

Pakulak, E., Hampton Wray, A., Longoria, Z., Garcia Isaza, A., Stevens, C. Bell, T., Burlingame, S., Klein, S., Berlinski, S., Attanasio, O., & Neville, H. (2017). Cultural adaptation of a neurobiologically informed intervention in local and international contexts. In Kenneth R. Pugh, Peggy McCardle, & Annie Stutzman (Eds.), *New Directions in Peer Nomination Methodology. New Directions for Child and Adolescent Development*, 158, 81–92.

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## Cultural Adaptation of a Neurobiologically Informed Intervention in Local and International Contexts

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### **Abstract**

*The relationship between early adversity and numerous negative outcomes across the lifespan is evident in a wide range of societies and cultures (e.g., Pakulak, Stevens, & Neville, 2018). Among the most affected neural systems are those supporting attention, self-regulation, and stress regulation. As such, these systems represent targets for neurobiologically informed interventions addressing early adversity. In prior work with monolingual native English-speaking families, we showed that a two-generation intervention targeting these systems in families improves outcomes across multiple domains including child brain function for selective attention (for detail, see Neville et al., 2013). Here, we discuss the translation and cultural adaptation (CA) of this intervention in local and international contexts, which required systematic consideration of cultural differences that could affect program acceptability. First, we conducted a translation and CA of our program to serve Latino families in the United States using the Cultural Adaptation Process (CAP), a model that works closely with stakeholders in a systematic, iterative process. Second, to implement the adapted program in Medellín, Colombia, we conducted a subsequent adaptation for Colombian culture using the same CAP. Our experience underscores the importance of consideration of cultural differences and a systematic approach to adaptation before assessing the efficacy of neurobiologically informed interventions in different cultural contexts. © 2017 Wiley Periodicals, Inc.*

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**A**cross international boundaries, social inequality has profound impacts on outcomes related to learning and academic achievement, crime, and health and well-being, as well as economic consequences related to these disparities (e.g., Caspi et al., 2016; Pakulak et al., 2018). With levels of societal inequality rising in many countries (e.g., Hoffmann et al., 2016; Saez & Zucman, 2016), there is a pressing need for the development and assessment of evidence-based programs addressing inequality in different cultural contexts. Informed by basic research on neuroplasticity, we previously developed a two-generation intervention that was effective with monolingual native English-speaking families in the United States (Neville et al., 2013). To implement successful programs in broader contexts, it is necessary to systematically consider how cultural differences may affect program acceptability. Here we discuss the cultural adaptation of this intervention in both local and international contexts. By systematically considering cultural differences, this work lays the critical foundation for broader implementation and evaluation.

Relationships between early adversity and life outcomes have been documented across a striking range of measures (Ursache & Noble, 2016), and such gradient relationships are evident across an increasingly wide range of societies and cultures (Fernald, Kariger, Hidrobo, & Gertler, 2012; Rubio-Codina, Attanasio, Meghir, Varela, & Grantham-McGregor, 2015). Much progress is being made toward identifying the mechanisms that underlie the biological embedding of early adversity (Lipina & Posner, 2012; McEwen & Gianaros, 2010; Pakulak et al., 2018; Ursache & Noble, 2016). Environments associated with poverty are characterized by multiple stressors, and chronic exposure to stress early in development has profound effects on multiple systems regulated by the brain, in particular those supporting attention, self-regulation, and stress regulation (McEwen & Gianaros, 2010; Ursache & Noble, 2016). Alongside this vulnerability, there is also considerable evidence for resilience, as shown by the literature on the responsiveness of these systems to interventions or changes in the environment (e.g., Pakulak et al., 2018). As such, brain systems supporting these regulatory functions are foundational systems related to multiple outcomes. Thus, they represent targets for interventions informed by neurobiology that can potentially ameliorate the broad effects of early adversity and that may be relevant across different cultural contexts.

Previously, we developed, implemented, and assessed a novel, 8-week two-generation intervention (Parents and Children Making Connections—Highlighting Attention; PCMC-A) that has a positive impact on vulnerable systems supporting attention, self-regulation, and stress regulation in children and parents in the United States (Neville et al., 2013). PCMC-A targets these systems by training attention and self-regulation skills in children while simultaneously providing parents with strategies to reduce stress and support the development of language and self-regulation in

the home. The child component of PCMC-A includes a set of 20 small-group activities designed to address the overarching goals of increasing self-regulation of attention and emotion states by targeting specific aspects of attention, including vigilance, selective attention, and task switching. The parent component includes a scaffolded set of strategies addressing the overarching goals of (a) family stress regulation with consistency and predictability, planning, and problem-solving strategies; (b) contingency-based discipline; (c) parental responsiveness and language use with the child; and (d) facilitation of child attention through explicit instruction on the development of attention and links to child attention training exercises (for more detail, see Neville et al., 2013).

Because our prior study examined children who were monolingual speakers of English from lower socioeconomic status (SES) backgrounds in the United States, an important next step was broader implementation and assessment. Indeed, most evidence-based programs for families are developed and assessed with nonminority participants (Dumas, Arriaga, Begle, & Longoria, 2010), and research on the effectiveness of family-based interventions with underserved and diverse populations is relatively scarce (Mejia, Leijten, Lachman, & Parra-Cardona, 2016). Here, we describe the process by which we culturally adapted PCMC-A in local and international contexts, thereby providing the foundation for further empirical assessment.

## **Cultural Adaptation**

Some argue that adaptations might reduce fidelity to and the impact of the core ingredients of an intervention (for more complete discussion, see Mejia et al., 2016). However, to address broader implementation in different cultural contexts, it is necessary to systematically consider the potential impact of cultural differences that could affect the acceptability of the program. One primary approach to this is cultural adaptation (CA), defined as “the systematic modification of an evidence-based treatment to consider language, culture, and context in such a way that it is compatible with the client’s cultural patterns, meanings, and values” (Bernal, Jiménez-Chafey, & Domenech Rodríguez, 2009, p. 362). Some evidence suggests that CA can improve a range of outcomes. For example, recruitment and retention rates are up to 40% better for culturally adapted interventions compared to generic versions (Kumpfer & Alvarado, 2003; Reese & Vera, 2007). Using a CA framework can improve the relevance and acceptability of a program; help maintain fidelity and contribute to broader adoption, scale-up, and sustainability of evidence-based programs (Baumann et al., 2015; Cabassa & Baumann, 2013); and, as some evidence suggests, improve program effectiveness (Smith, Rodríguez, & Bernal, 2011).

Despite this, surprisingly few parent training programs have taken a CA approach, and there exists a great need for rigorous CA and assessment of family-based programs (Baumann et al., 2015). The use of a systematic

process model to guide the adaptation process can result in an adapted intervention that maintains a high degree of fidelity to core instructional components (Baumann et al., 2015; Domenech Rodríguez, Baumann, & Schwartz, 2011; Dumas et al., 2010; Mejia et al., 2016).

### **Local Adaptation: Oregon, United States**

Our first adaptation was implemented with Latino families in Oregon who speak primarily Spanish. Several factors drove our decision to employ the widely used Cultural Adaptation Process (CAP) model (Domenech Rodríguez & Wieling, 2004). The CAP model includes elements recognized as important in the adaptation process, such as working closely with the community to be served (Barrera, Castro, Strycker, & Toobert, 2013), and has been used successfully both within the United States (Domenech Rodríguez et al., 2011) and internationally (Baumann, Domenech Rodríguez, Amador, Forgatch, & Parra-Cardona, 2014) with a parent training program closely related theoretically and functionally to the parent component of PCMC-A. The three-phase CAP model emphasizes working closely with community stakeholders in a systematic, iterative process. Although the process was not linear, for clarity we present the process in linear fashion, following other adaptation descriptions (e.g., Domenech Rodríguez et al., 2011).

**First Phase.** In the CAP, working closely with the community to be served begins with an assessment of community needs and initiation of collaboration with community leaders. We worked with our longtime collaborators, Head Start of Lane County, to confirm sufficient interest in a two-generation program among the Latino families they serve. We also sought guidance from researchers with experience working with the local Latino community. This process was expanded with the hiring of a bilingual/bicultural interventionist with experience in CA who worked with our team to establish relationships with the broader local Latino community. Multiple meetings with local community groups provided valuable information regarding perceptions about scientific research in the Latino community, concerns and reasons for potential reluctance of local Latino families to participate in research, and potential adaptations that might address these concerns.

**Second Phase.** This phase focuses on the adaptation and translation process. In a focus group (FG) format, we received detailed feedback from local Latino community members, including Head Start parents, a university researcher with extensive experience working with Latino families, and a coordinator of college programs for Latino students. Participants completed questionnaires designed by our team targeting specific areas identified as potential adaptations and reviewed PCMC-A materials with our interventionists to identify and discuss additional potential adaptations. Simultaneously we conducted a rigorous translation of

all PCMC-A materials into Spanish, using multiple translators to prevent idiosyncratic translations, with back translation into English, reviewed by our interventionists as an additional check for accuracy. Preliminary success of the proposed adaptations was assessed in subsequent FG meetings in which members discussed the adaptations, making minor adjustments as necessary in an iterative process until the group agreed on a final version.

**Third Phase.** This phase focuses on adaptation fidelity and an iterative process of refinement. After integrating adaptations identified in earlier phases, we implemented the adapted intervention with two groups and solicited feedback in FGs from parents who received the intervention ( $N = 10$ ; resulting in one minor additional adaptation, discussed later). To assess fidelity, all differences between the adapted intervention and PCMC-A were systematically examined in a qualitative evaluation by the lead adaptationist/interventionist (Dumas et al., 2010); the adapted intervention maintained fidelity to PCMC-A, as no changes were made that affected the core instructional components. At the conclusion of this iterative process, the number of cultural adaptations made to each of the eight weekly parent instructional sessions ranged from two to eight [ $M = 4.87 (2.17)$ ], and the lead adaptationist/interventionist verified that none of these adaptations affected core components of the intervention. Several examples are presented next.

**Resulting Adaptations.** This iterative process resulted in adaptations to recruitment, assessment, and the curriculum of PCMC-A.

*Recruitment and Assessment.* Based on FG input in the second phase, we made several changes to our approach to recruiting families. One involved requesting that Head Start family advocates, who generally have established trusting relationships with families, make initial contact to invite eligible Latino families to family information nights. We also made changes to information nights, where we provided an overview of the project and opportunities for enrollment. Because FGs emphasized that Latino families are more hesitant to participate in research because of cultural and social factors, these changes primarily involved efforts to be clear about what participation, and specifically visits to our laboratory for testing, would entail. To avoid medical-sounding language, we described our laboratory as a “research center.” We emphasized that our method to study brain function, electroencephalography, did not enable us to listen to thoughts or to make medical diagnoses, and we brought more equipment to the meeting than in previous projects, giving parents more opportunity to touch and feel it to gain a clear understanding. We explained that bilingual children would be given a brief language dominance assessment and then tested in their dominant language to make their child more comfortable during testing. Finally, based on suggestions from FGs, we produced a professional video in Spanish clearly illustrating all aspects of lab testing, which we showed at information nights and made available on our website. It featured a Latina mother and child and portrayed every step in a visit to our laboratory;

parents said the video made them much more comfortable coming to the university for testing.

Because FG participants in the second phase felt Latino families would have confidentiality concerns, we obtained Certificates of Confidentiality, which allow researchers to refuse to disclose identifying participant characteristics in response to legal requests. We also added direct discussions about confidentiality during information nights to communicate clearly what we could and could not ensure.

Second-phase FG participants also recommended changes to assessment procedures. To make parents with literacy concerns more comfortable with questionnaire assessments, the written format was replaced by interview administration by bilingual/bicultural research assistants. Testing involved multiple laboratory visits on different days; to make parents more comfortable, we sought to schedule the same research assistants with families during each appointment.

*Intervention: General.* The iterative process in the second and third phases of the CAP model was successful in producing adaptations that made the intervention more culturally acceptable while not affecting core instructional components as assessed by our adaptation specialist/interventionist and trained PCMC-A interventionists. Input in the second phase informed several general changes, beginning with the name, which we changed to *Creando Conexiones: Familias Fuertes, Cerebros Fuertes* [Creating Connections: Strong Families, Strong Brains]. In addition, FGs in this phase felt that Latino families would benefit more from the small-group format with additional time to eat and socialize with other parents and the interventionists; a half hour for socialization was added to each meeting, with curriculum still delivered in a 2-hour period.

Another consideration in the second phase was that groups of Latino parents are likely to include parents with varying levels of education and/or literacy; several changes were made to address this. First, when possible, the number of words in curriculum materials for parents was minimized; e.g., for some role-play activities, scripts were minimized or removed and made optionally available. Second, for activities designed to encourage children to think and ask questions, more emphasis was put on the fact that it is normal for parents not to know the answer to every question and that parents can still praise the child's inquisitiveness and find answers to questions they don't know. Finally, to address concerns that some parents may struggle with the idea of "teaching" their children, especially when activities involve reading and/or vocabulary, more emphasis was placed on alternative positive teaching activities such as telling stories or playing "make believe" with children.

*Intervention: Specific Examples.* Specific adaptations identified in phases two and three involved adjustments in framing to make strategies more culturally appropriate or relevant. One strategy involves increasing awareness of "meaningless questions," in which the child's answer does not

matter (e.g., “Are you ready for bed?” when it is bedtime). In PCMC-A, to help parents understand how it feels to get asked a meaningless question we had them imagine how they would feel if they declined a friend’s offer of coffee and then the friend insisted on serving them coffee. However, FGs felt that Latino parents would not identify with this example, as it would be considered culturally rude not to accept food or drink at a friend’s house. Therefore we modified the example to take place in a restaurant where a waiter insisted on serving coffee, thus conveying the same information in a more culturally relevant manner.

Another example concerns strategies that encourage parents to use specific praise. Although most PCMC-A examples focused on praising children for aspects of independence, FGs in the second phase felt that examples praising actions more relevant to Latino values would be more culturally appropriate. We added examples that involved praising actions that show respect (i.e., *respeto*), promote family ties, and demonstrate loyalty to the family (i.e., *familismo*).

Feedback from parents who received the adapted intervention, discussed in the third phase, was predominantly positive. The only additional minor adaptation involved the explanation of time-outs, which are taught in PCMC-A as opportunities for children to calm their bodies and brains when needed. Parents felt that the time-out strategy was not effective as a punishment because their children occasionally desired a time-out. The explanation was subsequently reframed to emphasize that time-outs, whether child or parent directed, give children an opportunity to calm themselves and that they help children learn *respeto* in ways that avoid criticism.

### **International Adaptation: Medellín, Antioquia, Colombia**

Our second adaptation took place in an international setting, working with Spanish-speaking families in a different cultural context. As part of research on evidence-based interventions targeting early childhood development in Colombia (e.g., Attanasio et al., 2014), the opportunity arose to implement and assess our program in Medellín, Antioquia, Colombia. It is especially important to assess the fit of an intervention to the target population when transporting an intervention to different countries (Baumann et al., 2014). Although the local adaptation described previously provided an important foundation, several additional challenges were presented by differences in both culture and environment (i.e., Medellín is more urban than our community in Oregon). These challenges included differences in primary caregiver roles, differences in everyday life that required different metaphors or examples, and differences in parenting practices (e.g., less familiarity with time-out strategies to deal with child behavior).

**First Phase.** With our collaborators in Colombia, we identified local partners at the preschool Fundación Ximena Rico Llano who confirmed interest from local families.

**Second Phase.** With the exception of the training manual, extensive translation of materials was unnecessary, though we were mindful of differences between U.S./Mexican and Colombian Spanish during the adaptation process and made minor language adaptations. We conducted two FGs at the preschool, with parents ( $N = 22$ ) and teachers ( $N = 8$ ), respectively. Participants received an abbreviated version of the *Creando Conexiones* (CC) curriculum and provided feedback on adaptations for the Colombian context. All FG members were excited about the research presented and thought the core curriculum of CC was compatible with their own goals and those of the preschool.

**Third Phase.** Adaptations identified in the FG stage were integrated into the CC curriculum by our Colombian specialist and our adaptation specialist. We then conducted a small-scale pilot in which the adapted curriculum was delivered by Colombian preschool staff trained in the program to local families who volunteered to participate ( $N = 12$ ). Fidelity for each session was remotely monitored in real time via Skype from Oregon by our adaptation specialist/interventionist, who gave feedback as necessary in weekly follow-up meetings. These qualitative fidelity assessments confirmed high fidelity of implementation; it was important to demonstrate that it could be delivered by interventionists socialized in Colombian culture. Differences between CC and the Colombian adaptation were also examined in a qualitative evaluation by the lead adaptationist/interventionist that confirmed that the adapted intervention maintained fidelity to the core instructional components of PCMC-A/CC. The number of cultural adaptations made after this iterative process to each of the eight weekly parent instructional sessions was lower than that for the U.S. adaptation, ranging from 0 to 4 ( $M = 1.5$  [ $SD = 1.51$ ]); several examples are presented in the next section.

Although no outcome data were acquired in the pilot, several metrics illustrate the overall success of the pilot study. Parent attendance was high, with 10 out of 12 parents attending at least seven of the eight sessions. Parents were given a questionnaire assessment and reported high levels of satisfaction with the program, suitability of adaptations, and use of strategies. Specifically, 100% of families reported that they were satisfied with the program, expected positive results in their homes, and would recommend the program to friends; 90% reported improvements in their child's behavior over the course of the pilot study; 80% reported increased confidence in managing problem behaviors in the home. Based on results from this pilot study, no further adaptations were made.

**Resulting Adaptations.** Adaptations for recruitment and assessment were discussed and will be implemented in a large-scale study. Here we focus on curriculum adaptations.

*Intervention: General.* The primary adaptation for Colombian culture involved the overarching metaphor used to convey respect for parenting practices inherited from parents and other family members. In

PCMC-A/CC, this metaphor is a car, and intergenerational parenting practices are described as being akin to a car that might be inherited. As one might be pleased overall with an inherited car, one still might seek to make small improvements, such as new tires; similarly, a parent might be pleased overall with inherited parenting practices but still seek improvements by adding “new tools to the parenting toolbox.” Colombian FGs immediately identified this as problematic because most families from lower SES backgrounds in Medellín do not own cars, but FGs brainstormed numerous promising adaptations. We ultimately adopted the metaphor of a family recipe, which is similarly useful (i.e., one might like a family recipe but still seek to make minor improvements) and was well received in the pilot study and thus retained.

Other general adaptations related to aspects of everyday life that differ for families in Medellín. One example in PCMC-A/CC describes a family going out to a restaurant; as families from lower SES backgrounds in Medellín rarely go to restaurants, the example was modified to focus on other family activities such as going to the park. Another example describing a family going to a supermarket had to be modified because FGs reported that families in Medellín typically did not go to supermarkets; the adapted example involved situations in which families went to the city center to run errands. Finally, FGs noted that it is common for grandmothers to be primary caregivers, as mothers and fathers often have busy work schedules; to capture this and avoid the gender specificity of *padres* [parents/fathers], in the adapted materials caregivers were referred to as *MPA*, short for *madre, padre, y acudiente* [mother, father, and guardian].

FGs were particularly interested in evidence concerning adult stress regulation and corporal punishment, including alternative strategies. In the adapted curriculum, when parents inquire about corporal punishment we emphasize that other strategies, such as time-out, are equally or more effective and may also provide an opportunity for the parent to manage stress and keep the parent–child relationship positive.

*Intervention: Specific Examples.* As with CC, most adaptations for Colombia involved minor adjustments to make the curriculum more culturally appropriate. One specific example involved an activity called “sink or swim,” which in CC takes place in a bathtub. Because bathtubs are rare in Colombian residences, the activity was modified to be done in a sink or bucket. Several word changes were also made. For example, FGs recommended changing the word for a temper tantrum, *berrinche*, to *pataleta* and the word for punishment from *castigo* to *sanción* for Colombian families.

## Conclusion

Rising levels of inequality and the profound effects of early adversity underscore the importance of evidence-based approaches that can be implemented in different cultural contexts. The increasing portability of

methodologies that can measure neurobiological mechanisms in a wider range of contexts makes it possible to more rigorously assess mechanisms of change in interventions in different cultural contexts. However, accurate assessment of an intervention requires rigorous implementation, and systematic considerations of the potential impact of cultural differences on program acceptability can improve implementation and other outcomes. Thus, we illustrate that a neurobiologically informed intervention can be adapted for local or international cultural contexts while maintaining a high degree of fidelity to core curriculum components. By detailing this process and highlighting specific changes, we hope to emphasize the importance of careful cultural adaptation. Data from a randomized controlled trial of CC are currently being analyzed, and plans for a similar project in Medellín are ongoing.

## Acknowledgments

We thank Head Start of Lane County and Fundación Ximena Rico Llano for their support. This research was made possible by U.S. Department of Education/Institute of Education Sciences Grant R305A110398 (to H.N./E.P) and Inter-American Development Bank Grant RG-K1234 (to O.A./H.N.).

## References

- Attanasio, O. P., Fernández, C., Fitzsimons, E. O., Grantham-McGregor, S. M., Meghir, C., & Rubio-Codina, M. (2014). Using the infrastructure of a conditional cash transfer program to deliver a scalable integrated early child development program in Colombia: Cluster randomized controlled trial. *BMJ*, *349*, g5785.
- Barrera, M., Jr., Castro, F. G., Strycker, L. A., & Toobert, D. J. (2013). Cultural adaptations of behavioral health interventions: A progress report. *Journal of Consulting and Clinical Psychology*, *81*(2), 196–205.
- Baumann, A. A., Domenech Rodríguez, M. M., Amador, N. G., Forgatch, M. S., & Parra-Cardona, J. R. (2014). Parent Management Training-Oregon Model (PMTO™) in Mexico City: Integrating cultural adaptation activities in an implementation model. *Clinical Psychology: Science and Practice*, *21*(1), 32–47.
- Baumann, A. A., Powell, B. J., Kohl, P. L., Tabak, R. G., Penalba, V., Proctor, E. K., ... Cabassa, L. J. (2015). Cultural adaptation and implementation of evidence-based parent-training: A systematic review and critique of guiding evidence. *Children and Youth Services Review*, *53*, 113–120.
- Bernal, G., Jiménez-Chafey, M. I., & Domenech Rodríguez, M. M. (2009). Cultural adaptation of treatments: A resource for considering culture in evidence-based practice. *Professional Psychology: Research and Practice*, *40*(4), 361–368.
- Cabassa, L. J., & Baumann, A. A. (2013). A two-way street: Bridging implementation science and cultural adaptations of mental health treatments. *Implementation Science*, *8*(1), 90.
- Caspi, A., Houts, R. M., Belsky, D. W., Harrington, H., Hogan, S., Ramrakha, S., ... Moffitt, T. E. (2016). Childhood forecasting of a small segment of the population with large economic burden. *Nature Human Behaviour*, *1*, 0005.

- Domenech Rodriguez, M. M. D., Baumann, A. A., & Schwartz, A. L. (2011). Cultural adaptation of an evidence based intervention: From theory to practice in a Latino/a community context. *American Journal of Community Psychology*, *47*(1–2), 170–186.
- Domenech Rodriguez, M. M., & Wieling, E. (2004). Developing culturally appropriate, evidence-based treatments for interventions with ethnic minority populations. In M. Rastogi & E. Wieling (Eds.), *Voices of color: First-person accounts of ethnic minority therapists* (pp. 313–331). Thousand Oaks, CA: Sage.
- Dumas, J. E., Arriaga, X., Begle, A. M., & Longoria, Z. (2010). “When will your program be available in Spanish?” Adapting an early parenting intervention for Latino families. *Cognitive and Behavioral Practice*, *17*(2), 176–187.
- Fernald, L. C., Kariger, P., Hidrobo, M., & Gertler, P. J. (2012). Socioeconomic gradients in child development in very young children: Evidence from India, Indonesia, Peru, and Senegal. *Proceedings of the National Academy of Sciences*, *109*(Suppl. 2), 17273–17280.
- Hoffmann, R., Hu, Y., De Gelder, R., Menvielle, G., Bopp, M., & Mackenbach, J. P. (2016). The impact of increasing income inequalities on educational inequalities in mortality—An analysis of six European countries. *International Journal for Equity in Health*, *15*(1), 103.
- Kumpfer, K. L., & Alvarado, R. (2003). Family-strengthening approaches for the prevention of youth problem behaviors. *American Psychologist*, *58*(6–7), 457–465. <https://doi.org/10.1037/0003-066x.58.6-7.457>
- Lipina, S. J., & Posner, M. I. (2012). The impact of poverty on the development of brain networks. *Frontiers in Human Neuroscience*, *6*, 238.
- McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences*, *1186*(1), 190–222. <https://doi.org/10.1111/j.1749-6632.2009.05331.x>
- Mejia, A., Leijten, P., Lachman, J. M., & Parra-Cardona, J. R. (2016). Different strokes for different folks? Contrasting approaches to cultural adaptation of parenting interventions. *Prevention Science*, 1–10.
- Neville, H. J., Stevens, C., Pakulak, E., Bell, T. A., Fanning, J., Klein, S., & Isbell, E. (2013). Family-based training program improves brain function, cognition, and behavior in lower socioeconomic status preschoolers. *Proceedings of the National Academy of Sciences*, *110*(29), 12138–12143.
- Pakulak, E., Stevens, C., & Neville, H. (2018). Neuro-, cardio-, and immunoplasticity: Effects of early adversity. *Annual Review of Psychology*, *69*.
- Reese, L. E., & Vera, E. M. (2007). Culturally relevant prevention: The scientific and practical considerations of community-based programs. *Counseling Psychologist*, *35*(6), 763–778. <https://doi.org/10.1177/0011000007304588>
- Rubio-Codina, M., Attanasio, O., Meghir, C., Varela, N., & Grantham-McGregor, S. (2015). The socioeconomic gradient of child development: Cross-sectional evidence from children 6–42 months in Bogota. *Journal of Human Resources*, *50*(2), 464–483.
- Saez, E., & Zucman, G. (2016). Wealth inequality in the United States since 1913: Evidence from capitalized income tax data. *Quarterly Journal of Economics*, *131*(2), 519–578.
- Smith, T. B., Rodríguez, M. D., & Bernal, G. (2011). Culture. *Journal of Clinical Psychology*, *67*(2), 166–175. <https://doi.org/10.1002/jclp.20757>
- Ursache, A., & Noble, K. G. (2016). Neurocognitive development in socioeconomic context: Multiple mechanisms and implications for measuring socioeconomic status. *Psychophysiology*, *53*(1), 71–82.

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