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The Promise of Prevention Science for Addressing Intergenerational Poverty

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This article reviews research suggesting that the prevention of intergenerational poverty will be enhanced if we add evidence-based family and school prevention programs to address the adverse social environments that often accompany poverty. Government policies such as the Earned Income Tax Credit can reduce family poverty, but simply improving the economic stability of the family will not necessarily prevent the development of child and adolescent problems such as academic failure, antisocial behavior, drug abuse, and depression, all of which can undermine future economic wellbeing. The authors briefly review the evidence linking family poverty to adverse social environments, which can have deleterious effects on children's behavioral, emotional, cognitive, and neurophysiological development. They then document the value of evidence-based family- and school-based prevention programs in effectively addressing these behavioral, emotional, cognitive, and neurophysiological factors that can put children at risk for continued poverty in adulthood. They also describe 3 family-based prevention programs that have been found to have a direct effect on families' future economic wellbeing. The evidence indicates that widely disseminating effective and efficient family- and school-based prevention programs can help to address both poverty itself and the effects of adverse social environments, making future poverty less likely. The authors conclude with specific recommendations for federal and state policymakers, researchers, and practitioners.

Keywords: prevention science, intergenerational poverty, family, school

According to the U.S. Census Bureau, 46.7 million Americans were living in poverty in 2014 (DeNavas-Walt & Proctor, 2015). Although poverty rates have declined slightly in recent years, about 21% of U.S. children and adolescents (up to the age of 18) still live in poverty (Jiang, Ekono, & Skinner, 2016). The figures are even more dramatic for minority children; in recent years, the poverty rates for White children have varied between 10% and 15%, but rates for Black and Hispanic children have ranged from 25% to 50% (Shanks & Danziger, 2010). A child who spends half or more of their childhood in poverty has a more than a 40% chance of living in poverty at age 35 (Fass, Dinan, & Aratani, 2009), and this lack of social mobility has become even more entrenched in recent years (Carr & Wiemers, 2016; Putnam, 2015).

The Impact of Poverty on Health and Development

Figure 1 articulates our model of the relationships that undergird intergenerational poverty. As detailed below, family poverty makes stressful social relationships more likely, and such adverse social environments contribute to behavioral, emotional, cognitive, and neurophysiological problems in childhood and adolescence, all of which are key risk factors for continued poverty in adulthood.

The Impact of Poverty and Adverse Social Environments on Behavioral and Emotional Problems

Poverty is a known risk factor for a variety of negative behavioral and emotional outcomes for children and adolescents, including academic failure, alcoholism, antisocial behavior, depression, drug use, and teenage pregnancy (Compton, Thomas, Stinson, & Grant, 2007; Ferguson, Bovaird, & Mueller, 2007; Harding, 2003; Valdez, Kaplan, & Curtis Jr., 2007). The effect of poverty on these outcomes appears to be mediated to a great extent by adverse social environments, particularly in the family (Evans, 2004; Van Ryzin, Kumpfer, Fosco, & Greenberg, 2016). Specifically, families that are living in poverty are more likely to have social interactions that are marked by high levels of conflict in which family members use aversive behavior to influence one another (Bank, Forgatch, Patterson, & Fetrow, 1993; Dishion & Snyder, 2016). When parents acquiesce in the face of highly negative, aversive family exchanges, it reinforces noncompliant child behavior (Patterson, Reid, & Dishion, 1992). In other words, children learn to escalate conflict to reduce parents' efforts to set limits on

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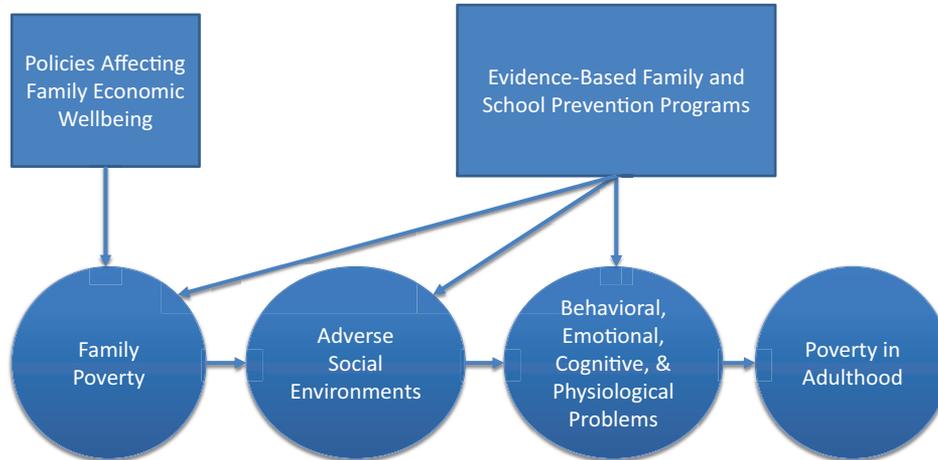


Figure 1. Proposed model. See the online article for the color version of this figure.

their behavior. Over time, parents' gradually withdraw from monitoring their children's behavior, thereby allowing opportunities for the child to engage in antisocial behavior and become involved with deviant peers, who further promote antisocial behavior and drug use (Dishion & Patterson, 2006; Van Ryzin & Dishion, 2014; Van Ryzin & Leve, 2012). Longitudinal studies of families have demonstrated that coercive and conflictual family processes contribute to the development of antisocial behavior (Van Ryzin & Dishion, 2012), substance use (Biglan, Duncan, Ary, & Smolkowski, 1995; Van Ryzin, Fosco, & Dishion, 2012), violence (Van Ryzin & Dishion, 2013), high risk sexual behavior (Van Ryzin, Johnson, Leve, & Kim, 2011), and depression (Compton, Snyder, Schrepferman, Bank, & Shortt, 2003).

Other aspects of the family, such as parental neglect and maltreatment, can also influence child outcomes later in life. For example, adults who have multiple adverse experiences in childhood, such as psychological, physical, or sexual abuse, emotional or physical neglect, or family dysfunction (e.g., parental problems with alcohol or drug abuse or mental illness) have been found to have significantly higher rates of a wide variety of behavioral, emotional, and even physical health problems (Anda et al., 2006; Repetti, Taylor, & Seeman, 2002; Szilagy & Halfon, 2015). Notably, poverty has been linked to a greater likelihood of children experiencing abuse or neglect (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007) and a greater likelihood of being placed in foster care (McGuinness & Schneider, 2007).

The Impact of Poverty and Adverse Social Environments on Cognition

The findings regarding child behavioral and emotional problems are consistent with a burgeoning body of new research that is establishing the effects of poverty and adverse social environments on neural development in ways that impact cognitive abilities (Willner, Gatzke-Kopp, Bierman, Greenberg, & Segalowitz, 2015). Specifically, poverty and adverse social environments have been found to have a direct impact on the development of the brain; in particular, connections between the front of the brain (e.g., prefrontal cortex) and structures in lower regions (e.g.,

amygdala, striatum, anterior cingulate) are likely not to develop as fully or function as effectively (McEwen & Morrison, 2013; Shonkoff, 2012). For example, research consistently finds a relationship between socioeconomic status (SES) and various facets of neurodevelopment, including executive cognitive functioning and structural and functional integrity of brain regions (Hair, Hanson, Wolfe, & Pollak, 2015; Willner et al., 2015). When children chronically experience psychosocial stressors such as family dysfunction, it undermines development of these neural systems (Glaser, Van Os, Portegijs, & Myin-Germeys, 2000; McCrory, De Brito, & Viding, 2010). Insecure attachment in childhood, which arises from inadequate caregiving, is associated with alterations in brain development and neurophysiological stress responses that manifest as long-term deficits in social responsiveness, attention, and other self-regulatory functions that would otherwise enhance resilience and reduce risk for behavioral and emotional problems (Anisman, Griffiths, Matheson, Ravindran, & Merali, 2001; Lupien, McEwen, Gunnar, & Heim, 2009). Poverty has also been found to have negative effects on IQ, vocabulary, memory, and problem-solving skills (Blair & Diamond, 2008; Caughy & O'Campo, 2006; Davis-Kean, 2005; Duncan, Brooks-Gunn, & Klebanov, 1994; Guo & Harris, 2000; Korenman, Miller, & Sjaastad, 1995; Najman et al., 2009; Wood, 2003). As with research on behavioral health, many of these studies (e.g., Davis-Kean, 2005; Fishbein et al., 2017; Guo & Harris, 2000; Korenman et al., 1995) indicate that parenting and the home environment account for a great deal of variance in these outcomes, often more than income levels and related effects of poverty (e.g., low birth weight, lead absorption, poor nutrition).

The Impact of Poverty and Adverse Social Environments on Neurophysiology

Significant social adversity in childhood and adolescence can also confer lifelong biological effects that contribute to ongoing poverty (Shonkoff et al., 2012). Research has found that the family environment modulates the functioning of biological systems, particularly the human stress response system, and the early overactivation of this system in the context of chronic adversity leads

to alterations in functioning (Korte, Koolhaas, Wingfield, & McEwen, 2005; McEwen, 2005). Specifically, early exposure to excessive stress can oversensitize the human stress-response system, leading to chronic “wear and tear” effects on multiple organ systems, including the brain. This stress-induced burden on the body has been referred to as “allostatic load,” and research has linked allostatic load to increased risk for cardiovascular disease, inflammation, impaired immunity, atherosclerosis, obesity, and mood disorders such as depression (Danese & McEwen, 2012; Juster, McEwen, & Lupien, 2010; McEwen, 2003; Ursache, Noble, & Blair, 2015). Thus, stressful or adverse childhood experiences can lead to enduring changes in biological systems that render individuals more vulnerable to serious, costly, and potentially debilitating health problems in adulthood. Interestingly, research also finds that maternal nurturance can attenuate the link between early childhood disadvantage and later metabolic syndrome, which is a precursor to health conditions such as diabetes, heart disease, and stroke (Miller et al., 2011). Researchers found that attaining economic security later in life did not completely attenuate this link between early poverty and health problems, suggesting that poverty and adverse social experiences early in life made the strongest contribution to negative long-term health effects.

Schools and Adverse Social Experiences

Although the family is central to child development, schools can also serve as sources of either risk or protection. For example, students who perceive their school environments to be less supportive, or offer fewer opportunities for positive interactions with teachers or other students, are at greater risk for behavioral and psychological problems (Eccles, Lord, & Midgley, 1991; Roeser, Eccles, & Strobel, 1998). In contrast, students who perceive their educational environment to be more supportive exhibit lower levels of behavioral and psychological problems, including emotional distress and depressive affect (Eccles, Early, Frasier, Belansky, & McCarthy, 1997; Roeser & Eccles, 1998, 2000; Roeser, Eccles, & Sameroff, 1998). Importantly, supportive school environments can moderate the established association between poverty and negative educational outcomes; specifically, students from poor families who perceive a positive school environment can exhibit similar outcomes to their peers from higher income families (Hopson & Lee, 2011).

Adverse or maladaptive social interactions between students often manifest themselves as bullying and victimization, which is remarkably widespread. According to national data, an astounding 23% of public school students reported that bullying and victimization were a daily occurrence (Robers, Zhang, Morgan, & Musu-Gillette, 2015). Defined as repeated, aggressive behavior with the intention to cause physical or psychological harm (Gladden, Vivolo-Kantor, Hamburger, & Lumpkin, 2014), bullying and victimization at school are associated with numerous negative outcomes. Cross-sectional and longitudinal research documents that children and adolescents who are bullies and/or victims are at an elevated risk of depression, anxiety, lower academic performance, substance use, delinquent and criminal behavior, and suicidal thoughts and behaviors (Cook, Williams, Guerra, Kim, & Sadek, 2010; Espelage & Holt, 2013; Ttofi, Farrington, Lösel, Crago, & Theodorakis, 2016; Ttofi, Farrington, Lösel, & Loeber, 2011). In

addition, students from impoverished families report disproportionately high rates of victimization, suggesting that negative social interactions may mediate the link between poverty and negative student outcomes (Due et al., 2009).

Summary

Overall, this evidence attests to the adverse effect of poverty on children and adolescents from a behavioral, emotional, cognitive, and neurophysiological perspective, and suggests that the effects of poverty are at least partially mediated by the effects of adverse social experiences on development, either in the family, in school, or both. We now turn to evidence suggesting that these adverse effects contribute to the intergenerational cycle of poverty, whereby children raised in poverty remain in poverty as adults.

Behavioral, Emotional, Cognitive, and Neurophysiological Problems as Risk Factors for Poverty in Adulthood

Most of the common behavioral, emotional, cognitive, and neurophysiological problems that develop in childhood and adolescence make it more likely that a young person will be in poverty as an adult, either by directly impacting economic wellbeing or by creating additional risk for life-altering negative events. For example, educational attainment is strong predictor of annual income (Julian & Kominski, 2011), and behavioral problems have been associated with lower rates of high school graduation and higher rates of high school drop-out (Battin-Pearson et al., 2000; Ensminger & Slusarcick, 1992; Newcomb et al., 2002). Similarly, alcohol and drug use are associated with both high school dropout (Townsend, Flisher, & King, 2007) and lower lifetime earnings (Harwood, Fountain, & Livermore, 1998), as well as other risks factors for intergenerational poverty, such as high-risk sexual behavior and teenage childbearing (Kirby, 2002; Van Ryzin et al., 2011), which reduce the likelihood that teenage girls will complete high school (National Campaign to Prevent Teen & Unplanned Pregnancy, 2010). In addition, early onset major depressive disorder predicts lower educational attainment, a higher risk of teenage childbearing, and unstable employment (Kessler, 2012), and life-course research finds that the relationship between adverse social environments in adolescence and reduced economic wellbeing in adulthood is mediated by poor mental health and reduced educational attainment (Berg, Kiviruusu, Karvonen, Rahkonen, & Huurre, in press).

Cognitive abilities such as self-regulation also play a key role in the intergenerational cycle of poverty. For example, self-regulation contributes to a number of key protective factors, including reduced behavioral problems and higher academic achievement in both secondary and postsecondary education (Duckworth & Carlson, 2013; Nota, Soresi, & Zimmerman, 2004; Trentacosta & Shaw, 2009). Research also indicates that self-regulation mediates the link between family income and academic achievement (Evans & Rosenbaum, 2008). Self-regulation can even influence an individual’s ability to make sound financial decisions (Howlett, Kees, & Kemp, 2008). Finally, life-course research suggests that self-regulatory problems can contribute to a host of negative outcomes in adulthood (e.g., substance dependence, criminal offending) including reduced economic well-being (Moffitt et al., 2011).

There is only limited research on the link between maladaptive human neurophysiology (or “allostatic load”) and economic well-being, but the literature is very clear that allostatic load can contribute to poor health, and poor health can restrict an individual’s job prospects or earnings and/or create significant medical expenses (Smith, 1999). Here again, life-course research can provide useful insight; recent studies suggest that adverse social environments in childhood negatively impact human stress neurophysiology and health, which in turn limit educational and workforce outcomes (Currie, 2009). Thus, as with behavioral, emotional, and cognitive problems, allostatic load and its impact on individual health can play a significant role in the intergenerational transmission of poverty.

In sum, lifelong risk for poverty can be embedded in childhood and adolescence due to behavioral, emotional, cognitive, and neurophysiological maladaptation that arises as a result of improper parental care and/or toxic stress. Fortunately, these lifelong effects can be attenuated through the application of evidence-based prevention programs in childhood and adolescence (Center on the Developing Child, 2010; Knudsen, Heckman, Cameron, & Shonkoff, 2006). The following sections delineate the various strategies shown to improve outcomes for impoverished children and families; however, it is critical to recognize that a multitiered approach to intervention is necessary given the multiple systems—social and biological—that are adversely affected by poverty.

Addressing Poverty Through Evidence-Based Prevention Programs

Efforts to prevent intergenerational poverty depend on their ability to sustainably increase family economic security and/or to prevent or ameliorate the adverse social conditions that make it more likely that children from impoverished homes will remain poor as adults. Research and policymaking relevant to poverty have so far focused on increasing family economic security, and among the policies demonstrating some benefit are a robust minimum wage, earned income tax credit, housing vouchers, food stamps, and conditional cash transfers (Dreyer, 2013; Hoyne, Schanzenbach, & Almond, 2016; Neumark & Wascher, 2000; Wolf, Aber, & Morris, 2013; Wood, Turnham, & Mills, 2008). However, simply raising their income may not alter the family interactions that are critical for successful development, nor will it necessarily improve the quality of school environments that also have a significant impact on development. To enhance family and school environments as contexts for healthy development will require a more widespread implementation of evidence-based prevention programs.

Here we briefly present examples of prevention programs that have demonstrated effects in making social environments more nurturing and in preventing problem development. Biglan (2015a) and Van Ryzin et al. (2016) present a more extensive discussion of this evidence. The programs we highlight are among the most widely known and thoroughly studied in their respective fields and thus can be considered exemplars of particular approaches to prevention. We do not wish to advocate for one program over another, but merely use these programs as examples to illustrate the value of prevention science.

Family Based Prevention Programs

These programs focus on providing education to families, improving the quality of family relationships, and teaching key family management skills. Their goal is to transform how parents manage and monitor child behavior, how the family negotiates conflicts and solves problems, and the affective quality of the family environment. They treat the family as the most influential and malleable context from which to promote long-lasting behavioral and emotional adjustment among children and youth.

Family-based prevention programs have demonstrated significant effects on a range of behavioral, emotional, cognitive, and neurophysiological risk factors for poverty (Brody et al., 2017; Beauchaine et al., 2015; Brotman et al., 2007). For example, several systematic reviews and meta-analyses have found family-based programs to be effective at preventing or reducing child externalizing and disruptive behavior, attention deficit/hyperactivity, and oppositional defiant disorder (Maughan, Christiansen, Jenson, Olympia, & Clark, 2005; Nowak & Heinrichs, 2008; Reyno & McGrath, 2006; Sanders, Kirby, Tellegen, & Day, 2014; United Nations Office on Drugs and Crime [UNODC], 2010). Reviewers have drawn similar conclusions with regard to adolescents, finding significant reductions in delinquency, violence, substance abuse, depression/anxiety, and HIV risk, as well as enhanced family and peer relations (Brody, Chen, Kogan, Murry, & Brown, 2010; Brody et al., 2012; Dusenbury, 2000; Farrington & Welsh, 2003; Foxcroft & Tsertsvadze, 2012; Kumpfer, Alvarado, & Whiteside, 2003; Lochman & van den Steenhoven, 2002; Petrie, Bunn, & Byrne, 2006; UNODC, 2010; Van Ryzin et al., 2016). In addition, family-based programs have been effective at promoting a wide range of effective parent behaviors (Kazdin, 1997; Kumpfer et al., 2003; Sanders et al., 2014; UNODC, 2010) and have demonstrated effectiveness in preventing child maltreatment (Brook, McDonald, & Yan, 2012; Lundahl, Nimer, & Parsons, 2006).

The quality of the home environment appears to be particularly impactful on a range of child development outcomes due to the proximal influences of family functioning, disciplinary tactics, order (vs. disorder), and enriching experiences on children’s ability to self-regulate behavior and emotion. In the absence of nurturing parenting, children are more likely to manifest poorly developed social skills, cognitive deficits, poor coping and stress regulation, and behavioral problems (El Nokali, Bachman, & Votruba-Drzal, 2010; Heckman, 2008). Although a relatively new area, some studies are showing effects of family and parenting programs on brain systems that support cognition and self-regulation (Tachibana et al., 2012). The effects are particularly pronounced in impoverished children (e.g., Neville et al., 2013) and children with more severe behavioral issues (Scott & O’Connor, 2012). Finally, there is also evidence that parenting programs can significantly alter cortisol rhythms in a way that is reflective of improved stress regulation (Fisher, Van Ryzin, & Gunnar, 2011).

Cost-benefit analyses indicate that family-based programs among the most cost-effective at addressing a range of problem behaviors (Miller & Hendrie, 2009). For example, Parent Management Training—Oregon (PMTO™), one of the leading family based prevention programs, has been found to deliver \$5,108 in lifetime benefits versus \$650 in total cost per family (Washington

State Institute for Public Policy [WSIPP], 2016a). Another leading program, Strengthening Families for Parents and Youth 10–14 (SFP 10–14), was found to have \$4,126 in lifetime benefits versus \$850 in total cost per family (WSIPP, 2016b). Among the benefits achieved are reductions in future societal costs for crime and health care as well as gains in future labor market earnings by individuals as a result of staying in school.

In addition, at least three family-based programs have exhibited direct effects on family economic security. Patterson, Forgatch, and DeGarmo (2010) reported on the impact of PMTO on the functioning of families in which parents had recently divorced. They analyzed changes in parenting, children's behavior, and the family's standard of living over a 9-year follow-up, in which standard of living was a composite measure including annual income, occupational prestige, and educational attainment. They found that families randomly assigned to PMTO had significantly greater improvements in standard of living over the nine years. Based on related evidence about the rigidity of coercive parents and their restricted social environment, Patterson et al. (2010) suggested that PMTO's economic benefits may be due to mothers becoming more flexible and prosocial, enabling them to obtain and keep jobs and/or acquire more education.

Another family program demonstrating direct economic benefit to families is the Nurse Family Partnership (NFP). With NFP, nurses reach out to at-risk pregnant women and help them plan for their education and work lives. Three randomized trials have assessed NFP's impact. In at least two trials, mothers' economic self-sufficiency was significantly greater among those who received the program than those in the control condition. Specifically, NFP led to lower use of welfare and other government assistance, more employment for mothers, and fewer closely spaced pregnancies (Kitzman et al., 1997; Olds et al., 1997, 2010; Olds, Henderson, Tatelbaum, & Chamberlin, 1988).

The third program originated in Jamaica. Published results reported that parental efforts to stimulate young children's cognitive skills and social competence significantly enhanced a child's adult income 20 years later (Gertler et al., 2013). For two years, community health workers made weekly hour-long visits to teach parenting skills and encourage mothers to interact and play with their children. Results indicated that the program increased the average earnings of participants by 42%.

School-Based Prevention Programs

School-based programs target specific aspects of child development in order to remediate the effects of poverty and/or suboptimal home environments. Importantly, some studies have included measures indicative of change in neurobiological indices such as executive function and found evidence for their partial mediation of school-based program effects on behavioral outcomes (e.g., Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Fishbein et al., 2017; Riggs, Greenberg, Kusché, & Pentz, 2006). As such, there is potential for evidence-based school interventions to modify the course of neurodevelopment and ultimately to alter individual risk status. Although the programs we review below are universal, and thus may not always be intensive enough to address the most severe problems with child and adolescent development, they nevertheless can play a very useful role in reducing risk for a variety of maladaptive outcomes that can increase the likelihood of

poverty in adulthood. Used in conjunction with interventions that target other critical contexts and conditions that adversely affect child outcomes, there is potential to alter the developmental trajectory of at-risk children and adolescents.

Some school-based programs have teachers, school counselors, or mental health professionals deliver a psychosocial curriculum aimed at changing attitudes, normative beliefs, behaviors, and/or resistance skills related to negative peer influence, such as peer pressure to use substances (see meta-analyses by Tobler et al., 2000, and Wilson, Gottfredson, & Najaka, 2001). A related group of curriculum-based prevention programs focus on promoting socioemotional learning. These programs teach skills in recognizing and managing emotions, making responsible decisions, handling challenging situations, and establishing positive relationships (see meta-analysis by Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). These programs are sometimes referred to as social-emotional and character development (SECD; e.g., Bavarian et al., 2013) or positive youth development (PYD; Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004).

Although curriculum-based programs have been found to be effective, with small to moderate effects on a range of behavioral and social-emotional outcomes, they often require a substantial time commitment. For example, Positive Action (PA) mandates over 140 lessons per grade, taught 4 days per week, for Grades K through 6 and 70 lessons taught 2 days a week for Grades 7 and 8 (Bavarian et al., 2013). These requirements may constrain their dissemination at a time when instructional time and test scores have become critically important to schools. These time demands may not be as onerous in preschool contexts, and socioemotional learning programs at this educational level have demonstrated the ability to promote academic and behavioral skills in kindergarten and later in elementary school (Hsueh et al., 2014; Nix et al., 2013; for review, see Bierman & Motamedi, 2015).

In contrast to curriculum-based programs, another set of approaches focus on promoting prosocial behavior and social skills in the context of instructional activities. Examples include the Good Behavior Game (GBG), cooperative learning (CL), and Positive Behavioral Interventions and Supports (PBIS). Below we briefly present the evidence for each.

The GBG is a classroom management strategy rather than a curriculum and operates on principles of social reinforcement for on-task, prosocial behavior (Kellam et al., 2011). Elementary schoolchildren in GBG classrooms learn to inhibit impulses to act with aggression, disruption, and off-task behavior; they are reinforced for regulating emotions and monitoring their classmates' behavior in a game-like setting. By increasing the likelihood that teachers and peers will reward students' prosocial behavior, GBG encourages students to practice inhibitory control, which can serve to sharpen self-regulatory skills and enhance social competence. Research finds that the GBG can prevent a wide range of problem behaviors that add to poverty in adulthood, including aggressive/disruptive and off-task behaviors, substance abuse, antisocial personality disorder, need for mental health services, and criminal behavior (Dolan et al., 1993; Kellam et al., 2008; Kellam, Rebok, Ialongo, & Mayer, 1994; Petras et al., 2008; Poduska et al., 2008). Economic analysis finds that the GBG delivers \$10,342 in lifetime benefits versus \$161 in total cost per student (WSIPP, 2016c).

Like the GBG, Cooperative learning (CL) is an approach to school-based prevention that focuses more on instructional

techniques than curricula or classroom management. Unlike the GBG, however, CL is suitable for use across elementary, secondary, and postsecondary education. CL is an umbrella term that includes peer tutoring, reciprocal teaching, collaborative reading, and similar methods in which peers in small groups work together to learn (O'Donnell, 2006). CL is not prescriptive but is a conceptual framework within which teachers design their own small-group activities centered on the concept of "positive interdependence," implying that educational goals are structured so that students attain their goals only if other group members also achieve their goals. Under positive interdependence, peer interactions, which previously may have been indifferent or even antagonistic, are significantly altered to promote the achievement of others through mutual assistance and sharing of resources. These prosocial interactions, in turn, increase interpersonal attraction and acceptance, support the development of new friendships, and promote academic motivation and achievement (Johnson & Johnson, 1989, 2005; see also meta-analyses by Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006; Roseth, Johnson, & Johnson, 2008). Emerging evidence also indicates that CL can reduce victimization, stress, and emotional problems among students who are socially marginalized (Van Ryzin & Roseth, 2017). By promoting more positive peer relations and a more supportive school climate, CL can promote improved academic achievement while simultaneously addressing many of the social processes linked to behavioral problems that can put students at risk for poverty as adults.

Finally, Positive Behavioral Interventions and Supports (PBIS) is a school-wide support system for prosocial behavior that helps schools teach students to follow a small number of rules while increasing reinforcement for following rules. Evaluations indicate that participation in PBIS is associated with lower levels of antisocial behavior and higher levels of academic achievement, both of which make poverty less likely (Bradshaw, Waasdorp, & Leaf, 2012; Flannery, Fenning, Kato, & McIntosh, 2014; Horner, Sugai, & Anderson, 2010; Luiselli, Putnam, Handler, & Feinberg, 2005).

Summary

Overall, substantial evidence indicates that family and school prevention programs can ameliorate the problems that are well-established risk factors for children's subsequent or continuing

poverty. Further, some evidence suggests that family-based programs can directly improve families' economic security. In general, these programs have demonstrated an ability to (a) reduce coercive interactions, (b) increase positive reinforcement for diverse forms of pro-social behavior, and/or (c) reduce opportunities to engage in problem behavior (Dishion & McMahon, 1998; Dishion & Snyder, 2016; Roseth et al., 2008; Sugai & Horner, 2008). Taken together, these effects can contribute to better outcomes for children raised in poverty. In the following section, we propose a set of steps designed to bring evidence-based prevention practices to a larger population.

Implications for Public Policy

In our work on the policy implications of prevention science, we have pursued a two-track strategy. Our National Prevention Science Coalition is conducting regular Congressional briefings on prevention science, especially as it is relevant to preventing intergenerational poverty. At the same time, we are working to increase the skill and knowledge of researchers on the important task of communicating with policymakers. The present article is intended to clarify for researchers how intergenerational poverty can be prevented while simultaneously articulating specific policy initiatives that policymakers can adopt. In addition to having a direct impact on policymakers, we hope that this paper will also influence researchers and advocates to articulate the policies that are needed in formats that are digestible for policymakers. Researchers who want further support in advocating for effective policies can learn more at the National Prevention Science Coalition website, <http://www.npscoalition.org/>.

In brief, we believe that there are three areas in which policy is needed: (a) The dissemination and implementation of evidence-based programs on a wider scale to reach families in need; (b) supporting research to identify ways to reconfigure and/or streamline existing family-based programs to enhance their ability to integrate with existing service contexts; and (c) taking an evidence-based approach to teacher professional development and educational practice to ensure that schools can support at-risk students. Each of these areas is enumerated below. Also, as alluded to above, we advocate for an increased role for scientists and practitioners in public policymaking and shaping the collective dialogue around these issues. A summary of these recommendations can be found in Table 1.

Table 1
Summary of Recommendations

Target	Recommendation
Federal policymakers	Promote the dissemination and implementation of evidence-based family interventions within federal programs targeting poverty (e.g., Head Start, Women, Infants, and Children). Support research on how dissemination and implementation can be accelerated (e.g., research on barriers in existing systems, streamlining of existing family-based prevention programs) through the National Institutes of Health and/or the Institute of Education Sciences.
State policymakers	Implement policies that require dissemination and implementation of evidence-based family interventions, both in healthcare (e.g., Accountable Care Organizations) and in education (K–12).
Researchers/practitioners	Work to educate citizens and state and local policymakers regarding the programs and policies that are available to prevent the most common and costly problems of youth. Engage the media to be responsible reporters about the long-term consequences of our actions for children's development.

Dissemination and Implementation

The first and most obvious implication of the research discussed here is that we need to integrate evidence-based prevention programs into the antipoverty efforts of the federal government. Specifically, Head Start and Women, Infants, and Children (WIC) include efforts to support effective parenting, so federal policymakers should begin by funding systematic implementation and evaluation of evidence-based family programs within each of these systems to strengthen their impact on families in poverty. Effective scale-up of these programs will require refinement and testing on a smaller scale prior to wider dissemination. Such a strategy will allow the demonstration of impact, which will generate further public support for widespread dissemination.

Families in need can also be reached through public health care systems. Recent federal policy has spawned the creation of Accountable Care Organizations (ACOs; National Academy of Medicine & National Research Council, 2015), which hold a group of health care providers accountable for the cost and quality of care delivered to a defined (e.g., at-risk) population using a value-based payment model designed to promote population health while reducing costs (DeVore & Champion, 2011). The focus on population health favors integrated medical and behavioral health care and promotes the prevention of behavioral and psychological problems before they become costly from a medical perspective (Leslie et al., 2016; Rawal & McCabe, 2016). This new model of integrated pediatric and family care has been found to be effective (Kolko & Perrin, 2014); further, it increases access to and engagement in behavioral health services and is economically beneficial (World Health Organization, 2008).

Though the number of ACOs is growing rapidly, however, little evidence exists concerning the strategies needed to support and improve the implementation of evidence-based prevention programs within ACOs. Research is needed to better understand the specific policy, structural, and financial barriers that preclude the uptake of these programs in order to enable development and testing of dissemination and implementation strategies for bringing about greater investment by ACOs in taking evidence-based prevention programs to scale. Such research could be supported by either the federal government (e.g., National Institutes of Health) or state governments (through state funding to ACOs).

Streamlining Existing Family-Based Prevention Programs

A chronic issue with existing family based prevention programs is the failure to reach families in need, as those families seeking support are often unaware of available programs or even of their need for assistance (Glasgow, Vogt, & Boles, 1999; Sanders, 2012). The stigma of attending a parenting program may reduce a family's willingness to attend (Leslie et al., 2016), and even when families engage, structural challenges (e.g., cost and complexity) can reduce a program's impact. There are also barriers to family participation among families willing to engage, including work schedules, childcare, and the substantial time commitment many programs require (Kazdin, 2000). Thus, even when family-based programs are universally available through well-trained community settings, family engagement may dip below 20% of the targeted/eligible families (Spath et al., 2007).

Innovation in the delivery of family-based programs will facilitate their reaching families in need. Federal policymakers

should fund research on more efficient and effective ways to deliver these services. We suggest that this effort focus on adaptive programs, in which the composition and/or intensity of the prevention programming is adapted to family characteristics and then adjusted in response to the family's ongoing performance. With an adaptive approach, service providers streamline program delivery to include only the material relevant to a given family, reducing delivery costs and barriers to family engagement. With this strategy, families can be provided with a customized level of support, whether that is universal (Tier 1), selective (Tier 2), or indicated (Tier 3); as a result, prevention programming is both relevant to the family and efficient to deliver (Bierman et al., 2006; Connell et al., 2007; Santisteban et al., 2011; Stormshak et al., 2009).

Barriers related to family work schedules and the stigma of parenting programs can be reduced through the application of technology. Specifically, family-based programs can be enhanced to support a tele-health model, whereby Web-based videoconferencing technology is used to deliver prevention programming to a family in their home, in the family's native language, on a schedule that meets the family's needs. Tele-health has already been shown to improve service access and satisfaction and improve child outcomes for numerous family health issues, including hearing loss (Blaiser et al., 2013), speech-language pathology (Heimerl & Rasch, 2009), and ADHD (Myers et al., 2015). As a tele-health service, family-based programs can be embedded in systems that have frequent contact with children and families, such as primary care. The tele-health approach also removes provider-level barriers to more widespread adoption of family based services, including (a) finding time for overworked care personnel to implement additional services, (b) reducing the extensive training requirements that commonly accompany family based programs, and (c) reducing demand on resources for implementation (Van Hook et al., 2007).

Technology can also support more automated and detailed family assessment, which can eliminate burdens related to service provider workload that currently serve as a barrier to the adoption and implementation of these programs. New methods in mobile and wireless technologies (e.g., ambulatory assessment, daily diary; Nahum-Shani, Hekler, & Spruijt-Metz, 2015; Riley et al., 2015) can give health care providers new insights into unique family-specific risk processes and support more customized adaptation of program content while relieving health care providers of the burden of compiling assessment data by hand.

By moving to adaptive models of family based prevention and by integrating technology to automate the most labor-intensive aspects of service delivery and overcome barriers to family participation, family-based programs can (a) have a greater likelihood of reaching families in need; (b) have more detailed, accurate, and targeted information to customize service delivery; (c) more quickly and effectively engage families; and (d) be less labor-intensive to deliver, enabling these programs to achieve a scalable public health impact. As above, such research could be supported by either the federal government (e.g., National Institutes of Health) or state governments (through state funding to ACOs).

Reaching At-Risk Students Through Schools

The research reviewed above speaks to the need for communities, states, and the federal government to get evidence-based programs implemented in schools in high-poverty neighborhoods. The implementation of these programs, for the most part, involves enhancing the skillset of the teacher through professional development (particularly Cooperative Learning and the GBG). More than 90% of teachers participate in professional development, and school districts spend upward of \$8,000 per teacher per year on this development (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Miles, Odden, Fermanich, & Archibald, 2004; Odden, 2011). However, research also indicates that these investments can have little effect because the training often does not focus on evidence-based practices or effectively engage teachers (Garet et al., 2011; Harris & Sass, 2011). These substantial investments by school districts could have a more significant impact on student performance and, in turn, on intergenerational poverty, if school districts would commit to implementing evidence-based programs with a track record of successful implementation, low costs, and measurable benefits. The programs highlighted above can provide an excellent starting point for any district attempting to deliver evidence-based prevention programming to their students.

The potential impact of the school-based programs we discuss above is further emphasized by current best practice in professional development, which hypothesizes that changing teacher practices in the classroom (e.g., child behavior management, instructional approaches) is easier than implementing sophisticated or complex curricula (Desimone & Garet, 2015). The programs we highlight above (i.e., the GBG, Cooperative Learning, and Positive Behavioral Interventions and Supports) emphasize straightforward changes in classroom management or instructional technique rather than implementation of complex curricula or wholesale pedagogical change.

We suggest that state and federal policies strongly encourage the use of evidence-based practices in schools and provide training and support to enable more widespread dissemination and implementation of evidence-based programs in schools. Notably, the Every Student Succeeds Act (ESSA) emphasizes the use of evidence-based practice in schools with a goal of increasing the impact of educational investments by ensuring that programs and practices being implemented have been proven to be effective. Under ESSA, all school improvement plans and all efforts to promote parent and family engagement must be based upon scientific evidence, and state policies can (a) reemphasize the importance of evidence-based practice, and (b) provide funding, training, and support for dissemination and implementation. Research on dissemination barriers and/or mechanisms to accelerate dissemination of evidence-based programs and practices in educational systems can be supported at the federal level by the Institute of Education Sciences.

Example: Pennsylvania's Statewide Effort

Pennsylvania offers an example of how an entire state can advance the implementation of evidence-based prevention. Since 1999, the Pennsylvania budget has included line items for implementation and support of evidence-based prevention programs. In 2008, funding from the Pennsylvania Commission on Crime and

Delinquency and the Pennsylvania Department of Human Services resulted in the Edna Bennett Pierce Prevention Research Center at The Pennsylvania State University establishing the Evidence-Based Prevention and Intervention Support Center (EPISCenter).

The EPISCenter supports dissemination, implementation, impact assessment, and sustainability of evidence-based programs (Bumbarger & Campbell, 2012). It has shaped a science-guided technical assistance strategy (Cooper, Bumbarger, & Moore, 2015; Moore, Bumbarger, & Cooper, 2013) to support service providers who deliver programs targeting delinquency, violence, and substance use and that promote positive youth development. The EPISCenter helps communities identify their prevention needs using local data and assists in selecting evidence-based programs that address those needs. To ensure that communities achieve the best results, the EPISCenter provides technical assistance to practitioners in implementing these programs, helps evaluate program impact, and promotes continuous quality improvement. The 2014 Annual Report estimated a \$24 million net benefit to the Commonwealth (EPISCenter, 2014); the savings were from reduced utilization of mental and physical health care services, juvenile justice involvement, and child welfare services.

Implications of Prevention Science for Broader Sectors of Society

Truly achieving significant reductions in poverty in the U.S. may require a movement that brings people together around a shared set of communitarian values. Prevention science has tended to focus on the development and implementation of evidence-based programs and, to a lesser extent, the impact of policy (Wagenaar & Burris, 2013). However, significant undertakings of this nature often involve social movements that produce widespread changes in attitudes and in people's shared understandings and commitments. The broad coalition of scientific, public health, philanthropic, advocacy, and governmental organizations that created the tobacco control movement is one such example (Biglan & Taylor, 2000b).

The high rates of poverty and inequality in the U.S. are in part the result of changes in public policy over the past 40 years (Hacker & Pierson, 2014; Putnam, 2015). Those policy changes are, in part, a result of diminished emphasis on values and goals that emphasize ensuring that every person has at least a modicum of economic and social wellbeing (Biglan, 2015a). This implies that if we are going to generate the societal support that is needed to bring about a significant reduction in intergenerational poverty, we must work to reverse this process and shift our societal mores away from materialism and toward more communitarian values. A broad coalition will be needed among all of the scientific, philanthropic, educational, religious, human service, health care, and other sectors of society that are dedicated to supporting human wellbeing (Biglan, 2015b). Speaking with one voice, such a coalition could significantly shift support toward values, policies, and practices that make the wellbeing of the entire population the touchstone of policymaking. Each of the initiatives that we suggest here seem more likely to be instituted if such a broad coalition can educate the public and policymakers about (a) the problem of poverty and the harm that it does, not only to children living in poverty, but also to the society as a whole (e.g., reduced innovation and productivity; Avent, 2016) and (b) the potential for evidence-

based policies and programs to significantly improve America's wellbeing.

Conclusion

Evidence-based family and school prevention programs have significant potential to reduce risk for negative outcomes associated with poverty and adverse social environments and, in turn, interrupt the cycle of intergenerational poverty. The effort to disseminate and implement these programs should accompany a concerted research effort to reduce the monetary and time investments these programs require and to reconfigure them as needed for new service delivery systems and target populations. The ultimate goal of these efforts should be to ensure that every family and school has the skills necessary to prevent the growth of problems such as antisocial behavior and drug abuse and to nurture development of children's self-regulation, social skills, and academic success, enabling them to become contributing members of society.

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