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Research that Helps Move Us Closer to a World Where Each Child Thrives

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Schools are curtailing programs in arts, physical exercise, and play to devote more time and resources to academic instruction. Yet doing that may *impede* academic success, rather than aid it. Correlational and retrospective studies, personal accounts, case studies, and theoretical arguments suggest that the arts (e.g., music, dance, and theatre) and/or physical activities (e.g., sports, martial arts, and youth circus) can transform kids' lives. Do they? Causal studies are lacking. There's enough suggestive evidence; the time is ripe for rigorous research on real-world arts and physical activity programs that permit conclusions about causality to be drawn and that investigate what characteristics of programs account for benefits. Granting agencies should be more open to funding such research.

I would like to encourage the field of human development to take as its charge: How can we help children (and help the adults in their lives to help the children) navigate their growing up so they grow into people we would all be proud to know—people who are upright, honest, considerate, compassionate, kind, caring, self-confident yet humble, proud but not arrogant, conscientious, bright, capable, playful, full of joy and a sense of wonder, committed to making a contribution—regardless of a child's nationality or country of birth, ethnicity, or gender, healthy or challenged, born into affluence or poverty, strife or peace?

A few things follow from that: (1) We need more studies with clear real-world implications and/or applications and (2) We need to see more "flesh" on the bones of many studies. I would like to "hear" from the people who received an intervention or program. What was their experience in the program like? I'd like to hear what they have to say about ways the program failed to live up to their hopes or expectations. Were there one or two particularly key moments or experiences in the program they can describe? I'd like to know if they see themselves any differently now that they have experienced the program. That is, I would like to see more qualitative data, more first-person accounts, alongside the "bare bones" of numbers entered into, and generated from, statistical analyses. And, I would like to hear from any observers or onlookers. What changes have they observed and what did they see that led them to conclude that a particular change had occurred?

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Importantly, (3) we need to see studies that enable us to draw strong causal inferences about real-world activities that I and many others would predict have a high likelihood of helping children grow into the kind of people I have described, activities that kids find fun and meaningful such as social or community action projects that help one's neighbors, neighborhood, or make the world a better place (such as Free the Children), music-making (be it band, orchestra [such as El Sistema], a drumming circle, choral singing, or something else), team sports (whether basketball, soccer, rowing crew, or any number of other team sports), martial arts, youth circus, social communal dance, filmmaking, theatre, caring for an animal, 4-H, orienteering, building things together, repairing things together, or any number of other comparable activities (Diamond, 2014).

TOPICS THAT NEED RIGOROUS RESEARCH AND THAT FEDERAL FUNDING AGENCIES SHOULD BE MORE WILLING TO FUND

Sadly, there is a marked dearth of studies on the benefits of (the benefits created by or caused by) the arts, physical activities, or community-focused activities for healthy development, pride and self-esteem, feelings of self-efficacy and confidence, and outcomes such as better executive functions, academic achievement, high school graduation, mental health, or physical health, and reduced arrests, crime, substance abuse, depression, or unemployment.

The few studies that exist of these sorts of activities tend to be correlational, retrospective, or case studies, which cannot demonstrate causality (i.e., they cannot demonstrate that these activities produced benefits). Instead of causal studies of such organic activities, many of which have been around since the beginning of civilization, we see causal studies of more sterile and one-sided activities such as computerized cognitive training, treadmill running, or riding a stationary bicycle. Among studies having characteristics that meet the minimum criteria I present below and looked at the effects of different activities at any age on executive functions, 29 investigated computerized cognitive training and 15 investigated aerobic walking or running or weight training, but only one investigated martial arts, only one investigated yoga, and only one investigated theater. No studies to date (zero) have investigated whether participation in any team sport, music making of any kind, participating in any social or community service activity, dance, social circus, and so on produces (causes) any social, emotional, or cognitive benefit.

Studies of these real-world activities are needed!

The different parts of the human being (social, emotional, cognitive, physical, and spiritual) are fundamentally interrelated (Diamond, 2007, 2014). As I wrote in 2010,

> Academic achievement, social–emotional competence, and physical and mental health are fundamentally and multiply interrelated. The best and most efficient way to foster any one of those . . . is to foster all of them . . . . We need to see the human being and human development as one whole, that those who care deeply about developing cognitive competence, social skills, emotional wellness, or physical health and fitness are not in competition, that one component is not more important than any another, and that we have much to learn from the insights and accumulated wisdom of our counterparts in other fields and specialties. (Diamond, 2010, p. 789)

For example, executive functions (self-control, working memory, cognitive flexibility, focused attention, and creative problem-solving) suffer first and most if anyone is stressed, sad, lonely, not

getting enough sleep, or not physically fit (reviews: Diamond, 2007, 2013, 2014; Ling, Kelly, & Diamond, in press). Even relatively mild stress overwhelms prefrontal cortex (but not other brain regions) with excess dopamine (Cerqueira, Mailliet, Almeida, Jay, & Sousa, 2007) and disrupts communication between prefrontal cortex and other brain regions (Liston, McEwen, & Casey, 2009), thereby impairing executive functions (Arnsten, 1998). People often can't think as clearly or exercise as good self-control when stressed and may appear to have a disorder of executive functions when they do not. The same is true if you don't get enough sleep (Huang et al., 2007). We show less creativity, are less able to think outside the box, and show worse attentional control when we are sad (Ashby, Isen, & Turken, 1999; Desseilles et al., 2009; Hirt, Devers, & McCrea, 2008). Conversely, we are able to work more flexibly (Murray, Sujan, Hirt, & Sujan, 1990), are more likely to see potential relatedness among unusual and atypical members of categories (Isen, Daubman, & Nowicki, 1987; Isen, Johnson, Mertz, & Robinson, 1985), and able to deploy our attention more efficiently and broadly (Grol, Koster, Bruyneel, & De Raedt, 2014) when we are happier. (It's not that sadder people are less creative, but rather that in general an individual tends to be more creative when happier than when more miserable). We are fundamentally social; people who feel alone, or are focusing on an anticipation of being alone, usually show poorer EFs than people who feel, or anticipate feeling, more socially supported (Cacioppo & Patrick, 2008; Campbell et al., 2006; Tangney, Baumeister, & Boone, 2004). Feeling excluded or as if you do not belong has been shown in controlled experiments to impair EFs such as reasoning, selective attention and persistence on difficult problems (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Twenge, Catanese, & Baumeister, 2002).

People who are more physically active, have better aerobic fitness, and better motor coordination show better EF performance (Boucard et al., 2012; Prakash, Voss, Erickson, & Kramer, 2015; Scudder et al., 2014; Voelcker-Rehage, Godde, & Staudinger, 2010).

Thus, if we ignore that a child is stressed, lonely, or not healthy, those unmet needs will work against that child showing the executive functions of which he or she is capable and thus showing the academic achievement of which the child is capable. Conversely, our executive functions are at their best when we are not feeling stressed, feel socially nourished, and are happy, well rested, and physically fit.

Trying to improve executive functions by the narrow strategy of only targeting executive functions (as with computerized training regimens) or trying to improve physical health by narrowly targeting only aerobic capacity (as in many exercise studies) in people who are feeling sad, lonely, or stressed is less likely to succeed than approaches that address the whole person. Activities and programs that should most successfully improve executive functions are those that not only directly train and challenge executive functions but those that also indirectly support executive functions by helping to reduce things that disrupt executive functions (e.g., loneliness) and/or by increasing things that aid executive functions (e.g., happiness). They are precisely the programs for which it is so difficult to get funding to study and that hardly anyone is studying with paradigms that permit causal inferences to be drawn.

The real-world activities for which I am calling for study address the whole person. For example, making music together, dancing together, team sports, collaborating on a social or community action project, martial arts, filmmaking, or theatre require, train, and challenge concentration, focused attention, discipline, perseverance, split-second responses to the unexpected, creativity, and holding complex sequences in mind (i.e., executive functions). They provide tremendous joy

and build feelings of pride, self-efficacy, and self-confidence. Participants are members of a community or team (they belong to something bigger than themselves), all working toward the same shared goal. These activities are hands-on. They require moving, using one's body, and often build motor skills, coordination, balance, and/or aerobic capacity.

After the initial studies, we will need studies that hone in on what works best for whom, why, and what the essential elements are. For example, would learning to play a musical instrument through private lessons be less beneficial (as I predict) than learning to play a musical instrument as is done in El Sistema (as a member of an ensemble from the start)? How important is the presence or absence of competition? How important is the mentoring piece (an adult who really and truly cares about you, listens when you need an ear and hears what you have to say, is consistently there for you, respects you, and believes in you)? Will the type of program end up mattering more or the way it is done? I have predicted that the way it is done will prove the more critical variable (Diamond & Ling, in press). How important is it to involve participants as decision makers, giving them a say in what is done and how, granting them a degree of autonomy? Social-service and community-action projects are acts of generosity and caring. How important is that element for various desirable outcomes such as self-confidence, pride, better ability to focus and concentrate, reducing the likelihood of drug addiction or crime, or nurturing compassion?

I fear that exactly the activities needed to help children thrive are being cut from school curricula and from children's lives. We in psychology can do something about that; my wish is that we do.

STUDY CHARACTERISTICS THAT ARE ABSOLUTELY ESSENTIAL

"Studies that enable one to draw conclusions about causality" means (1) studies that are not simply correlational (e.g., studies that look at one snapshot in time and find, for example, that children who did A where better at X; we have no way of knowing if they might have been better at X even if they had not done A). (2) Studies that include control groups (e.g., when studies document that children who did A got better at X over time but do not have a control group, we have no way of knowing if the children might have gotten better at X even if they had not done A). (3) Studies that find differential outcomes between groups (e.g., if children who did not do A or did B improved as much and performed as well afterwards as children who did A, we cannot know whether A and B helped equally or neither A nor B helped at all; to draw a causal inference we need differential benefits). Those three things are minimum criteria that any study that claims to inform us about the benefits of a program or activity should meet.

STUDY CHARACTERISTICS WE SHOULD ASPIRE TO HAVE

Ideally, an intervention study should also have four other features: First, the control group should not be passive, waitlist, or business as usual. Such a control group is not without any value; it allows us to conclude that benefits from the program of interest were not simply due to (1) practice effects from completing the assessment measures before and after the intervention or (2) the passage of time or developmental improvements over the period between pre- and posttest. However, such a control group presents a low bar to pass because anything new might produce better results than nothing or business as usual; indeed the hopes and expectations for what the intervention

could achieve might be the main causal factor rather than the intervention itself. Therefore, ideally an intervention study should include an "active control group," which also receives a new program for which the hopes and expectations for success are also high, and whose members also receive as much attention as those in the experimental group—that is, which is comparable to the experimental group in all the ways that might be pivotal, except for the aspect(s) that the researcher thinks are key to the intervention's success.

Second, an intervention study ideally should look not only at immediate postintervention benefits but also at benefits down the road. How long do benefits last? Do some benefits grow larger over time? This is seldom done. For example, of the 62 studies that met the three minimum criteria above that examined whether computerized or noncomputerized cognitive training, mindfulness, aerobic activities, resistance training, or school curriculum might improve executive functions, only 16% (10 studies) looked at any effects beyond immediately right after the program, only 10% (six studies) looked at benefits 6 months or longer after the program, and only 5% (three studies) looked at outcomes a year or more after the program (Diamond & Ling, in press). That is a pretty dismal record. We (i.e., the field) need to do better.

Third, participants need to be assigned to conditions because, if they can choose, one or more factors that led them to choose different programs might be responsible for any differential outcomes observed for the programs. The gold standard is random assignment. However, random assignment should only be expected to yield groups with comparable characteristics when dealing with large numbers, not when the number of participants per group is under 100 and certainly not when that number is under 50. It is important to stratify randomization by participant variables potentially important to the results or to pair participants as closely as possible on variables that might influence the results and then randomly assign one member of each pair to each group. The other problem with random assignment and lack of choice is that some participants might not like the activity of interest and might actively resist what the activity is trying is accomplish, thus reducing the size of one's effect. One way to address that is to only include children who express interest in the activity of interest or only include teachers who express interest in teaching the experimental curriculum and then randomly assign one half to the new activity or curriculum. It's true that in the real world teachers often have to teach an assigned curriculum without a choice. However, after a curriculum has been shown to be effective, many more teachers are likely to be open to teaching it than before effectiveness has been demonstrated.

Fourth, too often studies rely exclusively on what people tell us on surveys or rating forms, yet research has shown time and again that what people report can often be inaccurate and unreliable (Austin, Gibson, Deary, McGregor, & Dent, 1998; Donaldson & Grant-Vallone, 2002; Wells & Olson, 2003). Questionnaires and rating forms should be complemented by one or more objective measure. Too often studies rely on laboratory tests that bear little relation to the real world. Better objective measures that are more relevant to real life are needed.

CONCLUSION

In sum, I am calling for well-designed intervention studies that permit strong causal inferences to be drawn that examine the possibility that the arts, social service or community action, or/and physical activities like sports, martial arts, or circus are critical for the outcomes we all want for our children. I am calling for funding agencies to be far more willing to fund such critical studies and their longitudinal follow-up. And I am calling for studies that thoughtfully explore

what works best for whom, and why—especially what critical elements must be present for benefits to be seen. To fully understand and properly interpret the numbers generated by quantitative research, and to generate new hypotheses for quantitative research to test, it is critical that researchers make greater efforts to elicit first person accounts of participants and insights from observers.

I have offered some predictions. I predict that the most beneficial activities will be those that address the whole person: The most beneficial activities, I predict, tap into something the child is, or becomes, passionate about. They provide the child tremendous joy and pride. They enable the child to work on something deeply meaningful to that child and to others, who support one another as part of a community, team, or ensemble, whose members are there for each other and pull for one another. They enable a child to feel empowered and build the child's deep-seated confidence that he or she will eventually succeed. They enable a child to feel heard and deeply, genuinely cared about, often by an adult mentor. The mentors believe in the kids to succeed while holding them to uncompromisingly high standards. These activities build many skills including discipline; the ability to persevere despite setbacks; cooperation; and compromise; seeing things from others' perspectives; focused attention and concentration; creative problem solving; and flexibly adjusting to the unexpected. They keep one physically fit, with good dexterity, coordination, and balance. An arts, physical-activity, or social-action activity when done well can do all these things. I have predicted such activities are not only best for well-rounded benefits but for the best benefits in any individual sphere. If you care only about academic achievement, physical achievements, or success in business, the best way to produce any of those, I predict, is not to focus narrowly on only one domain (like more time for academic instruction to improve cognitive performance). The best way is to also address social, emotional, and physical needs. If the arts and physical activities were simply frills, they would not have arisen in every society and lasted for thousands of years. I fear that schools are moving in exactly the wrong direction by squeezing these out of the school day. Research in developmental science is critically needed to investigate, with well-designed studies that permit strong causal inferences, the benefits of arts and physical activities that are rapidly disappearing from children's lives.

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