given. Students who want to speak raise their hand and wait for the teacher to distribute the talking stick (1 student at a time). Students who do not have the talking stick are not allowed to speak. – If the laws and rules have been respected, the teacher encourages the students to continue and congratulates them. If they have not been respected, the teacher adds them again to the next agenda and encourages the students to make efforts. The teacher also congratulates the students who	Logbook Talking stick

(continued on next page)

(continued)

How?	What?	Materials
3 same	<p>received an assignment (e.g., helping a classmate in math) and completed it; otherwise, the teacher encourages them to make efforts or find another solution.</p> <p>Reading of notes</p> <ul style="list-style-type: none"> – The teacher distributes the notes to the children who wrote the thank-you/congratulatory notes. The teacher asks the children to read the note they wrote, one by one, giving them the talking stick. Children who are not reading a note are silent and listen to their classmates. When a child has finished reading their note, they return it to the teacher. The child to whom the note was addressed has the choice to express themselves or not about the comment (talking stick if they wish to speak). Any other child not concerned by the note wishing to express themselves can do so by asking for the talking stick (raising their hand). – The teacher distributes the notes to the children who wrote the criticisms. This step takes place in three stages. First, the children who wrote the notes read them at the teacher's invitation, who gives them the talking stick. The children who are not reading a note, as well as the criticized student, are silent and listen to their classmates. The child returns the note to the teacher when they have finished reading it. Second, the accused student has the right to express themselves when the teacher gives them the talking stick. At this point, the child who wrote the note listens without making any comments. The same applies to the other children in the class. If the situation can be resolved without having to find a solution, the teacher takes back the note and moves on to the next child; otherwise, the teacher allows the children who witnessed the situation to express themselves when they have their hand raised to ask for the talking stick. All the actors in the council search for a solution together until it suits the two children involved in the situation. – The teacher distributes the notes to the children who made calls for help. First, the children who wrote the notes read them at the teacher's invitation, who gives them the talking stick. The children who are not reading a note are silent and listen to their classmates. The children return the note to the teacher when they have finished reading it. The teacher reformulates the call for help. All the actors in the council look for a solution to help the child in difficulty. The discussion takes place using the talking stick. The teacher distributes it to give the floor. Children who do not have the stick raise their hand to ask for it or remain silent and listen to the proposals. Once the solution is found, the teacher writes it down in the logbook. – The teacher distributes the notes to the children who made apologies. The children who wrote the notes read them one by one at the teacher's invitation, who gives them the talking stick. The children who are not reading a note are silent and listen to their classmates. The children return the note and the talking stick to the teacher when they have finished reading it. The child to whom the message is addressed can express themselves if they wish by raising their hand to ask for the talking stick. – NB: If the values and guidelines are not respected, the teacher can remind the students at any time by referring to the values chart visible to the students. <p>I want to talk about...</p>	Notes placed in the box Talking stick
4 same	<ul style="list-style-type: none"> – The teacher reads the first point of the wall journal and invites the child who wrote it to explain their point by giving them the talking stick. Once this is done, the teacher asks for the opinions of the other students. Children who wish to express themselves raise their hand and wait to receive the talking stick. Children who do not have the talking stick listen to the proposals in silence and remain calm. Then, the search for a solution or the approval of the proposal is done when the majority of students agree. This is done in the form of a vote. The teacher announces the retained proposal, and the students raise their hand if they approve the proposal. The teacher notes the verdict in the logbook. If the proposal is approved, the teacher underlines its application as soon as the council ends; if the proposal is rejected, the teacher announces the resumption of the discussion at the next council and puts it on the next agenda. – The teacher moves on to the next point in the wall journal and applies the same procedure. 	Logbook
5 same	<p>How is the class doing?</p> <ul style="list-style-type: none"> – The teacher gives the talking stick to the child seated next to them, who says how they felt during the council. They can simply say a word (e.g., happy) or briefly explain their point (e.g., I am happy because no one got angry). Then, they pass the talking stick to the child seated next to them, who repeats the operation, and so on. During this time, all the children who do not have the talking stick remain silent and calmly listen to their classmates. All children must express themselves. – The teacher finally invites the children who wish to share a positive element about the class. The teacher gives the talking stick to the children with their hands raised. The other children listen calmly and silently to their classmates. 	Talking stick
6 same	<p>Closing the council</p> <ul style="list-style-type: none"> – The teacher thanks the students for their participation and announces that the council is over by saying, "I close the council." 	

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.cogdev.2026.101702](https://doi.org/10.1016/j.cogdev.2026.101702).

Data Availability

Data will be made available on request.

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