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Preferences for Enhancement Pharmaceuticals: The Reluctance to Enhance Fundamental Traits

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Four studies examined the willingness of young, healthy individuals to take drugs intended to enhance their own social, emotional, and cognitive traits. We found that people were much more reluctant to enhance traits believed to be more fundamental to self-identity (e.g., social comfort) than traits considered less fundamental to self-identity (e.g., concentration ability). Moral acceptability of a trait enhancement strongly predicted people's desire to legalize the enhancement but not their willingness to take the enhancement. Ad taglines that framed enhancements as enabling rather than enhancing the fundamental self increased people's interest in a fundamental trait enhancement and eliminated the preference for less fundamental over more fundamental trait enhancements.

Advances in medical technology are providing people with increasingly powerful ways to improve themselves. These technologies are not just used to restore health and youth, as increasing numbers of healthy young people are using them as well. More than a million young men have taken steroids to improve their strength and physical appearance (National Institute of Drug Abuse 2007), and millions of young women have taken weight loss drugs (Khan et al. 2001) or have undergone surgical breast enlargement or rhinoplasty (American Society of Plastic Surgeons 2005). In addition to these cosmetic technologies, many healthy young people take stimulants like Ritalin and Adderall to improve cognitive performance and antidepres-

sants to lift mood and reduce anxiety, even in the absence of any disorder or deficit (Elliott 2003; McCabe et al. 2005). The aim of this article is to examine the willingness of young, healthy individuals to take drugs intended to produce psychological enhancements.

The biotechnology boom has many scientists and clinicians optimistic that dramatic improvements in the effectiveness and safety of such pharmaceuticals are imminent. While such improvements will undoubtedly help clinical populations, they are also very likely to increase demand for these enhancements among nonclinical populations. Concern about such demand has sparked considerable public debate, including the publication of a report by the President's Council on Bioethics (2003). But there is little research attempting to understand the psychology underlying the demand for such enhancement pharmaceuticals. In what ways are healthy young people willing to enhance their psychological abilities? Will some psychological enhancements be more popular and less stigmatized than others? The present research begins to address these questions.

We suggest that people's willingness to take psychological enhancements will largely depend on beliefs about whether those enhancements will alter characteristics considered fundamental to self-identity. Especially in Western cultures, the belief in a fundamental, essential self is widespread (Markus and Kitayama 1991). People believe that particular stable traits explain much of a person's behavior and that these traits form a person's essential self or soul (Chen, Boucher, and Tapias 2006; Dweck 1999; Haslam, Bastian, and Bissett 2004; Markus 1977). Moreover, people are highly motivated to express their self-identities, often through consumption experiences (Aaker 1999; Belk 1988;

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Berger and Heath 2007; Celsi, Rose, and Leigh 1993; Shavitt, Lowrey, and Han 1992; Vazire and Gosling 2004). They are also highly motivated to maintain a consistent and stable self-identity and will reject information that challenges this self-identity (Swann 1987; Swann, Stein-Seroussi, and Giesler 1992). In this light, we propose that people will be especially reluctant to artificially enhance themselves in ways that are believed to alter their fundamental selves.

THE AVAILABILITY AND USE OF PSYCHOLOGICAL ENHANCEMENTS

Although bioethicists have been discussing the implications of human enhancement for decades, the discussion has gained momentum with the recognition that many drugs already on the market are being used by nonclinical populations to make themselves perform and feel better (Bailey 2005; Caplan 2007; Elliott 2003; Fukuyama 2002; Gazzaniga 2005; Green 2007; Hughes 2004; Sandel 2007). Indeed, many drugs offer potential benefits to nonclinical populations. For example, there are several drugs that can improve cognitive abilities such as intelligence, concentration, learning, and memory. Several studies have shown that Ritalin, the drug used to treat attention deficit disorder, can improve performance on basic problem-solving tasks that require high levels of concentration (Elliott et al. 1997; Mehta et al. 2000). Gazzaniga (2005) estimates that Ritalin can improve the SAT scores of children without attention deficit disorder by 100 points or more. And, indeed, many college students are aware of Ritalin's effectiveness. One study estimated that as many as 16% of college students have used it as a study aid, often illegally using pills prescribed for someone else (Babcock and Byrne 2000).

There is also ongoing research to develop drugs to treat memory loss in patients with Alzheimer's disease. Nobel laureate Eric Kandel has formed a company, Memory Pharmaceuticals, that uses his basic research on memory and learning to develop commercially viable compounds. One such drug, donepezil, is already on the market and is approved by the U.S. Food and Drug Administration to treat memory loss. Indeed, one study found that pilots who took donepezil just before learning specific maneuvers in a flight simulator outperformed a control group on tests of performance conducted 1 month later (Yesavage et al. 2002).

Social and emotional traits can also be altered in nonclinical populations. Antidepressants known as selective serotonin reuptake inhibitors (SSRIs) have been used to treat a variety of mental illnesses, including depression and anxiety disorders. However, Knutson et al. (1998) found that these drugs can reduce negative affect and increase outgoingness in healthy adults, and Kramer (1993) suggests that many nondepressed people in fact use them for this purpose. Similarly, beta-blockers, originally used for the treatment of hypertension and other cardiac conditions, are widely used by stage performers and public speakers to reduce performance anxiety (Jefferson 1996). SSRIs have limited effectiveness, and beta-blockers are dangerous, but

there are many ongoing research programs investigating compounds that will more safely and effectively allow people to regulate their emotions and improve their social skills (Barondes 2003; NeuroInsights 2006).

THE PSYCHOLOGY OF PSYCHOLOGICAL ENHANCEMENT

Michael Gazzaniga (2005), former president of the Association for Psychological Science, has suggested that the intelligence advantage gained from taking pharmaceuticals is not ethically any different from the intelligence advantages that some people already get from their genes or from money spent on a good education. On the other hand, the bioethicist Leon Kass (2004), former chairman of the President's Council on Bioethics, has called enhancement "dehumanizing," invoking references to Aldous Huxley's *Brave New World*.

While the bioethics debate is very active, little is known about the psychology underlying consumer demand for such pharmaceuticals. In one of the first investigations of this issue, Baron and Spranca (1997) found a strong resistance to the legalization of IQ enhancements for children with normal intelligence, and many people felt that they should not be allowed no matter what the social benefits might be. Similarly, Sabini and Monterosso (2003, 2005) found that although people were somewhat tolerant of allowing memory- and attention-enhancing drugs for performers in the bottom 10%, few thought that average or high achievers should be allowed to use them. Although these studies suggest conditions under which people may be unlikely to support legalizing particular enhancements, neither study examined people's interest in taking the drugs themselves or the factors associated with such interest. Indeed, concerns about fairness may be quite disconnected from individuals' own enhancement preferences.

Carl Elliott's (2003) book, *Better than Well*, describes the use of several enhancement technologies (both surgical and pharmaceutical), including sex change surgeries, steroids, and antidepressants. Although Elliott was sympathetic to the potential benefits that such technologies may offer, he also expressed some misgivings about these technologies, suggesting that identities should not be tampered with: "What is worrying about so-called 'enhancement technologies' may not be the prospect of improvement but the more basic fact of altering oneself, of changing capacities and characteristics fundamental to one's identity. . . . Much deeper questions seem to be at issue when we talk about changing a person's identity, the very core of what that person is. Making him smarter, giving him a different personality or even giving him a new face—these things cut much closer to the bone. . . . They mean, in some sense, transforming him into a new person" (Elliott 1999, 28-29; also cited by DeGrazia 2005).

The President's Council on Bioethics (2003) expresses this concern even more strongly: "In seeking by these [biotechnologies] to be better than we are or to like ourselves

better than we do, we risk 'turning into someone else,' confounding the identity we have acquired through natural gift cultivated by genuinely lived experiences" (300).

These passages reflect the authors' beliefs that (1) people have a fundamental self-identity and (2) tampering with this self-identity may be unpalatable. These two beliefs are consistent with much research on the psychology of the self. Although people are certainly willing to present themselves differently depending on situational contexts (Aaker 1999; Schlenker and Weigold 1989), it is clear that most people do see their core identities as being largely stable and consistent. Indeed, Markus (1977) suggested that people have "self-schemata" that capture the consistencies that they see in themselves. And, Swann (1987) and Swann et al. (1992) have shown that people seek verification of these consistencies in the feedback they get from others, suggesting that they maintain and value their own self-identity.

What has received less attention in the literature is that some individual characteristics are generally seen as more fundamental to self-identity than are others. Many people have the belief that physical characteristics (like height and hair color) are less fundamental to self-identity than are mental characteristics (like intelligence and outgoingness). But Haslam and colleagues (2004) have shown that there is variance even among mental characteristics, as some are believed to be more fundamental to self-identity than others. In particular, they found that people are more likely to consider emotional mental characteristics to be more "deeply rooted" aspects of self-identity. Because people desire to express and preserve their own self-identities, we suggest that people will be most reluctant to enhance such fundamental, deeply rooted characteristics of the self.

In the studies that follow, we examine whether the well-documented concern for the preservation of self-identity affects the willingness of young, healthy individuals to take drugs designed to improve their own social, emotional, and cognitive abilities. We expected such individuals to share the misgivings of the President's Council on Bioethics (2003, quoted above) and to resist tampering with their own self-identities. That is, we expected people to be less willing to enhance the more fundamental aspects of themselves, despite recognizing that such enhancements would make life better.

RESEARCH OVERVIEW

We present four studies investigating the determinants of people's willingness to take psychological enhancements. Studies 1 and 2 demonstrate that healthy young people are more reluctant to enhance traits that are believed to be fundamental aspects of their self-identities than traits that are believed to be less fundamental. Study 3 demonstrates that attitudes toward banning pharmaceutical enhancements are not driven by the same concerns that lead individuals to resist enhancements. Specifically, study 3 shows that the desire to restrict legal access to these enhancements is driven primarily by morality concerns, whereas the reluctance to take enhancements oneself is driven primarily by identity

concerns. Finally, in study 4, we explore the implications of our findings for advertising and regulation. Direct-to-consumer advertising of psychoactive pharmaceuticals has been controversial, with some authors suggesting that pharmaceutical companies purposefully reach out to nonclinical populations with their advertisements (Healy 2004). And there is evidence that nonclinical populations can easily get prescriptions for drugs like antidepressants from family physicians (Kravitz et al. 2005) and from online pharmacies (Forman and Block 2006). We inform this debate by investigating whether advertisements that frame enhancements as enablers of the self can disarm the self-identity concerns that would otherwise prevent nonclinical individuals from enhancing fundamental traits. All stakeholder groups (patients, physicians, policy makers, industry) have an interest in understanding how people react to these kinds of advertisements.

STUDY 1

In study 1, we examined the relationship between a trait's perceived relevance to self-identity and people's willingness to enhance it. We selected 19 social, emotional, and cognitive traits, and we asked participants to imagine that a pharmaceutical had been developed that could safely improve a person with respect to each trait. We correlated participants' ratings of how relevant each trait is to self-identity with (different) participants' willingness to take an enhancing pharmaceutical to improve each trait. We expected a strong negative relationship across traits:

H1: People will be less willing to enhance traits that are more fundamental to the self.

Like most important decisions, we expect decisions about enhancement to be multiply determined. However, while other factors may play a role in people's reluctance to enhance themselves, we expected concerns about altering the fundamental self to be dominant. To test this, we asked participants to indicate their reasons for being reluctant to enhance each trait. In addition to indicating reluctance because of not wanting to change their fundamental selves, participants could indicate reluctance due to (1) concerns about morality, (2) concerns about being affected in unexpected ways, and (3) general concerns about taking pills. Consistent with hypothesis 1, we expected concern for changing the fundamental self to be the most frequently cited reason for the reluctance to enhance, and we expected it to be cited more for traits considered more fundamental to self-identity.

Method

Participants and Design. Three hundred and fifty-seven undergraduates participated in an online study that offered a lottery prize of \$50. We used a between-subjects design: some participants ($n = 110$) rated 19 traits according to how fundamental they are to a person's self-identity. These participants were randomly assigned to one of three

self-identity rating instructions ("inherence," "fundamental," or "authenticity," described below). We expected all three ratings to tap into the same construct and to exhibit the same relationship with participants' willingness to enhance. A different group of 247 participants was asked to indicate whether they would take a pill to achieve each of the 19 enhancements (the "would-you-enhance" group).

Procedure and Materials. We selected 19 traits for use in studies 1-3 (see table 1). Trait selection was inspired by the bioethics literature on enhancement and was based on the following criteria. First, we selected traits that are psychological in nature and that reflect a range of social, emotional, and cognitive abilities. Second, we selected traits for which treatments already exist or are foreseeable (so traits like "humor" were excluded). Third, because we were uninterested in cases where the reluctance to enhance was driven by participants' lack of interest in improving, we selected traits that we believed many people would want to improve. Fourth, we selected traits that could be described in a very specific manner. Indeed, to ensure that all participants interpreted the traits in the same way, we provided only very specific trait definitions (e.g., "ability to memorize and remember rehearsed information" and "ability to relax and avoid unnecessary worry and anxiety") instead of single-word trait descriptors such as "memory" or "relaxed."

Of the three self-identity rating instructions, the inherence measure was used by Haslam et al. (2004), and we developed the fundamental and authenticity measures. Participants receiving the inherence instructions were shown a randomly ordered list of the 19 traits. For each trait, they indicated their agreement on a 7-point scale (1 = "strongly disagree" and 7 = "strongly agree") with the statement: "This characteristic is a deeply-rooted aspect

of a person: it lies deep within the person and underlies the person's behavior" (Haslam et al. 2004).

Participants receiving the fundamental and authenticity measures began by reading the following cover story about enhancing pharmaceuticals:

There is an increasing public interest in what is called "pharmacological enhancement"—the use of pharmaceuticals to enhance the brain functioning of ordinary individuals. Normal, healthy people will be able to enhance specific aspects of themselves without side effects. We would like your opinions about some of the enhancements that are expected to be possible. In each case, assume that a new kind of prescription pharmaceutical has been developed that can safely alter specific parts of the brain.

Think of these as a sort of magic pill. They only have to be taken once and the effect is permanent. Imagine that the pills are completely safe with no long-term or short-term side effects. They only alter the specific part of the brain that they target.

After reading the cover story, participants receiving the fundamental instructions were asked to indicate "how much each pill would fundamentally change 'who you are: For example, if a person changes their hair color, they are NOT fundamentally changing who they are. The changes that we want you to consider will generally be more fundamental than that." Below this instruction, the 19 enhancements were presented (in a random order) in the following form: "A pill that made me better at memorizing and remembering rehearsed information. . . ." Participants rated each enhancement on a 10-point scale, ranging from 1 = "superficial change in who I am" to 10 = "fundamental change in who I am."

TABLE 1

TRAIT LABELS AND DESCRIPTIONS

Trait label	Trait description
Absentmindedness	Ability to remember to do things and avoid absentmindedness
Concentration	Ability to concentrate while reading or doing other mental tasks
Creativity	Ability to think about problems creatively and in multiple ways
Emotional recovery	Ability to "get over" setbacks and traumas
Empathy	Ability to recognize and empathize with other people's emotions
Episodic memory	Ability to remember distant and recent life events
Foreign language ability	Ability to learn foreign languages
Kindness	Tendency to act kindly toward others
Math ability	Ability to understand and solve math problems
Mood	Average mood
Motivation	Motivation to accomplish one's personal goals
Music ability	Ability to learn and play music
Reflexes	Speed of reflexes and hand-eye coordination
Relaxation	Ability to relax and avoid unnecessary worry and anxiety
Rote memory	Ability to memorize and remember rehearsed information
Self-confidence	Self-confidence and belief in oneself
Self-control	Ability to exert self-control in deciding what to do and how to spend time
Social comfort	Tendency to feel comfortable when meeting new people
Wakefulness	Ability to function effectively and comfortably with little sleep

NOTE.—Only the trait descriptions were presented to participants. The trait labels are the authors' shorthand labels for the traits and were never presented.

TABLE 2
STUDIES 1 AND 3: MEANS AND PERCENTAGES

Trait	Identity index (study 1)	% Willing to enhance (study 1)	% Willing to enhance (study 3)	% Favoring a ban (study 3)	Moral acceptability (study 3)
Reflexes	-1.23	36	35	52	5.5
Rote memory	-1.18	51	45	49	5.9
Wakefulness	-1.13	53	52	45	6.4
Foreign language ability	-1.09	54	41	30	6.0
Math ability	-1.01	35	37	53	5.7
Episodic memory	-.99	34	51	43	7.3
Concentration	-.76	47	46	29	6.4
Music ability	-.69	35	37	49	5.7
Absentmindedness	-.58	35	38	24	7.2
Self-control	.43	24	23	38	6.4
Creativity	.54	30	33	49	5.8
Emotional recovery	.57	21	21	30	6.5
Relaxation	.66	31	32	28	7.1
Social comfort	.71	26	29	32	6.7
Motivation	.86	24	22	42	6.1
Mood	.99	21	24	35	6.7
Self-confidence	1.14	19	21	36	6.5
Empathy	1.38	13	19	40	6.4
Kindness	1.39	9	10	43	6.5

NOTE.-Traits are sorted in ascending order of identity relevance.

After reading the cover story, participants receiving the authenticity instruction read the following: "In each case, we would now like to know if you think that improving yourself by taking pills would affect your authenticity. In other words, do you think that you would in some way be fake or inauthentic, as a result of the pills? Or would you still be the 'real you' even if you improved through pills?" Below this instruction, the 19 enhancements were presented (in a random order) in the following form: "If a pill made me better at memorizing and remembering rehearsed information ... " Participants rated each enhancement on a 10-point scale, ranging from 1 = "I would still be the real me" to 10 = "I would be fake/inauthentic."

Participants in the would-you-enhance group were *not* asked to make any of the inherence, fundamental, or authenticity ratings. Instead, they indicated whether they would consider taking a pill to make themselves better on each of the 19 traits. The traits (e.g., "ability to memorize and remember rehearsed information") appeared in a random order, and participants indicated one of three responses for each trait:

1. I would take a pill to get better at this.
2. I wish I was better at this, but I would *not* take a pill.
3. I do not wish to be better at this.

After indicating their responses, participants were asked to indicate the reason(s) for their reluctance to enhance each of the traits. The list of possible reasons was developed by exaruning open-ended responses in pilot studies and through discussions with colleagues. Since many participants were not in fact resistant to enhancing, and many did not even wish to be better on some traits, we included response op-

tions associated with those possibilities. The specific instruction for this task was as follows: "Even if you would ultimately take the pill, you might still be at least a little reluctant, and we would like to learn why. A short list of reasons will be presented and you should indicate which one best represents your reason for being reluctant to take that particular pill. (You may select more than one reason if need be.)"

The enhancements were then listed in a random order. For each of the enhancements, the response options were as follows (the order of options 3-5 was counterbalanced between participants):

1. I am not at all reluctant to take this pill.
2. I am reluctant because I do not even wish to be better on this trait.
3. I am reluctant because this is immoral.
4. I am reluctant because this might affect me in some unexpected ways.
5. I am reluctant because this would fundamentally change who I am.
6. I am reluctant because I just do not like taking pills.
7. I am reluctant for a reason that is not listed here.

Results and Discussion

Across traits, the three self-identity measures correlated nearly perfectly, suggesting that these measures in fact assess the same construct. Inherence and fundamental ratings correlated at .93, inherence and authenticity ratings correlated at .96, and fundamental and authenticity ratings correlated at .95 (*p*'s < .001). For each trait, we averaged the standardized scores of each rating, and we refer to this average as the "self-identity index." Table 2 displays the self-

identity index for each trait, as well as the percentage of participants in the would-you-enhance group who were in fact willing to enhance. Half of the participants in the would-you-enhance group were told that the effects were reversible rather than permanent. However, this manipulation had no effect on the results, and so we collapsed across this variable in the analyses presented here.

Consistent with hypothesis 1, the self-identity index of each enhancement negatively and strongly predicted the percentage of people who were willing to take the enhancement ($r(17) = -.88, p < .001$). This correlation remained highly significant when we controlled for the percentage of people who did not want to be better on the trait ($r(16) = -.76, p < .001$) and when we eliminated all "I do not wish to be better at this" responses ($r(17) = -.89, p < .001$).

To examine hypothesis 1 further, we analyzed the reasons participants gave for being reluctant to enhance a particular trait. Since participants had the option of indicating that they were not in fact reluctant, we restricted the analysis to those who checked one of the six reasons for being reluctant. As shown in table 3, the most common reason given was concern that the enhancement would "fundamentally change who I am" (41%). Across traits, the percentage endorsing this reason was significantly greater than the percentage endorsing any other reason ($t's(17) > 2.90, p's < .009$).

More important, people were more likely to endorse the fundamentalness reason for more fundamental traits. Across traits, the proportion of people expressing reluctance to enhance because of a concern for fundamentally "changing who I am" correlated positively with the self-identity index ($r(17) = .93, p < .001$). The self-identity index did not significantly positively correlate with the proportion of people indicating resistance for any of the other reasons mentioned (see table 3). This suggests that fundamental traits are not those for which people perceive enhancements to produce especially unintended consequences or that inspire a particularly strong moral concern or distaste for pills. In fact, moral concerns were expressed more often for traits that are considered less fundamental to self-identity.

In sum, study 1 provides strong evidence that the reluctance to fundamentally alter one's self-identity largely determines people's reluctance to enhance particular psychological traits. People are less willing to enhance traits that

are believed to be more fundamental to the self (e.g., motivation, social comfort) than traits that are less fundamental to the self (e.g., memory ability, concentration), presumably because they are reluctant to alter their own self-identities.

STUDIES 2A AND 2B

In study 2, we sought to rule out some potential alternative explanations for the results of study 1. Toward that aim, we examined whether people's reluctance to enhance fundamental versus nonfundamental traits is attributable not to the hypothesized reluctance to change one's self-identity but rather to one (or more) of the following explanations:

1. *Value*: People are more willing to enhance less fundamental traits because they believe that these enhancements would better improve their lives.
2. *Magnitude*: People are more reluctant to enhance more fundamental traits because they believe that these enhancements would change more aspects of their lives.
3. *Unfairness*: People are more reluctant to enhance more fundamental traits because they believe that these enhancements would give them more of an unfair advantage over others.
4. *Self-possession*: People are more reluctant to enhance more fundamental traits because they believe that they are already superior on these trait dimensions.
5. *Effectiveness*: People are more reluctant to enhance more fundamental traits because they believe that these enhancements are less effective or plausible.

Participants in studies 2a and 2b indicated their willingness to enhance the 19 traits, and they rated the fundamentalness of each enhancement. To reduce the number of ratings the participants had to make, we used only the fundamental rating instructions from study 1 to assess self-identity. Across traits, this measure correlated at .98 with the self-identity index of study 1. In keeping with the desire to minimize the number of ratings required, we examined the five alternative explanations in two separate studies. Accordingly, participants in study 2a also rated the enhancements on value, magnitude, and unfairness, and participants in study 2b rated the traits on self-possession and the en-

TABLE 3

STUDY 1: PERCENTAGE OF PEOPLE ENDORSING EACH REASON FOR THEIR RELUCTANCE TO ENHANCE

Reason	%	Correlation with self-identity index
I do not <i>even</i> wish to be better on this trait	25.6	.27
This is immoral	13.7	-.60*
This might affect me in some unexpected ways	29.4	-.21
This would fundamentally change who I am	40.8	.93*
I just do not like taking pills	19.6	-.76*
A reason that is not listed here	15.8	-.54*

* $p < .05$; participants were free to endorse more than one reason for their reluctance to enhance.

hancements on effectiveness. Consistent with hypothesis 1, we expected to observe a strong negative relationship between fundamentalness and the willingness to enhance particular traits, even after controlling for each of the variables listed above.

Method

Participants and Design. One hundred and seventy-six undergraduates participated in study 2a, and 90 undergraduates participated in study 2b. Both studies were administered as online surveys that offered lottery prizes worth \$60. Both studies used a within-subjects design.

Procedure and Materials. Study 2a used the same cover story and traits as study 1. The survey consisted of five sections. In section 1, participants indicated their willingness to enhance each trait, using the same measure as in study 1. Section 2 featured the magnitude measure, and participants indicated, for each enhancement pill, "how many aspects of your life would be affected if you took the pill yourself." Participants rated each enhancement on a 10-point scale, ranging from 1 = "few aspects of my life would be affected" to 10 = "all aspects of my life would be affected." Section 3 featured the value measure, and participants were instructed "to indicate the extent to which you think that your life as a whole would be better if you were a little better on each trait." Each trait was presented in the following form: "My life would be better if I was better at memorizing and remembering rehearsed information." Participants rated these statements on a 10-point scale, ranging from 1 = "strongly disagree" to 10 = "strongly agree." Section 4 featured the fundamentalness measure, and participants indicated, for each enhancement pill, "the extent to which each pill would fundamentally change who you are." Participants rated each enhancement on a 10-point scale, ranging from 1 = "superficial change in who I am" to 10 = "fundamental change in who I am." Finally, section 5 featured the "unfairness" measure, and participants indicated "the extent to which taking each pill would give you an unfair advantage over others." Participants rated these statements on a 10-point scale, ranging from 1 = "not at all unfair" to 10 = "very unfair." Participants were randomly assigned to one of four survey orderings. The four orderings were achieved by counterbalancing the position of the willingness-to-enhance questions (either first or last) and by counterbalancing the order of the other four sections.

To examine whether our results are robust to different methods of enhancement, study 2b described a slightly different cover story than the previous two studies. Specifically, participants were told that the enhancement pills would have to be taken once per day for 3 months in order for them to be effective. However, all other aspects of the cover story and procedure were identical to study 2a, and there was no significant difference in rates of enhancement between studies 2a and 2b. The survey consisted of four sections. Section 1 featured the same willingness-to-enhance measure used in

studies 1 and 2a. Section 2 featured the effectiveness measure, and participants indicated "the extent to which you think scientists could potentially develop pills that have these specific effects." Participants rated each trait on a 10-point scale, ranging from 1 = "impossible to improve with pills" to 10 = "possible to improve with pills." Section 3 featured the same fundamentalness rating used in studies 1 and 2a. Section 4 featured the self-possession rating, and participants were asked, for each trait, "How do you compare to other people your age?" They rated their own abilities on a 10-point scale, ranging from 1 = "lower than everyone" to 10 = "higher than everyone." The order of these sections was reversed for approximately half of the participants.

Results and Discussion

Across traits, we regressed the percentage of participants who were willing to enhance each trait on study 2a's (1) mean value rating, (2) mean magnitude rating, (3) mean fundamentalness rating, and (4) mean unfairness rating and on study 2b's (5) mean self-possession rating and (6) mean effectiveness rating. We conducted two regressions, one using study 2a's enhancement percentage and the other using study 2b's enhancement percentage. Table 4 shows the results. As predicted, participants were less likely to enhance traits that they considered to be fundamental to the self (p 's < .003). This was the only effect significant in both regressions. The results were nearly identical when study 2a's enhancement percentages were regressed on only the mean ratings obtained in study 2a (i.e., value, magnitude, fundamentalness, and unfairness) and study 2b's enhancement percentages were regressed on only the mean ratings obtained in study 2b (i.e., fundamentalness, self-possession, and effectiveness).

The within-subjects design used in studies 2a and 2b permitted by-participant analyses as well. To accomplish this, we computed, for each participant, the across-trait partial correlation between the willingness to enhance and ratings of how fundamental each trait was to the self (controlling for the other variables measured in each study). We removed participants whose responses to one of the critical measures were identical across traits, as correlations could not be calculated for these participants. And, for each participant, we removed traits for which he or she responded "I do not wish to be better" to the would-you-enhance question, because we were interested in predicting people's willingness to artificially enhance traits that they wanted to improve. Consistent with our hypothesis, the average within-subject partial correlations between a participant's willingness to enhance and the same participant's fundamentalness rating were significantly negative in both studies (p 's < .003; see table 5).

In addition, using the same analytical procedure, willingness to enhance was significantly positively related to magnitude, unfairness, value, and effectiveness (see table 5). Contrary to the alternative explanations suggested above, when we controlled for the other measured variables, par-

TABLE 4
STUDIES 2A AND 2B: ACROSS-TRAIT STANDARDIZED REGRESSION
COEFFICIENTS (3) PREDICTING PARTICIPANTS' WILLINGNESS TO ENHANCE

Predictor	% Willing to enhance (study 2a)	% Willing to enhance (study 2b)
Fundamentalness (study 2a)	-1.00"	-1.33"
Magnitude (study 2a)	-.26	-.05
Value (study 2a)	.92"	.58
Unfairness (study 2a)	.27	-.22
Effectiveness (study 2b)	-.03	.16
Self-possession (study 2b)	-.10	-.07

" $p < .05$.

Participants were more likely to enhance traits that altered more aspects of themselves, as well as traits they perceived to give them an unfair advantage. Not surprisingly, they were also more likely to enhance traits that would make their lives better and more likely to take enhancements that would be more effective. Participants' willingness to enhance traits did not depend on whether they believed they already possessed them.

Finally, in a separate study ($N = 115$), we examined another potential alternative explanation for people's reluctance to enhance fundamental traits: perhaps people are more reluctant to enhance traits that they can change via more natural means. In this study, participants indicated their agreement with statements of the form: "If I wanted to, it would be possible for me to get better at memorizing and remembering rehearsed information, without resorting to medications or other remedies." When we added this measure of "controllability" as a predictor in the regressions reported above, it was not significant ($p's > .18$), and the effect of fundamentalness remained highly significant ($p's < .005$).

In sum, the results of study 2 reinforced the results of study 1. People were less willing to artificially enhance fundamental traits, and the alternative explanations put forth seem unable to account for this relationship.

STUDY 3

Studies 1 and 2 established that people are more reluctant to enhance traits that are more fundamental to self-identity.

Indeed, the willingness to enhance particular aspects of one's personality seems driven by the desire to improve oneself without meaningfully changing the fundamental self.

Interestingly, the willingness to enhance seems *not* to be driven predominantly by moral or fairness concerns. On the surface, this seems at odds with research showing that people morally object to the legalization of enhancement technologies (Baron and Spranca 1997; Sabini and Monterosso 2003, 2005). To reconcile this, we suggest that one's own willingness to engage in enhancement is driven by different concerns than is one's desire to ban legal access to particular enhancements. Whereas people are more reluctant to take enhancements that would alter their own identities, they may not object to other people altering their identities. Indeed, when judging the actions of others, people are much more likely to invoke concerns for moral acceptability than they are when judging their own actions (Diekmann et al. 1997). Accordingly, although we expected moral concerns to play little (if any) role in predicting people's own enhancement preferences, we did expect such concerns to predict the enhancement restrictions that they wish to impose on others.

In study 3, we asked some people whether they would be willing to take the various enhancement pills and asked others whether they thought that the enhancement of each trait should be banned. As in studies 1 and 2, we expected fundamentalness, but not moral acceptability, to primarily predict people's willingness to enhance. As in previous research (Baron and Spranca 1997; Sabini and Monterosso 2003, 2005), we expected moral acceptability, but not fun-

TABLE 5
STUDIES 2A AND 2B: MEAN WITHIN-SUBJECT PARTIAL CORRELATIONS

Measure	Willing to enhance (study 2a)	Willing to enhance (study 2b)
Fundamentalness (study 2a)	-.13"	
Magnitude (study 2a)	.11'	
Value (study 2a)	.23"	
Unfairness (study 2a)	.05"	
Fundamentalness (study 2b)		-.12"
Effectiveness (study 2b)		.12"
Self-possession (study 2b)		.01

" $p < .01$; the partial correlations control for the other variables measured in each study.

damentalness, to primarily predict the desire to ban particular enhancements. Because we expected different motivations to affect these two choices, we also expected responses to the two questions to be only modestly correlated.

- H2:** Unlike people's willingness to enhance, people's desire to ban legal access to enhancements will be driven more by moral concerns than by concerns about fundamentally altering the self.

Method

Participants and Design. Three hundred and fifty-nine undergraduates participated in an online study that offered a lottery prize of \$50. We used a between-subjects design. One group ($n = 113$) indicated their willingness to enhance each trait ("would-you-enhance" group), a second group ($n = 110$) indicated whether the enhancement of each trait should be banned ("banning" group), and a third group ($n = 136$) rated the fundamentalness and moral acceptability of each enhancement ("fundamental/moral" group).

Procedure and Materials. We used the same 19 traits as in studies 1 and 2 and the same cover story about pharmaceutical enhancements described in study 1. Using the same method as in study 1, participants in the would-you-enhance group indicated which, if any, enhancements they would consider taking. Participants in the banning group indicated "whether or not you think that use of the pill should be banned for enhancement purposes, that is, for people who are near average or above average on the particular trait." Their response options were "Yes, such a pill should be banned for enhancement purposes" and "No, such a pill should *not* be banned for enhancement purposes." Participants in the fundamental/moral group were asked to imagine that a person who is already average on the given trait becomes significantly above average by taking the pharmaceutical. Similar to the instructions in study 1, they were then asked to imagine how much each enhancement would fundamentally change "who the person is" on a 10-point scale, ranging from 1 = "superficial change in who the person is" to 10 = "fundamental change in who the person is." These participants also rated the moral acceptability of each of the enhancements on a 10-point scale, ranging from 1 = "not at all morally acceptable" to 10 = "completely morally acceptable." The order of fundamental and morality questions was counterbalanced, and for all participants in this study the order of enhancements was randomly presented.

Results and Discussion

The percentage of people willing to enhance each trait was very consistent with the previous studies (average $r(17) = .88, p < .001$). However, as shown in table 2, there was considerable variance across traits in the willingness to take and ban enhancements: some trait enhancements were appealing for one's own use but were frequently opposed

for use by others. Conversely, some enhancements were *less* appealing for one's own use but were infrequently opposed for others' use.

The willingness to enhance and the desire to ban legal access to the enhancements were not significantly correlated ($r(17) = -.19, P = .61$). Consistent with the reasons analysis in study 1, when willingness to enhance was regressed on the moral acceptability and fundamentalness ratings, fundamentalness was a significant predictor ($\beta = -.92, p < .001$), but moral acceptability was not ($\beta = .004, p > .96$). However, consistent with hypothesis 2, when the desire to ban legal access to the enhancements was regressed on these same two predictors, the exact opposite result was observed: moral acceptability was a strongly significant predictor ($\beta = -.90, p < .001$), but fundamentalness was not ($\beta = -.03, p > .77$).

These results provide strong support for the hypothesized dissociation between the decision to enhance one's own traits and the decision to ban others' access to those enhancements. Whereas the former is largely determined by concerns about altering the fundamental self, the latter is largely determined by moral concerns. The strong relationship between banning and moral acceptability is important, because it suggests that our measurement of moral acceptability is valid and that there is meaningful variance in this variable across traits. This means that the null relationship we observed between moral acceptability and the willingness to enhance cannot be attributed to poor measurement but rather to the truly small (or null) relationship between these variables.

STUDY 4

The results of studies 1-3 suggest that people are more resistant to enhancing traits that they believe to be fundamental to self-identity. In study 4, we examined the implications of this finding for advertising. Direct-to-consumer advertising of psychoactive pharmaceuticals has been controversial, and all stakeholder groups (patients, physicians, policy makers, industry) have an interest in understanding how people react to these advertisements. We hypothesized that interest in enhancing fundamental traits could be increased through marketing messages that are framed so as to reduce the threat that enhancing fundamental traits poses to self-identity.

In study 4, we presented participants with advertisements for a hypothetical enhancement pharmaceutical (Zeltor), which was described as improving a trait that was high (social comfort) or low (ability to concentrate) in fundamentalness. We manipulated the tagline associated with Zeltor, and we asked participants to rate their interest in trying the drug. In the enhancement condition, the tagline suggested that taking the drug would enhance people's true selves. In the enablement condition, the tagline suggested that taking the drug would enable people to realize their true selves (Lynch 2006, forthcoming).

Because studies 1-3 suggested that people are more willing to enhance traits that are less fundamental to self-iden-

ity, we expected participants in the enhancement condition to show more interest in enhancing concentration (a relatively nonfundamental trait, with an identity index score of $-.76$ in study 1) than social comfort (a relatively fundamental trait, with an identity index score of $.71$ in study 1). Moreover, if people are less willing to take a drug to enhance social comfort (vs. concentration) precisely because so doing imposes a greater threat to the self, then an enablement tagline that minimizes this threat to the self should increase participants' willingness to take the social comfort drug and thereby reduce the difference in their relative preference for the concentration drug. Thus, consistent with our claim that concerns about preserving self-identity are critical in determining people's across-trait enhancement preferences, we expected participants in the enablement condition to show a more equal interest in enhancing concentration versus social comfort.

- H3:** People's relative preference for enhancing less fundamental versus more fundamental traits will be diminished when a drug's tagline frames it as an enabler of the true self rather than as an enhancer of the true self.

Method

Participants and Design. Five hundred participants, ages 18-45 years, completed an online survey that offered a chance to win a \$35 gift certificate. Participants were randomly assigned to one of four conditions in a 2 (more fundamental vs. less fundamental trait) \times 2 (enhancement vs. enablement tagline) between-subjects design.

Procedure and Materials. Participants began by reading an introductory paragraph about an enhancement drug named Zeltor. For example, participants in the less fundamental/enhancement condition read the following:

Within the next 5-10 years, pharmaceutical companies are planning to introduce drugs that are designed to allow normal, healthy individuals to improve themselves in various ways. It is believed that one of the most popular of these new drugs will be designed to improve people's ability to concentrate while reading or doing other mental tasks.

In this study, we are interested in which sorts of concentration drugs will be the most popular. One such drug is known as Zeltor, and its manufacturers promise that the drug has no side effects and that its effects will not be permanent. The tagline for Zeltor will be "Zeltor-Become More Than Who You Are."

Participants in the more fundamental trait condition were told that Zeltor was designed to improve people's ability to feel more comfortable when meeting new people (instead of concentration), a trait that people in all of our studies indicated as being highly fundamental to the self. The tagline manipulation involved only a slight change in the wording of the ad's tagline. The enhancement tagline read, "Zel-

tor-Become More Than Who You Are," whereas the enablement tagline read, "Zeltor-Become Who You Are."

After reading the description of Zeltor, participants answered two questions: (1) "Assuming that the drug truly has no side effects, to what extent would you be interested in increasing your concentration [social comfort] by using a drug like Zeltor?" and (2) "To what extent would you be interested in trying Zeltor at least once?" Participants gave their responses on 9-point scales ranging from 1 = "not at all interested" to 9 = "extremely interested."

Results and Discussion

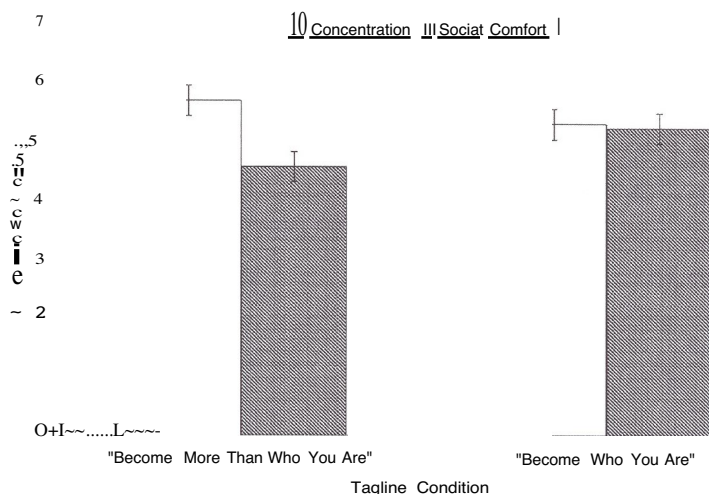
Responses to the two dependent measures were highly correlated ($r(498) = .89$), and so we averaged them before conducting the analyses. A 2 (trait) \times 2 (tagline) between-subjects ANOVA revealed a significant main effect of trait ($F(1,496) = 5.26, p < .03$) as well as a significant interaction between trait and tagline ($F(1,496) = 4.07, P < .05$). As shown in figure 1, participants who read the enhancement tagline were more interested in the concentration drug than in the social comfort drug ($t(254) = 3.01, P = .003$). This replicates the results of studies 1-3, which found that participants were less willing to enhance more fundamental than less fundamental traits. However, consistent with hypothesis 3, this effect was reduced for participants who encountered the enablement tagline, and they were not more interested in the concentration drug than the social comfort drug ($t(242) = .20, p > .84$). Looking at differently, the results show that the enablement tagline increased interest in the social comfort drug ($t(250) = 1.77, P < .08$) but not the concentration drug ($t(246) = -1.08, p > .28$).

These results have both theoretical and practical implications. On the theoretical side, these results lend further support to our claim that across-trait differences in people's willingness to enhance are largely governed by concerns about altering one's fundamental self-identity. When a tagline framed drugs as enablers instead of enhancers, we expected participants to view pharmaceutical improvements to fundamental traits as less threatening to their fundamental self. Thus, we expected and found that the enablement tagline increased interest in taking an identity-relevant social comfort drug but did not increase people's interest in taking an identity-irrelevant concentration drug. As a result, the relative preference for concentration over social comfort drugs—a preference observed in studies 1-3—significantly decreased when the drug was described in a way that was less threatening to self-identity. This finding helps to isolate the role of identity concerns in across-trait differences in participants' willingness to enhance, particularly because other differences between the traits (e.g., desirability, controllability, self-possession, fairness) were held constant across the enhancement and enablement conditions.

On the practical side, these results suggest ways in which advertisers can reduce the identity concerns that would otherwise prevent nonclinical populations from seeking an enhancement pharmaceutical. Indeed, people seem reluctant to enhance traits that are fundamental to self-identity unless

FIGURE 1

STUDY 4: INTEREST IN ENHANCING AS A FUNCTION OF TRAIT AND TAGLINE



advertisers pitch such enhancements as enabling rather than altering self-identity.

GENERAL DISCUSSION

In an effort to understand the psychology underlying the demand for enhancement pharmaceuticals, we hypothesized that people would be more reluctant to enhance aspects of themselves that they consider to be fundamental to self-identity. In three studies, we found that this was indeed the case. Enhancements that were independently evaluated as being more fundamental to the self were the ones that people were most reluctant to take (studies 1-3), and concern for changing the fundamental self was the most frequently cited reason for resisting enhancement (study 1). Furthermore, the relationship between traits' fundamentalness and the willingness to enhance was robust to controls for the enhancements' perceived value, magnitude, effectiveness, morality, and unfairness and for the traits' self-possession and perceived controllability (study 2). It seems that people are reluctant to take fundamental enhancements primarily because they are reluctant to fundamentally change their self-identities.

Although people were not more willing to take enhancements that were more morally acceptable, moral acceptability did predict people's policy preferences. People were more inclined to ban enhancements that were morally unacceptable. This result has implications for both marketing managers and regulators. Notably, because policy preferences and consumption preferences may be, at best, only modestly correlated (study 3), practitioners may need to craft different communication appeals depending on whether their goal is to influence support for legalization policies or to influence consumer demand. Specifically, appeals that emphasize moral concerns may be most effective for influenc-

ing policy support, whereas appeals that emphasize identity concerns may be most effective for influencing consumer demand.

In study 4, we found that by framing enhancements as enablers of one's true self, advertisers can successfully disarm the identity concerns that would otherwise prevent non-clinical individuals from enhancing a fundamental trait. In this light, it is interesting to consider the case of Paxil, an antidepressant sold by GlaxoSmithKline. Paxil has used the tagline "Paxil gets you back to being you" on its Web site. This tagline can, appropriately, ease the concerns of clinically depressed and anxious individuals who are considering taking this potentially helpful medication. At the same time, our research suggests that it could also increase the inclination of nonclinical individuals to seek a Paxil prescription for self-improvement purposes. It is for regulators (as well as for industry and consumer welfare groups) to decide if anything should be done about this. It is our role as market researchers to inform their decisions by uncovering the psychological mechanisms underlying consumer demand for this increasingly powerful and available product category.

We consider our research to be a starting point in the investigation of people's decisions to enhance their psychological abilities. In what follows, we discuss some of the many unanswered questions that remain.

First, relatively little is known about how people form beliefs about which traits define a person's fundamental self-identity. Using several different measures, we found considerable cross-trait variance in which traits are believed to be fundamental to self-identity. Though the split is not perfect, it seems that our participants believe that social and emotional abilities are fundamental to self-identity, whereas more cognitive abilities are less fundamental. This finding is consistent with research by Haslam et al. (2004), who

found that a trait's emotionality was correlated with its inherence (one of the measures composing our identity index in study 1). However, despite our findings, it is still not clear which variables affect people's conception of the fundamental self, nor is it clear whether the distinction between cognition and emotion plays a causal role in governing beliefs about identity. Indeed, understanding the factors affecting beliefs about identity is an important topic for future research, especially because knowing what affects these beliefs may provide researchers and practitioners with ways to alter them. As our findings suggest, changing beliefs about which aspects of the self are fundamental is likely to affect people's willingness to take psychological enhancements.

A second question concerns how people's beliefs about their own capabilities might affect their desire to enhance themselves. It is possible that people who perceive themselves as worse than they "should be" on some trait dimension are more likely to enhance that trait in an effort to become "who they really are." As one illustration of this phenomenon, consider Kramer's (1993) very interesting discussion of a depressed patient who needed "Prozac in order to 'feel [like] herself,'" a puzzling development that prompted Kramer to ask, "Might [the patient], absent the invention of the modern antidepressant, have lived her whole life—a successful life, perhaps, by external standards—and never been herself?" (19). Future research should try to understand the conditions under which fundamental trait enhancements will be seen as a means by which the true self can be realized rather than altered. Indeed, even young, healthy individuals may be willing to enhance fundamental traits if they believe that those enhancements will make them as good as but no better than they think they ought to be. Shifting reference points or standards of comparison may effectively alter whether people believe that they are better or worse than they should be and may alter their preferences for fundamental enhancements.

A third question relates to segmentation in the drug enhancement market. In this article, we have focused on college-age adults, in part because they are likely to be heavily targeted by companies marketing enhancement products. However, the preferences of older adults may be quite different, especially because they may have experienced the development or decline of certain traits in their lifetimes. People may be very willing to enhance traits on which they used to be better, even if the traits are fundamental and the decline has been natural. In such cases, people may view some enhancement pharmaceuticals as enablers of a past but truer self, and they may be more willing to take such enhancements as a result. Indeed, as technologies develop, older adults may come to feel entitled to certain enhancements, thus putting further pressure on health care providers and insurers.

Another unexplored issue is the role of culture. Cultures that place less value on personal identity (Markus and Kitayama 1991) or that view personalities as more malleable (Chiu, Hong, and Dweck 1997) may be less likely to resist altering the self in fundamental ways or may hold less stable

beliefs about what constitutes the fundamental self. Alternatively, such cultures may dislike the heavy emphasis on the self that is evoked by psychological enhancement products and thus be more likely to resist them.

Open questions also pertain to other self-improvement products that are on the market. For example, many "natural" supplements are sold over the counter as cognitive and emotional enhancers, and although their effectiveness is highly questionable (Silver 2006), they are very popular (Bolton et al. 2008). Mental training techniques such as yoga and meditation are also popular as forms of cognitive and emotional enhancement (and evidence of their effectiveness is more compelling; Lutz et al. 2004). It is possible that when self-improvement can be achieved through more "natural" means, people may feel that the threat to self-identity is minimized and that the self is being enabled rather than enhanced. This would suggest that the pattern of enhancement preferences that we found with pharmaceuticals may be somewhat diminished when people contemplate what they perceive to be more natural forms of self-improvement. Indeed, we have found some preliminary evidence for this (Simmons, Goodwin, and Riis 2008). In one study, we manipulated both whether enhancements were achieved through a pill regimen or through a "mental training" regimen and whether the respective regimens would improve more fundamental traits or less fundamental traits. We found both main effects and a significant interaction. People preferred enhancement with training to enhancement with pills, and they preferred enhancement of less fundamental traits to enhancement of more fundamental traits. More important, the preference for enhancing less fundamental versus more fundamental traits was significantly smaller in the mental training conditions (70.5% vs. 55.4%) than in the pill conditions (41.5% vs. 16.2%). This effect may arise because fundamental enhancements are seen as less identity-altering when the enhancements require a seemingly more natural effort or training component. However, this interpretation is speculative, and future research on this topic is needed.

Enhancements that require effort may not only be more palatable to individuals themselves, but they may be deemed more socially or morally acceptable as well. The moral acceptability of enhancement varied greatly by trait in study 3. If effort was required for the enhancement, this variance may be diminished. As one reviewer pointed out to us, enhancement pills that produce unpleasant side effects may be considered more morally acceptable, since the individual is clearly incurring a cost to receive the benefit. Again, this is an area for future investigation.

In this article, we have focused on psychological as opposed to physical enhancements. However, many forms of physical enhancements are available (e.g., growth hormone, steroids, Propecia, Viagra, and cosmetic surgery), and we expect that people will resist more fundamental changes in the physical domain as well. However, it is likely that many people feel that some of their physical features prevent them feeling and appearing like their "true selves," in which case many physical enhancements may be taken as enablers.

We also have not discussed the emerging opportunities for the genetic selection of children through diagnostic tests, egg and sperm donation, and surrogate mothers (Spar 2006). The opportunity for parents to make these choices will increase rapidly with advances in genetic research. It is possible that concern for an unborn child's identity would influence the choices that parents make. For example, parents may be more reluctant to endow their children with genes that alter traits and characteristics that are more fundamental to the self.

In closing, we must point out that although our investigation has focused primarily on understanding how self-identity concerns affect people's preferences for enhancement pharmaceuticals, it is clear that the impact of self-identity concerns extends well beyond self-improvement products. People adopt a wide variety of products for the purpose of expressing their self-identities (Aaker 1999; Belk 1988; Shavitt et al. 1992), and they are likely to forgo previously chosen products when this identity function is no longer being met (Berger and Heath 2007). Consumers' choices are also strongly influenced by salient aspects of their identities (LeBoeuf, Shafir, and Belyavsky 2007). Together, this research converges to highlight the importance of identity expression and preservation in governing the choices and lives of consumers.

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