Chapter 7
Promoting Resilience Through Executive Function Training for Homeless and Highly Mobile Preschoolers

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Resilience is a dynamic, multifaceted, and inferential concept that refers generally to the capacity of a system for successful adaptation in the context of significant adversity or challenges. In human development, positive adaptation can be defined broadly in terms of function in many domains (e.g., doing well in all the ways expected for a person of a given age, culture, and time in history, including physical, mental, social, school, or work expectations) or more narrowly in a single domain (e.g., academic achievement or getting along with peers). In this chapter we describe a new intervention program designed to foster school readiness in homeless and highly mobile (HHM) children, with the goal of promoting their *academic resilience*. We hope to foster resilience in these children by promoting their executive function (EF) skills during the preschool period, which is believed to be an important window of opportunity for growth and change in the neurocognitive processes that support learning and school readiness.

Homelessness and residential instability in families with children living in poverty are issues of growing concern in the United States as well as many other countries of the world (Masten, 2012; Miller, 2011; National Research Council, 2010). Homelessness is a housing status variable associated with high levels of cumulative adversity in families, including extreme poverty, family violence, residential instability, and hunger, among other risks to health and development. Thus, it is not a surprise to find that HHM children have elevated risk for numerous problems in health and development, including school failure (Samuels, Shinn, & Buckner, 2010). Ideally, homelessness would be completely prevented. Instead, persistent poverty, even in wealthy countries such as the United States, and the recent global economic crisis, along with widespread shortages of affordable housing, have increased the

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problem of homelessness in families in recent years. During the 2010–2011 school year, the number of homeless students counted by the U.S. Department of Education rose above one million (National Center for Homeless Education, 2012).

Many urban school districts, including the districts near the University of Minnesota, have substantial numbers of children identified as HHM by government guidelines. Recent data clearly show significant achievement gaps between these children and other low-income children, as well as more advantaged children, across the school years (Masten, 2012). Many stakeholders, including parents, educators, policy makers, and eventually the young people themselves, are concerned about these gaps because of the limited opportunities (e.g., job prospects) associated with poor academic achievement. The future of these children, our communities, and society depends on the success of these children. Yet, it is challenging to promote school success in mobile or homeless students.

In this chapter, we describe the origins and evolution of a new preventative intervention program under development that targets executive function skills in very high-risk, HHM preschool children, with the goal of promoting academic resilience. In the first part of the chapter, we provide a brief overview of risk and resilience in HHM children, with a specific focus on academic skills. We also describe the literature implicating executive function (EF) skills as a promising intervention target, particularly during the preschool years. In the second part of the chapter, we describe the specific context and background for our project, which grew out of community–university partnerships focused on addressing the needs of homeless and similar high-risk, mobile children. In these first two sections, we delineate how our project was shaped both by research on risk and resilience in regard to EF and school success and by the local context and our experiences in the community.

In the third part of this chapter, we describe the "Ready? Set. Go!" (RSG) intervention as it was conceived initially and how it has evolved through a deliberately iterative process, by implementing small scale trials, evaluating results, and refining the program accordingly. We describe the theory of change that guided its development, the collaborative team that implemented the work, the components of the intervention under development, and progress to date. Subsequent sections outline the lessons learned through the iterative process and the challenges we faced along the way. In the concluding section we describe future plans.

Overview of Risk and Resilience in Homeless Children

The focus and design of our program was informed by the literature on homeless families and children, as well as the evidence of the role of EF in school readiness, both in general and specifically for HHM children. We targeted change in EF skills because there was good evidence that these skills are malleable. Their importance in school success and the fact that they can be increased through training make EF skills a promising intervention target.

Families and Homelessness

The number of children affected by poverty in the United States is staggering, with 13 million US children living in poverty at the time of the 2007 Census. Many of the most disadvantaged children are also faced with homelessness and high mobility as their families struggle to secure stable housing. At one time, homelessness was most typically associated with single adults who often had mental health or substance use problems. However, over the past quarter century the picture shifted due to changing housing policies and economic recession (Samuels et al., 2010). There was a 20 % increase in the number of homeless families from 2007 to 2010, according to the U.S. Department of Housing and Urban Development (HUD, 2010).

A recent statewide survey in Minnesota provides an in-depth look at this issue in Minnesota. The Amherst H. Wilder Foundation has conducted a statewide survey of homelessness in emergency shelters and on the streets on a single night every 3 years since 1985. Data from the 2012 survey indicates that families are the fastest growing segment of the homeless population, with their numbers tripling from 1991 to 2012 (Wilder Foundation, 2013). This 2012 survey found that approximately 3,900 children reside in emergency homeless shelters each night in Minnesota, totaling 14,120 whose families utilize these shelters per year. In fact, the majority of shelter residents (59 %) are minor children (Wilder Foundation, 2013).

Homelessness and Academic Achievement

Homeless and other highly mobile low-income students face myriad challenges to academic success including high academic mobility (e.g., switching schools in the middle of the school year), isolation from peers (e.g., moving too frequently to develop enduring peer relationships), fragmented services, and stigma attached to the issue of homelessness (Miller, 2011). These children often lack bonds with teachers, friends, relatives, and schools due to their high mobility (Rafferty, Shinn, & Weitzman, 2004). Moreover, the stress of homelessness on the whole family could affect the fundamental capacities for learning in children, including memory and concentration (Obradović et al., 2009).

Using data from students in a large, urban school district, investigators from our team in collaboration with district researchers have compared achievement test scores over time on a nationally standardized test across levels of socioeconomic risk. Risk was indexed by status as HHM or qualified for free/reduced meals (both by Federal guidelines) at any time during the period under study. Each year from third to eighth grade, students in the district are tested on the same test designed to assess growth over time in achievement. In two studies to date, HHM students were found to have significantly worse average reading and math achievement scores than other low-income students, who in turn scored much below the national averages on reading and math (Cutuli et al., 2013; Obradović et al., 2009). These gaps

were evident at the time of the first test administration in third grade and persisted or worsened. The pattern was congruent with a continuum of risk. The data also were alarming because of the high proportion of students who were identified cumulatively as HHM in this district, about 14 % in the most recent study (Cutuli et al., 2013). Additionally, results indicated that growth in math (but not reading) slowed in the year following identification as HHM, suggesting acute as well as chronic risk to learning (Cutuli et al., 2013). These data indicated that HHM students had the highest overall academic risk, significantly higher than their low-income but housed peers.

Academic Resilience in HHM Children

These gaps are concerning; however, there is another way to view the data that reveals a different story. One can examine individual students' performance over time instead of group average scores (see Cutuli et al., 2013). Individual growth curves in achievement scores reveal striking variability in the performance of HHM children. Although the average math and reading scores for HHM children were very low, a considerable portion (45 %) of individuals had scores within or above the average range on these tests (within a standard deviation of the national mean or better; Cutuli et al., 2013). These data suggest academic resilience for a substantial subgroup of HHM children, despite their adverse circumstances and challenges associated with homelessness. This variability could not be fully explained by student characteristics such as ethnicity, English language learning, school attendance, or special education status, although these variables were related to achievement. For example, HHM students have lower attendance, but attendance only explains a small proportion of the variability in the achievement among these students. There is good reason to believe that individual differences in EF may play a substantial role in this variability (e.g., Buckner, Mezzacappa, & Beardslee, 2003).

Executive Function and Academic Achievement

Executive function refers to a set of skills involved in the deliberate, top-down, goal-directed control of thought, action, and emotion (e.g., Carlson, Zelazo, & Faja, 2013). EF is often described as consisting of three distinct components including working memory, inhibitory control, and cognitive flexibility (e.g., Miyake et al., 2000). Working memory is the capacity to keep information in mind and manipulate that information. Inhibitory control refers to the ability to ignore distractors or inhibit an often expressed, relatively automatic response. Cognitive flexibility refers to the ability to consider information in various ways and the ability to switch between different rule sets or ways of thinking.

Importance of Executive Function for Academic Success

Individual differences in EF have been consistently associated with academic achievement (Blair, 2002; Buckner, 2003; Carlson et al., 2013), especially math and reading skills (e.g., Blair & Razza, 2007; Diamond, Barnett, Thomas, & Munro, 2007; McClelland et al., 2007). Children with more developed EF, measured in both behavioral assessments and through teacher and parent report, show better academic achievement than their peers with less sophisticated EF. A positive relationship between EF and academic achievement remains even when controlling for general intelligence (IQ test scores; Buckner et al., 2003; Masten et al., 2012). Individual differences in EF in childhood are predictive not only of academic achievement in childhood but also of more distal outcomes such as differences in cognitive skills in early adulthood (Eigsti et al., 2006).

The evidence linking EF to academic performance makes sense when one considers the applicability of these skills to the classroom environment. Behaviors that kindergarten teachers report as important for school success depend on good EF skills, including the ability to sit still, pay attention, and follow rules (Rimm-Kaufman, Storm, Sawyer, Pianta, & LaParo, 2006). It has been hypothesized that boosting a child's EF would help with classroom skills that depend on EF, including paying attention, remembering and following rules, learning from instruction, planning ahead, delaying gratification, ignoring distractions, and managing emotions (e.g., Blair, 2002; McClelland et al., 2007).

The Malleability of Executive Function

Fortunately, given its potential importance for academic achievement, an increasing number of studies indicate that EF is malleable through interventions, including EF training or practice and preschool curricula. While the potential to train EF presumably exists throughout development, the preschool period has been identified as a window of opportunity for change when there appears to be considerable plasticity in human brain development and function, due in large part to structural and functional changes occurring in the prefrontal cortex (PFC) during that window (e.g., Carlson et al., 2013; Diamond & Lee, 2011; Zelazo & Carlson, 2012). Improvements in EF have been documented following both lab-based training and classroom curricula focusing on EF. Rueda, Rothbart, McCandliss, Saccomanno, and Posner (2005) found that 5 days of lab-based attention training improved EF in 4- to 6-year-old children as evidenced both in behavioral measures of EF and in related neural changes when monitored during task performance. In a separate training study, preschoolers' working memory improved after 5 weeks of computerized working memory training in a lab setting compared to an active control group who played commercially available computer games (Thorell, Lindqvist, Bergman Nutley, Bohlin, & Klingberg, 2009). Espinet, Anderson, and Zealzo (2012) provided evidence that children's EF can be modified through even briefer exercises that

encourage children to reflect on more aspects of the context in which they were responding. These authors assigned children who failed a measure of EF (the Dimensional Change Card Sort) to one of the three conditions: an experimental condition that consisted of reflection training, and two control conditions consisting of minimal feedback training or mere practice. Children who received reflection training showed significant improvements in EF performance, unlike children in the two control conditions, and they also showed a more mature pattern of neural activity, as measured by electroencephalography (EEG).

In addition to these lab-based studies, EF training has also been studied outside the laboratory, most notably in classrooms using adapted, EF-focused curricula. Tools of the Mind (Diamond et al., 2007), Promoting Alternative Thinking Strategies (PATHS) (Riggs, Greenberg, Kusche, & Pentz, 2006), and the Chicago School Readiness Program (CSRP) (Raver et al., 2011) all show promise in improving students' EF. Tools of the Mind is a year-long preschool curriculum in which 40+ core activities are used to support and challenge EF throughout the day. When Tools of the Mind was tested in low-income, urban preschools, children receiving the Tools curriculum improved their performance on computerized measures of EF when compared to children receiving a standard literacy-based preschool curriculum (Diamond et al., 2007). PATHS is a curriculum add-on designed to train teachers to support children's self-control, help children recognize and manage emotions, and build children's interpersonal problem-solving skills. Second and third graders who received the PATHS curriculum showed larger inhibitory control gains throughout the school year than did children who received school as usual (Riggs et al., 2006). CSRP is a multicomponent intervention that trains teachers to utilize more effective classroom management strategies to help children better regulate behavior and emotions. When tested in low-income, Head Start-funded urban classrooms, CSRP was effective at improving preschoolers' EF and effortful control over the course of a school year (Raver et al., 2011).

Although EF training interventions have worked to improve low-income, disadvantaged students' EF, no intervention to date has been shown to work with HHM students at very high risk of academic difficulties. Due to the high mobility of this population, an effective intervention must be brief enough to be delivered before the family moves again, yet potent enough to induce meaningful, long-term change. HHM families are characterized by both frequent residential and academic mobility, with children oftentimes moving housing and schools throughout the year. Thus, a preschool curriculum designed to be delivered throughout the entire school year is not necessarily appropriate for HHM families. Our team is working to develop an intervention to fill that gap.

Parenting, EF, and School Success

Effective parenting also is associated with school success and self-regulation skills, including EF (Brody, Dorsey, Forehand, & Armistead, 2002; Eisenberg et al., 2005;

Herbers et al., 2011; Thompson & Raikes, 2007). Good parenting, which is one of the most widely reported protective influences in the literature on resilience in children (e.g., Luthar, 2006; Masten, 2007), may be particularly important for HHM children and similar high-risk children, who lack stability in other aspects of their lives (e.g., constantly shifting peer groups, academic environments, and neighborhoods due to frequent residential mobility). Indeed, Herbers (2011) found that EF mediated aspects of the relationship between parenting quality and academic functioning in young homeless children. Bernier and colleagues found that two specific aspects of parenting in infancy, maternal mind-mindedness (talking about a child's thoughts and feelings) and autonomy support (non-intrusive scaffolding during problem solving), predicted child EF at 2 years old, and again at 4 years, over and above child IQ, and parent–child attachment security (Bernier, Carlson, Deschênes, & Matte-Gagne, 2012; Bernier, Carlson, & Whipple, 2010). Scaffolding was also related to EF in another study examining low-SES preschoolers prone to behavior problems (Hughes & Ensor, 2007). Not only is parenting predictive of child EF, but also parents' own EF is predictive of their parenting, specifically to their scaffolding effectiveness (Hughes & Ensor, 2007). Given the important role parents play in children's developing EF, especially in HHM children for whom parents may be one of the few stable aspects in their daily lives, parent involvement should be considered a key component in efforts to foster EF in young children.

Evolution of the Research Program

For more than 20 years, one of our team leaders, Professor Ann Masten, has been engaged in research on risk and resilience in HHM children (Masten, Miliotis, Graham-Bermann, Ramirez, & Neemann, 1993; Masten et al., 2008). During that time, Masten worked closely with shelter providers and local school districts and other community partners to gather data that would be informative for practice and helpful to schools, while also trying to learn more about the nature of risk and resilience in these families. Basic research from this body of work has indicated that HHM children staying in shelters often have high cumulative risk levels, which are related to a variety of problems (e.g., Masten et al., 1993; Monn et al., 2013). Children in homeless families often have difficulties in academic achievement (Cutuli et al., 2013; Herber et al., 2012; Masten, 2012; Masten et al., 2008), behavior problems (Masten et al., 1993), compromised social functioning (Masten et al., 1993), and increased likelihood of asthma (Cutuli, Herbers, Rinaldi, Masten, & Oberg, 2010). At the same time, this team has also focused on resilience and factors associated with better adaptation among these children. They have found that child function and school adjustment are associated with cognitive skills, such as IQ and EF (Masten et al., 2012; Obradović, 2010), and effective parenting (Herbers et al., 2011; Miliotis, Sesma, & Masten, 1999).

With the new surge of homelessness that accompanied the Great Recession of 2007, Masten and her long-term collaborators decided to focus more of their

attention on developing strategies to improve school readiness in children entering kindergarten during or shortly after they were homeless. They continued with basic research aimed at a deeper understanding of the processes of risk and resilience in these families, while also shifting to focus more directly on developing and testing intervention strategies that were designed to promote school readiness in HHM children and similarly disadvantaged preschoolers.

In 2010, with support from a local funder, the group began a collaborative effort to boost executive function skills in rising kindergarteners residing with their families in an emergency homeless shelter in Minneapolis. The design team included shelter staff and teachers as well as a university faculty, early childhood teachers, and graduate students. The intervention was planned as a 3-week program for children attending the early childhood program at the shelter, timed to occur during the month before the children entered kindergarten, and designed to boost EF skills immediately prior to this critical transition.

This program, called "Ready? Set. Go!" (RSG), has been implemented yearly in August beginning in 2010, with support from a local foundation (Sauer Children's Renew Foundation). It is a small program that was forged by a team of community and university experts who brought different skills to the table: teachers and community staff with extensive experience working with homeless families; university lab school teachers with expertise on teacher training; researchers with extensive research experience and knowledge of risk, resilience, and EF in human development; and district researchers and social workers with access to important district data and expertise on the rights of, and national programs for, HHM students. The success of this small program and the enthusiasm of children and parents inspired our group to apply to the U.S. Department of Education's Institute of Education Sciences (IES) for funding to further develop the intervention. We expanded the goal to develop a program targeting EF skills in preschools with many homeless or highly mobile, disadvantaged children and redesigned the program for greater flexibility in terms of context, age, and timing. Since many preschools have mixed-age classrooms, we targeted children 3–5 years of age and designed a program that could be implemented within a single month any time of the year. The development and testing of RSG are fully collaborative in the spirit of what Masten (2011) has called translational synergy—designed and implemented in partnerships that are collaborative from the outset, thus eliminating the infamous translational gap in which it often takes many years for basic research to be applied to real-world settings. The program is theory-driven but also aimed to be practical and usable.

Description of the Intervention: Ready? Set. Go!

With funding from IES (Goal 2: Development), we have been developing a three-component intervention for preschool children designed to be suitable for highly mobile and disadvantaged children, but also with the flexibility to be applied in any preschool classroom. Our theory of change, described below, was based on

neurodevelopmental theory about the nature of EF development and training, informed by resilience science and preschool pedagogy. Funding from IES provided the opportunity to develop and refine our EF intervention through an iterative process of sequential, small scale trials and appropriate refinements. Each component could be designed, tested, and revised as we developed methods for evaluating changes in the children, parents, and classroom, teaching training, and fidelity of implementation (O'Donnell, 2008). During this process, our overall intervention shifted from initial pull-out training in which small groups of children were removed from the classroom for EF training, to a classroom-integrated strategy and teacher training model. These changes represent a move toward a more sustainable intervention model that would be practical for subsequent dissemination if the intervention proved successful.

Theory of Change

RSG's target of change is EF in high-risk preschoolers, with the goal of improving their early school success by improving the fundamental learning skills that depend on EF. As noted above, EF is important for school readiness and also malleable. Preschool appears to be a window of opportunity for altering EF, proximal to the beginning of school and also a period when there is rapid development of EF related to brain development (Zelazo & Carlson, 2012). Early childhood is also a period when quality preschool experiences yield a good return on the costs of intervention (Heckman, 2006; Reynolds, Temple, White, Ou, & Robertson, 2011). Building foundational competence in this window is believed to generate a positive cascade of achievement that carries over to school: competence begets competence (e.g., Heckman, 2006; Masten, 2006). By intervening prior to entry into kindergarten, we are able to both take advantage of a naturally occurring window of plasticity and potentially set in motion a positive cascade of effects that will proliferate throughout a child's academic years and beyond. Through the direct promotion of EF skills, we aimed to also indirectly promote emergent literacy as well as relationships with teachers and peers, giving children a better start on the road to school success at a critical juncture in their neurocognitive development.

As demonstrated in the literature summarized above, EF skills are amenable to training, especially during the preschool period. The change processes implicated in such training are based on a theory that changes in EF during childhood result from increases in children's tendency to engage in reflection (e.g., on the situation, on their own knowledge, on their goals) prior to responding, which allows them to formulate more complex plans, maintain these plans in working memory, and use them when solving problems (Zelazo, 2004; Zelazo et al., 2003). Neural correlates of EF, including regions of the PFC, develop as children engage these regions when reflecting prior to responding (Bunge & Zelazo, 2006). Indeed, according to this framework, reflection training promotes the formation of neural networks in the PFC and then exercises those networks to increase the ease with which and
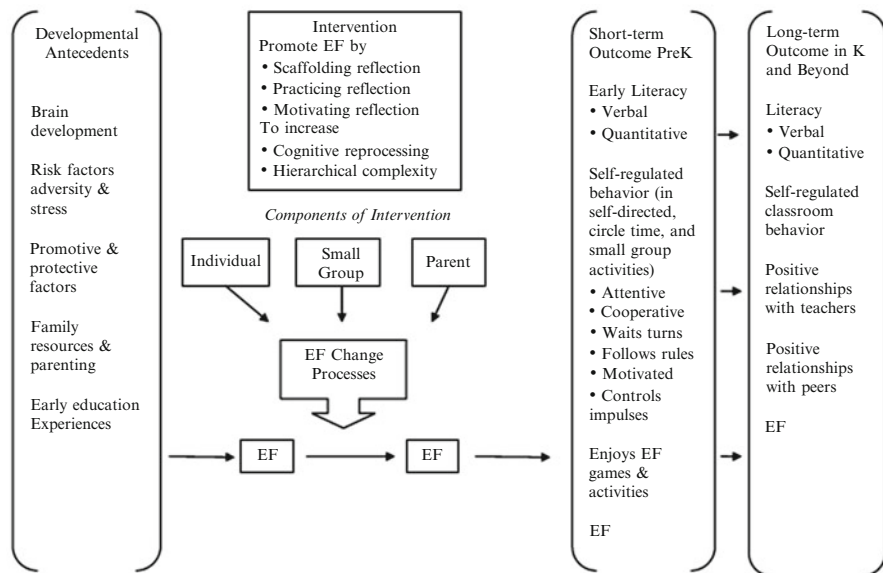
Fig. 7.1 Conceptual model of the Ready? Set. Go! intervention

likelihood that they will be used in the future. In reflection training, adults intentionally model and scaffold verbal reflection on rules and actions, for example, pointing out that the child is still thinking about the old rules and acting on them, and encouraging him or her to think about the new rules or the more appropriate course of action. See Fig. 7.1 for a visual depiction of our theory of change.

Three Components of the Intervention

RSG is a three-component intervention delivered over 3 weeks in a preschool or early childhood education setting. The three integrated components include teacher training and classroom curriculum, parent training and involvement, and child training and support at the individual level. Each component will be described in detail below.

Teacher Training and Classroom Curriculum

Prior to implementation of the intervention, lead teachers and teachers' aides as well as any site leadership or administrative staff interested and available attend a training session lasting approximately 5 h led by an expert teacher from our team. During the teacher training, the leader introduces the concept of EF, highlights

research on the importance of EF for school success, encourages teachers to brainstorm ways that EF is already involved in their classrooms, describes the intervention structure, introduces core EF curriculum activities, and demonstrates through video and live demonstration those EF curriculum activities to be used in the classroom during the duration of the intervention. Teacher engagement and active participation in the training are encouraged and promoted through inclusion of in-session brainstorming, eliciting teachers' own experiences, opinions, and ideas, and completion of in-session response activities in an accompanying handout. At the end of the formal presentation, teachers are given a chance to practice the EF activities for themselves while the leader is present to answer questions. Teacher's aides receive additional training on the individual support component of the intervention, as the aides are expected to provide that support. Similar to lead classroom teachers' practice with the core EF curriculum activities, teachers' aides are given the opportunity to practice individual support activities themselves and ask questions following formal instruction. At the conclusion of the training, teachers receive all necessary supplies for the upcoming intervention including props used for the activities, activity scripts and rules, fidelity tracking forms that teachers will complete during the course of the intervention, and an intervention manual including information about EF that was communicated during the training.

During implementation of the intervention, the expert teacher who led the training continues a relationship with the classroom teacher. The pair meets weekly to discuss progress and develop plans for the upcoming week. Initially, the meetings focus on making the classroom teacher more comfortable with the core EF activities himself or herself. In the second week, the meetings focus on the classroom teacher's use of language to support students' EF skills. Uses such as open-ended questions, providing opportunities for reflection throughout the day, and presenting opportunities for problem solving are emphasized. In the final week of the intervention, the expert teacher works to help the classroom teacher to both find places in the curriculum to insert the core EF curriculum activities developed by our team and apply an "EF lens" to the activities already occurring in the classroom and add an EF focus to already existing activities and routines where possible. The content of the weekly meetings is flexible and unfolds organically considering the current skill level of the classroom teacher, the relationship between the classroom teacher and the expert teacher, and the particular demands of the classroom in question. Apart from the weekly meetings, the expert teacher is always available for consultation during the course of the intervention should any concerns or questions from the classroom teacher arise.

A primary piece of the classroom curriculum component of the intervention is the utilization by the classroom teacher of the core EF curriculum activities developed by our team. Classroom teachers integrate these activities into their curriculum for use during large group or whole classroom time as well as during small group time. Each of the five core EF activities we have developed for use in the classroom emphasizes at least one aspect of EF: working memory, cognitive flexibility, and inhibitory control. For instance, BINGO is a group activity during which teachers

first invite children to sing the traditional BINGO song and then introduce the EF challenge of dropping certain letters from the song. When a letter is dropped, the children must clap in its place. When the teacher drops N, for instance, the children sing "B-I-*clap*-G-O." BINGO requires children to inhibit the learned response of singing every letter. The song also requires children's working memory to keep the rules in mind and use those rules to guide their singing. Freeze dance is a group activity in which children dance to music until it stops. As the music stops, the teacher holds up a card depicting a body position that the children are invited to imitate. Freeze dance requires full body inhibitory control as the children must stop dancing and hold their bodies in a given position, inhibiting their tendency to move. The activity can also be adapted to include a stronger working memory component by showing the children the body position card prior to the time that they must freeze thus requiring them to remember the position when the music stops.

In addition to the five core EF activities we have developed, classroom teachers are also encouraged to develop an "EF lens" through which to view their classroom and current curriculum. Classroom teachers work to adapt activities and routines already in place in their classrooms to have an EF focus. One example of a common preschool activity that has been adapted in this way is working with moldable clay. While using the clay, teachers can emphasize cognitive flexibility by encouraging the creation of different shapes and figures. Children might first create a ball and then create a larger, more complex structure, such as a smiley face where the ball functions as an eye and then a snow man where the ball functions as a body segment. Emphasizing EF is not restricted to formal lessons, but can be integrated into routines and transitions such as snack time or lining up to make transitions in and out of the classroom. During one developmental iteration, a classroom teacher used her line up time as an EF booster by taping shapes of many different colors on the floor where the children line up. Children were asked to line up by color one day and by shape the next day, requiring them to continually switch between rule sets depending on the teacher's instructions that day. In addition to adapting current activities and utilizing transition times, teachers are encouraged to infuse other practices associated with EF development throughout the day, including open-ended questions and reflection.

Teacher training is required in order to implement full intervention program. During the current developmental phase of the program, we conduct onsite trainings led by teachers and graduate students on our team. The training takes place over 2 days, with approximately 3 h of material presented per day. The first day of training focuses on introducing the idea of EF to teachers and reviewing research about its development, malleability, and importance for school success. The second day of training focuses on training teachers and teachers' aides with concrete activities to implement in the classroom or in an individual support setting as well as helping teachers develop an EF lens with which to view their curriculum to identify spots to boost EF. While the training is currently delivered onsite, our team is working to develop alternative flexible training modalities that include an off-site train the trainer model, delivery of online training and support, and a combination of these modalities to allow for eventual widespread dissemination of the program.

Parent Training and Engagement

Parent involvement in the intervention includes both formal and informal aspects. Informal involvement includes parents' vital role in assuring their child's attendance in preschool. At the most basic level, parents need to bring their children regularly and on time to the preschool for the children to benefit from attending and participating in the program. This basic task can be challenging for parents in crisis. More formally, parents of children in the intervention classroom are invited to attend weekly Family Fun Meetings over the 3-week course of the intervention. These meetings last approximately 2 h on a day and time that is convenient to the participating families and community site. The meetings have two components: a parent education portion and a parent–child interaction portion. The meetings begin with the parent education portion during which the parents gather while childcare for participating preschoolers and their siblings is provided in a separate room. During this portion of the meeting, experts lead the parent group through content including introduction of the concept of EF, emphasis of the importance of EF for academic success, introduction of the idea of brain plasticity and the importance of practice for building skills, discussion of the detrimental effects of stress on EF, and teaching of tangible, specific activities to parents to try at home with their children.

Following the parent education portion of the meeting, parents and children are reunited for the parent–child interaction portion. Here, parents are given an opportunity to practice the tangible, EF-boosting games and activities they learned during the parent education portion of the meeting with their child with the support of the family educators and classroom teachers. Parents introduce their children to the games they were taught earlier and play the games while experts walk around offering advice and answering questions as necessary.

Following the guided EF activity practice, children and parents are invited to participate in a musical experience adapted to emphasize EF from the internationally recognized Music Together® program. First offered to families in 1987, Music Together® pioneered the concept of research-based, developmentally appropriate early childhood (birth to age 8) music curriculum that consciously facilitates adult involvement. As part of our project, we have collaborated with Music Together® teachers to develop EF-specific enhancements for Music Together® songs as well as for common preschool songs.

Children and parents gather in a circle while a registered Music Together® teacher guides families through approximately eight songs with related movement and instrument activities. The music portion of the Family Fun Meetings serves a dual purpose. First, it provides a designated time for an enjoyable, positive interaction between parent and child. Such opportunities are often times hard to come by for low-income, highly mobile families as parents are frequently preoccupied with other pressing needs associated with poverty (e.g., working long hours, searching for gainful employment, securing basic resources such as food and shelter). Second, the songs parents and children are engaged in during the sessions help support EF through the already existing structure intrinsic to the songs and through more specific EF adaptations. Certain elements of the music curriculum support EF

inherently. For instance, many songs include a "pause moment" in the middle, an element that requires inhibitory control to master, as one must stop singing for the pause. Cognitive flexibility is emphasized when teachers provide children with the opportunity to come up with different ways to use their bodies or instruments such as rhythm sticks. Dropping certain words from songs while hearing them in one's mind requires inhibitory control in order to not sing that word as well as working memory to remember which words one should sing and which words are dropped. In addition to these already existing supports, we have added elements to the songs, which are specifically designed to use and challenge EF. For instance, in one song children are invited to move to the beat but to do the opposite of what the leader is doing. For example, if the leader puts his or her hands up, the children put their hands down. This activity requires inhibitory control to resist the impulse to imitate the leader as well as cognitive flexibility to be actively thinking of a different, opposite way one could act. Finally, we include a song requiring regular deep breathing, as well as a lullaby to foster awareness of the tools for self-regulation.

Due to the extreme poverty of the targeted population, parents participating in RSG are provided with various take-home materials to assure easy access to EF-boosting activities at home. Throughout the course of the program, parents are provided with game and activity materials, such as storybooks that promote EF and cards for EF games that parents learned during Family Fun Meetings, music CDs including EF songs made familiar during Family Fun Meetings and CD players, ideas for games and other opportunities to practice EF that do not require purchasing materials, and a tote to keep all their materials together or for parents to store the child's school records and artwork. The portable tote is particularly important for a mobile population to help reduce lost or misplaced pieces or important documents as the family moves from one location to another.

Individual Child Training and Support

The third component of RSG is the provision of individual support as needed for students struggling with EF skills in the classroom. The goal of providing such individualized support is to support the EF development of those children who lack the prerequisite EF skills required to benefit from the group activities. Children who receive individual support are identified through a combination of initial EF test scores and teacher recommendation. The individual support is delivered by a teacher's aide, while the lead teacher remains in the classroom with the remainder of the class. Aides work individually with each child for approximately 10 min each day the child attends preschool. Session occurs either outside the classroom, if a suitable alternate location is available (e.g., an unoccupied additional classroom in the building or unoccupied resource space such as a library), or in an isolated location within the classroom itself. If the individual support is provided within the larger classroom, the aides attempt to isolate themselves and the target child as much as possible from the other children and classroom activities to avoid distractions or interference from other students. Working individually with targeted children is

encouraged to ensure aides are able to provide intensive scaffolding to meet the child's current level of functioning at a level that would not be possible when working with a larger group of children. The content of the individual support sessions includes six activities in a 3-week rotation and additional relaxation/stress reduction activities. Activities include some from the larger classroom activities as well as some unique to the individual support repertoire. Importantly, each activity is leveled to allow for scaffolding for children who are struggling as well as challenge for children as they improve. Throughout the course of individual support, the aide begins at the easiest level of an activity and ascends through the levels as the child progresses in his or her understanding or skill.

The leveled approach is well represented in the Bear/Dragon activity, a scaffolded version of the traditional Simon Says game. In our version of Bear/Dragon, the aide introduces children to a "nice Dragon" puppet and a "mean Bear" puppet. Children are required to inhibit their actions when the "mean Bear" asks them to do something (e.g., "Touch your toes") but not when the "nice Dragon" asks. The easier levels of this activity include scaffolding strategies such as the teacher holding children's hands, and later having children sit on their own hands to help them inhibit responding to Bear's commands. Other scaffolding strategies include using "mean" and "nice" voices when controlling the puppets to remind children of the rules and having children do something in place of listening to "mean Bear's" commands (e.g., shaking their head no or shouting, "No way!" when Bear asks them to do something).

Lessons Learned from the Iterative Strategy

In the development of RSG to date, we have completed nine unique iterations of the intervention at four community sites including a preschool within an emergency homeless shelter, a community preschool serving disadvantaged, low-SES children, a university laboratory preschool, and a university research laboratory setting. Initial iterations implemented only certain components of the intervention while others were being refined, and later iterations integrated all three components into a cohesive program.

Several lessons have been learned in the course of the iterative development of RSG. The most salient lesson, discussed further below, is the importance of collaboration between all parties involved in the project including research staff, teachers and administrators at participating community sites, and parents. Another salient lesson from the iterative process of intervention development involved a shift in method of delivery of the classroom curriculum component. During initial iterations of RSG, the classroom curriculum component was delivered by an expert teacher from our team rather than by the classroom teacher from the participating community site. We began by placing a teacher from our team in the classroom to model effective EF teaching strategies to classroom teachers. It quickly became clear, however, that this model was not ideal for various reasons. First, we experienced understandable resistance to implementation of the intervention from classroom teachers

who wanted to maintain leadership of their own classrooms. Aside from creating issues for classroom teacher buy-in, the teacher-in-classroom model also did not provide the rich opportunities for modeling our team foresaw. Rather than being able to observe the expert teacher leading core EF activities, the classroom teacher was often otherwise preoccupied by the constant demands of the classroom (e.g., attending to children who needed assistance, leading a different lesson with a separate small group, handling administrative duties). Thus placing an expert teacher in the classroom served to free up the classroom teacher to accomplish other duties, but rarely afforded the opportunity of learning through observation. Lastly, we realized that the teacher-in-classroom model is impractical for an intervention that might be widely disseminated. It would not be possible to provide guest expert teachers to each classroom wishing to implement an innovative program like RSG. Teacher training, in contrast, has the possibility of being delivered remotely with the use of video conferencing or online tutorials. Switching to a teacher training model improved classroom teacher buy-in and fidelity of implementation, as the classroom teacher was able to maintain ownership over her classroom and curriculum. The transition also increased the potential for widespread dissemination of RSG following the demonstration of the intervention if it proves effective.

In examining data from the various iterations implemented thus far, it is clear that a variety of measurement techniques give a more complete picture of change. We began the project examining child behavioral measurements, parent report, and teacher report. The consideration of child behavioral data alone is inappropriate for an HHM population when one considers the chaos and day-to-day variability in children's lives and resultant inconsistency in their behavior. Measuring change by examining child behavioral measures alone risks missing meaningful change that is occurring if a child is assessed on a randomly occurring day in which he or she is particularly dysregulated. Thus, from the beginning, we have adopted a multi-informant approach, collecting data about the children from their parents and teachers in addition to the child behavioral measures of interest. After several iterations, we moved to include classroom observation as an additional measurement technique to capture the changes not only in individual children but also in the classroom itself that our team and community partners reported experiencing. We have plans to incorporate a further level of analysis by including biological measures in upcoming iterations.

An important consideration when working with HHM children is the difficulty of transitions. While transitions are somewhat dysregulating for all preschoolers, we observed that children experiencing high levels of stress, whose lives are characterized by residential or school mobility or both, had even greater difficulties with daily transitions. Over the iterative development process, our team has worked both to minimize transitions for children receiving the intervention and to build EF training activities around typical transition times (e.g., transition to snack time or playground). For example, working with a classroom teacher, we tried to limit the number of times a child is pulled from the classroom for any of our assessments by using the beginning and end of the school day for assessments. Thus, a child must only transition once (e.g., transition into the classroom in the morning) rather than

multiple times (e.g., transition into the classroom in the morning, then out of the classroom for assessment, then back into the classroom for the remainder of the day). Our team also collaborated with classroom teachers to identify times in the schedule that are best for transition of children into the classroom following morning assessment or out of the classroom for afternoon assessment. Important considerations include avoiding large group time to minimize distractions for other children and avoiding the target child missing any EF-focused curriculum activities. Lastly, to minimize the effect that transitions have on child behavior and performance during assessment sessions, we have included a warm-up and stress relaxation portion of the session that occurs before administration of any of our key behavioral measures. This warm-up helps to both familiarize the child with the assessor and reduce any ambient stress the child is experiencing that may affect his or her performance. In addition to minimizing transitions due to assessment, the curriculum includes minimal transitions in and out of the classroom during the school day and encourages engaging children in EF-boosting activities when those transitions must occur.

Related to the difficulty with transitions is the consideration of the current level of stress both children and their parents are experiencing. Homelessness and the associated demands to find stable housing, stable employment, and provide the food and material goods to meet their child's basic needs exert chronic high stress loads on HHM families. This stress often needs to be addressed for children and parents to be able to actively engage in the EF-focused portion of the intervention. RSG addresses children's stress levels by the inclusion of the warm-up and stress relaxation activities discussed above. Parents are given the opportunity to talk about their own stress and learn stress management techniques during the parent education portion of the Family Fun Meetings. During parent education sessions, we also discuss the importance of family routines, including bedtime routines, for helping children manage stress, and the role of adequate sleep for learning.

A final example of lessons gained through the iterative process of intervention development is the importance of flexibility in the program components to facilitate implementation at diverse community sites. Each site and even different classrooms within the same site have different needs, routines, issues, and expectations. Flexibility is built into RSG through provision of classroom EF activities as a menu, encouraging classroom teachers to add EF focus to activities already existing in their curriculum, and collaborating with community partners to identify appropriate times and locations for other components (i.e., parent involvement and individual support). While we currently provide classroom teachers with five core EF curriculum activities, RSG is not a full preschool curriculum requiring elimination of existing structure. No strict scripts or lessons are prescribed. Instead we encourage the organic inclusion of the core EF activities within the already existing classroom structure. In addition to the core EF activities, classroom teachers are allowed further flexibility with the emphasis of adoption of an "EF lens" through which to view their classrooms. Classroom teachers are then free to maintain ownership over their classrooms by developing new activities and adapting existing activities that work for their specific classroom and group of students. With the use of these principles, we have found that it is feasible to retain core theoretical elements of the

intervention (e.g., sharp focus on developing EF, encouragement of active reflection, inclusion of all three components of the intervention) while building in the flexibility necessary for widespread dissemination across sites likely to have diverse needs and circumstances.

Challenges

There are several challenges our team has encountered during the iterative development process. Some challenges we face are unique to working with an HHM population, such as the inherent chaos of the shelter environment and the chronic mobility of the families. Others are reminiscent of hurdles in the development and implementation of any intervention, such as the engagement of target families and the need for collaboration with community partners.

The largest challenge our team has had to contend with is the high mobility of the target population itself. Given that the intervention is delivered through the preschool classroom at the emergency shelter, children only receive the intervention when staying in the shelter. The average stay at the emergency shelter in which we have worked is 38 days. Thus, our intervention must be brief enough to be delivered within the average shelter stay of a family, yet potent enough to imbue meaningful change. In addition to the delivery of the intervention itself, our research team must also collect pre- and post-assessment data. Families commonly move out prior to our team conducting post-assessments. Even more common is that families have often moved by the time we would like to collect additional follow-up data, which is up to several months after the conclusion of the intervention to assess the longevity of the induced change. Thus, we are developing and testing a variety of strategies for following these mobile families.

A challenge not necessarily unique to an HHM population is the challenge of engaging families meaningfully with the program. In the course of any research or intervention project, implementers are likely to encounter some skepticism on the part of potential participants. The investigators' task is to demonstrate very quickly after meeting the families the benefit that the research will provide to families like theirs. The message about kindergarten readiness resonates well with parents of preschoolers, especially in the summer months prior to their child's entry into kindergarten. The legitimate framing of the intervention as a strengths-based program (e.g., "promoting EF development") rather than a deficit reducing program (e.g., "eliminating behavior problems") is also more readily accepted by families (Buckner, 2012).

Another set of challenges shared by many intervention researchers are those related to collaboration with community partners. In an intervention that is delivered through various different community sites, understanding each context and the diverse priorities and needs of each site is essential. Within each community site, many parties must be involved and committed to the project. One must not only involve classroom teachers but also other key staff who facilitate the effectiveness

of any program, including teacher's aides, food service staff, and others, as well as administrators at the site. Inherent in the iterative development process is the continual refinement of program components. Community partners must be kept abreast of any decisions and be on board in implementing these changes.

Importance of Collaboration

The complex nature of this project has required a wide range of skills and resources, beyond what any single individual or discipline could offer. Thus, the importance of collaboration in the success of this project cannot be overemphasized. Our team is made up of developmental psychologists, early childhood educators, preschool teachers, and leaders and staff from community sites. The cooperation of each of these individuals has resulted, we believe, in "translational synergy" (Masten, 2011), where the collaborative efforts of the team of researchers, community partners, and families have yielded an intervention design that is better overall than it would be if it were created in isolation in either a research setting or a community setting. We think that the combined expertise of the team (on EF, teaching, homelessness, and other key domains of knowledge) has produced a practical and evidence-informed intervention that children, teachers, and parents enjoy, with the potential of boosting EF skills in very disadvantaged, preschoolers.

The practical and creative research design is the result of the collective expertise of all the collaborators. The combined expertise on the cognitive neuroscience of EF, assessment of EF, learning in preschoolers, classroom management, and the development of competence in children at risk laid the foundation for an intervention with a strong theory of change, as well as real-world applicability. Shelter staff and the community advisory board, which included leadership from the participating sites, local shelters, and the school district, provided numerous insights and practical guidance on project design and implementation.

The intervention components of the project have benefited from collaboration across sites and disciplines as well. An expert preschool teacher along with early childhood educators at the University of Minnesota (U of MN) developed the curriculum and teacher training component. It has subsequently benefited from the feedback of preschool teachers who underwent the training and implemented the curriculum in a variety of settings, including the U of MN Laboratory School and community sites in Minneapolis. These teachers provided ideas for new EF-boosting activities and suggested improvements to the program during coaching meetings, in daily tracking forms, and in evaluations collected at the end of the program.

Under the guidance of lead researchers, graduate students at the Institute of Child Development (U of MN) developed both the parent education and one-on-one support components. In the most recent implementation of the parent education component, we trained the parent educator at the shelter to co-lead the Family Fun Meetings. Her knowledge of this population and her feedback about the content of the groups helped us improve this component to better meet the needs of these

families. Throughout the iterative process, the one-on-one component has been implemented in multiple settings by research assistants, student teachers, and teacher's aides. Each of these individuals provided us with a different perspective on the effectiveness and feasibility of this component and we arrived at our current form of the one-on-one component based on this rich feedback.

In addition to collaboration between professionals on the project, we have found collaboration of the project team with participating families to be invaluable. We hope that by requesting feedback from families we make it clear to parents that they have an important role in shaping and refining our project. We believe that acknowledging and engaging with parents as collaborative partners has increased parent involvement and attendance at groups and research sessions, in addition to improving the design of our intervention.

Ethical Considerations and Sociocultural Sensitivity

Our project targets a population living in challenging circumstances. The majority of families that participate in RSG are racial/ethnic minorities who live in poverty. Many are currently homeless or have been homeless in the past. Consequently, the ethical considerations of our project are multifaceted and its implementation requires a high level of sociocultural sensitivity. We followed principles and guidelines of our respective professional associations, drew on the considerable experience of all the collaborating professionals who work with such families, and also consulted often with the participating families through focus groups and feedback evaluations. Additionally, we consulted as needed with multicultural experts.

Members of our team have longstanding relationships with each other and community partners and extensive experience working as clinicians, researchers, educators, and service providers with disadvantaged and culturally diverse families. Our work has been informed by feedback from parents, focus group members, teachers, and our advisory group. We routinely hold design meetings with partners at community sites where we not only gather information about the real-world feasibility of implementation but also gain insight about the unique characteristics of the project's target population. Each of these individuals and groups have contributed to the development and implementation of an intervention research project that is deeply knowledgeable, respectful, and sensitive to the families and children we hope to engage in this project.

The APA Guidelines on Multicultural Education, Training, Research, Practice and Organizational Change for Psychologists (2003) encourage psychologists to learn about the social norms in a given culture prior to and throughout the implementation of a research project. Our team has benefited from the insight of multicultural staff who serve many roles in the project, including Family Fun Meeting leader, parent interviewer, child assessor, and in-classroom aide. In addition, we have held focus groups with parents at the shelter to determine the appropriateness of new measures and incentives, and we always request parent feedback about the

program after its completion. Through relationships with these families, we have gained insight into the needs and concerns of participating families and have established trust and credibility within the community, another indicator of an ethically sound, culturally sensitive project.

One of the hallmarks of ethical research is a proportional risk to benefit ratio for participants and the larger community (APA, 2002). We believe that the risks from participation in this intervention are minimal for families, and that there may be some benefits. We believe that it is particularly important that the communities who participate in a project like this one are also those that will benefit from the research. Our program is deliberately designed to help the communities in which we conduct our research, and the ultimate project goal is disseminating an effective program to similar groups in the future.

We also aim to provide immediate benefits to participating families. For example, parents may learn new strategies to help improve their children's EF skills and are given physical tools, such as EF-focused books, games, and CDs, to practice their new skills beyond the program's end date. The Family Fun Meetings provide parents and children the chance to simply have fun together, an opportunity that is often lost in the chaos of homelessness and poverty, and children have the chance to practice EF skills in a variety of supportive settings. Parents have indicated high levels of satisfaction with RSG components and overall iterations.

In addition to our goal of positive change in child EF and thereby school readiness, we also aim to have a positive impact on the families, teachers, and sites involved. The teachers and aides at community sites have received highly focused training on the benefits of strong EF and the ways to best support it in the preschool classroom. Descriptions of the intervention strategies and reports of the program results have also been shared at staff meetings so that staff not directly involved with the project could learn about EF. Staff at community sites have reported continued use of the tools and strategies learned during the program, an encouraging sign.

Another ethical challenge of the project was determining the appropriate incentive amounts for families living in poverty. The APA Ethical Principles of Psychologists and Code of Conduct (2010) states psychologists must avoid making "excessive or inappropriate financial or other inducements." Determining what qualifies as an excessive or inappropriate incentive is complex. Our research experience with families in the same situation, along with guidance from the University of Minnesota Institutional Review Board (IRB) and from parent focus groups, has helped us identify appropriate dollar amounts. All incentive amounts and changes to incentives throughout the iterative process have been approved by the IRB. Some families who learn about the study choose not to participate, which may indicate that the compensation amounts are not in the coercive range.

In accordance with the APA Ethical Principles of Psychologists and Code of Conduct (2010) on the use of assessments, we took the sociocultural background and education level of our participants into consideration when selecting measures. The majority of the questionnaires we use in parent interviews have been used successfully with homeless families in the past, and some were designed specifically for this purpose. Results from new measures are examined with possible limitations

in mind. We have also continued to refine our measures to be more appropriate for use with this population. To provide one example, interviewers noticed that many parents did not know the meaning of the word "essential," which was one of the choices on a Likert scale, so we changed the wording to "extremely important" to make it easier for parents to understand. We also took steps to ensure that parents feel respected and comfortable throughout their involvement in our project regardless of their education level, for example, by reading questionnaires aloud and ensuring that our consent form is concise and clear.

A more concrete outgrowth of our concern about the suitability and validity of measures for our research is the adaptation of two computerized measures of EF for use with children from more diverse backgrounds. It was clear from our early assessments that some of the most widely used measures of EF did not work especially well with highly disadvantaged children. Too many of the children failed "practice" trials or did not understand the instructions. For example, on the Flanker task, where the child is asked to feed the middle fish in an array, some children did not understand the concept of "middle." As a result, a team has worked to create downward extensions of two core tasks included in the NIH Toolbox, Flanker and the Dimensional Change Card Sort. This work has been supported in part by the National Children's Study as a formative project. These tasks are being validated not only through RSG use but also in collaboration with the school district (e.g., Anderson, Wenzel, Carlson, Zelazo, & Masten, 2013; Wenzel et al., 2013). The measures appear to be very promising, not only for assessing EF in young and more diverse children but also potentially for early childhood screening and assessment of change in intervention studies.

Conclusion and Future Directions

The goal of this translational research program is to promote early school success in very disadvantaged and mobile children. The RSG intervention was built around a theory of change focused on EF as a key set of protective processes for learning and school success. Self-regulation skills have been widely implicated as protective for high-risk children in resilience science (e.g., Masten et al., 2012). We hope to show that by changing EF and the skills that depend on EF, we can promote academic resilience in very high-risk preschoolers during a window of neural plasticity.

At this time, we are preparing to pilot test our refined, multicomponent intervention to determine whether it is ready for a full-fledged efficacy trial with randomized control classrooms. We will continue implementing the program in our shelter-based preschool site. In addition, we plan to implement the intervention in a new site to test all the refined training materials and components with new teachers. We are eager to learn if it shows promise. However, we also recognize that our intervention may not work as well as we hope or it may need further development before we conduct a randomized efficacy trial. Our goal was ambitious and there are formidable challenges for implementing preventative interventions with multiple-risk

families currently experiencing considerable adversity. In any event, we will continue toward our goal, learning from successes and failures. That is the nature of the iterative process for developing and improving any intervention. We also will continue with our basic research on the processes underlying risk and resilience in these children, and particularly the role of stress in the adaptive function of these families. If our intervention succeeds and we can show that RSG leads to change in EF which promotes school success, the research will be informative both for interventions to promote academic resilience and for resilience theory on promotive processes linked to the development of EF.

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