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## **The Prospect of Plasticity: Malleability Views of Group Differences and their Implications for Intellectual Achievement, Mental/Behavioral Health, and Public Policy**

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*This article critically examines the psychological and policy implications of the belief that characteristics of social groups are grounded in biology and thus are unchangeable. We specifically focus on how this immutability mind-set may perpetuate group-based educational achievement gaps and deter treatment seeking for mental/behavioral health conditions. We then consider the prospect of plasticity: the notion that psychological attributes, although rooted in our biological endowment, are inherently malleable. Our discussion reviews the evidence for—and social implications of—this alternative mind-set for intellectual achievement as well as mental/behavioral health. We conclude by describing several concrete policy applications of a plasticity perspective.*

In an interview in 2007, James Watson—a Nobel Prize winning molecular biologist and codiscoverer of the helical structure of DNA—noted that he was “inherently gloomy about the prospects of Africa,” explaining that “all our social policies are based on the fact that their intelligence is the same as ours—whereas all the testing says not really” (Nugent, 2007).

In January of 2011, an Arizona man by the name of Jared Loughner opened fire on a crowd in Tucson, killing six people and critically wounding a U.S.

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congressional representative. Despite months of erratic and even threatening behavior, for which he was forced to withdraw from college, neither Jared—nor anyone who knew him—contacted a mental health professional.

Though seemingly disparate, these two events raise a similar question residing at the heart of social science: Can people, and their psychological dynamics, change? Watson's statement suggests that group-based differences in intelligence are fixed and immutable, and that any attempt to modify intelligence is an exercise in futility. The case of Jared Loughner raises the question of whether mental illness is malleable as well. If it is not, attempts to expand access to treatment have little point, and receiving a mental health diagnosis is an occasion to meet with resignation and hopelessness.

In this article we engage with, and critically examine, the viewpoint that one's membership in a social category (such as being a member of the African diaspora, or having a mental illness label) provides a type of "upper limit" to one's capacities that no amount of intervention—be it training, schooling, or treatment—can overcome. Often such a perspective is rooted in a belief about persons' unchangeable biology that construes psychological attributes as unalterably "hard-wired" into one's genetic code. We examine the consequences of this immutability mind-set, focusing on how it impacts the perception and experience of group-based difference for the social categories of race as well as mental/behavioral health status. We also examine the flipside of the immutability mind-set—the perspective that psychological characteristics are inherently malleable or plastic—and we describe the evidence for, and consequences of, adopting this perspective.

We argue that endorsing an immutability mind-set that regards psychological attributes as unchangeable leads to a host of adverse consequences. Specifically, promoting an immutable view of intelligence may perpetuate, and even exacerbate, the intellectual underachievement of members of stigmatized social groups. In another domain, promoting the view that mental illnesses are fixed and immutable may discourage seeking treatment for those coping with mental health issues. After discussing the consequences of the immutability mind-set for these two domains, we review and assess the growing evidence that psychological attributes, though rooted in biological structures and processes, do in fact show considerable plasticity. We then discuss how policy can profitably harness this body of findings to promote positive social change in the realms of intellectual achievement and mental/behavioral health.

### **Beliefs About Malleability Versus Immutability**

Whether we focus on creativity, personality, or intelligence, a question that we often confront is whether the characteristic in question is immutable or malleable. Psychologists (e.g., Dweck & Leggett, 1988; Molden & Dweck, 2006) have documented how peoples' views of human changeability lie on a

continuum: At one end of the continuum is the belief that human attributes are fixed and unchangeable—what these researchers have referred to as the “entity” view of human attributes. At the other end of the continuum is the belief that human attributes indeed can be changed and developed through effort, practice, and experience. Dweck and colleagues refer to this as an “incremental” view. For simplicity, throughout this article we will refer to these two poles as immutable or malleable, respectively.

Whether we adopt an immutable versus malleable view of psychological attributes can have important consequences. Research from the intersection of psychology and education reveals the powerful, and often startling, effects that such mind-sets can have (Dweck & Leggett, 1988; Elliot & Dweck, 1988). Learners who hold an immutable view of intelligence are more likely to adopt performance goals, seeking to document or “prove” their intelligence. This leads them to forego challenging learning opportunities, as they may risk making mistakes and appearing “dumb,” and diminishes learning in the long-term. Holding learning goals, by contrast, is associated with a malleable view of intelligence, and has been linked with approaching learning tasks as opportunities to improve one’s capacities, even if it means not being seen as “smart” by others. In one study, for example, Grant and Dweck (2003) found that students in a highly competitive college chemistry course who endorsed learning (as opposed to performance) goals were more likely to find the material intrinsically motivating. Further, such learning goals protected the students from the inevitable setbacks associated with mastering difficult material: if they did poorly on one test, learning goals were related to dramatically improved performance on a subsequent exam.

Although an entity mind-set leads people to feel good about themselves when tasks are easy, or before they have received feedback (Grant & Dweck, 2003), such benefits tend to be short-lived. This idea is illustrated in a study showing that, paradoxically, praising children for their intelligence, compared to praising children for effort, can put them at risk when they confront future setbacks (Mueller & Dweck, 1998). In this research, children who confronted failure after having been praised for their intelligence on an easier task were less likely to want to persist on new problems, enjoyed the subsequent tasks less, and performed worse on a new learning task, when compared with children praised for their effort. Reinforcing a malleable mind-set, by praising children’s efforts, seemed to inoculate them from setbacks and motivated them to apply their efforts to new tasks, even after failure, setting the stage for further growth and achievement.

### *Immutability Beliefs and Social Groups*

The consequences of promoting an immutable versus a malleable view of psychological attributes reverberate beyond individual-level achievement. Additional research has shown that the immutability/malleable continuum sheds light on how

perceivers understand the characteristics of social groups (Levy & Karafantis, 2008). Research on essentialism shows how certain social categories, including those based on race (Williams & Eberhardt, 2008) and mental health status (Ahn, Flanagan, Marsh, & Sanislow, 2006) are often seen as having deep and unchanging properties (Gelman, 2003; Prentice & Miller, 2006; Rothbart & Taylor, 1992). These “essences” are perceived to derive in part from a biological substrate (Haslam, Bastian, Bain, & Kashima, 2006) and are often comprised of the psychological attributes that are stereotypically associated with social categories.

Beliefs in the biological origin of group differences may be especially likely to bolster people’s beliefs in the appropriateness and inalterability of social inequality. Research suggests that people possess strong psychological needs to uphold the status quo (Jost, Banaji, & Nosek, 2004), an idea referred to as system justification. By linking social conditions to an immutable biology, any effort to change this status quo may seem as impossible and foolhardy as attempting to subvert nature itself. In addition, for individuals who already possess strong tendencies to see group-based hierarchies as desirable and inevitable (Sidanius & Pratto, 1999), biologizing group-based difference may place their worldview beyond challenge and critique. Endorsing biologically based explanations for social organization, regardless of any factual merit such beliefs might have, may curtail effort to change inequity in society. Recent research by Williams and Eberhardt (2008) has shown, for example, that viewing racial categories as biologically based, rather than socially constructed, is related to increased justification for social inequity, less desire to interact with members of out-groups, and greater prejudice and discrimination.

The comments of Nobel Prize winning molecular biologist James Watson provide an illustration of how beliefs about the biological origins of human characteristics and the immutable nature of human attributes go hand-in-hand. If Watson sees human attributes such as intelligence through a predominantly biological lens, this may suggest to him that intelligence is “written in” to each person’s DNA. By this reasoning, when low intelligence and achievement test scores are clustered in a particular ethnic group, this must be because of immutable biological factors that we cannot change, and this may be the basis for his “inherently gloomy” outlook. In the next section, we examine how members of stigmatized groups respond to the notion that intelligence is fixed and immutable, and how this belief may influence intellectual achievement.

### **Malleability Beliefs and Intellectual Ability**

There is a persistent, and widely recognized, gap in achievement and aptitude test scores for Blacks and Whites, with Blacks consistently scoring lower than Whites (see Ladson-Billings, 2006). Furthermore, there is substantial controversy over the interpretation of intellectual aptitude scores. Influential psychologists

have argued that IQ tests, and related standardized aptitude tests, measure a stable, genetically based trait (Herrnstein & Murray, 1994). The fact that these standardized tests are referred to as measures of ability, in which intelligence is construed as a stable quality (see Dweck & Leggett, 1988) rather than an acquired skill set, suggests this default interpretation.

Classic research documenting the phenomenon of “stereotype threat” (Steele & Aronson, 1995) begins to shed light on the complex relationship between beliefs about the immutable abilities of social groups and intellectual achievement. In one experiment, Black and White students took a test that employed difficult items from Graduate Record Examination (GRE) study guides. In the ability diagnostic condition, before participants took the test, the experimenter told them that the researchers were testing “various personal factors involved in performance on problems requiring reading and verbal reasoning abilities.” In the nondiagnostic condition, the experimenter told participants that the test was designed to understand “psychological factors involved in solving verbal problems.” Data analyses statistically controlled for baseline Scholastic Aptitude Test (SAT) scores to eliminate prior achievement as a confounding factor. When the researchers compared participants in the nondiagnostic problem-solving condition, there were no reliable differences between Black and White students. However, there was a striking difference in the supposedly “ability diagnostic” condition: Black students’ performance significantly worsened compared to their White peers. This pattern of results shows that when tests that are typically framed as diagnostic of ability (implying the measurement of an immutable capacity) are instead framed as problem-solving tasks, group-based differences are eliminated. This stereotype threat effect, however, extends beyond the performance of African Americans.

#### *The Broad Reach of Stereotype Threat*

Stereotype threat effects are pervasive in that they are found across a broad range of social categories (Steele, 2010). To take another example, consider gender. In the fields of science, technology, mathematics, and engineering, women have been historically excluded (see Ceci & Williams, 2010). The debate about whether this is because of social or biological causes received increased public attention when then Harvard president Lawrence Summers attributed this state of affairs to factors of “intrinsic aptitude” between men and women (see Barres, 2006 for a discussion). Just as the stereotype equating African Americans with low intelligence can undermine intellectual performance via stereotype threat, so too can activating the stereotype linking female gender with deficits in quantitative ability.

When mathematics tests are framed as tests that show gender differences, results in accord with this expectation are obtained: female scores, relative to male scores, sharply decline. But when the same tests are framed as problem-solving tests, testing disparities vanish (see Steele, 1997). Moreover, when mathematics

performance differentials are framed as the result of biogenetic factors, stereotype threat effects emerge (Dar-Nimrod & Heine, 2006). Again, stereotype threat effects are eliminated when the frame shifts to experiential causes.

Stereotype effects have also been documented in the realm of mental health stigma, a burgeoning research area at the intersection of social and clinical psychology. An enduring stereotype about those bearing mental illness labels is that they are incompetent (Hinshaw, 2007; Hinshaw & Stier, 2008; Teachman, Wilson, & Komarovskaya, 2006). Hence, making a person's mental health diagnosis salient should reduce his or her intellectual performance on tests purporting to measure intellectual ability. Quinn, Kahng, and Crocker (2004) tested whether revealing one's mental health status, when an ability test is framed as diagnostic of ability versus nondiagnostic, can influence subsequent test performance. These researchers recruited participants who either received treatment for depression or did not have a mental health diagnosis. Participants were either asked to reveal their mental health status or did not receive this instruction. They then took two GRE tests, one framed as nondiagnostic (to "develop appropriate questions for future use in our laboratory") and the other as diagnostic of "reasoning ability." Like other stereotype threat studies, baseline SAT scores were statistically controlled. These researchers discovered stereotype threat effects among those who had a depression diagnosis. For these participants, on the test framed as nondiagnostic of ability, scores were not affected by whether or not participants revealed their mental health status. In contrast, when the frame of the test shifted to a measure of ability, participants who revealed their mental health status showed disrupted performance.

Although we have focused our review on research from the United States, stereotype threat effects extend well beyond domestic borders (see Walton & Spencer, 2009 for a recent meta-analysis). In India, where caste is revealed by surnames, priming caste (by simply taking a roll call using last names) causes decreases in intellectual performance for lower caste individuals (Hoff & Pandey, 2004). Furthermore, as Steele (1997) notes, caste-like groups throughout the globe (e.g., the Maoris of New Zealand and the Baraku of Japan) show IQ performance decrements based on stigmatized versus nonstigmatized status.

Yet a question remains: what is it about activating stereotypes in particular that disrupts the intellectual performance so reliably for members of stigmatized social groups? One reason may be that the stereotypes themselves may often be seen as immutable or essential. In other words, the belief that one's category group membership provides an upper limit to one's abilities or intelligence that cannot be transcended (Aronson, Fried, & Good, 2002; Good, Aronson, & Inzlicht, 2003) may play a particularly damaging role vis-à-vis performance.

Aronson and colleagues (2002) explicitly link the predicament of academic underachievement with the predicament of having a fixed level of intelligence—the idea that one is intellectually limited, unable to grow, and unable to change.

These researchers note that people who are under threat of confirming a stereotype of underperformance in an intellectual domain adopt many of the same strategies that entity theorists do—they tend to choose easier tasks that do not put their competence into question, adopt performance rather than learning goals, and disengage from the threatening domain (see also Major, Spencer, Schmader, Wolfe, & Crocker, 1998). As Aronson and colleagues (2002) write, “negative ability stereotypes may derive part of their power to undermine intellectual performance and motivation precisely because they imply a self-threatening and inalterable deficiency—a fixed lack of intelligence” (p. 116).

In an elegant test of this idea, these researchers found that an intervention that reaffirmed stigmatized minority students’ belief in the malleability of intelligence changed their academic trajectory. Aronson (2002) recruited a group of African American college students and exposed them to an intervention aimed at changing the students’ beliefs about intelligence. A key component of the intervention was presenting a view of intelligence as a capacity that can change. They were instructed that intelligence is “like a muscle,” capable of growth. Participants also saw an animation displaying a brain developing new cells, with a narrator explicitly emphasizing neuronal growth. Results showed that participants who were exposed to this view of the brain as malleable reported greater enjoyment of, and higher levels of engagement in, academic life. Importantly, those exposed to the malleability intervention showed greater academic progress: students who underwent the intervention achieved higher grade point averages than participants in the control conditions.

Building on this work, Mendoza-Denton, Kahn, and Chan (2008) hypothesized that these same assumptions of immutability, in the presence of a positive stereotype (e.g., “men are good at math”), may actually facilitate the performance of favorably stereotyped groups by entrenching the immutability of their advantage and easing performance concerns. To test this hypothesis, the researchers examined the test performance of two positively stereotyped groups in math—Asians and men—and experimentally manipulated two factors: whether a positive stereotype of the group’s ability was confirmed or disconfirmed, and whether math ability was framed as fixed or subject to change through learning and effort (Mendoza-Denton et al., 2008). The results showed that math performance was highest when the stereotype of high ability was confirmed and this ability was framed as being immutable. Further, perceived difficulty of the test mediated the effects of the manipulation on task performance, suggesting that stereotypic messages of fixed group ability boost the performance of positively stereotyped groups by easing performance concerns. Thus, these findings show that it is not merely that low status groups are harmed by stereotypes of fixed ability, but also that the performance of high status groups is bolstered. Overall, then, the research argues that reaffirming notions of immutable ability maintains, and even exacerbates, educational disparities between stereotyped groups.



### Malleability Beliefs and Mental/Behavioral Health

Relative to other stigmatized identities, comparatively less research has examined devalued social identities on the basis of mental/behavioral health categories (Quinn & Chaudoir, 2009). The accumulated research evidence argues that above and beyond the symptoms of a mental disorder, bearing a mental illness label leads to social rejection in the community, discrimination, and reduced quality of life (Corrigan, Markowitz, & Watson, 2004; Hinshaw, 2007; Link, Struening, Rahav, Phelan, & Nuttbrock, 1997).

Mental/behavioral illness affects approximately over a quarter of the United States' population and can have tremendous social and economic costs. Depression, for example, is estimated to have an annual cost of \$53 billion in the United States, \$33 billion of which is associated with lost work productivity because of the illness (Wang, Simon, & Kessler, 2003). Nevertheless, many people are reluctant to seek treatment. In any given year, although 28% of people in the United States have a diagnosable mental disorder, only 8% will seek help from a mental health professional (US Department of Health and Human Services, 1999). Frustratingly, this unwillingness to seek treatments exists in a climate of many efficacious interventions. To take the condition of depression as an example, 80% of those who seek treatment will experience meaningful symptom relief, yet two-thirds of those suffering from depression will not seek treatment or receive care (National Institute of Mental Health, 1996). Tragically, each year more than 30,000 individuals commit suicide (see Hinshaw, 2007), a situation that could be alleviated if more people accessed treatment. The recent tragedy in Arizona, involving Jared Loughner, makes the issue of why so few access or receive treatment especially poignant.

Why is it that so few people seek mental health services in times of psychological distress? Research suggests that an important reason for this state of affairs may be stigmatization. Link and Phelan (2006) write that one way that stigma affects mental health care is that people may delay or decline seeking treatment to avoid the label of being a "mental patient," in an effort to evade becoming a member of a highly devalued social group. Below, we argue that the motivation to avoid such a label is particularly pronounced because of a pervasive belief that mental illness is a fixed, immutable category.

#### *Biologization, Immutability, and the Stigma of Mental Illness*

In the 1950s, psychiatry and clinical psychology underwent a profound revolution. Until then, there were few viable treatments for the most devastating of mental illnesses. With the advent of chlorpromazine, many patients improved from such disabling conditions as psychosis. In the ensuing decades, a new zeitgeist emerged. Research evidence was showing that mental illness had biological origins

and remedies, and psychiatry took on a new biological focus, which it maintains today (see Read, 2007). In the midst of the revolution in psychopharmacology, campaigns emerged to brand mental illness as “an illness like any other” (see Corrigan & Watson, 2004 and Read, 2007). However, mounting evidence argues that the biological emphasis of the mental health professions actually exacerbates stigma. Overattributing mental illness to biological causes may render individuals contending with mental health problems as categorically different (Read, 2007), because biological differences may seem more fundamental and unchangeable than problems arising from learning or one’s social milieu (see Phelan, 2002).

A study by Mehta and Farina (1997) illustrates how focusing on aberrant biology as the cause of mental illness may fuel stigma toward those bearing the labels of mental illness. Research participants engaged in a learning task with a target participant (actually a confederate) who was labeled with mental illness (specifically, “nervous breakdowns”). In this learning task, participants were allowed to electrically shock the target when he made mistakes (although unbeknownst to the participants, shocks were not actually administered). Participants were randomly assigned to conditions that varied the explanation of the target’s mental illness. In one condition, participants were told that the target’s mental health problems stemmed from biological origins, whereas in another condition participants were told that the target’s mental health problems stemmed from psychosocial origins.

On the basis of the logic of “an illness like any other,” one might anticipate less punitive responses to a target with a mental illness having biological origins. Though such targets were rated as less blameworthy for their condition, participants in the biological cause condition actually were more punitive in their administration of electric shocks to targets given a disease interpretation for their mental health problems. The fact that the harshest treatment was meted out to those whose mental illness was framed in disease terms seriously questions the stigmatizing potential of biologically based attributions for mental disorder.

Why would biologization yield discriminatory and punitive responses? Research has found that biological attributions, rather than promoting acceptance, increase desires for social distance from targets labeled mentally ill (Read & Harre, 2001; Dietrich, Matschinger, & Angermeyer, 2006). Available data suggest that even though people recognize that mental illness symptoms can be abated through medical treatment, they tend to believe that treatment is neither efficacious nor long-lasting, leaving intact the belief that “once a mental patient always a mental patient.” Consistent with this idea, Schnittker (2008) finds that although believing in the genetic origins of mental illness is associated with perceivers thinking medical treatment is necessary, endorsing biological causes is not necessarily associated with perceived likelihood of improvement. Phelan, Yang, and Cruz-Rojas (2006) have found that in some cases biogenetic beliefs are associated with more pessimistic beliefs about treatment effectiveness. When we consider the genome, people typically do not think of it as modifiable (recall James Watson’s 2007

statements; see Williams & Eberhardt, 2008) and genes may signal immutability to lay perceivers (Levy, Stroessner, & Dweck, 1998). In the domain of mental illness in particular, an overemphasis on biogenetic accounts may give rise to the belief that the mental health conditions are, in effect, hopeless (Hinshaw & Stier, 2008).

The above research thus suggests that people may view mental illness treatments as largely cosmetic, with the “essence” underlying mental illness remaining unchanged. Metaphorically, then, people may see treatment for mental illness like an ineffective cough suppressor that does little, if anything, to change the underlying root of the cough. If receipt of a diagnosis of mental illness means permanent and unalterable membership in a highly devalued group, we begin to understand the tendency to forgo seeking help from mental health professionals. In the specific case of mental illness, the overbiologization of mental illness may, ironically, have the effect of reducing treatment seeking by reaffirming notions about its fundamental immutability. By not seeking treatment, one can bypass the mental illness label in the first place, and in doing so avoid an unchangeable lifelong stigma.

### **The Prospect of Plasticity**

Whereas previous eras viewed the engine of mind and behavior—the brain—as a relatively stable structure, contemporary research challenges this interpretation (Kaffman & Meaney, 2007; Rosenzweig, 1984; van Praag, Kempermann, & Gage, 2000; Wexler, 2006), setting the groundwork for the possibility that human behavior and psychological attributes may be more malleable than previously assumed. The prospect of plasticity in human characteristics emerges from a newly emerging general understanding of human psychology and its underlying neural basis.

Rosenzweig and his research team (see Rosenzweig, 1984 for a review) conducted a series of studies that fundamentally changed our notions about the malleability of the brain. These investigators randomly assigned rats to enriched/stimulating or impoverished environments, and observed changes in their central nervous system. On the basis of these purely environmental manipulations, structural and neurochemical alterations (e.g., cortical thickness, dendritic growth, and acetylcholinesterase levels) ensued. In other words, environmental interventions—in the absence of direct intervention on neural tissue—led to changes in the brain. These kinds of changes occurred even in mature, adult organisms. These initial demonstrations suggest two fundamental points. The first is the recognition that our brains can change; the second is that experience does change neural architecture and processes.

Subsequent research has expanded on the original demonstrations of brain plasticity. For example, parent–infant bonding behaviors can change neural substrates: rodent mothers’ licking and grooming of their young has been shown to

lead to the expression of particular genes in the offspring's central nervous system (Kaffman & Meaney, 2007). This maternal behavior can alter their offspring's biological profiles of stress reactivity as well (Francis, 2009; Francis, Diorio, Liu, & Meaney, 1999). Even regularly walking is enough to enlarge the volume of the hippocampus, a neural structure subserving memory function (Erickson et al., in press). In all of these cases, the experiences of the organism lead to changes in his or her underlying neurobiology.

### *Intellectual Ability*

Psychobiological findings regarding biological plasticity have implications for intellectual achievement. There is emerging evidence that intellectual ability in humans, far from being a static and immutable quality, is malleable through experience, learning, and the environment. In preschool children, classroom interventions can enhance executive functions—an array of skills that includes working memory, cognitive flexibility, and inhibiting mental distractions (Diamond, Barnett, Thomas, & Munro, 2007). Further, research on cognitive training using adult participants has shown that fluid intelligence, a key component of IQ, can be increased through structured interventions (Jaeggi, Buschkuhl, Jonides, & Perrig, 2008). This research shows that fluid intelligence is a dynamic quality, and, moreover, the more a person trains, the greater the augmentation of this capacity. That malleability is an intrinsic feature of intellectual ability is also revealed in the “Flynn effect,” in which IQ scores have consistently increased across time (Flynn, 1999). If intellectual ability were indeed immutable, this well-documented phenomenon would be unimaginable, yet it is so reliable that IQ tests must be periodically renormed.

Although we have discussed how experience can augment intellectual ability, adverse experience leads to the deterioration of this capacity. Recent work shows that living in poverty can depress verbal ability among children (Sampson, Sharkey, & Raudenbush, 2008). Further, children living in an environment that exposes them to homicides can impair cognitive performance (Sharkey, 2010). In sum, the weight of the available evidence argues that intellectual ability, though rooted in the brain, is dynamic and malleable: it is influenced by the quality and conditions of the environment. A similar conclusion can be reached in the realm of mental/behavioral illness, to which we now turn.

### *Mental/Behavioral Health*

There is substantial evidence that mental illnesses are the result of the confluence of both biological and environmental factors. Although one's genotype is at present unalterable, the cause and treatments of mental illness include psychological, social, and environmental factors. In the domain of mental health, biogenetic

factors are but one of the relevant factors to consider. For example, in depression, both specific genetic polymorphisms of the serotonin transporter gene and environmental stress combine to yield depressive symptoms (Caspi et al., 2003; but also see Risch et al., 2009 and Karg, Burmeister, Shedden, & Sen, in press).

This pattern in which genes and environment interact may be a common pattern for shaping behavior, including a variety of mental health conditions. For example, allelic variants of the monoamine oxidase A gene combine with childhood maltreatment, an environmental stressor, in the development of antisocial behavior (Caspi et al., 2002; Kim-Cohen et al., 2006). Further, allelic variants of the catechol-O-methyltransferase gene combine with adolescent cannabis usage to influence the development of psychosis (Caspi et al., 2005). Thus, in a range of mental illnesses, environmental forces exert an important role, and just because one has a genetic vulnerability does not invariably mean that one becomes symptomatic. One underlying message of this pattern of findings is that social and environmental contexts matter, and that one's genotype is not the sole determinant of mental health. In short, mental disorders are not the exclusive result of biogenetic influences.

In addition, the likelihood of successful treatment for mental disorders is increased when intervention involves consideration of psychological and social factors. For instance, in the case of depression, the most successful treatment does not simply consist of altering neurobiology with medicine. Keller and colleagues (2000) compared the treatment of depression with three conditions: antidepressant medicines, psychotherapy (specifically, cognitive behavioral therapy), and a combination of the two. They found that the treatment that employed both medicine and psychotherapy yielded the greatest symptom alleviation.

The nature of the social environment also makes a difference for those at greatest risk for depression, namely those who have specific genetic vulnerabilities and have experienced heightened levels of stress. If children possess this combination of risk factors, but have positive social supports in their environment, they are less likely to develop depression (Kaufman et al., 2004). In other words, the social environment can buffer individuals who are at the greatest risk for depression (because of dual genetic and environmental vulnerabilities).

As we have argued in a previous section, an overemphasis on the biological origins of mental illness may reinforce lay notions of a fundamental, untreatable "essence" to mental illness (Ahn et al., 2006), and an exclusive reliance on biologically or chemically based treatments for mental illness may paradoxically lead people to avoid treatment in an effort to avoid the mental illness label in the first place. In contrast, a broader recognition of the social and environmental factors in mental illness may have the potential to alter treatment seeking patterns, in that such recognition may change perceptions that mental disorders are unchangeable, predominantly biological conditions. In the next section we consider the implications of plasticity for policy, first returning to the realm of intellectual ability.

We conclude this section with the recognition there are clearly instances involving biological insult or congenital pathology that may render intelligence and mental illness very limited in their susceptibility to change (e.g., for some individuals born with developmental delays). Moreover, we are not claiming that every human attribute is infinitely malleable. However, acknowledging these boundaries, the research nevertheless shows that intelligence, achievement, and mental health are responsive to environmental and social influence. We recommend that the accumulated evidence for plasticity be used to inform the design of social policy.

### **Implications for Policy: Education**

The immutability mind-set, with its emphasis on the fixed and unchangeable nature of psychological attributes, is problematic in a number of ways. We have considered how an immutability perspective may hinder the intellectual achievement of stigmatized groups, and even undermine willingness to access mental health services. We have also summarized a growing body of empirical evidence that questions the very tenability of the assumptions behind an immutable mind-set. Basic psychological functions, including intelligence and mental/behavioral health, are influenced by the environmental contexts in which people are embedded. This fundamental insight, stemming from diverse areas of psychological and biological science, contains the potential to be harnessed for a variety of policy goals aimed at affecting positive social change. Below we discuss some fruitful applications of the plasticity perspective for intellectual achievement and mental/behavioral health.

#### *Promoting Plasticity Beliefs*

One way to promote heightened achievement among socially stigmatized groups may be to promote plasticity beliefs themselves, emphasizing the malleability of intelligence. As we discussed earlier, Aronson and colleagues (2002) have provided experimental evidence that altering beliefs about the malleability of intelligence leads to a variety of positive outcomes for stigmatized students. Research by Blackwell, Trzesniewski, and Dweck (2007) leads to similar conclusions. In one study, 7th grade students were exposed to either an intervention that taught students about the malleability of intelligence or a control condition that taught students about the structure of memory. Although both groups' grades were declining before the intervention, after the intervention strikingly different patterns emerged. Whereas the control groups' grades continued to decline, the students taught about the malleability of intelligence showed an upward trend.

These demonstrations of the effectiveness of malleability messages offer a promising avenue for intervention in schools. Nevertheless, the entrenchment of

immutability beliefs at a structural level—from classrooms and “tracks” that are segregated by “ability” levels, to basing school admissions on the basis of standardized tests, to the widely accepted notion that such tests are indeed a marker of immutable intelligence—conspire to make such interventions an uphill battle. In addition, it may be difficult to convince legislators to allocate scarce budgetary resources to conducting classroom interventions across multiple districts. Given these obstacles, we suggest that it may be fruitful to explore the efficacy of condensing malleability messages into public education campaigns: short messages that may be amenable to mass media broadcasts that can reach large audiences.

### *Malleability in the Classroom*

Although we have focused on the beliefs of individual students, this does not mean that the behaviors of their teachers are unimportant. Minorities, relative to majority group students, are treated differently in academic settings: teachers may neglect to call on certain students to answer questions in class, or teachers may withhold encouragement (see Steele, 1997). Furthermore, minorities are more likely to be expelled and endure disciplinary actions relative to their majority group peers. In addition to these behaviors, teachers may differentially communicate immutability messages to minority students, which may undermine their performance in the face of setbacks.

Rather than communicating to disadvantaged students that minds are like muscles, and that intelligence can be developed through sustained work and effort, teachers may convey that students’ intelligence is fixed and that their efforts matter very little. The interventions regarding malleability that have worked so well with students may need to be experienced by teachers too.

### *Tracking*

Whether we see intelligence as immutable or malleable has profound implications for how we use standardized testing in the context of ability tracking (Hallinan, 1994). This practice consists of separating students into different learning tracks in elementary, middle, and high schools based on measures of intellectual ability. This can set up a lifelong achievement trajectory in that some students are shunted into vocational tracks whereas others are directed into college preparatory tracks. In this way an ability assessment, based on presuppositions of immutability, sets a long-term trajectory that, in effect, says, “Thus far and no further.” In practice, tracking leads to reserving different types of instruction for different students, often to the detriment of students tracked into the low-ability groups. This has the unintended consequence of stabilizing the “low ability” group at their low level, whereas the “high ability” groups excel and blossom intellectually. These practices may end up perpetuating initial ability divisions—in other words,

creating self-fulfilling prophecies whereby the assignment to a given group essentially ensures a given outcome.

Without a doubt, different students enter schools with different levels of preparation. However, this should not be construed to mean that people and groups who begin with a lower level of skill cannot attain a higher level of proficiency. Rather than seeing those with lower initial levels of ability as incapable of academic achievement, we should instead use the current metrics to inform curricular decisions toward better enabling them to achieve like their (initially) better-prepared peers. In other words, ability tests would indicate where to begin the curriculum and what needs to be learned, rather than indicate a boundary of how far a curriculum can extend for a particular student.

In light of these considerations, tracking group boundaries should be porous, with initially low-achieving students being able to enter more advanced tracks if and when such students are ready. Ideally, tracking itself should be reevaluated—particularly in light of the success of “jigsaw classrooms” (Aronson, 2002) in which students with different skill levels successfully learn together by dividing the information to be learned.

The issue of tracking becomes particularly problematic when it is differentially distributed by group membership. Underachievement may then be perceived as a group-level characteristic. To the extent that group-level differences are seen as wedded to an unchangeable biological substratum, group-level underachievement may be seen as a natural and inevitable state of affairs. Rather than searching for social and environmental factors that affect performance, our sights become fixed on an immutable biology (again, we recall James Watson, who shows that even internationally recognized scientists are subject to these biases), and we may conclude that the situation is irreversible. Seeing academic inequality as a stable characteristic that is written into our genes may lead to the inference that social policies seeking to rectify that inequality are misguided and squander taxpayer revenue. But if our brains and intellectual capacities are malleable (as research from Rosenzweig and others strongly suggests), acting to improve performance for all students is a realistic goal that makes sense to pursue in the long term.

### *College Admissions*

Viewing intellectual ability as malleable has additional implications for college admissions tools such as the SAT, which is often interpreted similarly to IQ tests (see Herrnstein & Murray, 1994). At present, we tend to interpret aptitude as a construct denoting fixed ability, and use its assessment to direct college admissions accordingly. This test disproportionately penalizes ethnic minority groups in the United States. A fixed ability construal of the SAT justifies exclusion from selective institutions of higher education. We argue for a different interpretation of the nature of what standardized tests are gauging.



Rather than interpreting the test as an indicator of the limiting potential of what can be learned, we argue that test scores reflect what the test taker has learned thus far. This suggests that admissions officers should not construe such tests as the SAT as a measure of an immutable ability. Rather, test results would constitute a measure of attained competencies, instead of denoting the upper limit of an applicant's capabilities. Finally, standardized tests scores should be evaluated alongside the assessment of other attributes that are important to social and professional success. In the domain of law, for example, assessments of communication and interpersonal skills are also important predictors of professional performance (Shultz & Zedeck, 2008), and can be readily incorporated into law school admissions protocols. Measures tapping these domains might prove useful when considering college admission more generally.

### **Implications for Policy: Mental/Behavioral Health**

We have considered how an accurate assessment of the origin and treatment of mental illness involves a consideration of both biological and social dimensions. Whereas an overemphasis on the biological and genetic aspects of mental illness implicates immutability and may lead to undesirable social consequences, a concomitant consideration of the social dimensions of mental/behavioral health may yield positive social dividends.

#### *Dual Attributions*

Promoting a dual attribution (Hinshaw & Stier, 2008) that acknowledges the biological basis of mental health, although simultaneously acknowledging social factors, may help alleviate perceived stigmatization and promote service utilization. As Hinshaw and Stier (2008) explain, this lens on mental disorders may allow people to recognize the seriousness of mental disorders, while at the same time acknowledging that efforts beyond biology are important components to treatment. A person may reason that although there is an underlying biological reality to disorders of the mind and behavior, that does not mean that psychosocial support, interpersonal relationships, and other social factors are irrelevant. Casting mental disorders as responsive to contextual intervention may also legitimize the importance of caregivers, who are known to be at risk for depression and exhaustion (Baronet, 1999). The idea that the social milieu can be a force for change may be a powerful antidote to hopelessness and powerlessness, and may even increase engagement and compliance with psychotherapeutic intervention.

#### *Messages in the Media*

Promoting a dual attribution also has implications for how psychiatric medicines are marketed to potential consumers (Wilkes, Bell, & Kravitz, 2000).

At present, the public is exposed to advertisements about particular psychiatric drugs for specific mental health conditions. These advertisements, however, typically make no mention of the social aspects regarding the causes and treatments of mental illnesses. These advertisements, through this omission, may unintentionally reinforce the notion that mental illnesses are exclusively biological. To the extent that policy makers want to highlight the social aspects of mental disorders, these advertisements should be accompanied by information about the disorder in question that contains discussion of its psychological and social dimensions.

We suggest considering a Fairness Doctrine for psychopharmaceutical advertisements. In broadcasting, the Fairness Doctrine (see Barron, 1964) was developed to create ideological balance on the airwaves: for every right wing communication a left wing communication had to be given a similar hearing. We should consider an analogue in the mental health treatment realm so that communications regarding biological causes and treatments are met with commensurate communications regarding psychosocial factors.

### *Mental Health Checkups*

Finally, policy makers may want to promote mental health checkups in primary care settings (see Hinshaw, 2007). Ideally, mental health checkups would be as mundane and routine as dental checkups. A physician could inquire about the well-being of their patients and anticipate mental health problems before they arise or intensify. Further, physicians could inform their patients about the biological and social aspects of mental health causation and treatment, providing accurate information and correcting misconceptions. Primary care physicians could accomplish some of the education that schools and media may not be able to adequately provide. Also, the routine and periodic nature of these checkups could help reduce stigma, in that mental illness might be seen as less threatening and less taboo.

Although this policy recommendation is predicated on a system of care that fosters comprehensive (and equal) access to service, the present health policy climate is characterized by disparities in health outcomes and access (Adler & Rehkopf, 2008; Lurie & Dubowitz, 2007). The effectiveness of mental health checkups hinges on expanding access, especially among members of stigmatized social groups (for example, those based on social class and ethnicity) who are often excluded for financial reasons. We suggest that investing in preventive care may actually improve the bottom line, yielding savings in the long term by preventing crises before they escalate. Investing in preventive care may also yield financial gains by increasing long-term work productivity (see Wang et al., 2003). Thus, what may seem like a large investment initially will yield dividends in the long run.

### Future Directions

Although our review has focused on aspects of the immutable/malleable continuum, two future research directions strike us as particularly important. First, beliefs in immutability and biologization may be facets of a more integrative, and perhaps more entrenched, belief system: essentialism. Second, the malleability of psychological attributes, such as intelligence, may go deeper than previously assumed.

#### *The Essentialist Meaning System*

Although we have focused on beliefs about immutability and its connection to biologization, other related beliefs may be relevant to understand, and change, how people perceive intellectual ability and mental health treatability. That innate or biogenetic explanations go hand-in-hand with immutability may link these beliefs to a broader meaning system that in recent years has been called essentialism (see Bastian & Haslam, 2006). This broader meaning system may need to be engaged to more effectively promote plasticity perspectives.

Essentialism is a generalized worldview that attributes human characteristics, and social categories, to an enduring, unchangeable, and deep-seated core or essence. This meaning system is a constellation of four separable but interrelated dimensions. The first dimension to essentialism is biological basis or origin. This belief is that most human characteristics are primarily rooted in a person's genetic endowment or biological makeup. Another facet of psychological essentialism is discreteness, or the belief that human types have clear lines of demarcation and are easily separated into mutually exclusive categories. In the essentialist worldview, there is no overlap or blurring of boundaries between different "types" of people. The third dimension comprising essentialism is a belief that the categories in which people fall into are informative; mere knowledge of a category to which a person belongs yields significant insight into their identity and justifies a wide range of inferences about their behavior. The final component of essentialism is immutability, the view that human attributes as fixed, enduring, and highly resistant to change.

Psychological essentialism situates the immutability beliefs, as well as biologization beliefs, in a richer, more tightly knit, network of meaning (Haslam et al., 2006). Recent psychometric work, using multiple indicators for the proposed facets of essentialism, offers support for this conceptualization (Bastian & Haslam, 2006). The facets of discreteness and informativeness, and their causes and consequences, however, are not well understood. Nevertheless, they represent a fertile area for future inquiry and theoretical synthesis.

Future work should determine how beliefs in the immutability of intellectual ability and mental illness categories relate to this more nuanced essentialist

meaning system. We may discover that to more effectively shift beliefs away from the immutability of intelligence and mental health, and toward plasticity, it is crucial to simultaneously engage the beliefs about discreteness and informativeness. Future research should determine how engaging these latter dimensions of belief may change, or entrench, immutability mind-sets.

### *The Situational Modifiability of Intelligence*

Recent work on the situational modifiability of intellectual performance suggests that the malleability of intelligence may be even greater than previously realized. Research by Lichtenfeld, Maier, Elliot, and Pekrun (2009) has shown that simple exposure to the word “red” is enough to induce worry, and thereby depress performance on standardized measures of intelligence. These scholars propose that activating mental associations to red (such as red marks that denote mistakes on graded examinations) are enough to cause performance decrements.

Such effects underscore the fragility of what are often perceived as metrics assessing an enduring, stable attribute. We might conceptualize the previously discussed stereotype threat effect as an instantiation of a far more general principle, which boils down to the notion that intellectual performance is an extremely dynamic capacity, subject to an extremely broad array of environmental and situational pressures. Further, subtle environmental signals of rejection (e.g., pictures on the wall or other images that exclude minority members), which may diminish a sense of belonging and trust among members of stigmatized groups (Purdie-Vaughns, Steele, Davies, Ditlemann, & Crosby, 2008), may depress intellectual performance. Understanding how intellectual ability fluctuates based on a variety of external pressures may allow better harnessing of these influences to augment intellectual achievement. For instance, if it is found that cues in a school environment that signal inclusion augment intellectual performance of members of devalued social groups, this knowledge could be employed to optimally design classrooms.

### **Conclusion**

Adopting an immutability mind-set (the belief that human attributes are fixed and unchangeable) versus a malleability mind-set (the perspective that human attributes are inherently modifiable) has numerous downstream consequences. Making an immutability perspective salient may perpetuate and exacerbate group-based inequities in the domain of intellectual achievement. These immutability beliefs—especially when they are wedded to the notion of a fixed, unchanging biological endowment—may also have pernicious effects in the domain of mental/behavioral health. The immutability mind-set may cast mental health conditions as unalterable and hopeless, thereby discouraging service utilization when

it is most needed. Messages and policy interventions that promote plasticity—the view that human attributes and their biological underpinnings are malleable—may constitute an effective corrective to the immutability mind-set. Although human characteristics are not infinitely malleable, the available research argues that promoting plasticity has positive consequences. The insights from this literature are likely to bear fruit when designing public policy and interventions.

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