
REPLY

With a Little Help From My Colleagues: Strengthening the Stereotype Inoculation Model With Insights From Fellow Psychologists

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It is a rare occasion in our field to have an opportunity to propose a new theoretical idea, put it to a community of colleagues who have expert knowledge of the topic from multiple perspectives, and receive thoughtful feedback within a short time frame. I could not have asked for more constructive and incisive commentaries. Writing this target article, and reading and reflecting on my colleagues' responses to it, has been an immensely gratifying learning experience. I thank you all for it. In this response essay, I have used the commentaries in four ways. First, I discovered common themes in several commentaries that connect the stereotype inoculation model to related theories and evidence (in some cases the evidence is new and as yet unpublished). I highlight these themes to enrich the proposed model and set it in context. Second, I try to allay a few concerns raised by some commentaries. Third, I clarify aspects of the model that may not have been explicit in the target article, including the boundary conditions of the model. Finally, I identify unanswered questions about stereotype inoculation based on the commentaries that have the great potential to generate future research.

Ingroup Experts and Peers Create a Positive "Ecosystem" for Disadvantaged Individuals

Several of the commentaries provide insights into the ways in which exposure to ingroup experts and peers creates a positive climate in achievement contexts. These commentaries enrich the stereotype inoculation model by highlighting how processes described in the target article connect with related theories and evidence. For example, as noted by Manke and Cohen (this issue), when members of disadvantaged groups see ingroup experts and peers in an achievement context in which their group is negatively stereotyped, it is likely to signal that their group is valuable in the domain and their contribution important, which in turn

strengthens their sense of belonging in the achievement context. It also activates motivations to affiliate, leading individuals to socially tune with successful others (Pelham & Hardin, this issue). More generally, seeing ingroup experts conveys a positive message about the system (e.g., an academic setting or workplace). It signals that the system will reward ingroup effort and success, which in turn enhances trust in the system (cf. Laurin, Fitzsimmons, & Kay, 2011). Trust and belonging are key ingredients that activate ecosystem motivation—a motivational system eloquently described by Crocker and colleagues in which people care about something larger than themselves because they trust that their needs can be met in collaboration with others (Crocker, this issue; Crocker & Canevello, in press). Initially, such motives may be directed toward ingroup members, but ecosystem motives are likely to radiate out to include outgroup peers with whom one interacts daily, works with, and depends on in the service of common goals. In other words, the initial belonging and trust elicited by ingroup experts and peers is likely to enhance collaborative relationships with *both in- and outgroup members* in the achievement domain.

Normalizing difficulty is another benefit of exposure to ingroup experts and peers as rightfully pointed out by Manke and Cohen (this issue). Indeed, our research shows that if individuals learn about ingroup experts' careers especially their early experiences, struggles, and how they started small and got to their current success, they are more likely to implicitly identify with the achievement domain and express positive attitudes toward it than if they learned about the same experts' current success without any information about their early struggles (Asgari, Dasgupta, & Stout, in press). This parallels Walton and Cohen's (2007) findings about normalizing difficulty by providing information about others in the same learning stage. Besides normalizing difficulty, we have found that personalizing ingroup experts inoculates disadvantaged

individuals' self-concept because it prevents those experts from seeming like attainable "superstars" and renders them human (Asgari, Dasgupta, & Gilbert Cote, 2010; Stout, Dasgupta, Hunsinger, & McManus, 2011, Study 2).

Sekaquaptewa (this issue) makes the important point that exposure to ingroup experts and peers may reduce uncertainty (imposter feelings) via another mechanism as well—by changing individuals' attributions for their successes and failures. Seeing ingroup peers struggle and knowing that successful ingroup experts have also struggled in the past promotes external attributions (e.g., the material is difficult; everybody is struggling). Because domain difficulty is salient, success—when it comes—is likely to be particularly sweet and increase internal attributions (e.g., I'm good at this). The idea that uncertainty triggers comparison processes is central to social comparison theory, as Pelham and Hardin (this issue) rightfully remind us. These authors go on to highlight that the stereotype inoculation model extends social comparison theory by proposing that under conditions of uncertainty, upward comparison with successful ingroup experts is actually beneficial (not detrimental) to the self-concept. Going further, I suggest that if individuals *identify* with ingroup experts and perceive them as similar to the self, such upward comparison is likely to reduce one's uncertainty in the domain.

Does the benefit of ingroup experts and peers extend beyond the inoculating environment? This insightful question, asked by Tse, Logel, and Spencer (this issue), requires longitudinal studies. We are beginning to investigate this question in a new study that was recently started where we randomly assign female students who are beginners in engineering to female peer mentors, male peer mentors, or no peer mentors for 1 year. After ensuring mentor–mentee contact for 1 year, we plan to track participants' progress through the year and for the next several years until graduation in order to examine whether contact with advanced same-sex peers in the 1st year of college will act as a social vaccine to protect and enhance women's success in the engineering major for the next 3 years (Dasgupta, Dennehy, & McManus, 2011). This study will also provide important information as to how positive relationships with male peer mentors compares with female peer mentors versus no mentors on women's self-conception, performance, persistence, and future career goals in engineering.

Why Exposure to Ingroup Experts and Peers Is Unlikely to Create a "Bunker Problem"

Akcinar, Carr, and Walton (this issue) raise the concern that exposure to successful ingroup members might create a "bunker problem"—that is, disadvantaged individuals might feel that they live in a bunker (or bubble) within a larger threatening domain that

would isolate them further. Two reasons make me sanguine that this scenario is not likely. First, within a given academic and professional environment (e.g., a workplace, a college campus, etc.), individuals typically move in and out of many situations (team meetings, classes, study groups, dyadic projects) that vary widely in demographics. In proposing the stereotype inoculation model I expect that if members of underrepresented groups have opportunities to interact with ingroup peers and experts in some situations, these will be offset by many more situations in which they will be interacting with mostly majority group members. It will be difficult for them to stay isolated with ingroup peers and experts only. Instead, I predict that having some contact with ingroup peers and experts will be a catalyst that increases belonging and trust in the achievement domain as whole, which in turn is likely to facilitate ecosystem motives and positive interactions with outgroup members (see the preceding section).

A second reason why I am sanguine is because, as described in the original model, reliance on ingroup members is likely to be more important to beginners and less important to individuals who are advanced in the achievement environment. In other words, once individuals find a few similar others (ingroup members), they are likely to venture out and make connections with others who are different (outgroup members). The presence of similar others creates an initial feeling of security that allows individuals to cast a wider social and professional net. This is loosely analogous to attachment theory's prediction of how securely attached individuals use their caregiver as a "secure base" from which to venture out and explore unfamiliar situations (Hazan & Shaver, 1994). In a similar manner, ingroup experts and peers serve as a secure base that allows disadvantaged individuals to venture out to form other collaborative relationships with outgroup members.

Highlighting the Positive Role of Ingroup Experts and Peers Is Not Meant to Negate the Role of Outgroup Members

Although the stereotype inoculation model focuses on ingroup experts and peers only, this does not mean that positive experiences with outgroup members don't matter. I believe they do matter very much (this goes to concerns raised by Akcinar et al., this issue). However, what is not clear from available evidence, and worth empirically investigating in the future, is whether positive contact with ingroup and outgroup members in achievement contexts act independently as main effects or if they interact with each other in interesting ways to influence the self-concept of disadvantaged individuals. For example, following up on Loyd and Amoroso (this issue) and Manke and Cohen (this issue), one might imagine that relationships with

outgroup experts might benefit disadvantaged individuals' self-concept *independently*, over and above the benefit of similar relationships with ingroup experts and peers. Both variables might independently increase opportunities, resources, and networks for individuals who previously felt isolated.

Alternatively, as suggested by Tse et al. (this issue), how outgroup members treat the disadvantaged perceiver herself or treat experts and peers from her ingroup may *moderate* the impact of stereotype inoculation predictions described by the proposed model (see Tse et al., this issue). Tse et al. suggest that if outgroup members are respectful and professional, that may enhance or facilitate stereotype inoculation processes proposed by the model, whereas if they are disrespectful it may weaken stereotype inoculation. That is entirely possible. An alternative moderation prediction derived from stereotype inoculation model is that disrespectful treatment by outgroup members may "sting" less if individuals are inoculated by ingroup experts and peers. A benefit of an ingroup social vaccine might be to protect one's self-concept if interactions with outgroup members don't go well. In sum, a fruitful avenue of future research would be to examine how positive experiences with ingroup versus outgroup members work in tandem (as independent effects or interaction effects) to influence the experiences of disadvantaged individuals who find themselves in small numbers in achievement contexts.

Do Ingroup Experts Versus Ingroup Peers Impact the Self-Concept in Different Ways?

One way to strengthen the stereotype inoculation model would be to specify whether and when ingroup experts versus ingroup peers enhance individuals' self-concept in different ways—perhaps at different time points in development or by emphasizing different mechanisms among the ones specified by stereotype inoculation model. Commentaries by Cheryan, Marx, Pelham, and their colleagues made me think about this issue more carefully and helped generate predictions as to how ingroup experts versus peers might play somewhat different roles in stereotype inoculation (see Drury, Siy, & Cheryan, this issue; Marx & Ko, this issue; Pelham & Hardin, this issue). I propose that exposure to ingroup experts might have the strongest effect on individuals' feelings of belonging and trust, which will affect their persistence, retention in the domain, and future career decisions. The effect of ingroup experts on self-efficacy, threat, and challenge may be secondary to belonging. Because experts allow individuals to imagine their own career trajectory and strengthen their feeling of legitimacy and belonging in that environment, ingroup experts are likely to enhance the retention of underrepresented individuals.

In comparison, exposure to ingroup peers is likely to affect all the mediators equally: belonging, self-efficacy, threat, and challenge. Moreover, positive contact with peers is likely to enhance both recruitment and retention of disadvantaged individuals in a high-stakes achievement environment. Because peers are everyday points of contact for disadvantaged individuals, interaction with ingroup peers is likely to reduce daily experiences of threat, enhance challenge, and increase belonging and self-efficacy. All of these psychological processes are likely to bolster retention. In addition, because ingroup peers are closer to one's developmental stage, and thus similar to the self, they are more likely to encourage individuals to enter into the new domain than experts who are more developmentally distant from the newcomer (see also Drury et al., this issue).

What Are the Boundary Conditions of the Stereotype Inoculation Model?

The strength of a theoretical model is partly determined by the clarity with which it specifies boundary conditions within which the theory applies. Ceci, Williams, Sumner, and DeFraigne (this issue) asked for clarification about these boundary conditions. Here are three such boundary conditions proposed by the stereotype inoculation model. First, exposure to ingroup experts and peers will matter more to members of disadvantaged groups who are *novices* trying to decide whether to enter or stay in an achievement domain but will matter less (or not at all) to advanced individuals. For example, in adolescence and early adulthood when individuals encounter choices about academic coursework or are considering various career options, their choice to enter, stay, or leave will be determined in part by the presence versus absence of ingroup experts or peers. Predictions from stereotype inoculation model are less likely to apply to elementary school students who are not faced with such choices or advanced students and professionals who have been in an achievement domain for a while.

Second, predictions from the proposed model should apply to groups that are *negatively stereotyped in a particular achievement domain* but not to other groups that may be a numeric minority but not stereotyped as lacking ability in the given domain. As a case in point, in North America, in science and engineering, negative stereotypes are mostly applied to women, non-Asian ethnic minorities, and working-class students. Members of these groups are more likely to fall within predictions articulated in stereotype inoculation model, whereas Asian students (who are positively stereotyped in science, technology, engineering, and mathematics) or gays and lesbians (whose stereotypes are not relevant to science, technology, engineering, and mathematics) should be less vulnerable.

Third, ingroup experts and peers will benefit individuals' self-concept only if individuals *perceive them as similar to the self*. If they are perceived as too different from the self (despite their demographic similarity), if they are disliked (see Pelham & Hardin, this issue), or viewed as "superstars" whose achievements are unattainable, then such exposure will not work. Relatedly, individuals must have an opportunity to reflect on the successful expert or peer and compare themselves to him or her. Incidental exposure without opportunity for elaboration and social comparison will probably be less effective. This latter point provides one possible explanation for mixed evidence regarding the "Obama effect" described by Aronson and McGlone (this issue). These authors mention that although some studies have shown that exposure to Barack Obama increased Black students' test scores and reduced the race gap in academic performance (Marx, Ko, & Friedman, 2009), other studies have failed to find such an effect (Aronson, Jannone, McGlone, & Johnson-Campbell, 2009). Aronson and McGlone wonder if the stereotype inoculation model might provide any explanation for these mixed findings. One possible explanation is that the Obama manipulation in Marx's studies may have allowed African American students to elaborate on Obama as a person and reflect on the degree to which they were similar to him. In comparison, perhaps the manipulation in Aronson et al. (2009) prevented Black participants from mentally elaborating on Obama as a person, engaging in social comparison, and perceiving themselves as similar to him. We know from other research that feeling similar to a successful ingroup member is a critical subjective variable that makes the other become one's personal role model (Asgari et al., 2010; Asgari et al., in press). Cheryan and colleagues also describe new research in their commentary, underscoring that perceived similarity to successful role models determines whether that exemplar will benefit one's self-concept (see Drury et al., this issue).

Some Clarifications

The Medical Metaphor

Stereotype inoculation is described as a "social vaccine"—just as a vaccine inoculates the human body from disease, so too ingroup experts and peers inoculate individuals' self-concept from negative stereotypes. Aronson and McGlone (this issue) are correct to note that the "social vaccine" in this model is not a weak version of the stereotype. Rather it is similar to antibodies (ingroup experts and peers) that attack the virus (stereotype). What might happen if individuals are exposed to a weak version of an ingroup stereotype (e.g., made aware of an ingroup stereotype and its negative effects)? A study by Johns, Schmader, and

Martens (2005) did just that and found that it protected women's test performance against stereotype threat.

Relation Between Self-Efficacy and Performance

Marx and Ko (this issue) were puzzled about the prediction made by the stereotype inoculation model regarding the relation between disadvantaged individuals' self-efficacy and their performance. They wondered if the model predicts a negative, positive, or a null correlation between these two variables. To clarify, in psychology we generally assume a strong positive correlation between individuals' performance and their self-efficacy. That is, individuals who perform well in a domain are expected to feel efficacious and competent in that domain, whereas others who perform poorly are expected to lack self-efficacy in the domain. Although this strong positive correlation is likely to be true of majority group members who feel a strong sense of belonging in an achievement domain, the stereotype inoculation model proposes that the analogous correlation will be *substantially weaker* for disadvantaged group members whose group's ability is called into question. For the latter, this correlation may be weakly positive on average but fragile enough to be rendered nonsignificant under threat.

Identification With Ingroup Experts and Peers Versus Identification With the Ingroup as a Whole

In the stereotype inoculation model, the effectiveness of ingroup experts and peers depends on how much perceivers identify with them and feel similar to them. The greater one's perceived identification with the exemplar, the greater the benefit of seeing ingroup experts and peers. It is worth emphasizing that identification with individual experts or peers is different from perceivers' identification with the social group as a whole. Our model does not make any predictions about whether individuals' identification with the ingroup as a whole will moderate the effectiveness of seeing ingroup experts or peers, which is a question posed by Tse et al. (this issue). I imagine that ingroup identification might have two different effects. On one hand, high ingroup identification might increase disadvantaged individuals' likelihood of personally identifying with successful ingroup members in the achievement context, which would be beneficial. On the other hand, high ingroup identification might make individuals particularly sensitive to their minority status and negative ingroup stereotypes, which would be detrimental.

Conclusion and Future Directions

I leave readers with some unanswered questions emerging from the target article and commentaries that

need to be empirically tested in the future. How long does stereotype inoculation endure? That is, does the benefit of knowing ingroup experts and peers in earlier achievement contexts help individuals navigate future situations where the experts and peers are no longer present? To the issue of boundary conditions, when in development is stereotype inoculation most effective versus least effective? Does positive contact with ingroup experts versus ingroup peers inoculate individuals' self-concept in different ways? Finally, we know there is evidence showing that positive contact with ingroup *and* outgroup peers and experts can have beneficial effects on disadvantaged individuals—how do these effects compare? Are they independent or interactive? Which type of intervention is most useful when? These generative questions emerging from the current written exchange promise to push forward the larger enterprise of understanding when and how individuals can successfully resist societal stereotypes about their group and make free(r) choices about their academic and professional lives.

Note

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