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Michael Buffett Greenberg
Bard College, mg7340@bard.edu

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How Our Public Education System Discourages Curiosity and Encourages Depression and Anxiety

Senior Project submitted to
The Division of Social Studies
of Bard College

by
Michael Greenberg

Annandale-on-Hudson, New York

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Abstract

The increase in adolescent depression over the last decade has been well-documented. Though promising treatments continue to be developed, the rate of increase is clearly outpacing our ability to help those who suffer. As such, it is worth taking a look at what factors may be contributing to this increase. The argument contained in this paper is that the nature of public education, in particular its existential reliance on extrinsic motivation, encourages depression through both implicit and explicit discouragement of curiosity. Curiosity will be posited as key marker of human vitality, and human vitality will be investigated as an inherently prosocial phenomenon. Self-Determination Theory's proposition of basic psychological needs will provide an understanding of how this prosocial nature can be nurtured, as well as a lens through which to understand the fundamentally incompatible relationship between the current state of public education and curiosity. The paper will conclude with some thoughts on the puzzle of meaningful school reform.

Sow Its Is

Despite its inclusion in the first edition of the DSM back in 1952, treatment of depression continues to be something of a mystery (APA, 2020). Or at least a formidable puzzle box. While the SSRIs of the 1980s were at first celebrated as some kind of miracle drugs, depression has proven to be far too complex a psychological phenomenon to have a simple chemical fix¹ (Callahan & Berrios, 2005). Fortunately, we have a vibrant community of mental health practitioners who are more dedicated to understanding and vanquishing depression than depression is to winning. But we should make no mistake: depression is winning.

Lifetime prevalence of adolescent depression has been on the rise over the last decade, with an increase from 12.8% in 2011 to 18.1% in 2016 (Lu, 2019). With today's adolescent population of 42 million, such a rate suggests roughly 7.5 million adolescents² will struggle with depression at least once in their life (HHS, 2019). On a particularly grim note, roughly 11% of all teenage deaths are from suicide, compared to 6% from cancer (CDC, 2010).

Perhaps the only thing more absurd than nearly twice as many teenagers dying intentionally than unintentionally is the fact as a society that we do almost nothing

1. Though psilocybin has been showing incredible potential as a... "simple" chemical fix (e.g., Carhart-Harris, Bolstridge, Rucker, Day, Erritzoe, Kaelen, Bloomfield, Rickard, Forbes, Feilding, Taylor, Pilling, Curran, & Nutt, 2016).

2. That is more than the combined total populations of Chicago and Los Angeles.

proactive to prevent depression from developing in the first place. My contention is that we have the perfect vehicle for a large-scale intervention to reduce the toll depression takes on adolescents and, as they grow, adults.

We do have a public education system, after all.

To be fair, the last couple of decades have seen a rapid proliferation of social emotional learning (SEL) programs. Built on the understanding that children need a solid base of emotional intelligence in order to succeed in school and in life, schools across the country are supplementing traditional curriculum with SEL (CASEL, 2020). Among other positive life outcomes, SEL programs have been found to be a protective factor against the development of depression (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). This is an unequivocal good. It is also not cutting it.

While SEL programs are arguably our best available option for large-scale preventative mental health services, the continuing rise in depression suggests we have a deeper problem, one that cannot be remedied with supplementary programs and palliative care. Perhaps we have something working against us.

With this paper, I intend to make the case that the nature of our public education system³ works against the psychological well-being of children, and that it does so

3. I want to note here that although I am using public education as the example, many, if not most, private schools operate on the same set of educational principles I will be discussing. Further, I do not mean to denigrate public education as a *concept*. I have a strong belief in the importance of a vital public education system being available to all children. My intention with this paper is simply to illustrate how this is not what we have *now*.

through the inhibition of curiosity. Not just through the inhibition of *children's* curiosity, but through the inhibition of the curiosity of theoretically everyone who works in education, starting with the Department of Education and trickling down from there. I will suggest that an ongoing state of national self-consciousness makes us afraid to embrace new things even though we have evidence of their effectiveness.

The nature of my argument, therefore, is organismic. It treats our public education system as an emergent organism with successive levels (i.e., students, teachers, principals, superintendents, school boards, state DOE, federal DOE, etc.) of coordinated functioning. Where the layers of a biological organism communicate chemically, the layers of a societal organism communicate psychologically. I will therefore use Self-Determination Theory, an organismic theory of psychological well-being, to illustrate the relationship between the levels of the education system and how the psychological well-being of the Department of Education influences the psychological well-being of everything below it. In doing so, I hope to illustrate how the extrinsically motivated nature of our public education system discourages curiosity and therefore encourages depression and anxiety.

I will conclude the paper with something approximating optimism.

Vital Instincts

"Our mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access."

Mission Statement, U.S. Department of Education

Children are chaotic. Anyone who has ventured an early-morning foot into a preschool classroom knows well the oftentimes overwhelming combination of noise and locomotion characteristic of a group of budding youngsters. Such a scene is easy to write off as...well, chaos. Disorder. Pandemonium, perhaps. And to be sure, children, in this environment, are not necessarily operating out of consideration to the sensitivities of the adults around them. But that does not mean they are without an explicit direction. In fact, they are operating under the iron-grip of something far more commanding than an adult could even hope to be, a power whose forcefulness is so all-encompassing, so deterministic, the children literally cannot help themselves: their curiosity.

Curiosity is more than an explicit desire for information, it is an innate need to make sense of our moment-by-moment experience of the world. So innate, in fact, that its neurological substrate undergirds virtually every behavioral inclination of our lives - what do we approach and what do we avoid? (Alcaro & Panksepp, 2011). As such, each person's curiosity represents something of their true self, a window into how they organize the world and what they value - or do not value. For children (and likely for

adults as well), the determinants of this value are based around what facilitates physical and/or social survival (Geary, 2007). It is perhaps unsurprising, then, that information learned in a state of curiosity is better remembered than information learned in a non-curious state. In fact, research has found we are willing to sacrifice scarce resources for information about which we are curious (Kang, Hsu, Krajbich, Loewenstein, McClure, Wang, & Camerer, 2009).

The purposes of the following subsections are to establish an understanding of the neurological basis of curiosity, of children's evolved propensity to integrate into society, and how these two factors interact in a setting like a classroom.

Why So Curious?

Though lacking an official scientific definition, research into curiosity tends to coalesce around a common understanding of the concept as an "intrinsic motivation to learn" (Gruber, Gelman, & Ranganath, 2014), or learning for its own sake. To learn for its own sake suggests we experience - and therefore are motivated by - a particular level of emotional satisfaction when learning (Alcaro & Panksepp, 2011), much like the deep satisfaction of achieving a personal goal. Thus, curiosity invites us to engage with learning as not just an intentional, achievement-oriented pursuit but as a defining characteristic of our personality. We are curious about that which we care.

The subjective, emotionally motivating nature of curiosity reveals the brain as a

cybernetic system, meaning it is goal-directed and self-regulating. The brain sets goals based on a combination of emotional and sensory processing - for example, wanting to alleviate loneliness. It achieves these goals through the integration of new information with its own knowledge and experience - for example, choosing which people to approach based on who has been nice to them before. In order to carry out this process, the brain exists in a state of constant learning, which can be sub-divided into three interdependent categories:

“[learning about:] (1) desired end states or goals, (2) the current state, largely comprising evaluations and representations of the world as it is relevant to those goals, and (3) a set of *operators* potentially capable of transforming the current state into the goal state; operators are skills, strategies, and plans that aid one in moving toward one’s goals” (DeYoung, 2013).

The first kind of learning, the goals themselves, may or may not be expressed in explicit terms, such that the person may or may not be conscious of them. In the context of a cybernetic system, a goal describes a *state of being* rather than an *object or experience*, per se. A goal may of course *involve* either of these things - say, winning \$10 million in the lottery, or making a new friend. But the value of the object or experience is in the *neurological state* it creates in the cybernetic system of the brain.⁴ Whether attached to

4. Money of course has value in the world, but even that value is based only on a complex set of brain states between all involved. Food would be an example of a thing with objective value, in that it provides calories to a biological system, but even then, the food’s value is in the alleviation of...an aversive state: hunger and its related emotions.

physical objects, social interactions, or anything in between, goals describe any state the brain wishes to realize and / or maintain on a moment-to-moment basis.

The specifics of a given goal - and of course multiple goals are often activated simultaneously - shape the next two types of learning articulated by DeYoung (2013) by informing how the brain evaluates and represents the world, while also suggesting cues to identify methods to achieve said goal (Alcaro & Panksepp, 2011).

Take, for example, a lonely preschooler's brain that creates a goal to make a new friend in order to alleviate loneliness. Having delineated this goal, the brain will evaluate and represent the environment, perhaps according to where other children are and what they are doing (rather than, say, what time it is or where the bathrooms are). It will then identify operators to help the child become friends with one of those children (perhaps a set of cool-looking toys). Of course, some goals are more difficult than others to achieve, and it is according to this difficulty that curiosity comes into play.

In the cybernetic brain, the gap between a goal and its attainment is "psychological entropy" - the difficulty of the brain to know, anticipate, or make sense of what is happening in the environment and therefore what it should or could do in order to attain a goal state. Cybernetic systems are defined by the need to reduce entropy (Hyötyniemi, 2004). As such, the brain responds to entropy with anxiety - a response to the loss of the comfort of certainty as the number of available options increases. Fortunately, the brain has an innate mechanism to overcome entropy: curiosity.

Well, sometimes. Curiosity, as evidenced perhaps by the ease with which it can be discouraged (Bonawitz, Shafto, Gweon, Goodman, Spelke, & Schulz, 2010), is a fragile thing. Because curiosity requires a spark of anxiety, entropy begets curiosity, which can be thought of as the *motivation* to overcome entropy. (Whether or not the person acts on that motivation is a different story, which I will discuss later.) But too much entropy and the person can become overwhelmed; too little entropy and the person can become bored (DiDomenico & Ryan, 2017).

Sustainment of curiosity, therefore, rests on the careful balance of certainty and uncertainty. That is to say, it occurs when uncertainty that also cues the potential *for* certainty. For example, when a sudden wonderment about the odds of winning the lottery reminds a person their uncle is a statistician. When the brain discovers an information gap that it has a sense of how to close, and when the closing of that gap leads to more entropy that also cues a path to understanding, curiosity can be a bottomless force keeping people motivated through everything from making friends at a new school to earning a law degree (DiDomenico & Ryan, 2017). The scientific literature describes such a quality of entropy as containing “incentive reward” - or illuminating a path toward *achieving* a particular goal (DeYoung, 2013).⁵

These rewards are evaluated by the brain’s dopaminergic SEEKING system, which functions as the ground-floor of the brain’s curiosity response. As alluded to earlier, the

5. “Consummatory reward,” on the other hand, describes the achievement of the goal itself (DeYoung, 2013).

SEEKING system governs the most fundamental entropy-response of all: approach or withdrawal (Alcaro & Panksepp, 2011). When something unpredictable happens, do we move toward or away; are we piqued by curiosity or repelled by anxiety?

The answer to this question lies in whether the unpredictable event signals reward, whether incentive or consummatory, or punishment. (And again, entropy-inducing events can be as simple as a door opening or as complex as a college acceptance letter.) Such evaluations are carried about by two types of dopamine neurons: value- and salience-coding.

Value-coding neurons are excited by rewarding events and inhibited by aversive events, according to a “reward prediction error” (Bromberg-Martin, Matsumoto, Hikosaka, 2010). An event that turns out better than predicted yields proportional dopamine excitement; an event that turns out worse than predicted yields proportional dopamine inhibition. Events that turn out exactly as good or exactly as bad as predicted have virtually no effect on dopamine response.⁶

Salience-coding neurons, on the other hand, are excited by both rewarding *and* aversive events, according to what they signal about the rewarding (or not) nature of the environment (Bromberg-Martin et al., 2010). Salience-coding neurons help orient people in relation to potentially rewarding or aversive events. Take each in the context

6. Though, because the brain’s ability for precise temporal predictions falls off considerably beyond a few seconds, *exact* predictions are not common (Bromberg-Martin et al., 2010).

of our lonely preschooler.

Having established she would like to make a new friend her brain orients her in the environment based on the location and activities of other children. Overall entropy is reduced. Because she is a bit shy, she is not interested in approaching children in groups larger than two. Overall entropy is increased. Her salience-coding neurons excite upon observation of both the aversive large (three-or more) and rewarding small (two-or less) groups of children, signaling the location of possible rewards and punishments. Overall entropy is reduced.

Having identified three groups of two children, she considers the activities in which each group is involved. Overall entropy is increased. Group one plays make-believe school, group two colors with crayons, and group three builds with blocks. Overall entropy is reduced. Being a fan of make-believe, she wanders to group one and asks if she can join. The children say no. Having expected at least a tentative welcome, her value-coding neurons are inhibited, generating a bad feeling. She learns from this feeling not to approach these children again. Entropy increases in regard to these specific children (for she cannot make accurate predictions about them based on available information as she first thought), but she already has two other strategies with incentive reward (approaching groups two and three), so she re-orientes herself to those groups. Overall entropy is reduced.

She approaches group two and asks if she can color with them. Not only do both

children say yes, but one of them tells her he likes the cartoon character on her t-shirt. The interaction being so much better than she predicted, particularly after her previous rejection, her value-coding neurons excite like crazy. This gives her a rush of euphoria and motivation. Entropy around the goal of making a new friend reduces, but entropy also increases because she has entered a whole new world of unpredictability. She, along with every other child, will continue this pattern of goal-setting and exploration through the rest of the school year and beyond. But what are those goals?

Where Children Come From

In his book, *Blueprint: The Evolutionary Origins of a Good Society*, Nicholas Christakis argues that humans' genetic code predisposes us to create constructive, prosocial societies. The construction of these societies is "not just something we *can* do--it is something we *must* do" (Christakis, 2019, p. 13). To do otherwise, he asserts, puts us on a path toward societal collapse.

He supports this bold claim in part through a review of experimental evidence demonstrating prosocial behaviors (including fairness, reciprocity, and in-group bias) in children as young as three-months old, which suggests such behaviors have a hardwired, evolutionary origin (Christakis, 2019, p. 5). The evolutionary basis of these traits, he contends, provides evidence for why, with some level of variation, "every society values kindness and cooperation, defines acts of cruelty, and categorizes people

as either virtuous or nasty" (Christakis, 2019, p. 5).

From such evidence Christakis creates a list of "cultural universals," features which cultures must include if they are to be successful - that is, to avoid collapse. He terms these universals the "social suite," a set of eight features that characterize successful groups all around the world. These traits are:

"(1) the capacity to have and recognize individual identity, (2) love for partners and offspring, (3) friendship, (4) social networks, (5) cooperation, (6) preference for one's own group (that is, "in-group bias"), (7) mild hierarchy (that is, relative egalitarianism), (8) social learning and teaching" (Christakis, 2019, p. 12).

He provides evidence for his proposal through the explication of various types of real-world societies, ranging from the unintentional (communities formed by the survivors of shipwrecks), to the intentional (communal utopian experiments, of varying success), to the hyper-intentional (lab-created virtual societies), all of which illustrate how the existence of these eight features correlate with successful communities and the betrayal of any combination of these features correlates to societal decline and total or near-collapse, sometimes through violence (Christakis, 2019, p. 48).

Such evidence suggests it is not that humans *cannot* create societies without the "social suite." Rather, it is that doing so impedes prosocial human flourishing, which emerges from a "blueprint" written by our genes (Christakis, 2019, p. 16). Explaining his specific choice of the word "blueprint," Christakis emphasizes that blueprints, like genes, are structural plans that leave room for the interpretation of specifics. This

interpretative space explains the aesthetic cultural differences that sit atop the eight cultural universals. It also explains how an outcome of human flourishing is not guaranteed.

To answer the question posed at the end of the last section (What are the goals of children?), the answer seems to be, in a broad sense, building prosocial communities. In addition to the experimental evidence cited above, anthropological research into the nature of children's spontaneous play shows play to be characterized across every culture⁷ on Earth as being social in nature, and oftentimes an imitation of adult roles. Even in the absence of adults, children are driven to interact in accordance with the social suite and develop skills to integrate into society (Christakis, 2019, p. 3).⁸

Neurological evidence also supports the innate prosociality of children. Experience-*expectant* plasticity describes a type of plasticity wherein the brain creates neuronal structures in *preparation* for the development of particular abilities. Unlike experience-*dependent* plasticity, which occurs throughout the lifetime and describes brain changes in *response* to experience, experience-*expectant* plasticity occurs in early development. It characterizes critical developmental periods, wherein failure to develop the ability in a pre-programmed time frame means the skill will never develop as normal (Kolb,

7. With one known exception, the Baining people of Papua New Guinea (Christakis, 2019, p. ___)

8. Even the imaginary children playing school who rejected our imaginary preschooler could be seen as acting in accordance with the social suite, which includes the oftentimes troublesome, "in-group bias."

Harker, & Gibb, 2016).

Speech-development follows such a pattern. There is a sequence of critical periods occurring over approximately 20 months beginning with language discrimination (wherein infants go from being able to discriminate sounds in any language to only those in their native language) and culminating in word forms and phonological categories (Birdsong, 2018). Each of these critical periods relies on interaction with speakers of the infant's native language. If social interaction, and therefore speech development, does not occur within the first three years of a child's life, the child will be unable to develop normal speech abilities.

That the brain not only *expects* to learn a language (the cornerstone of society) but *requires* social interaction to do so *and* can only do so within a given window speaks to the genetic basis of the social suite.⁹ Taken to an unfortunate extreme, the developmental differences between abuse and neglect illustrate how neurological substrate will still develop in response to negative interactions, but not an absence of interaction (Teicher, Dumont, Ito, Vaituzis, Giedd, Andersen, 2004).

Children's instinctive goals, it seems, are to integrate. In a hurry.

9. Speech is, of course, not the only human capability that requires practice in order to develop and avoid atrophy. However, many of these other capabilities (e.g., sight, locomotion) do not require a social human context to be *useful*. That is to say, even a child raised by wolves would benefit from being able to see and to walk. Speech, however, (or specifically language) is not only arguably useless outside of a social context, but in fact human's ability for complex language is seen as a primary factor distinguishing us from other animals (Harari, 2011).

Great Expectations

Fossil records suggest the modern human brain arrived at its "characteristic globular shape" about 35,000 years ago (Neubauer, Hublin, & Gunz, 2018), though anatomical homo sapiens are believed to have originated 315,000 years ago (Callaway, 2017). Both of these evolutionary traits developed during the Pleistocene era, beginning about 2.6 million years ago and ending about 11,700 years ago. Because of these particular developments, the Pleistocene era gets most of the attention in conversations about cultural evolution (Harari, 2011; Harris, 2019; Klein, 2020). However, dopaminergic systems are found in a vast enough spectrum of species as to include invertebrates, an evolutionary split which occurred roughly 450 *million years ago* (Berkeley, 2019). Therefore, it seems to follow that the same basic mechanics apply to everyone, underneath contextual specifics.

As discussed above, the instincts of unsupervised children often motivate them to practice the skills of their elders, presumably in order to integrate themselves into society. Given their exploratory nature, we might consider such motivations as manifestations of curiosity (i.e., Can I do this? What happens if I try? How do I get better? What do I get out of it?, etc.), particularly since entropy-reduction goals need not be conscious to be at work (DeYoung, 2013). As the dopamine system mediates motivational potential, dopamine itself functions as a key *moderator* of the relationship

between curiosity and behavior (Alcaro & Panksepp, 2011). We seek out what might feel good and return to what does feel good.

That one of the most intrinsically rewarding experiences for theoretically *all human children* is the exploration of societal integration - and that societal integration facilitates healthy brain development - has profound implications for how our society relates to children. Some of the most profound implications may be found in education. Notably, what happens when room for curiosity-driven exploration does not exist?

Public education, with its grade levels, seating charts, schedules, and grades, is not known as a hotbed of spontaneity. As the U.S. Department of Education's mission statement says, federal oversight of education is predicated on ensuring equal access to the promotion of student "achievement," "competitiveness," and "excellence" - three self-conscious concepts defined and enforced by adults, each requiring some degree of evaluation of children's behavior (DOE, 2020). And the evaluations are manifold.

Children are expected to learn specific pieces of information, and to develop specific skills, on predetermined timelines. Failure to do so can result in a child being held back a grade or placed in remedial classes. Standardized tests loom over these timelines, casting long shadows over the curricular landscape teachers might otherwise explore to children's developmental benefit. In fact, the constriction of freedom teachers face is so ubiquitous it has a nickname along with its own field of research - "teaching to the test" (Popham, 2001).

And just how tight is the constriction? A study of the 2014-2015 school year by the Council of the Great City Schools found the average U.S. public school student took 112 standardized tests between preschool and 12th grade (Hart, Casserly, Uzzell, Palacios, Corcoran, Spurgeon, 2015). Such findings occurred while No Child Left Behind was still in effect, having since been replaced by the Every Student Succeeds Act, which allows districts greater flexibility in their use of standardized testing. It is not clear, however, that any states have made substantive changes to their districts' standardized testing practices (Gewertz, 2018).

My goal here is not to argue that standardized tests are "bad," though research does exist illustrating their potentially deleterious psychological effects (i.e., Fleege, Charlesworth, Burts, & Hart, 1992; Herman, Abedi, Golan, 1994). Rather, it is to illuminate the intensity and frequency of the impersonal evaluations children face on a regular basis, and the psychological effects of such evaluations, particularly with regard to the socially integrative motivation of their curiosity. And researchers have found significant interactions between educational environments and curiosity.

Susan Engel, a psychology professor at Williams College who teaches on the psychology of education and founded the college's Program in Teaching, has spent her career studying children's curiosity. She has found that as children move from one grade level to the next expressions of curiosity in the classroom diminish (Engel, 2009). She and Randall (2008) found that a teacher's tendency to foster curiosity can be

informed by the directive they were given. Teachers who were told to help children learn about science were more likely to encourage a child's deviation from the planned lesson than were teachers who were told to help children complete a science worksheet (Engel & Randall, 2008). A 2002 study by Hackmann and Engel illustrated an inconsistency around how we value curiosity - though of 75% of teachers polled chose "curiosity" from a pre-written list of qualities when asked what they want to nurture in students, only 25% of them named it at an earlier time point when asked to generate traits they value.

The same 2002 (Hackmann & Engel) study found a correlation between teacher affect and children's expressions of student curiosity, with smiling and encouragement related to curiosity behaviors. Moore and Bulbulian (1976) found similar results, showing a differential impact of adult interactive styles - "friendly-approving" or "aloof-critical" - on children's expression of curiosity. This finding illustrates how Hackmann & Engel's (2002) finding about affect could snowball into a situation like Engel's (2009) finding about expressions of curiosity decreasing as children age. Engel found analogous results suggesting a child's tendency to explore a novel item was informed by their environment, including their teacher's demeanor (Engel, 2011).

Together, this evidence demonstrates the psychological effects of evaluative contexts, such as public education, on expressions of student curiosity. This result is all the more alarming when considered in light of our genetic instinct to express prosocial behavior

through curiosity. In our cultural mission to have students achieve, compete, and excel, we may in fact be impeding the human mission to thrive, love, and cooperate (Christakis, 2019, p. 12).

I do not, however, mean to imply that children should never be evaluated. What I want to convey is that the type of evaluation, as well as the motivation behind the evaluation, has a psychological impact. Accordingly, I believe public education's evaluations, which are motivated by academic performance, carries an immense psychological toll. I will lay out how this happens in the next section. I believe this evidence makes a strong argument for a total revamping of the goals and means of education (Ryan & Deci, 2016, p. 239). But even for those who believe academic measures to be of utmost importance, curiosity should still be a priority as it is a trait that increases the overall likelihood of academic success.

A longitudinal study of 6,200 children found two key results regarding curiosity and achievement in both reading and math. First, curiosity was found to be as predictive of both reading and math achievement as effortful control (i.e., sustained attention and persistence).¹⁰ Second, the correlation between curiosity and achievement (reading and math) was positive for all children, but even more so for children of low socioeconomic

10. This is perhaps not surprising considering that curiosity in a topic predicts deeper engagement with and learning of that topic (Kang et al., 2009).

status (Fig. 1) (Shah, Weeks, Richards, & Kaciroti, 2018).¹¹

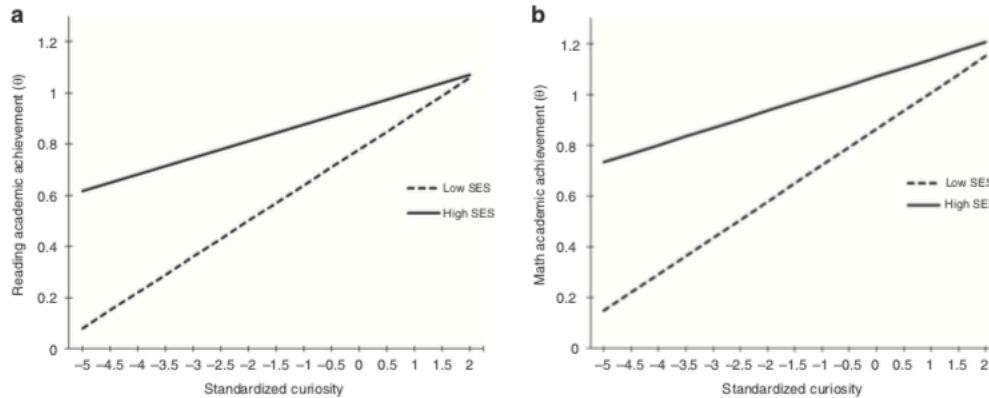


Fig. 1 Moderation of curiosity by socioeconomic status with reading and math academic achievement. **a** Reading academic achievement stratified by SES. **b** Math academic achievement stratified by SES. --- Low SES, — High SES

(Fig. 1, Shah, Weeks, Richards, & Kaciroti, 2018)

Further, a meta-analysis by von Stumm, Hell, and Chamorro-Premuzic (2011) suggests the combined forces of curiosity and effort (which we should presume are related (Bromberg-Martin et al., 2011) to be as predictive of academic performance as general intelligence. We would do well to foster curiosity in the quest for “equal access” to “academic excellence,” particularly if “equal access” includes children of low socioeconomic status.

Though I am essentially contrasting public education to unsupervised play, I am not arguing that, rather than go to school, children should be left unsupervised until they

11. I hypothesize this is related to the previous result about effortful control. Poverty has been shown to have deleterious developmental effects on executive functioning, meaning children from low-income households are likely to have diminished ability to exercise effortful control. The motivating effects of curiosity, then, might work as a compensatory force.

become adults. What I am arguing is that we would benefit from a better understanding of the psychological mechanisms that *moderate the relationship* between supervision and curiosity because curiosity is a marker of vitality (DiDomenico & Ryan, 2017). Doing so could help us create a more supportive environment in which children can thrive, influencing their communities according to the prosocial blueprint of their genetic code, which itself aids in their ability to learn culturally relevant information.

In the following section I will take an in-depth look at what I believe to be the most fundamental moderator of this relationship: psychological autonomy. I will illustrate the fragile nature of its existence, and how its ongoing disturbance can discourage children from *wanting* to learn culturally relevant information, and is even disposing them toward antisocial afflictions like anxiety disorders and depression.

Anchors A-weigh

"The opposite of depression is not happiness, but vitality..."

(Solomon, 2001, p.443)

Edward Deci conducted his first experiment on autonomy in 1971. He sought to build on an inconsistent, but compelling, body of evidence that suggested that certain types of extrinsic rewards (i.e., money) for otherwise enjoyable activities can cause a shift in the feeling of causality from within the person to outside of the person. Such a shift leads to a decrease in intrinsic motivation for those activities once the reward has been attained (Deci, 1971). This evidence contradicted some behaviorist experiments that suggested that extrinsic rewards (i.e., food) could function as "secondary reinforcers," leading to lasting *increases* in intrinsic motivation - even in otherwise enjoyable activities (Davis, Settlege, and Harlow, 1950).

Intrigued by the contradictory evidence, Deci suggested that the issue was more complicated than just whether a reward was extrinsic or intrinsic (i.e., emotional satisfaction). The critical factor was whether the reward triggered a process of "cognitive re-evaluation." That is, does the person experience the reward and its context as "informational," in which they experience support for their autonomy, or "controlling," in which they feel pushed toward a specific outcome. He hypothesized that certain types of extrinsic rewards (money) would trigger this process of re-evaluation, while others (unexpected verbal reinforcement) would not. In essence,

extrinsic rewards that are phenomenologically identical to a sense of internal satisfaction would be experienced as informational, rather than controlling (Deci, 1971).

His findings in support of this hypothesis were only the first trickle of what would become a decades-long tsunami of evidence supporting the relative fragility of autonomy and its critical role in motivation and psychological well-being (Ryan & Deci, 2017). In fact, Deci and his research partner Richard M. Ryan went on to develop Self-Determination Theory (SDT), a theory of motivation that posits autonomy as one of human beings' three basic psychological needs, along with competence and relatedness. SDT suggests it is the supporting or thwarting of these basic psychological needs that determine an individual's motivation and influences their psychological well-being (Ryan & Deci, 2017).

The argument I make over the following subsections is that psychological autonomy is a necessary pre-condition for expressions of curiosity, because expressing curiosity is, by definition,¹² an act of autonomy. Although SDT posits the necessity of all three needs for full human flourishing (which we might conceive of as the expression of behaviors in complete accord with the social suite¹³), competence and relatedness will only be

12. That "definition" being, "intrinsic motivation to learn" (Gruber, Gelman, & Ranganath, 2014).

13. i.e., having a clear grasp on one's own identity, giving/experiencing unconditional love, engaging reciprocal friendships, practicing good hygiene, supporting those in your community, having agency to pursue interests, taking opportunities to lead and to follow

discussed to the extent they are relevant (which they are), but will not be explored with the same depth as autonomy (Ryan & Deci, 2017, p. 247).

The following subsections will: provide an overview of the basic relationship between curiosity and psychological autonomy, provide an overview of the relationship between biological autonomy and organizational functioning, use SDT to analogize biological organization to psychological organization, and finally explore how the public education system's suppression of curiosity influences depression and anxiety via the thwarting of psychological autonomy.

The Condition of Curiosity

The perceived locus of causality (PLOC) describes where a person senses a given behavior to have originated, either internally (I-PLOC) or externally (E-PLOC); within themselves or the environment, respectively. SDT identifies autonomy as behavior that has an I-PLOC. In other words, it results, over and above anything else, from intrinsic motivation.¹⁴ Intrinsic motivation describes the psychological experience of behavior driven from a full endorsement by one's own values, rather than, for example, for a grade, because you think you should, or because of what someone else might think of you. Autonomous behavior is what you would be doing in any given moment even in

14. Meaning, for example, a person who is paid for a job can still feel autonomous if they love what they do (Deci & Ryan, 2016, p.125).

the absence of any obvious reason to do anything.¹⁵

In contrast to autonomy's relative psychological simplicity - are you the primary cause of your behavior or not? - extrinsic motivation comes, according to SDT, in four flavors. Each type has a slightly different impact on behavior and well-being, according to an "internalization continuum" (Figure 2). Internalization describes the extent to which one has taken in "values, beliefs, or behavioral regulations from external sources and [transformed] them into one's own" (Ryan & Deci, 2017, 2016, p.180). This continuum will be crucial in illustrating a link between autonomy and curiosity.

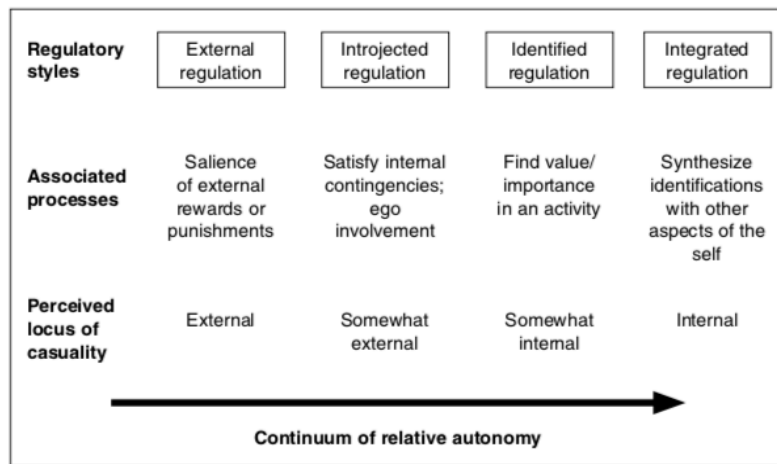
SDT proposes five general causalities for human behavior, one internal and four external. From most intrinsic to most extrinsic, the causalities are:

- *autonomous* (intrinsic motivation),
- *integrated regulation* (behavior aligns with sense of self),
- *identified regulation* (recognition of a behavior's value or importance),
- *introjected regulation* (ego preservation), and

15. I want to emphasize here the first-person nature of psychological autonomy. Autonomy often comes up in common parlance around issues of people's freedom to make choices for themselves, and whether or not external factors restrict that freedom (i.e., Purdy, 2006; Schmidt, 2019). However, whether or not a person was *theoretically* free to make whatever choices they wished does not mean they *felt* free to make whatever choices they wished. As a theory of psychology built on organismic biological principles (more on that later), SDT identifies ways both macro and micro in which the first person psychological experience of our environments disrupts autonomy, regardless of what may appear to be going on to anyone else.

- *external regulation* (to gain a reward / avoid a punishment) (Niemic & Ryan, 2009).

For the purposes of understanding how the thwarting of autonomy suppresses curiosity, I want to focus on the distinction between *external* and *introjected* regulation.



(Figure 2, Niemic & Ryan, 2009)

External regulation describes, for example, a student who studies and does their calculus homework only for the purpose of getting an “A,” because one way or another (e.g., they get paid for good grades, they get grounded for bad grades) that particular grade helps them earn a reward or avoid a punishment. Regardless of the specifics of the reward or punishment itself, it is about *external* value, or what use the behavior provides in the world. The crucial quality of *external regulation* is that it does not trigger concerns about self or identity, it is free of self-consciousness (Ryan & Deci, 2017). Of course, earning money or getting grounded (to say nothing of the countless other forms

of rewards and punishments) *can* induce a feeling of self-consciousness, but they do not have to do so by definition.

Introjected regulation, on the other hand, is defined by self-consciousness. The introjected student studies and does homework for class because they don't want their peers to think they are stupid, because they don't want their teacher to judge them, or because they want their math professor father to be proud of them (no, my father is not a math professor).

In terms of relating autonomy to curiosity, there are both behavioral and psychological factors, both of which I will frame within the context of *external* and *introjected regulation*. The psychological differences between these two forms of regulation are stark, but from a behavioral standpoint, the effects of *external* and *introjected regulation* are quite similar.

Because they are both experienced as an E-PLOC, a controlling form of motivation, any behaviors associated with them are likely to cease once the contingency has been lifted. Our students above are unlikely to review their notes or practice their calculus skills once class has ended for the semester. One's individual feelings about advanced mathematics will determine whether such an outcome is a tragedy in and of itself (I do not feel a great level of concern), but there are larger behavioral implications than just whether behaviors *cease*.

Beginning with Deci's (1971) experiment on autonomy, a primary concern of SDT

has been how contingencies affect the *continuation* of behaviors. However, the issue of curiosity also hinges largely on whether someone engages a *new* behavior. As such, my interest lies not in how *external* and *introjected regulation* affect existing behavior, but whether they impede new behavior, curiosity most particularly, from emerging in the first place.

A through line of the curiosity research cited in the previous section was the inhibiting effect of external contingencies (whether presumed or actual) on expressions of curiosity. In Moore and Bulbulian's (1976) study, children who experienced activation of external contingencies in an initial arranging task (an adult saying "I hope [you] will do the task right—the way it ought to be done," and "there should be a fence around these animals over here") displayed fewer expressions of curiosity in a subsequent exploratory task than did children who experienced activation of self-ownership in the initial arranging task ("You will be a big help to me," and "I really like the way you arranged the animals").

Engel and her colleagues found similar results. Her 2002 study found a relationship "between how much the teacher smiled and talked in an encouraging manner and the level of curiosity the children in the room expressed" in exploring a large box with eighteen drawers each containing a different item (Hackmann & Engel, 2002). In the context of SDT, such results could be seen as the effect of autonomy support on curiosity. Similar to Deci's (1971) experimental use of positive verbal feedback, smiling

and encouragement, though external, have informational value and therefore support autonomy. In fact, the participants in Deci's study who continued to work on puzzles even in the absence of a directive to do so, and in the presence of other enjoyable activities, could be seen to be satisfying their curiosity.¹⁶

In addition to direct effects, Engel's research also demonstrates the trickle-down effects of controlling contexts on children's curiosity. Engel and Randall (2008) demonstrated that when teachers are given open-ended, autonomy-supportive informational context ("Please help this student learn more about science") they are more likely to foster both children's and their own curiosity than when they are given an outcome-oriented, controlling context ("Please help this student fill out this worksheet").

As discussed, the concern with curiosity is not just which behaviors these types of contingencies discourage the continuation of, but which behaviors these contingencies impede the initial *existence* of. I believe the inhibiting role of controlling contexts on expressions of curiosity illustrated in these studies supports the necessity, though not necessarily the sufficiency, of autonomy for said expressions. Of course, I do not intend to rest such a large claim on only a handful of experiments.

Self-Determination Theory provides an extraordinarily effective framework for

16. The specific game used was called *Soma*, a puzzle game by Parker Brothers that was apparently quite engaging (Deci & Flaste, 1995).

distinguishing the various ways social context affects psychological functioning (and therefore behavior), because it analogizes social context and psychological functioning to chemical environment and cellular functioning. That is to say, SDT is an *organismic* theory, in that it suggests psychological functioning arises from a “social metabolic process,” much like how physiological functioning arises from a digestive metabolic process (Ryan & Deci, 2017, p.31). Because I will be using the language of organization in discussing how our public education discourages curiosity, the next section will provide an overview the basics of organismic functioning from a biological perspective. The following section will overview SDT’s psychological analogy.

Organismic Functioning

Organization describes the sequential levels of life found in biology, from atoms to the biosphere,¹⁷ in which each successive level emerges from the coordinated interactions of the components of the level below. For example, organ tissue *emerges* from the coordinated interaction of individual cells. Organization, then, also becomes an engine of *identity*. Each emergent layer has a physical boundary by which it is known (cell, tissue, heart, cardiovascular system, human body, etc.) and through which it interacts with the external environment (Ruiz-Mirazo, Etxeberria, Moreno, & Ibañez

17. The full sequence of levels is: atoms ► molecules, organelles ► cells ► tissues ► organs ► organ systems ► organisms ► populations ► communities ► ecosystems ► biosphere (Stanford, 2018).

2000).

This environmental interaction occurs via *metabolic processes*, which take in environmental information and process it into something the organism can use (e.g., photoreceptors absorbing light or liver cells absorbing glucose) (Jheeta, 2007). We can see a psychological correlation of metabolic processes in SDT's conception of internalization and the *internalization continuum* (Figure 2). That is, degrees of psychological internalization describe the extent to which particular "values, beliefs, or behavioral regulations from external sources" have been metabolized into one's own regular functioning (Ryan & Deci, 2017, p.180).

Of course, organisms sometimes metabolize things they *cannot* use (i.e., spoiled food, a flu virus, mercury), which can lead to temporarily or permanently impaired functioning, or death. When something harmful has been metabolized, an organism's survival depends on its ability to maintain *autonomy*. In biology, autonomy describes an organism's ability to self-generate the means by which it maintains coherent relations among its components (Shimizu, 1993). With regard to a potentially harmful agent, does it become overwhelmed by it, or not?

When an organism does in fact maintain autonomy, that means it was able to *integrate*. Physiological integration suggests "the structures of the body communicate and interact with one another in such a way as to support, nourish, and protect the organism" (Wolf, 1998). That is to say, integration is the actual process of successfully

incorporating environmental (whether aversive or nutritive) information into the organism. Consider, for example, the immune system.

An immune system that fought off and developed antibodies in response to a virus is one that was able to maintain autonomy via integration - it incorporated the environment (the virus) so as to improve its own self-supporting functioning. We can see how physiological integration's "[requirement of] detector and regulatory mechanisms that bring each element into play under the appropriate circumstances at the appropriate time" applies here. The immune system's maintaining of autonomy means it was able to process the virus "on its own terms" such that it was beneficial to the immune system's existence. This mirrors SDT's framing of integration as the self's successful processing of internalized behaviors into autonomous functioning (which again describes full self-endorsement of behavior) (Ryan & Deci, 2016, p. 180; Wolf, 1998).¹⁸

Integration, then, is the "upward" emergent force "motivating" biological organisms' propensity toward differentiation and complexity of structure via hierarchical functioning (Shimizu, 1993; Quastler, 1959). Deci and Ryan (2017, p. 31), rest the basis of the organismic nature of SDT on the understanding that the self has

18. The opposite of psychological integration is *fragmentation*, which describes behavior one carries out without full self-endorsement. This concept will be discussed in greater depth in a later section (Ryan & Deci, 2017, p. 31).

“inherent growth-related, integrative tendencies and capacities for self-organization.”

We might say integration is the force of life itself.

Just as integration instigates the upward emergence of new organizational levels, “downward causation” describes the environment’s ability to affect the functioning of lower organizational levels through the direct interaction with higher levels. That is to say, when the environment is metabolized into an organism, its effects are felt not only at the place where it was metabolized, but also at the levels below. Upon infection of the heart, for example, cells may change their functioning from assisting in pumping blood to producing antiviral interferons (Peake, 2017).

At the base of all these concepts - emergence, metabolism, autonomy, integration, and downward causation - are an organism’s genes (Jheeta, 2017). Genes influence an organism’s “structure, function, and regulation” through *transcription*, which describes the process of DNA information being converted into protein molecules (NIH, 2020). As such, it may be fair to think of genes as what integration acts *on*, or as the materials used in order to create emergent levels of life.

Viewed as a whole, I believe these concepts provide a better appreciation for how to grapple with Christakis’ argument that prosocial behavior is not just natural or intuitive, but that it is genetic, ingrained into the chemical makeup of our *cells*. At the same time, the above review of biological organization also reinforces Christakis’ choice of title, *Blueprint*. Genes, though pivotal, are not *entirely* determinant; they express

themselves in relation to environmental forces. People may be evolutionarily inclined to build harmonious societies, but their environment (i.e., other people) may not be so accommodating. Autonomy is not always an option.

And this reality illuminates the complication of Christakis' argument: it is based in genetics, but it expresses itself in society. Therefore, in order to make it actionable, we must translate organizational mechanisms from the level of cells to the level of people, to the level of psychology. Of course, people are, in a literal sense, a collection of cells. So, although we have a very real phenomenological *experience* of being a "whole person," we are all just carrying out cellular processes on a macro scale.

All behavior, whether physical or verbal, emerges from coordinated cellular functioning. And just as metabolically-coordinated cardiac cell behavior is a scaling up of metabolically-regulated gene transcription, socially interpreted human interactions are a scaling up of neurotransmitter-regulated neuronal communications. Just like coordinated cardiac cells, humans receive signals from one another and turn them into action.

Nonetheless, we do *have* the phenomenological experience of being a person, and as such we have the field of psychology to provide the most functional frame for understanding human interaction at the interpersonal, organismic, level. And in the quest for understanding how to realize Christakis' vision of humanity's inherent genetic potential, which so aligns with our own goals for society, Ryan and Deci's autonomy-

centered organismic theory of human well-being provides the perfect psychological correlate of organizational functioning.

Organismic Psychology

As an “organismic” theory of motivation, Self-Determination Theory (SDT) investigates the mechanisms of well-being from an understanding that, because the self emerges from a biological organism, it too obeys organizational mechanics. And, *as* an emergent organism, the self has an inherent motivation to integrate (Ryan & Deci, 2017, p. 29). Just as the developmental evidence Christakis lays out in his book aligns with the neurology of sensitive periods to suggest children’s genes push them toward deliberate societal integration, SDT suggests this instinct does not go away when a sensitive period is reached, nor when a certain number of friends have been made.

Rather, it does what the force of integration would suggest any organism does: it works to create further integration by maintaining autonomy over its, in this case social, metabolic processes. So, just as cells coordinate behavior through the metabolization of their chemical environment, the self coordinates behavior through the metabolization of its social environment. Our sense of “self” then, according to SDT, is not a fixed entity, but rather a process. It is both “a center of experience and [the] initiator and regulator of volitional behavior” (Ryan & Deci, 2017, p. 52).

And it is the utilization of this biological framing that reveals the true audacity of

SDT. Just as the human heart has a specific biological composition, such that a doctor can apply the same medical advice to virtually every human on the planet (not to mention that hearts can be *transplanted* between humans), the self has a specific psychological composition, such that a psychologist could apply SDT to (theoretically) every human on the planet (Sheldon, Abad, & Omolie, 2009). That is, underneath all the vast subjectivity of the human experience, every last one of us requires the same three basic “psychological nutriments” in order to be the most emergent, integrated version of ourselves. It is in fact through this filter of autonomy, competence, and relatedness that our own subjective experience is metabolized as either supporting or thwarting of our well-being (Ryan & Deci, 2017, p. 241).

As discussed in Deci’s (1971) experiment, as well as in the subsequent development of SDT itself, autonomy is conceived of as full self-endorsement of one’s behavior. That is, a person is autonomous when their behavior emerges first and foremost from within themselves, from a spontaneous intrinsic desire, independent of any external or even partially internal source/s (as laid out in Figure 2) (Ryan & Deci, 2017, p. 198).

Competence describes not just having skills, but having skills that carry some social relevance such that you are able to affect outcomes in your life and community.

Similarly, relatedness describes not just having relationships in a broad sense, but having reciprocal relationships in which you feel connected to important others without condition (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan & Deci, 2017, p. 26).

Though the fulfillment of all three needs is essential to psychological flourishing, autonomy is arguably the most “fundamental” of the needs in that a person cannot experience genuine competence or relatedness in a non-autonomous - or, “controlled” - context. One must feel they are the cause of their competent behavior, or that they are not in a coercive relationship, in order to receive the psychological benefit of either. Of course, the combination of all three needs is necessary for long-term motivation, particularly in social contexts (Ryan & Deci, 2017, p. 200; p. 126).

The ultimate *effect* of a given social context on our behavior represents the “functional significance,” or psychological meaning, we have given to that context. Consider the result of eating either fresh spinach or moldy spinach - feeling good or feeling sick. Functional significance describes the ultimate “nutritional value” of a particular experience and therefore whether it supports or thwarts well-being; was it autonomy-supportive, or controlling? The self determines this nutritional value through a process of “cognitive evaluation,” which is essentially a metabolic process. It describes how we interpret, or process, a situation in relation to our need for autonomy, competence, and relatedness (Ryan & Deci, 2017, p. 159). Take, for example, our math students.

The *externally regulated* student, whose parents paid them to earn an “A,” may cognitively evaluate encouragement from their parents as controlling. Therefore, the functional significance of that encouragement will be a diminished likelihood of the

student practicing math skills once the money is earned. The *introjected regulation* student, who wants an “A” to impress their father, may cognitively evaluate neutral comments from their father as critical, and therefore the functional significance of those presumably neutral comments will be an increase in anxious behaviors. Cognitive evaluation highlights that it is not just *what* people do that matters, but how we *interpret* what they do.

And this theoretical integration of emotional subjectivity into an organizational framework distinguishes biological autonomy from psychological autonomy and provides the final link between biological organization and organismic psychology. Biological autonomy hinges on whether an organism is *able* to self-generate the means by which it maintains its existence. Psychological autonomy, on the other hand, hinges on whether the self *feels* it is able to self-generate the means by which it maintains its existence. But just like a biological organism, a self that loses its autonomy is a self that struggles to survive. And this is why it matters that children express their curiosity.

Encouragement

“The second question was whether freeing the secondary schools from external restraints would encourage them to develop new programs that would be better for young people, for colleges, and for society.”

(Watras, 2006) (emphasis added)

Paul B. Diederich posed the above question as a member of the evaluation committee for what came to be known as the “Eight Year Study.” In 1932, the committee

gave 29 American high schools each the opportunity to redesign their curricular structure however they like, with no regard to college entrance requirements, “in order to test the effect freedom had on high schools” (Kridel & Bullough, 2007, p.3; Watras, 2006). In order to create an environment of freedom, the study’s committee got 284 colleges to agree to waive their typical admissions requirements for students from participating high schools. Admissions would instead be based on a recommendation from their high school principal as well as some record of their abilities (i.e., an aptitude test) (Kridel & Bullough, 2007, p.3; Watras, 2006). The committee gave the participating high schools no guidelines for how to teach. Instead, they required them only to work from two basic principles:

“The first principle was that life in the school and the teaching methods would conform to what educators knew about **the ways human beings learn and grow**. [This meant] the students should have the opportunity to engage in activities that had three characteristics: they had meaning for the students, they involved all aspects of the students’ beings, and they led to other different activities. The second principle was that the **schools should rediscover their reasons for existence**” (Watras, 2006) (emphasis added).

While students would still need to come out the other end knowing the same fundamental material, teachers were free to reimagine the teaching *process* however they felt best served the needs of their students. Departments collaborated, classroom boundaries dissolved, subject emphasis was recalibrated, and student engagement took any form it could imagine, including involvement in curriculum development (Tyack &

Cuban, 1995, p. 99).

Rounding out the environment of total procedural freedom were the standards by which the committee evaluated schools, which were neither preconceived nor generalized from one school to the next. Rather, the study's committee developed the evaluation process *for* each school in partnership *with* each school. The committee believed that this would encourage participating educators to develop greater clarity around their values. And in the spirit of the progressive belief that schools know what is in their own best interest, each school was able to "evaluate their work in relation to their own goals" (Watras, 2006).

The Eight Year Study was, in essence, an investigation of organismic functioning, and specifically an investigation of autonomy. A developing frustration among progressive educators in the late 1920s was that the limitations of college admissions requirements prevented secondary schools from serving the real-time needs of the students, particularly in the wake of the Great Depression (Watras, 2006). In the language of SDT, schools were becoming an autonomy-thwarting environment for teachers and students, which was leading to the bubbling up of frustration among progressive educators, perhaps as an effort to *regain* their autonomy. In fact, the study's director, Wilford M. Aikin, credits someone at a 1930 meeting of teachers and principals as proposing the idea of the Eight Year Study (Watras, 2006).

In response, the Progressive Education Association (PEA) set out to discover not just

whether students who learned under progressive, school-specific curricular structures could do just as well in college as their traditional high school counterparts. But, in the interest of preserving democracy, what kind of *citizens* these students turned out to be, regardless of college aspirations (Tyack & Cuban, 1995, p. 99). To paraphrase Diederich's question above - could a secondary school's educational autonomy generate non-academic benefits to society?

If we view the school as a component of the larger organism of society, then the mechanisms of organization suggest a school's autonomy would better facilitate its *integration* into society. In the language of organization, then, the Eight Year Study was effectively a *metabolic* experiment. That is, it set out to facilitate student autonomy via the teaching *process*, or the digestion of material. Because autonomy allows for the emergence of organismic integration, it would follow that teachers would flourish in an environment in which students flourish and that, with the combined effect of enough secondary schools, colleges and society as a whole would also experience an increase in organismic vitality. In this regard, the grievances of educators referenced above suggest a perceived *imbalance* in the metabolic relationship between secondary schools and colleges. Therefore schools, and by extension teachers and students, were being overwhelmed by, rather than in an integrative relationship with the downwardly causative effects of colleges.

And the language of the Eight Year Study was implicitly organismic. Imploring

schools to rediscover their reasons for existence is an imperative to understand what it would mean to become autonomous. Removing the restraints of college admissions allows schools to translate that meaning into *objectives*. Allowing schools to shape their own evaluative measures ensures they will *feel* autonomous while carrying out their stated objectives - and therefore that they will *be* autonomous. To put this in organizational language, the Eight Year Study sought to demonstrate educational autonomy as an effective method for generating greater societal integration of adolescents.

And that appears to be what happened. A comparison of college outcomes between students from the six most experimental of the participating schools and a comparable number of traditionally-educated students found the progressive students to have “substantially outperformed their peers in terms of academic averages and honors, intellectual traits, and personal and social responsibility” (Kridel & Bullough, 2007, p. 7).¹⁹

Academic equivalence is all but a requirement for the legitimacy of virtually any alternative form of schooling. Therefore, the academic aspect of these outcomes is, of course, exciting in terms of supporting the legitimacy of progressive education’s

19. These results come from the “Study Within the Study,” which is considered to be a more reliable assessment of the impact of the Eight Year Study than the more commonly known “College Follow-up Study” (Kridel & Bullough, p. 7).

principles. They also speak to the power of autonomy when basic values between parties are aligned. But the non-academic aspect of these outcomes reflect our deeper societal values: a more stable, engaged social functioning (Jones, Greenberg, & Crowley, 2015).

Among these substantial increases in “personal and social responsibility” found in the study population was an increased engagement in collegiate “social, artistic, and political life” (Kridel & Bullough, 2007, p. 7; Tyack & Cuban, 1995, p. 99). I believe this suggests that students from the progressive schools were more likely to follow their *curiosities*, in that these activities represent pursuits of personal interest. As such, we can begin to see how autonomy becomes a necessary precondition for expressing curiosity. Even further, we can look at the combination of academic and non-academic outcomes for the progressive students and see how the expression of personal curiosity correlates to the prosocial nature of human vitality.

The central argument of this paper - that the extrinsically motivated nature of public education inhibits children’s curiosity, a primary marker of human vitality - stems from the presumption of a common mechanism of vitality in all humans. Given that, it is important to note the general racial and socioeconomic homogeneity of the sample cited above, and of the Eight Year Study as a whole. While a small number of students of color were involved in the study, the vast majority were primarily white and middle- to upper-class. That two of the six most successful schools cited above enrolled a more-

diverse-than-average racial and socioeconomic student body does not *necessarily* equate to total generalizability (Kridel & Bullough, 2007, p.225). But through the lens of basic psychological needs, we can see how it could.

In fact, the principles of SDT could have predicted a general approximation of the above results in many different populations. By learning in an autonomy-supportive environment, students should demonstrate deeper engagement with subject matter (competence), better quality relationships with teachers (relatedness), and higher overall well-being and social engagement. In addition, the phenomenon of “social contagion” suggests students should get an added benefit of autonomy support from knowing their teachers are *also* autonomous (Radel, Sarrazin, Legrain, & Wild, 2010). That is to say, students become even more engaged when they perceive their instructors as autonomous. The fact that the six schools who most embraced the committee’s granting of freedom for experimentation were also the six schools with the most academically successful *and* the most socially engaged students speaks to the deep satisfaction of both students’ and teachers’ basic psychological needs, which was facilitated by an environment of complete autonomy.

And when we use the lens of basic psychological needs to compare these results to students, whether back then or today, who do not exhibit the same psychological flourishing, we see that it is likely not the *mechanisms* of vitality which differ from

demographic to demographic, but rather the barriers to *engaging* those mechanisms.²⁰

What the Eight Year Study sought to create was a school-level transformation from an extrinsically regulated state to an intrinsically regulated state. Mapping from SDT's five forms of motivation, secondary schools existed in a state of *external regulation*, wherein the goal was to achieve particular outcomes in particular ways in order to earn the reward of college (or perhaps to avoid the societal punishments of not-college). By persuading colleges to agree to waive traditional admissions requirements, students had the psychic space for the concept of college to shift from being a *reward* to being an integrated *value*. This shift meant that students were more likely to engage with any given aspect of both secondary school and college, and the shift occurred because students were able to develop a new, autonomous relationship with the curriculum that made them ready for college.

Despite these findings, we do not live in a world of progressive education and flexible college admissions requirements. World War II is often credited for blunting the potential impact of the Eight Year Study, and to some extent that is almost certainly true. But it is also true that progressive ideals that challenge the premise of a standardized evaluation system have never been able to pierce through to the mainstream (Kridel & Bullough, 2007, p. 8). As such, schools today operate in the same state of extrinsic

20. Of course, school is far from the only barrier to vitality. But it is arguably the second most consequential one, after the family.

motivation, or E-PLOC, as did schools in the 1930s. They are bound to both college and society through the traditional reward system of grades and test scores. And while the cognitive awareness of right and wrong answers has been shown to be detrimental to curiosity, I believe there is a secondary force at play that is less obvious and yet poses a much greater threat to children's vitality. That threat is the grip of *introjected regulation* on our country, which I believe keeps our education system in a state too afraid to implement progressive ideas on a large scale.

Introjection

Introjective depression is a depression subtype characterized by the loss of autonomy through "maladaptive self-scrutiny." This is informed by an ongoing failure to live up to unattainable standards, which feeds into a recurring cycle of self-induced failure (Reis & Greyner, 2002; Ryan & Deci, 2017, p. 405).²¹ The centrality of self-consciousness to introjective depression makes sense in relation to SDT's delineation of *introjected regulation* as being characterized by ego preservation (Niemic & Ryan, 2009). States of introjection are linked to "maladaptive perfectionism," in which a person imposes large amounts of pressure on themselves to "live up to introjected goals." Such a person is highly self-critical when they do not achieve these goals. This pressure has

21. Anaclitic depression, on the other hand, is "characterized by externally focused interpersonal concerns, intense neediness, and fears of rejection" (Reis & Greyner, 2002).

been shown to arise from harsh and authoritarian parenting styles, and in fact “achievement-oriented” states of psychological control from parents during adolescence has been shown to predict symptoms of depression (Ryan & Deci, 2017, p. 406; Soenens, Park, Vansteenkiste, & Mouratidis, 2012).²² Where *external regulation* inhibits curiosity and vitality through the warping of enjoyment, *introjected regulation* inhibits curiosity and vitality through the warping of self-concept.

We can see evidence of this - in smaller, incremental ways - in children’s tendencies around curiosity. Bruce Perry, current Senior Fellow of The Child Trauma Academy and former Chief of Psychiatry at Texas Children’s Hospital, has written about curiosity’s developmental significance as a driver of exploratory play. Perry stresses the importance of exploratory play (also known as “expressing curiosity”) in fostering healthy development as both a child *and* an adult, in part because it drives repetition and therefore mastery. He draws a relationship between expressing curiosity and feelings of safety, having found that what fosters children’s curiosity is an environment of “consistent...attentive, attuned and attached [adults]” (Perry, Hogan, & Marlin, 2000). That is to say, curiosity requires autonomy-support.

At the same time, he suggests curiosity, and therefore psychological development, can be inhibited by anxiety about the unknown as well as by fear of disapproval (Perry,

22. Undergirding the suggestion of “basic” psychological needs, Soenens et al. (2012) found this effect in both independent (Belgium) and interdependent (South Korea) cultures.

Hogan, & Marlin, 2000). An example of this effect can be seen in Moore and Bulbulian's (1976) findings. Recall that in that study, children took longer to engage curiosity behaviors and engaged fewer curiosity behaviors overall after a critical (introjective) adult response than after an encouraging (autonomy-supportive) adult response.

Fears of the unknown and of disapproval predict a state of introjected regulation due to the risk of damage to the ego (Ryan & Deci, 2017, p.168). Introjection kills curiosity because curiosity requires *entropy*, something self-consciousness cannot handle. What makes introjection so psychologically toxic over the long term is the state of ongoing internal "fragmentation," which describes a lack of autonomy due to the inability to integrate ego-preserving behaviors into the self-concept. A human is fragmented when they feel defensive, or that their behavior somehow does not align with what they believe about themselves (Ryan & Deci, 2017, p.12).

Similar to how a biological organism's long-term loss of autonomy would likely lead to death, the self's introjective loss of psychological autonomy can feel like a psychological death, one of the learned helplessness and despair of depression (Ryan & Deci, 2017, p. 405). Building on the curiosity-inhibiting effects of entropy-aversion, depression is often characterized by hopelessness and pessimism about the future, which reflects a state of mind higher in certainty, or lower in entropy, than normal (Lavender & Watkins, 2004). When one is certain that things will be terrible, curiosity serves little purpose. As such, it becomes easy to see how too much inhibition of

curiosity, whether in the classroom or anywhere else, can begin to become a problem. And though perceived parental control plays a role in determining the *total* introjective power of the classroom, the purpose of this paper is to focus on the introjective factors at play within the educational system (Lu, 2019).

Viewing modern public education in an organizational framework illustrates how, although the child's experience of introjection occurs in the classroom, the phenomenon of downward causation suggests we need to look at higher organizational levels in order to see the potential intensity of its impact.²³ Where to begin, I argue, is at one of the highest levels of human societal organization: the country. It is with the concept of a national reputation, or a national "ego," that I believe we can begin to understand the intensity of the grip, as well as the potential psychological toxicity, of what we might call "trickle-down introjection," (Greenberg, this paper).

Dis-curio-gement

The Department of Education's mission statement reads as follows: "Our mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access" (DOE, 2020). It is worth noting, I believe, the explicit centering and enshrining of extrinsic motivation in

23. i.e., Student > Teacher > School > State DOE > Federal DOE (This chart represents the scope of this paper, but of course it could be filled in with much more granularity.)

education at the national level. As written, “educational excellence” and “equal access” are not ends in and of themselves, but rather a means to “global *competitiveness*.” Setting aside ideological questions about whether this is the “right” goal for education, it inherently thwarts national educational autonomy by planting the PLOC extrinsically, into simultaneously external (win/lose) and introjected (winners/losers) states of regulation. We educate not for our own good, but to be the best. Right off the bat, we limit our willingness, even our ability, to develop new approaches.

Though perhaps not the type of competition referred to in the DOE’s mission statement,²⁴ one way in which our education system competes at the global level is through international rankings. According to the oft-cited PISA test, the US ranks 13th, 21st, and 38th out of 78 countries tested in reading, science, and math, respectively (OECD, 2018). These rankings are not ignored by the media (Balingit & Van Dam, 2019; Tures, 2018). In fact, Louis Serino of the Brookings Institution suggests that media coverage, not accuracy, is why these rankings matter. The numbers reported by media outlets are raw numbers which have not taken statistical significance into account, and are therefore potentially misleading. And while researchers do not utilize rankings in “serious” statistical analyses of test scores, media coverage of them can nonetheless

24. Also...perhaps exactly the type of competition. Stay tuned.

influence “political rhetoric and consequentially education policy” (Serino, 2017).²⁵ This would suggest our federal education policy is being influenced by a national self-consciousness informed by questionable measures. So, we protect our ego.

Anxiety about the unknown and fear of disapproval inhibit curiosity, so, knowing that other countries are aware of our rankings, the federal government is likely to be skeptical of new approaches and to double down on existing ones. Entropy is avoided. The downward causative effects (the functional significance) of this national introjection could thwart autonomy at the state level by encouraging states to adhere to standardized tests and curriculums in order to receive funding. In fact, we see this in federal programs such as No Child Left Behind and the Every Student Succeeds Act (the latter of which carries the implicit reminder of failure) that define the strings attached to the federal government’s education budget²⁶ (which amounts to a whopping 8-10% of

25. George Mason University professor F. H. Buckley wrote, in a Fox News opinion column, “We throw more money at our schools than just about any other country, and what do we get? For our K-12 school system, an honorary mention in the Third World” (Tures, 2018). Of the 2012 PISA results, Education Secretary Arne Duncan said at the time, “The big picture of U.S. performance on the 2012 PISA is straightforward and stark. It is the picture of educational stagnation. The brutal truth, that urgent reality, must serve as a wakeup call against educational complacency and low expectations” (Bidwell, 2013). (Duncan made similar comments about the 2018 PISA results while promoting his book, *How Schools Work* (Birnbaum, 2018).)

26. Similarly, Race to the Top was an Obama-era program that tied competitive grants to point totals states earned through the adoption of various optional accountability measures, including common curriculums (Center for Public Justice, 2020). As Education Secretary Arne Duncan said, “We’re running in place, as other high performing countries start to lap us” (Tures, 2018). The message to states is clear: do not lose.

public schools' total operating costs) (Maciag, 2019).

Many states are, of course, motivated to get all the federal money they can because even state-level government funding accounts for, on average, only about half of public schools' operating costs. For the most part, public school funding comes from property and sales taxes. As such, neighborhood affluence often determines the amount of resources, both material and personnel, available to a school, and has led to, among other things, a \$23 billion dollar funding disparity between predominantly white and predominantly black schools²⁷(Center for Public Justice, 2020; Meckler, 2019). In such an environment, the allure of standardized assessments as a means to funding may become very appealing, lest any of a state's schools be marked as "failing" and subsequently put on the life support of emergency measures or shut down altogether (Superville, 2017). Entropy is avoided. Lotteries at high performing charter schools are popular with parents from neighborhoods with poorly funded schools (NYSED, 2017).

The stigma of low ratings and "failure" invites not only top-down scrutiny but bottom-up scrutiny, as demonstrated by the close relationship between real estate and school rankings/perception. In fact, the National Association of Realtors has on their website a page titled *Steering, Schools, and Equal Professional Service*, advising realtors how to respond to prospective homeowners' questions about local school quality without violating the Fair Housing Act's attempts to ameliorate the effects of racism

27. For reference, the federal government spendt \$59 billion on education in 2018 (DOE, 2018)

(NAR, 2014). Nonetheless, local school quality often accords with the racial divides of a city, which leads to self-reinforcement of the relationship between property values and school rankings (Yoshinaga & Kamenetz, 2016). For under-funded schools struggling to regain financial autonomy under both introjective *and* existential threat, innovation and exploratory play would likely be far from mind. Entropy is avoided.

As mentioned earlier, even schools not in financial jeopardy are still subject to rampant standardized testing - in some cases up to 112 tests over the course of a student's K-12 career (Hart et al., 2015). Though some states are signaling attempts to move away from standardized testing, doing so would require greater trust in schools and looser federal oversight, both of which are antithetical to a national state of introjection (Gabor, 2019).

By the time teachers get to the classroom even the most dedicated, compassionate ones can find their hands tied by resources, standards, or both. And as demonstrated in Engel and Randall's (2008) work, constricted teachers produce constricted children. Entropy is taken away. Therefore children, surrounded by right answers and adults who need them to know those right answers lest they become part of the problem, can only hope to find themselves at a reasonably well-resourced school with a caring, creative teacher. Or at least one who can see them for who they are (Terada, 2019).

A child's likelihood of succeeding in an environment of pre-determined learning and standardized testing depends heavily on factors outside of their control, including

socioeconomic status, the early childhood environment, and school funding (Kappich, 2020; Levin, 2007).²⁸ Because school funding is linked to property taxes, children from impoverished neighborhoods are likelier to go to under-funded schools, and therefore are likelier to have a lower quality, less stable, less curiosity-inducing curricular experience in which they are less likely to be successful (Levin, 2007). Entropy is taken away. Even for children who arrive at school able to adapt to a standardized environment, or who get lucky with the right confluence of teachers and/or funding to do well academically and socially, schools, by design, do not foster curiosity, which means they do not foster *vitality*.

Yet even if we care only about international academic rankings, to not cultivate vitality through an autonomy-supportive approach is a clear mistake. The Eight Year Study suggests that increased human vitality leads to both increased prosocial behavior *and* improved academic performance, as does research into the educational impact of basic psychological needs satisfaction, as does Christakis' argument of humanity's shared prosocial genetics (Christakis, 2019; Kridel & Bullough, 2007, p.7; Niemiec & Ryan, 2009). How much more evidence we need for the human societal benefits of greater autonomy-support and psychological integration is not clear. But if the systematic undercutting of children's vitality - and largely the vitality of children of

28. Also including: household composition, parents' level of education and beliefs about education, violence exposure, physical and mental health, and racism. (Kappich, 2020).

color - were not alarming enough, there is also what occurs as the ultimate loss of vitality: depression.

A survey by the APA of teens aged 13-17 found school to be the most commonly cited source of stress, with 83% of teens reporting “that school is a somewhat or significant source of stress” (American Psychological Association, 2014). Major Depressive Disorder (MDE) is defined as a 2-week period of depressed mood or loss of pleasure, with stress and anxiety serving as primary warning signs (American Psychological Association, 2013, p. 166). In a sample of over 95,000 adolescents, both “authoritative parenting styles” and “negative school experiences”²⁹ predicted depressive symptoms, as the nature of introjective depression would suggest (Lu, 2019; Ryan & Deci, 2017, p. 405). And as noted in the introduction, adolescent depression is on the rise (Lu, 2019).

Depression also has an alarming rate of recurrence, with 50% of those who suffer an initial MDE experiencing at least one more in their life, and 80% of those who experience a second MDE experiencing at least one more in their life (Burcusa & Iacono, 2008). Although lifetime prevalence of depression is lower in African Americans than

29. “Negative school experiences” encompassed six measures, the first five of which are arguably measures of autonomy: “(1) overall feeling about going to school...(2) how often they felt the assigned schoolwork was meaningful and important...(3) how important they thought that the things they had learned in school were going to be to them later in life...(4) how interesting they thought their courses had been...(5) how often their teachers at school let them know they were doing a good job with their school work, and (6) grades” (Lu, 2019).

European Americans, its course of duration is almost 70% longer in African Americans than European Americans. African American boys are also more likely than their European counterparts to attempt suicide (Lindsey, Sheftall, Xiao, & Joe, 2019). Overall suicide rates among adolescents ages 15-19 have increased by nearly 76% between 2007-2017, going from 6.7 out of 100,000 to 11.8 out of 100,000 (Curtin & Heron, 2019).

To the extent that hope for an autonomy-supportive future is on the horizon, that horizon is very far away. Current Education Secretary Betsy DeVos has been known to cite the PISA scores in public, even denouncing as irrelevant a 25-year increase in overall national test scores because “test scores **vís-a-vís the rest of the world** have not gone up” (Stahl, 2018; Whitehurst, 2018; emphasis added). Entropy is for losers. And yet, the general decline in public school funding over the last decade appears to be in direct contradiction to the national imperative to stop losing (Leachman, Masterson, & Figueiroa 2017). Maladaptive perfectionism after all, perhaps.

The purpose of this paper is not to blame schools for depression or for suicide. The purpose of this paper is not to blame *schools*, and certainly not to blame teachers, for anything. The purpose of this paper is to illuminate how the paralyzing self-consciousness of our national ego organismically infiltrates our education system from the top down, undercutting human’s prosocial vitality by discouraging *everyone’s* curiosity - but perhaps most consequentially children’s - and therefore encouraging depression and anxiety in adolescence. Our federal government exacerbates the

problem through underfunding while making up games for states to win money.

Games, as curiosity research demonstrates, are important. But they are hard to play when you fear for your safety.

When a child walks into their kindergarten classroom on the first day, their entropy-reduction mechanisms primed for action, what awaits them is a lesson. A lesson that, although they and their classmates' developmental tracts require an autonomy-supportive environment in order to get on the road to learning from, caring for, and creating with one another, the adults require something different (Christakis, 2019, p. 12). A lesson that the extent to which they will thrive in school, and therefore potentially in life, is not dependent on whether or not their school can show sensitivity to their inborn prosocial needs, but on whether they can perform according to the psychologically paralyzing trickle of the national ego's manufactured economic self-consciousness.³⁰ A lesson that education is not designed according to their best interests, or even to society's.

Education, as it turns out, is designed according to what makes adults in elected offices feel the most comfortable while they compulsively perpetuate their own insecurities.

30. Research shows that students who were moved from low-performing to high-performing schools demonstrated a drastic increase in academic performance, suggesting that increasing federal funding for public education could do wonders for "failing" schools. (Superville, 2018)

Living Room

"Hence it is that the objective system of teaching...is philosophical and necessary."

(Mowry, 1882, p.145)

The first American public school was founded in 17th century New England for the purpose preparing children for college (National Geographic Society, 2020). At that same time, in that same geographic location, it was legal for a parent to murder their child for misbehavior (Mash & Wolfe, 2017, p. 4). I do not mean to imply that these two things are connected. What I do want to highlight, however, is that American public schooling began at a point in time when we so horribly misunderstood children's behavior that we thought murder was an acceptable disciplinary response. Given that, during this time, we knew virtually nothing - and perhaps cared just as little - about children's well-being, it is almost impossible to conceive that schools just *happened* to be psychologically beneficial to children.

Spoiler alert: they were not (Ryan & Deci, 2017, p. 239)

I do not mean this as a judgment - I have no doubt that the Boston Latin School (it was called a *Latin* school, for crying out loud) was built with the best of intentions. But those intentions were set in 1635, when we thought murder was, at least theoretically, an acceptable response to the behavior of one's *own children*.³¹ Therefore, children's well-being was likely not a consideration, and even if it were, it was likely poorly

31. No children were actually murdered under this law (Mash and Wolfe, 2017, p.4)

understood. Schools, as the quote at the top of this section suggests, were first and foremost places for children to learn information. That is what made school school.

And I do not mean to suggest that children should not learn information, or that learning information is inherently harmful to children. It is not. Children's brains are built to take in and make sense of *unfathomable* amounts of information, and they show incredible joy when they begin to grasp a new concept. What I mean to suggest is that, over the past 400 years, we have learned some things *about* learning: namely, that it is undergirded by autonomy (Ryan & Deci, 2017, p. 239). Our education system, on the other hand, was designed (through no fault of its own) to produce states of extrinsic motivation in children. Or rather, in "students" (National Geographic Society, 2020).

I believe it is worth keeping that in mind when considering the meaning of the last century or so of school "reforms." To reform something is to "improve or correct *it*" (OLD, 2020; emphasis mine). Reform, therefore, can only go as deep as the essence of the "it," because reform is something that happens in coordination with the "it." Reform does not replace, it reshapes. We can keep tricking ourselves into thinking that costumes of "accountability," "standards," "access," or any other reforms we have or will dream up are actually changing education, but they are not. Not *really*. They are simply changing how we *interact* with the same extrinsically motivated organism we have had for 400 years, adding a veneer of modern acceptability to a frighteningly out-of-context idea.

What I hope to have laid out in this paper is evidence that extrinsic motivation is the “it” of public education. That the initial externally regulating force of college has been the genes from which the public education system has emerged, eventually metabolizing the introjection of international economic competition such that it remains stuck in a perpetually fragmented state. I also hope to have made it clear that I do not think anyone is specifically to *blame* for the ill effects of this, particularly not teachers or other school staff. No one becomes a teacher for the comforts of the job, and the way society explicitly treats teachers is perhaps only slightly less shameful than how the education system implicitly treats children. Teachers can very well be the only people children have keeping them afloat (Terada, 2019).

I hope to have made the case that we are in a toxic psychological stranglehold by an idea planted at a time when we had not the slightest idea of how children’s brains developed. So long as we are caught in the argument of reform, no matter which side of what issue, we will keep ourselves blind to the fact the vitality of our children, and therefore our society, is being siphoned away right before our eyes.

Public education does not need to be reformed. It needs to be replaced.

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