Sweat Equity: How Exercise May Help Address Negative Health Impacts of Adversity

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Among the most stunning public health revelations of the past 25 years has been the discovery of a link between adverse childhood experiences (ACEs) and an array of negative health outcomes that reach across the lifespan.

Children who encounter more ACEs – examples of which include trauma, abuse, neglect, poverty and social marginalization – are more likely to develop health problems in adulthood. These problems range from depression to chronic pain, obesity, heart and liver disease, diabetes, broken bones, autoimmune conditions and cancer.

The link between ACEs and poor health is increasingly understood to stem from toxic stress. Repeated encounters with adversity can push stress hormones to high levels that become toxic, poisonous enough to make lasting changes to a young person's DNA, tissues, and brain. These changes create vulnerabilities to disease later in life.

Exercise: An Opposing Force

Over the past several decades, in research ranging from laboratory experiments to large epidemiology studies, regular exercise has been formally linked with a variety positive impacts on health. Remarkably, exercise offers protection from virtually the same array of health problems – from depression to cancer – for which ACEs increase risk. In the brain, exercise promotes healthy growth in sensitive regions that ACEs can erode. Even on a molecular level, exercise has been shown to tame stress hormones, modify DNA, and move other chemical biomarkers up or down, in the opposite direction that ACEs appear to push them.

In general, the study of exercise has remained separate from the study of ACEs. Yet, when we view the collection of outcomes linked to exercise and ACEs side-by-side, it is difficult to ignore the contrast. Existing research suggests that ACEs and exercise work in opposing ways on common biological pathways. In other words, exercise may be a solution to reduce health risks for those who have faced adversity.

Running Past Adversity

If this is the case, then effective and scalable public health interventions may already be afoot. Over the past decade, Philadelphia has seen the growth of programs like Girls on the Run, Black Girls Run and Back on My Feet that link group running with a mission for positive personal development.

Recognized as the first of these programs in Philadelphia, Students Run Philly Style (SRPS) is an exemplar for its durability and scope. Each year, SRPS engages more than 1,000 middle and high school students in a

mentored distance running program, with the aim of preparing them for Philadelphia's primetime road races. The students are grouped with adult running leaders, usually teachers, counselors or administrators from their own schools, and commit to meet after school for training runs several times each week. In addition to providing material and logistical support, SRPS provides training for the leaders in a mentorship model focused on cultivating resilience.

Most of the students are new to running when they enroll. To get a sense of their athletic achievements, consider this: last year, 900 SRPS youth completed the ten-mile Broad Street Run and more than 100 ran the Philadelphia Marathon.

Yes, these students receive a big dose of exercise, but running also creates opportunities for them to build connections with caring adults. These connections, in their own right, can help protect youth from adversity.

Spend a few hours with these students, and you will likely hear them throw around words like "connection," "family," "support," "persistence," and "growth" to describe their experience. These anecdotes hint that something positive and deeply protective may be happening during all those after-school sweat sessions. As researchers, we asked if these observations could be studied in a formal way.

The Craig-Dalsimer Division of Adolescent Medicine at Children's Hospital of Philadelphia has partnered with SRPS to carry out research that examines the relationship between adversity and exercise in key areas of adolescent health. Last year, we reached out to high school students (grades 9-11) participating in the program. More than 200 agreed to enroll in our pilot study. They completed surveys at the beginning of the running season and agreed to let us contact them again, nine months later, at the end.

Through the surveys, we learned what we feared: these youngsters are no strangers to adversity. On the whole, the students' reported exposure to a higher number of ACEs than adults in national studies, and in numbers similar to urban Philadelphia adults. One-third of SRPS youth reported exposure to four or more ACEs — placing them in a category thought to be at the highest risk for long term health problems.

We were able to follow up with approximately 150 students at the end of the nine-month training season. As our work continues, we will evaluate how their scores on measures of toxic stress – like depression and anxiety – and factors related to resilience – such as social support and grit – changed over the course of the season. In particular, we are interested to learn how their ACE scores and their level of participation in SRPS impact these measures.

What Next Steps Can We Take?

Global Teen Health Week offers a moment to raise awareness about the state of adolescent health and to highlight opportunities for future efforts. Here are some of my suggestions for how we can move the dial on ACEs:

- Public health efforts and social policies should continue to prioritize work that builds our capacity to prevent ACEs and reduce their impact.
- Likewise, we should continue to prioritize sports, recreation, and physically active play, which already have recognized roles in promoting lifelong health, beginning in early childhood. Future work should incorporate the insight that exercise has a positive impact on health in virtually every domain that is impacted negatively by ACEs.

- New research should focus on clarifying the ways in which exercise and adversity may influence common biological pathways, and identifying the potential role for exercise in reducing the impact of ACEs.

- We should continue to explore how the influence of exercise may be magnified by the protective power of human connection, including through mentorship programs.

- Our work in these areas must continue to actively incorporate the voices of youth, while remaining sensitive to their developmental needs and status as a vulnerable population, and responsive to their goals and wishes.

Our team has been honored to partner with SRPS to take steps in advancing this important work. The road to overcoming adversity may still be long — but it is wide enough that we can run together as a pack, inviting new partners with shared intentions and new insights along the way.

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