

Growing Fixed with Age: Lay Theories of Malleability are Target Age-Specific

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### Abstract

Beliefs about whether people can change (“lay theories” of malleability) are known to have wide-ranging effects on social motivation, cognition, and judgment. Yet rather than holding an overarching belief that people can or cannot change, perceivers may hold independent beliefs about whether different people are malleable—that is, lay theories may be *target-specific*. Seven studies demonstrate that lay theories are target-specific with respect to age: Perceivers hold distinct, uncorrelated lay theories of people at different ages, and younger targets are considered to be more malleable than older targets. Both forms of target specificity are consequential, as target age-specific lay theories predict policy support for learning-based senior services and the rehabilitation of old and young drug users. The implications of target age-specific lay theories for a number of psychological processes, the social psychology of aging, and theoretical frameworks of malleability beliefs are discussed.

*Keywords:* lay theories, malleability, target-specificity, individual differences, age

**Growing Fixed with Age: Lay Theories of Malleability are Target Age-Specific**

Should states invest in continuing education programs for older adults? Are older heroin addicts good candidates for drug rehabilitation programs? Is it worthwhile to confront an older person who expresses racism or sexism?

A large body of research shows that the perceived value of education, rehabilitation, and social change efforts rests on whether people are considered malleable like clay, or fixed like plaster. Regardless of whether people actually can or do change, simply *believing* people can change or are fixed powerfully guides a wide array of psychological processes, as “lay theories” of malleability shape one’s perception of, and interaction with, the social world (Molden & Dweck, 2006; Plaks, Levy, & Dweck, 2009). For example, lay theories of malleability guide such processes as stereotyping (S. Levy, Stroessner, & Dweck, 1998), inferring traits from behavior (Chiu, Hong, & Dweck, 1997; S. Levy & Dweck, 1998; Molden, Plaks, & Dweck, 2006), engaging in self-regulation (Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013), managing emotions (Tamir, John, Srivastava, & Gross, 2007), managing relationships (Kammrath & Dweck, 2006), and navigating intergroup interaction (Carr, Dweck, & Pauker, 2012; Neel & Shapiro, 2012; Rattan & Dweck, 2010). Specifically, because a belief that people are fixed (an “entity” theory) leads to expectations of behavioral and trait stability, perceivers with fixed beliefs rely on stereotypes and traits to understand and predict others’ behavior; engage in performance-oriented, rather than mastery-oriented, goal pursuit; and avoid confronting personal, relationship, or intergroup conflict in ways that would change the problem’s source. In contrast, perceivers who believe people can change (an “incremental” theory) rely on dynamic forces (such as motives, beliefs, and situations) to explain and predict

behavior; engage in mastery-oriented goal pursuit; and more directly engage with the sources of personal, relationship, and intergroup conflict.

Clearly, one's beliefs that people can or cannot change their personality or intelligence have wide-ranging consequences for social perception and behavior. But do perceivers in fact hold a unified belief about whether all people are malleable on a particular attribute? Current perspectives suggest that people fall on a continuum of chronically believing that a particular attribute is fixed vs. malleable (Plaks et al., 2009). This "core belief" of malleability or fixedness about a particular attribute then forms the foundation of a broader meaning system used to predict and explain attribute-relevant phenomena. For example, a perceiver will tend to hold a theory of whether personality can or cannot change, which is then applied for personality-relevant judgments. By implication, those who hold a fixed theory of personality will infer traits from others' behavior, be more likely to stereotype others, avoid conflict in their many relationships, etc. – regardless of who those others are. Thus, even though people may have access to beliefs that an attribute is both malleable and fixed, this perspective presumes that people chronically fall on a continuum from believing personality is malleable to believing it is fixed (Molden & Dweck, 2006; Plaks et al., 2009).

The current research pursues the possibility that people do not hold singular lay theories of a particular attribute across targets. Rather, people may hold a suite of distinct lay theories *specific to different target groups*. In other words, rather than chronically believing personality is malleable or fixed, people may believe some people's personality can change, whereas others' cannot. Just as people may hold distinct lay theories of different attributes, rather than one overarching theory of all attributes (Dweck, Chiu, & Hong, 1995), they may hold specific

theories tailored to specific targets on particular attributes, rather than an overarching theory of all targets.

Target-specificity would have important consequences for how lay theories shape social perception, judgment, and self-regulation. For example, if some people are considered malleable whereas others are fixed, then rather than exhibiting cross-target consistency, people may tend to infer traits from some people's behavior but not others' behavior; to avoid conflict in their relationships with some people, but not with others; or to confront the prejudice expressed by some people, but not others. Furthermore, it's possible that people's lay theory of one group does not predict their lay theory of another group; interindividual rank-ordering of lay theories may be different for different targets, as someone who most strongly believes one group of people can change may not be the same person who most strongly believes another group can change. Target specificity would thus constitute an important shift in the way we consider the impact of lay theories of malleability – the relevant question for considering the impact of lay theories would be not assessing endorsement of whether people in general can change, but whether a specific person can change.

Perceivers may thus hold distinct beliefs about whether different types of people can change, and calibrate their beliefs that a particular person could change based on that particular target's malleability cues. The current research focuses on one cue in particular – target age – that is likely to guide the belief that a particular person can or cannot change. There are at least two distinct ways in which target age may shape lay theories of malleability (See Figure 1). First, people may hold distinct, target-differentiated lay theories of young, middle-aged, and older people, which vary independently of one another (Figure 1, Models B and D). That is, the extent to which a person believes that younger people can change may not necessarily predict the extent

to which they believe older people can change if they hold distinct lay theories about whether younger and older people can change. Second, across perceivers, there may be stereotypes that certain age groups are more malleable than others (i.e., mean differences in the perceived malleability of different targets; Figure 1, Models C and D). For example, the average perceiver may consider older targets to be less malleable than younger targets.

### **Target Age-Specific Lay Theories**

Age occupies a privileged status in social perception. Perceivers readily detect cues of age (Montepare & Zebrowitz, 1998), automatically categorize others based on age (Brewer, 1988; Fiske & Neuberg, 1990; Macrae & Quadflieg, 2010), and infer people at different ages to have different goals and attributes (e.g., Hess, 2006; Neuberg & Sng, 2013). One review of target effects on social perception found age cue effects to be at least as large as, and often larger than, the substantial effects of target sex or attractiveness (Montepare & Zebrowitz, 1998). People thus lean heavily on target age to inform many social judgments.

Research shows that target age influences beliefs about actual change (e.g., Fleeson & Heckhausen, 1997; Grühn, Gilet, Studer, & Labouvie-Vief, 2011; Haslam, Bastian, Fox, & Whelan, 2007; Heckhausen, Dixon, & Baltes, 1989; McFarland, Ross, & Giltrow, 1992), and the ubiquity of such phrases as, “you can’t teach an old dog new tricks” suggests that target age might likewise influence beliefs about the *capacity* for change. Indeed, research on workplace stereotypes reveals that older workers are perceived as having less potential for skill development and being less trainable (Finkelstein, Burke, & Raju, 1995; Maurer, Barbeite, Weiss, & Lippstreu, 2008; Posthuma & Campion, 2008; Rosen & Jerdee, 1976a, 1976b). Likewise, older adults are stereotyped as having less cognitive ability and competence (B. Levy, 1996; Fiske, Cuddy, Glick, & Xu, 2002; Kite, Stockdale, Whitley, & Johnson, 2005), which

suggests that older adults may be perceived to have diminished capacity to change themselves or their lives.

Target age-specific lay theories would offer important contributions to lay theories research on both methodological and theoretical grounds. If people hold not a singular lay theory about whether people can change, but many different lay theories about specific targets, then measures and manipulations of lay theories that do not specify or consider target group may risk measuring or manipulating the wrong construct, inflating the number of false negative findings in the lay theories literature and underrepresenting the extent to which lay theories do in fact guide downstream processes. Target-specific lay theories would also have implications for theory. For example, the developmental process by which these beliefs are developed may be even more nuanced than previously thought: Instead of learning simply about a particular attribute's malleability (e.g., can intelligence change?), people may in fact learn what *kind of person* is malleable on that attribute (e.g., what kind of person's intelligence can change?), calibrating their beliefs over time to both attribute and target. Target specificity thus would have both practical implications for lay theories research, and implications for theories of how people develop, hold, and rely on these beliefs.

### **Research Overview**

Seven studies test whether, and how, lay theories of malleability may be target-specific, and with what implications for several policy decisions. Study 1 directly measures lay theories of malleability for targets ranging from age 1 to 85, and allows us to test which model from Figure 1 best characterizes lay theories across target ages. Study 2 examines whether exemplars of different ages come to mind when considering malleability vs. fixedness. Studies 3a and 3b explore whether target age-specificity extends to self-perceptions: Do older people see

themselves as fixed? Studies 4a, 4b, and 5 test whether target age-specific lay theories uniquely predict support for learning-based programs for seniors and lead drug treatment to be more strongly recommended for young drug users than for older drug users.

### **Study 1: Target Age-Specific Malleability Beliefs**

Study 1 tests whether people use target age as a cue to malleability, measuring the perceived malleability of infants (1 year old), adolescents (15 years old), young adults (25 years old), middle-aged adults (45 years old), older adults (65 years old), and “old-old” adults (85 years old; see Neugarten, 1974). These were chosen because they span a broad range of ages likely perceived to be developmentally distinct (e.g., infants, adolescents, etc.). Past literature suggests that younger people’s personalities will be judged more malleable than those of older people. In addition, this study explored whether people hold unique lay theories for different ages (i.e., lay theories may be *age-differentiated*, as in models B and D from Figure 1), or whether they tend to have one overarching theory of whether or not people – of any age – can change (i.e., lay theories across target ages reflect a single underlying malleability belief). An overarching lay theory of whether people of any age can change would manifest in positive correlations between target age-specific malleability beliefs, whereas distinct lay theories for different target ages would manifest in a lack of correlation between target age-specific malleability beliefs. Study 1 also examined whether perceiver age moderates target age-specific malleability beliefs.

It may also be useful to distinguish between beliefs that it is *possible* for someone to change from the perceived *likelihood* that they actually will do so. Possibility sets the upper limit of change, whereas likelihood gauges the probability that change will occur, and these may diverge. For example, people may believe that the typical 85 year old could change given the

right circumstances, effort, etc., but judge those conditions as unlikely for most 85 year olds. To tap a fuller scope of malleability beliefs, this study measured beliefs that it is likely and possible for people to change in addition to measuring lay theories of personality.

## Method

**Participants.** Power analyses in G\*Power suggested that a sample in the range of 30-70 participants should be sufficient to achieve 95% power to detect a small-to-medium effect size in repeated measures analyses (for  $f = .18$ ,  $n = 68$ ; for  $f = .25$ ,  $n = 36$ ). Seventy-seven participants from the United States were recruited via Amazon's MTurk (43 men, 30 women, 4 did not indicate;  $M$  age = 34, age range = 19-73; 74% White).<sup>1</sup>

**Measures.** All items measuring malleability beliefs were anchored at 1 = *strongly disagree* and 6 = *strongly agree*, and referred to targets at ages 1, 15, 25, 45, 65, and 85. Items in this and all subsequent studies were coded so that higher responses indicated a greater belief in change. The three malleability beliefs correlated at average  $rs = .62-.64$ , suggesting that the constructs are related but not identical.

**Lay theories of personality.** Six items were modified from Dweck's (1999) measure to be appropriate to targets of different ages (e.g., "Everyone is a certain kind of person at age [X], and there is not much that can be done to really change that" [reverse-scored], α range from .89 - .95).

**Perceived likelihood of change.** Two items measured the perceived likelihood of change (e.g., "Overall, it's LIKELY that a person will change after age [X]," α range from .91 - .96).

**Perceived possibility of change.** Two items measured the perceived possibility that a person can change (e.g., "Given the right effort or circumstance, it's POSSIBLE for a person to change after age [X]," α range from .86 - .96).

**Demographics.** Participants responded to a number of demographic and individual difference measures. Most (e.g., relationship status) were included as standard practice for the lab and are not directly relevant to the current study. Focal demographic variables were gender, age, and race/ethnicity.

**Procedure.** Participants completed the study in one of two orders (randomly assigned): either youngest target to oldest, or oldest target to youngest. The likelihood and possibility items were grouped together within target age. For example, those in the youngest-to-oldest order condition completed all six target-specific versions of the lay theories of personality measure starting with 1 year olds and progressing to 85 year olds, and then completed all six target-specific likelihood and possibility items together, starting with 1 year olds and progressing to 85 year olds. Finally, all participants completed demographic measures.

## Results

**Target age effects on malleability beliefs.** Do judgments of malleability vary with target age, and are people at older ages considered progressively more fixed? To test this, each of the three malleability belief dependent variables was subjected to Repeated Measures ANOVAs, with target age (1, 15, 25, 45, 65, 85) as the repeated factor and order (youngest-to-oldest, oldest-to-youngest) as the between-subjects factor. Repeated contrasts comparing adjacent ages (1 and 15; 15 and 25; etc.) probed any target age effects. There were no main effects of order, though for lay theories of personality the interaction of order and target age was significant, whereby those who first responded about 85 year olds saw some differences between adjacent ages as steeper. However, the direction of the target age effect was the same across orders so the results below focus on target age effects. Because the assumption of sphericity was violated for all

repeated measures analyses, Greenhouse-Geisser-corrected statistics are reported. See Table 1 for all means, standard deviations, and 95% confidence intervals.

Across all dependent variables, the data strongly support the hypothesis that malleability beliefs vary with target age. A main effect of target age emerged for lay theories of personality,  $F(2.4, 178.6) = 41.47, p < .001, \eta_p^2 = .36$ , perceived likelihood of change,  $F(2.1, 152.3) = 110.53, p < .001, \eta_p^2 = .61$ , and perceived possibility of change,  $F(2.3, 160.5) = 41.58, p < .001, \eta_p^2 = .37$ . Older targets were perceived as more fixed ( $Fs > 11, ps < .002, \eta_p^2 = .14\text{-.36}$ , except for ages 15 and 1,  $F < 1, p = .56, \eta_p^2 = .01$ ), less likely to change ( $Fs > 5, ps < .03, \eta_p^2 = .07\text{-.51}$ ), and less able to change ( $Fs > 12, ps < .001, \eta_p^2 = .19\text{-.23}$ , except for ages 15 and 1,  $F(1, 74) = 2.44, p = .12, \eta_p^2 = .03$ ). Examining the 95% confidence intervals for each age relative to the midpoint of the scale (3.5; see Table 1) reveals that for both lay theories of personality and likelihood of change, younger people (ages 1, 15, and 25) are considered malleable and likely to change, older people (ages 65 and 85) are considered fixed and unlikely to change, and 45 year olds are not considered to be clearly malleable or fixed, nor likely or unlikely to change. In contrast, all ages but 85 year olds were considered to have the *possibility* of change.

**Perceiver age.** Older perceivers hold more malleable lay theories of one year olds than do young perceivers ( $r = .35, p = .002$ ), but perceiver age did not predict lay theories of any other age ( $rs = .01 - .14, ps > .23$ ). Perceiver age also did not significantly predict perceived likelihood of change ( $rs = -.04 - .19, ps > .11$ ) or possibility of change ( $rs = .03 - .23, ps > .05$ ).

**Malleability beliefs across target ages: One or several constructs?** If people tend to hold a broad, unified belief that people can or cannot change, then target age-specific malleability beliefs will correlate positively. However, if people hold distinct beliefs about whether people of different ages can change, target age-specific beliefs will be weakly correlated

or uncorrelated, especially in reference to the most different ages (e.g., 1 or 15 year olds and 85 year olds). To examine this, for each dependent variable, we computed the correlations between malleability beliefs for each target age (see Table 2). At the most different ages (e.g., 1 and 85 year olds; 15 and 85 year olds), the measures were uncorrelated or in the case of perceived likelihood of change, significantly *negative*. The pattern of correlations thus does not suggest that participants hold target-age-general malleability beliefs, whether defined as lay theories of personality, likelihood of change, or possibility of change.

## Discussion

Study 1 confirms that beliefs about whether people can change depend strongly on target age. Across three dependent variables, perceived malleability decreased as target age increased. Specifically, a 1 or 15 year old was judged as clearly malleable (whether measured as lay theories, likelihood, or possibility of change), and older ages considered to be progressively more fixed, with people at age 85 unlikely and potentially impossible to change. By conventional standards, the main effect of target age on each dependent variable was very large ( $\eta_p^2 = .36-.61$ ), strongly supporting the hypothesis that people rely on target age as a cue to whether someone is able or likely to change. Young and old participants also had similar beliefs about whether people at specific ages can change; everyone considered younger people to be malleable and older people to be relatively fixed. Study 1 furthermore suggests that people do not hold one overarching lay theory of personality, but rather tend to have distinct beliefs about whether older and younger people can change, as beliefs about distant ages were uncorrelated or negatively correlated (see Model D, Figure 1).

### **Study 2: Age Differences in Exemplars of Malleability and Fixedness**

Study 2 explores whether the observed association between age and malleability may be so strong that age differences emerge in exemplars of malleability and fixedness, even when age is not mentioned or made salient. In Study 2, participants nominated a person who demonstrates either malleability or fixedness, and then reported that person's age.

## **Method**

**Participants.** To determine sample size, a heuristic of at least 50 participants per cell was used as a baseline. To bolster the power to detect any interactions of condition with participant age, this heuristic target sample size was increased to 75 participants per cell. One hundred and fifty-two participants (86 men, 66 women;  $M$  age = 32, age range = 18-72; 80% White) were recruited via Amazon's MTurk.

**Design and procedure.** Participants were randomly assigned to nominate someone who demonstrates either that some people can change or that some people cannot change. The wording of these manipulations was based on common manipulations of lay theories (e.g., Chiu et al., 1997; Nussbaum & Dweck, 2008; Rattan & Dweck, 2010). In addition, the manipulations referred to whether "some people" can change or are fixed, rather than all people being changeable or fixed, because the purpose of the study was not to manipulate people's belief that people can change or are fixed but to elicit examples of change or fixedness. Furthermore, prior work suggests that even though people tend to endorse a general belief that people are fixed or can change, most people are familiar with both ideas and either can be made accessible (Plaks et al., 2009). Participants in the change condition read, "Research suggests that some people can change. Specifically, for some people, their essential attributes and personality are like clay that can be molded and changed with experience and/or effort." In the fixed condition, participants read, "Research suggests that some people cannot really change. Specifically, for some people,

their essential attributes and personality are set like plaster, tend to stay the same, and cannot be molded or changed with experience and/or effort.” All participants were then asked to “Think of someone you know who demonstrates that some people [can/cannot] change. This person can be someone you know personally or someone you have heard about.” Participants were asked to write briefly about their example person in a text box. Then, participants were asked to indicate the approximate age of the person as they had described them in the example. Participants also provided their own gender, age, and race/ethnicity.

## Results

As predicted, participants nominated younger exemplars of change ( $M = 33.39, SD = 13.03, 95\% \text{ CI } [30.37, 36.41]$ ) than of fixedness ( $M = 39.44, SD = 17.31, 95\% \text{ CI } [35.53, 43.34]$ ),  $t(142.7) = 2.44, p = .02, d = .39$ . Descriptively, 13.5% of change exemplars were 50 or older, whereas 30.8% of fixed exemplars were 50 or older (a significant difference in proportions,  $Z = 2.55, p = .01$ ).

Participants’ own age also positively predicted the age of their exemplar,  $r = .42, p < .001$ , perhaps because people tend to associate with or know people close to their own age, and thus own-age examples are particularly likely to come to mind. Regressing target age on both malleability condition (change, fixedness) and perceiver age revealed that controlling for perceiver age,  $B = .57, SE = .10, 95\% \text{ CI } [.38, .77], t = 5.94, p < .001$ , participants generated exemplars of fixedness that were on average 7 years older than exemplars of change,  $B = 7.09, SE = 2.24, 95\% \text{ CI } [2.66, 11.52], t = 3.17, p = .002$ . The strength of the condition effect did not differ with perceiver age (i.e., the interaction of condition and perceiver age was not significant),  $B = -.14, SE = .10, 95\% \text{ CI } [-.33, .05], t = 1.49, p = .14$ .

## Discussion

In Study 2, participants spontaneously generated examples of fixedness that were 6 years older than examples of change (7 years older when controlling for their own age). Indeed, whereas fewer than 1 in 7 examples of change would qualify as “seniors” (age 50 or older) as defined by the American Association for Retired Persons (AARP), nearly 1 in 3 examples of fixedness would qualify as “seniors.” Target age thus appears to be so closely linked to perceptions of malleability that even when age is not made explicit or salient, perceivers assume a link between malleability and age.

### **Studies 3a and 3b: Do Self-perceptions of Malleability Differ with Age?**

Studies 1 and 2 show that perceivers view older people as more fixed than younger people. Does this link extend to self-perceptions? People may use age as a cue to their own malleability, just as they use age to assess others’ malleability. For example, both stereotypes of older adults and older adults’ self-perceptions assume decreasing control of age-related memory decline (Lineweaver & Hertzog, 1998). However, self-perceptions often differ from perceptions of others for a variety of cognitive and motivational reasons (e.g., Brown, 1986; Kruger, 1999; Biernat, Manis, & Kobrynowicz, 1997). Our aims in Studies 3a and 3b were thus exploratory, and we did not make strong predictions about whether participant age would predict self-perceived malleability.

#### **Study 3a**

Study 3a assesses the extent to which a person’s age correlates with self-perceived malleability across five attributes. Because it is possible that participant age would only exert effects when salient, we manipulated whether participants completed measures of self-perceived malleability before or after reporting their own age.

#### **Method.**

**Participants.** Because MTurk skews toward younger users, we aimed for 500 participants to ensure sufficient representation of older participants. Five hundred participants (298 men, 200 women, 2 did not indicate; Mage = 33, age range = 18-76; 78% White) were recruited via Amazon's MTurk.

**Measures.** All items measuring malleability beliefs were anchored at 1 = *strongly disagree* and 6 = *strongly agree*. Items were coded so that higher responses indicated a greater belief in change.

**Self lay theories.** Four items from Dweck's (1999) lay theories measure assessed self lay theories, modified as needed so that all attributes were measured with items as similar as possible (e.g., "My [personality] is something very basic about me and can't be changed very much" [reverse-scored]). Specific attributes were personality ( $\alpha = .93$ ), intelligence ( $\alpha = .95$ ), memory ability ( $\alpha = .92$ ), racial bias ( $\alpha = .93$ ), and moral character ( $\alpha = .93$ ).

**Demographics.** Participants responded to a number of demographic and individual difference measures. Focal demographic variables were gender, age, and race/ethnicity.

**Procedure.** Participants completed the study in one of two randomly-assigned participant age salience conditions: participants reported their own age either before (participant age first) or after (participant age last) completing the self lay theories measures. Attribute order was randomized for each participant. Finally, all participants completed demographic measures.

**Results and Discussion.** Regressions showed that for no attribute did participant age salience moderate the effect of participant age, interaction  $\beta$ s = -.07 - .10,  $p$ s = .12 - .91, so analyses of participant age collapse across participant age salience. Participant age had weak effects overall (See Table 3). Age did not predict perceived malleability of one's own

personality, moral character, or racial bias. Older age did predict viewing one's own intelligence as slightly less malleable, and one's memory ability as slightly more malleable.

### **Study 3b**

Study 3a suggests that older age does not consistently nor strongly predict seeing oneself as more fixed. However, it is possible that participants implicitly compared themselves to same-age standards when answering the lay theories items (e.g., Biernat & Manis, 1994; Chambers & Windschitl, 2004; Mussweiler, 2003). This could mask an actual impact of age on self-perceptions of malleability. For example, it's possible that 60 year olds perceive themselves to be similar in malleability to other 60 year olds, but less malleable than 20 year olds. In Study 3a, the self-ratings of 60 year old participants might have been implicitly shaped by their comparisons of themselves with other 60 year olds, yielding responses that would suggest as much self-perceived malleability as responses from 20 year olds (who implicitly compared against 20 year olds). Study 3b addressed this concern. Participants first made malleability judgments about an age-specific target group, with target age manipulated between subjects. Next, they made self-malleability judgments. Finally, they directly rated how their malleability compared to that of the age-specific target group. This last measure is clearly not vulnerable to the age-matched, implicit comparisons that might have affected responses in Study 3a. Also, comparing the ratings on the first two measures controls for this problem as well, producing an indirect assessment of how malleable participants perceive themselves relative to how they perceive an age-specific target group.

### **Method**

**Participants.** See Study 3a for sample size planning. Four hundred seventy-six participants (261 men, 203 women, 12 did not indicate; Mage = 32, age range = 18-73; 78% White) were recruited via Amazon's MTurk.

**Design, procedure, and measures.** Study 3b had a 5 (reference group: the average 15-, 30-, 45-, 60-, or 75-year-old; between-subjects) X 3 (attribute: personality, intelligence, memory ability; within-subjects) design. For each attribute, participants first completed *target age-specific lay theories* for each attribute with four items modified from Dweck (1999) (e.g., "At [X] years old, it's possible to substantially change [the kind of person you are]";  $\alpha_s = .91-.93$ ), and then *self lay theories* with items identical to those of Study 3a ( $\alpha_s = .91-.95$ ). After completing those measures for all attributes, participants completed *direct comparisons of malleability*: For each attribute, participants selected one of three statements (e.g., "My [personality] is MORE malleable than the [personality] of the average [X]-year-old") to indicate whether they see themselves as more (coded 3), less (coded 1), or equally (coded 2) as malleable as the reference target. Finally, participants responded to a number of demographic and individual difference measures. Focal demographic variables were gender, age, and race/ethnicity. As in Study 3a, we counterbalanced whether participant age was asked before or just after the dependent variables; order did not produce significant or consistent effects and is not discussed further.

**Results.** For each attribute, we computed *indirect comparisons of malleability* by subtracting participants' target age-specific lay theories from their self lay theories. This provides an indirect index of how malleable participants consider themselves to be compared to a specific reference group. The assumption of sphericity was violated for all repeated measures analyses, so Greenhouse-Geisser-corrected statistics are reported where applicable.

**Target age-specific lay theories.** We first examined whether this between-subjects study replicates Study 1's within-subjects finding that older people are considered more fixed, and whether the perceived malleability of intelligence and memory ability are similarly age-dependent. To test this, we conducted a mixed ANOVA with attribute (personality, intelligence, memory ability) as a within-subjects factor and reference group (that is, target age: 15, 30, 45, 60, 75) as a between-subjects factor. The analysis produced a main effect of attribute  $F(1.94, 894.36) = 4.31, p = .01, \eta_p^2 = .01$ . More importantly, the expected main effect of target age emerged,  $F(4, 460) = 21.93, p < .001, \eta_p^2 = .16$ ; across attribute, older targets were rated as progressively more fixed,  $p < .001$  to  $.04$ , except for 45 and 60 year olds,  $p = .22$  (See Table 1). The main effect of target age did not differ by attribute,  $F(7.78, 894.36) = 1.85, p = .07, \eta_p^2 = .02$ . Across three attributes and a between-subjects design these data replicate Study 1's finding that older targets are considered more fixed than younger targets.

### ***Self-perceptions of malleability.***

**Self lay theories.** Does older age predict reporting oneself to be more fixed? We first analyzed the correlations between participant age and self lay theories for each attribute (personality, intelligence, memory ability; see Table 3). As in Study 3a, the correlations of participant age and self lay theories across attributes were small in magnitude, and of mixed direction and significance. To examine whether the effect of participant age depended on reference group condition, we conducted a regression in two steps: In the first step, main effects of participant age (centered) and reference group (dummy coded) were entered. In the second step, the interaction of participant age and reference group was entered; to the extent that reference group significantly moderates the effect of participant age on the outcome, we will observe a significant increase in  $R^2$ . The effect of participant age did not depend on reference

group condition: The interaction of participant age and reference group produced no significant increase in  $R^2$  for any attribute ( $\Delta R^2 < .02$ ,  $F < 1.4$ ,  $p > .24$ ).

*Indirect comparisons of malleability.* To answer this study's central question – does older age predict seeing oneself as more fixed when taking into account reference group effects? – we first examined indirect comparisons of malleability. To some extent, age predicts seeing oneself as less malleable than the reference group one has just considered: Across attributes, the correlations of age with indirect comparisons of malleability were negative and significant, though small in magnitude. These effects were not moderated by reference group condition: The interaction of participant age and reference group produced no significant increase in  $R^2$  for any attribute ( $\Delta R^2 < .01$ ,  $F < 1.3$ ,  $p > .28$ ). Older participants do see themselves as slightly more fixed when indirectly comparing their self-perceptions to perceptions of a reference group, regardless of that reference group's age.

*Direct comparisons of malleability.* Does older age predict explicitly rating oneself as less malleable than a specific reference group? Yes, depending on the age of the reference group. Overall, the correlations of age with direct comparisons of malleability were negative and significant. However, this effect depended on reference group condition, as for all attributes the interaction of participant age and reference group condition was significant (see Table 4). Examining the simple effects of participant age within each reference group reveals that when comparing themselves to 30 or 45 year olds, older participants rated themselves as more fixed than younger participants rated themselves. Older participants also rated their own memory ability as more fixed than did younger participants when comparing themselves to 15 year olds. In contrast, participants of all ages saw themselves as more malleable than 60 or 75 year olds on all attributes, and more fixed than 15 year olds on personality and intelligence.

**Discussion.** Study 3b suggests that although older people do not report greater self-perceived fixedness than do younger people on a self lay theories measure, this is likely due to a reference group effect. When self lay theories are indirectly compared to lay theories about a target group, older age predicts slightly lower self-perceived malleability (see Figure 2). When comparing themselves directly to someone who is 30 or 45, the effect of participant age is stronger, with  $\beta$ s ranging from -.25 to -.55 across attributes. These data suggest that just as people in general see older people as more fixed, older people also tend to see themselves as more fixed, although the effect only appears with comparison to specific age groups. Future work should seek to replicate this finding in other samples, explore the downstream consequences of lesser self-perceived malleability with increasing age, and investigate what predicts variability in seeing oneself as fixed or malleable with increasing age.

#### **Studies 4a and 4b: Support for Learning-Based Senior Services**

Many social policies hinge on the premise that people can change. For example, it is not uncommon for U.S. states to finance seniors' (often defined as people over 50) continued learning and development. These services can provide continued growth opportunities and the possibility of gaining skills that could help older people to stay in or re-enter the workforce. Yet variability in lay beliefs regarding seniors may critically predict support for such programs: those who believe people 50 and older are fixed may exhibit lesser support, because if older people cannot learn and improve their intelligence, then supporting seniors' learning-based programs may be considered a waste of valuable state resources. In contrast, those who believe people 50 and older can learn and improve their intelligence may view learning-based programs as a worthwhile investment.

Studies 4a and 4b build on Studies 1-3b by examining the unique predictive value of target age-specific lay theories in the realm of policy support. Both studies test the prediction that lay theories of 55 year olds positively correlate with support for learning-based senior services, whereas lay theories of 25 year olds do not – thereby testing whether malleability beliefs about targets of a specific age, not just any age, predict supporting policies that would benefit that age group. In addition, because learning-based programs may be perceived as drawing more directly on intellectual capacities than on general personality characteristics, it's possible that lay theories of 55 year olds' intelligence would more strongly predict support for learning-based senior services than would lay theories of 55 year olds' personality. To be able to rule out the possibility that people with malleable lay theories of 55 year olds are simply more supportive of senior services in general, support for four non-learning-based senior services was also measured. Study 4b also tests whether target age-specific lay theories predict support for learning-based senior services better than a general (non-target-specific) measure of lay theories.

## Method

### Participants.

**Study 4a.** To determine sample size, a heuristic of at least 100 participants for a correlational study was used. One hundred participants (64 men, 32 women, 4 did not indicate;  $M_{age} = 31$ , age range = 18-59; 78% White) were recruited via Amazon's MTurk.

**Study 4b.** To ensure sufficient power to detect whether target age-specific lay theories better predict support for learning-based senior services than do general lay theories, we used G\*Power to estimate the sample size required to detect with 95% power the difference between two dependent small-to-moderate correlations ( $rs$  of .3 and .1) whose predictors correlated at  $r = .6$ . This analysis suggested 245 participants. Two hundred and forty nine participants (104 men,

142 women, 3 did not indicate;  $M_{age} = 36$ , age range = 19-74; 81% White) were recruited via Amazon's MTurk.

**Measures.** Studies' measures were identical except for the addition of general lay theories measures in Study 4b.

**Support for senior services.** Participants indicated the extent to which states should prioritize six senior services, anchored at 1 = *very LOW priority* and 7 = *very HIGH priority*. Item order was randomized for each participant. Two items measured participants' support of learning-based senior services ("job skills training for unemployed seniors looking for work," "continuing education programs for seniors,"  $\alpha_s = .74, .71$ ). These were the focal items of the study. Four additional items measured participants' support of other senior services (e.g., "disease prevention and health promotion,"  $\alpha_s = .73, .73$ ).

**General lay theories.** In Study 4b only, six items each measured lay theories of intelligence and personality (e.g., "Everyone, no matter who they are, has the potential to significantly change their [intelligence],"  $\alpha_s = .93-.94$ ).

**Target age-specific lay theories.** Six items each measured target age-specific lay theories of intelligence and personality in reference to 55 and 25 year olds ( $\alpha_s = .94-.95$ ).

**Demographics.** For both studies, participants' gender, race/ethnicity, and age were measured.

**Procedure.** In both studies, participants first read, "States often provide services to seniors (people age 50 or older). When facing a limited budget for senior services, states may need to prioritize which services receive funding." Participants in both studies then completed the measure of support for senior services. Participants in Study 4b only next completed general measures of lay theories of intelligence and personality. Then in both studies participants

completed measures of lay theories of both 55 and 25 year olds' intelligence, lay theories of both 55 and 25 year olds' personality, and demographic items.

## Results

The central prediction of Studies 4a and 4b was that beliefs that older, but not younger, people can change (particularly their intelligence, and possibly also their personality) would predict support for learning-based senior services, but not other kinds of senior services. See Table 5 for means, standard deviations, 95% confidence intervals, and correlations between variables.

**Support for learning-based senior services.** As predicted, lay theories of 55 year olds' intelligence positively predicted support for learning-based senior services in both studies. In correlations, lay theories of 25 year olds' intelligence predicted support for learning-based senior services only to a small extent, suggesting that the effect of lay theories of 55 year olds' intelligence may not be due to a target-general belief that intelligence can change. Indeed, when regressing support for learning-based senior services onto lay theories of both 55 and 25 year olds' intelligence, and thus controlling for lay theories of 25 year olds' intelligence, lay theories of 55 year olds' intelligence still significantly predicted support for learning-based senior services, Study 4a:  $B = .59$ ,  $SE = .15$ , 95% CI [.29, .89],  $t = 3.93$ ,  $p < .001$ ; Study 4b:  $B = .58$ ,  $SE = .13$ , 95% CI [.32, .83],  $t = 4.49$ ,  $p < .001$ . Furthermore, when general lay theories were directly assessed in Study 4b, general lay theories of intelligence and personality did not predict support for learning-based senior services, and general lay theories were significantly weaker predictors of support for learning-based senior services than were lay theories of 55 year olds ( $Zs > 3.20$ ,  $ps < .002$ ). In Study 4a, lay theories of 55 or 25 year olds' personality did not correlate with support for learning-based senior services. In Study 4b, lay theories of 55 year olds' personality and 25

year olds' personality did predict support for learning-based senior services, but neither predictor remained significant when controlling for the effect of lay theories of 55 year olds' intelligence in a regression ( $p > .5$ ). In neither study did perceiver age predict support for learning-based senior services.

**Support for other senior services.** Unexpectedly, lay theories of 55 year olds' intelligence also predicted support for other, non-learning-based senior services. Support for non-learning-based senior services was not predicted by lay theories of 25 year olds' intelligence, nor lay theories of 55 year olds' personality. In Study 4b only, support for these services was also predicted by lay theories of 25 year olds' personality. Perceiver age predicted support for non-learning-based senior services in both studies.

It's possible that the unexpected relationship of lay theories of 55 year olds' intelligence to support for other senior services is due to common variance with support for learning-based services. To parse whether support for other senior services was uniquely related to lay theories of 55 year olds' intelligence, a regression was used to predict support for other senior services from learning-based senior services, and the residuals were saved. The partial correlation between lay theories of 55 year olds' intelligence and the residuals for other senior services was no longer significant, Study 4a  $r_p = -.07, p = .52$ ; Study 4b  $r_p = .09, p = .18$ . In contrast, conducting the complementary analysis on support for learning-based services residuals revealed that lay theories of 55 year olds' intelligence continued to predict learning-based services when controlling for other services, Study 4a  $r_p = .31, p < .001$ ; Study 4b  $r_p = .22, p < .001$ .

## Discussion

Studies 4a and 4b demonstrate that target age-specific lay theories have policy implications as support for learning-based senior services depends on the belief that older adults'

intelligence can change. Moreover, this effect was target age-specific: Lay theories of 55 year olds' (but not 25 year olds') intelligence predicted support for learning-based services. The effect was also attribute-specific: Lay theories of 55 year olds' personality did not predict support for these services beyond lay theories of 55 year olds' intelligence. And finally, the evidence suggests that believing 55 year olds' intelligence can change does not simply lead one to support all policies for seniors, but only those predicated on learning: When examining the variance unique to learning-based and to other (e.g., health) services, only learning-based services were significantly predicted by lay theories of 55 year olds' intelligence. In contrast, general measures of lay theories of intelligence and personality, which did not specify age, did not predict support for learning-based senior services.

Interestingly, whereas older participants more strongly supported the non-learning-based senior services than did younger participants—possibly reflecting self-interest, as older participants would be more likely to benefit from these services in the near future—older participants' support of learning-based services was no different from younger participants' support. This suggests that seniors' target age-specific lay theories may exert a more powerful effect on support for education and job training programs than does their eligibility to participate in such programs.

Study 5 builds on these findings to explore the implications of target age-specific lay theories in another policy realm: drug treatment.

### **Study 5: Treatment Recommendation for Older and Younger Drug Users**

Lay theories can be consequential for how we choose to treat people who engage in illegal or unhealthy behavior. For example, people who believe moral character is fixed are less likely to view rehabilitation as a primary function of imprisonment (Gervey, Chiu, Hong, &

Dweck, 1999). Courts, in particular, make many decisions about rehabilitating criminals, including deciding whether those who are found guilty of drug possession should be recommended for drug treatment as part of their sentence. The perceived utility of such a treatment program may be contingent on the perception that a drug user can, indeed, change. Target age-specific lay theories suggest that older drug users will be considered more fixed, and thus poorer candidates for drug treatment, than will younger drug users. Study 5 thus examined whether younger drug users are recommended more strongly for treatment than older drug users, and tested whether target age-specific lay theories mediate this difference.

The current study measured beliefs that the target can change both their drug use and their personality. As in Studies 4a and 4b, where target age-specific lay theories of a particular attribute (intelligence) accounted for variability in support for senior services, it may be that target age-specific lay theories about the malleability of a specific attribute (i.e., drug use) account for target age differences in treatment recommendation. Alternatively, if older people's personalities are considered to be fixed and treatment success is believed to be contingent on changing one's character at a more fundamental level, then target age-specific lay theories of personality would account for target age differences in treatment recommendation. Mediation analyses tested both these possibilities.

## **Method**

**Participants.** To err on the side of sufficient power to conduct mediation analyses, a heuristic target sample size of 100 participants per cell was used. 202 participants (120 men, 80 women, 2 did not indicate; Mage = 31, age range = 18-74; 68% White) were recruited via Amazon's MTurk.

## **Measures.**

**Drug treatment recommendation.** After reading the scenario described below, in which the target is described as a heroin user convicted of possessing controlled substances, participants indicated whether the judge should recommend the target for a treatment program on a scale from 1 = *definitely should NOT recommend* to 7 = *definitely SHOULD recommend*.

**Anticipated treatment success.** Two items measured the anticipated success of the treatment program (“If John enters the treatment program, what is the likelihood that [the program will help him to control his addiction/he will quit using heroin],”  $\alpha = .89$ ) on a scale from 1 = [*definitely will NOT help/definitely will NOT quit using heroin*] to 7 = [*definitely WILL help/definitely WILL quit using heroin*].

**Lay theories of the target’s drug use and personality.** Six items each were adapted from the lay theories of personality measure in Study 1 to assess participants’ beliefs that John can change his drug use (e.g., “John’s drug use is something very basic about him and it can’t be changed very much,” [reverse scored],  $\alpha = .91$ ), and his personality (e.g., “John has the potential to significantly change his basic characteristics,”  $\alpha = .91$ ).

**Design and procedure.** Participants were randomly assigned to read about either a younger (20 years old) or older (50 years old) drug user. Participants read, “John is [20/50] years old and addicted to heroin. John was arrested and tried for possession of a controlled substance, and was found guilty. John is going to be sentenced to a year of prison. In addition, the judge has to decide whether or not to recommend treatment for John’s addiction while he serves part of his sentence. The drug treatment program works for some heroin users, but not others. The treatment is expensive and will cost the state thousands of dollars, so the judge wants to recommend such treatment only to people who are sufficiently likely to succeed in the program and quit using heroin.” Participants then responded to the measures of their recommendation of the drug

treatment program, anticipated treatment success, and lay theories of the target's drug use and his personality. Participants were then asked to estimate for how long the target had been using heroin, in months and years. Participants also reported their gender, race/ethnicity, and age.

## Results

T-tests were used to assess the effect of target age on the dependent variables. Where Levene's test for equality of variances revealed unequal variances between target age groups, the corrected degrees of freedom were used.

**Drug treatment recommendation and anticipated success.** Drug treatment was recommended more for the younger ( $M = 5.59, SD = 1.17, 95\% \text{ CI } [5.36, 5.82]$ ) than for the older ( $M = 4.99, SD = 1.81, 95\% \text{ CI } [4.63, 5.35]$ ) target,  $t(169.3) = 2.79, p = .006, d = .39, 95\% \text{ CI of the difference } [.17, 1.02]$ , and was anticipated to be more successful for the younger ( $M = 4.60, SD = .99, 95\% \text{ CI } [4.41, 4.80]$ ) than for the older ( $M = 4.11, SD = 1.11, 95\% \text{ CI } [3.89, 4.33]$ ) target,  $t(199) = 3.31, p = .001, d = .47, 95\% \text{ CI of the difference } [.20, .78]$ .

**Lay theories.** The younger target's *drug use* was considered more malleable ( $M = 4.93, SD = .82, 95\% \text{ CI } [4.77, 5.09]$ ) than that of the older target ( $M = 4.27, SD = .96, 95\% \text{ CI } [4.07, 4.46]$ ),  $t(199) = 5.27, p < .001, d = .74, 95\% \text{ CI of the difference } [.42, .91]$ . Consistent with Studies 1 - 3, the younger target's *personality* was also considered more malleable ( $M = 4.27, SD = .92, 95\% \text{ CI } [4.08, 4.45]$ ) than that of the older target ( $M = 3.85, SD = .97, 95\% \text{ CI } [3.66, 4.05]$ ),  $t(197) = 3.07, p = .002, d = .44, 95\% \text{ CI of the difference } [.15, .67]$ .

**Do lay theories account for the effect of target age on treatment recommendation and anticipated success?** To test whether lay theories of the target's drug use and/or personality mediated the effects of target age on treatment recommendation and anticipated success, multiple regression was used in conjunction with bootstrapping procedures. The analysis used the

PROCESS macro developed by Hayes (2013) and estimated the indirect effect for lay theories of the target's drug use and personality. Specifically, PROCESS model 4 (Hayes, 2013) in SPSS tested a parallel model of both lay theories of the target's personality and lay theories of the target's drug use as mediators, using 1,000 bootstrapped samples (with replacement) to estimate bias-corrected 95% confidence intervals of the indirect paths. This model thus estimated the extent to which lay theories of personality and drug use each independently mediated the effect of target age on treatment recommendation and anticipated success.

***Drug treatment recommendation.*** Results are consistent with the hypothesis that the relationship between target age and drug treatment recommendation was mediated by lay theories of the target's drug use and personality (see Figure 3). The indirect effect of lay theories of the target's personality was estimated at  $B = -.11$ ,  $SE = .06$ , 95% CI [-.27, -.02], and the indirect effect of lay theories of the target's drug use was estimated at  $B = -.48$ ,  $SE = .14$ , 95% CI [-.79, -.27]. The direct effect of target age on treatment recommendation was no longer different from zero,  $B = .03$ ,  $SE = .20$ , 95% CI [-.36, .41].

***Anticipated treatment success.*** Results are consistent with the hypothesis that the relationship between target age and predicted success of treatment was mediated by lay theories of the target's personality and drug use (see Figure 3). The indirect effect of belief that the target's personality can change was estimated at  $B = -.09$ ,  $SE = .05$ , 95% CI [-.22, -.02], and the indirect effect of belief that the target's drug use can change was estimated at  $B = -.18$ ,  $SE = .08$ , 95% CI [-.37, -.05]. The direct effect of target age on anticipated success was no longer different from zero,  $B = -.21$ ,  $SE = .15$ , 95% CI [-.50, .08].

***Perceiver age.*** Older participants were slightly less likely to believe that the treatment would be successful,  $r = -.14$ ,  $p = .05$ , or that the target could change,  $r = -.14$ ,  $p = .05$ . There

were no effects of perceiver age on drug treatment recommendation or beliefs that the target can change his drug use,  $rs = -.04$ ,  $ps > .55$ . Perceiver age did not moderate the effects of target age, beliefs that the target can change his drug use, or belief that the target can change his personality, for either treatment recommendation or anticipated success of treatment,  $Bs < .012$ ,  $ps > .26$ .

## Discussion

Study 5 shows that people are more likely to recommend treatment for a younger than an older drug user, and suggests that target age-specific lay theories mediate this age-dependent difference. Thus, many people who believe young adults should be given drug treatment may nonetheless view such programs as relatively wasted on older adults. And, if those who decide eligibility for treatment programs or who administer such programs likewise hold target age-specific beliefs about drug users' malleability, older drug users may find themselves with less access to such programs, and with less encouragement and support once within those programs. Indeed, to the extent that older people see themselves as more fixed (as Studies 3a and 3b suggest), older drug users may be less likely to seek out treatment or to anticipate that it would be successful.

Could the perception that older drug users cannot change simply be due to an assumption that older users have been using drugs for a longer period of time than have younger users? Additional analyses show that this is not the case: Although the older target was estimated to have been using drugs for a longer period of time, this does not account for the age differences in beliefs about change, in treatment recommendation, or in anticipated treatment success. This recalls the finding from Study 1 that people consider it less *possible* for older people to change than younger people, even when the right circumstances and effort are present; older people may be considered essentially more fixed than younger people, whatever the external circumstances.

Studies 4a, 4b, and 5 demonstrated target age-specific lay theories' role in policy endorsement. A separate question is whether such policies will be effective, and the answer will rely to some extent on actual (not perceived) malleability. Future work may explore the extent to which target age-specific lay theories track actual malleability, and with what implications for policy effectiveness.

### General Discussion

Across seven studies, target malleability and age were tightly linked. Study 1 showed that people do not necessarily hold a single belief that personality can or cannot change, but rather hold separate theories of whether older and younger people can change (see Model D in Figure 1). In Study 2, people spontaneously generated older exemplars when asked about the fixedness (vs. malleability) of personality, suggesting that people may hold differently-aged prototypes of fixedness and malleability. Studies 3a and 3b show via comparative assessments that older people do have somewhat more fixed self-perceptions than do younger people. The final three studies explored several implications of lay theories' target age-specificity for social programs and policies. In Studies 4a and 4b, lay theories of 55 year olds' intelligence – but not 25 year olds' intelligence nor general lay theories – predicted support for learning-based senior services. In Study 5, participants were less likely to recommend treatment for an older drug user than a younger one, and anticipated that such treatment would be less successful. This target age difference was mediated by beliefs that both the older user's personality and his drug use were more fixed than those of the younger drug user.

Looking across studies, the effect of target age on malleability beliefs is consistent and clear, with older targets viewed as more fixed than younger targets. Notwithstanding these strong mean differences by target age, perceivers also exhibit individual differences in their target age-

specific lay theories, and these individual differences are independent across target ages: In Study 1, malleability beliefs of older targets (65 and 85 year olds) were not strongly positively correlated with malleability beliefs of the youngest targets (1 and 15 year olds). And in Studies 4a and 4b, lay theories of 55 year olds' intelligence predicted support for senior-centered learning policies, whereas lay theories of 25 year olds' intelligence did not, providing discriminant validity of age-differentiated lay theories. People thus appear to hold distinct, target age-differentiated theories of whether people can change.

### **Further Implications for Social Perception, Cognition, and Judgment**

These results suggest that the numerous demonstrated social implications from the lay theories literature will shift, be amplified, or diminish, depending on the age of the target in question. For example, target age-specific lay theories may guide basic social cognitive processes such as age-based stereotyping: Because holding a fixed belief about people leads to a greater reliance on traits and stereotypes to understand and predict behavior (e.g., Chiu et al., 1997; Dweck et al., 1995; S. Levy et al., 1998; Molden et al., 2006), older people may be more likely to have their behavior judged as indicative of their underlying personality, and to be subjected to stereotyping, than are younger people. Indeed, differences in perceived malleability may be one reason older people are more strongly stereotyped than are younger people (Chasteen, Schwarz, & Park, 2002). To the extent that older people believe themselves to be relatively fixed, target age-specific lay theories may even help to account for older people's greater susceptibility to the effects of aging stereotypes (B. Levy, 2003; Zebrowitz, 2003).

Target age-specific malleability beliefs may also consequentially guide more "downstream" psychological processes and behaviors. For example, behavioral change can be an important component of improving health, and this may be particularly so for older adults

(Rothman, 2010). Yet the current studies suggest that to the extent health care providers, social workers, and others see older adults as more fixed than younger adults, they may be less likely to recommend, support, or recognize behavioral changes that otherwise could improve those adults' physical and mental health. People may also be less likely to confront an older perpetrator of prejudice than a younger one (Rattan & Dweck, 2010) or to openly express dissatisfaction with older than with younger close others (Kammrath & Dweck, 2006), and may see prison as a means for rehabilitating young, but not older, criminals (Dweck et al., 1995; Gervey et al., 1999). In short, differing lay theories of younger vs. older targets may have profound consequences for how people of different ages perceive, evaluate, and manage themselves and others across a number of important life domains.

### **Perceiver Age Effects**

Across studies, participants of varying ages showed remarkable consensus in their beliefs that older people are more fixed than younger people, which is consistent with previous work showing that perceivers of different ages exhibit strong consensus about the developmental patterns of various psychological attributes (Heckhausen, et al., 1989; Heckhausen & Baltes, 1991). Study 3b suggests that age likewise affects self-perceptions of malleability, as older people see themselves as somewhat more fixed than younger people see themselves. The extensive lay theories literature on self-regulation and social perception suggests that to the extent that older people do see themselves as more fixed, they may respond to challenges with greater helplessness and less mastery-seeking than they did in their youth (Burnette et al., 2013), and may be particularly vulnerable to age-based stereotype threat (Aronson, Fried, & Good, 2002; Plaks & Chasteen, 2013). Yet a number of factors affect how people exert control to regulate their own outcomes in older age, and integration with life-span approaches to

development and aging (e.g., Brandstädter & Renner, 1990; Heckhausen, Wrosch, & Schulz, 2010) may be particularly useful for discovering the extent to which lay theories affect such self-regulatory and social cognitive outcomes.

### **Target-Specificity of Lay Theories**

Target-specificity may have cautionary implications for lay theories research: If perceivers' lay theories are in fact target-specific, but are measured in a target-general way, then studies may be less likely to successfully detect true effects, reducing the apparent robustness of lay theories effects. Greater target specificity in lay theories may help to ensure that actual effects do not go undetected. As a step in this direction, some work has differentiated between lay theories of the self, of people in general, and of groups (e.g., Dweck, 1999; Dweck et al., 1995; Rydell, Hugenberg, Ray, & Mackie, 2007). Yet whereas this prior work has generally examined targets at different levels (self, people, groups) without making explicit comparisons, the current work demonstrates that examining target differences within a single level (people) reveals beliefs finely tuned to target characteristics. To be clear, we are not advocating that all lay theories measures must be target specific, and there may indeed be circumstances under which a general measure is not only sufficient but also preferable. Future research may benefit from consideration of whether target-specific or target-general measures are more appropriate, given the study's goals and sample.

Together, these past and current findings suggest that target-specificity may be a rich new direction for lay theories research, leading to such questions as: To what extent are target age-specific lay theories accurate, and to what extent do they reflect bias? What other cues do people use besides target age to determine whether a particular person can change? Why are these cues, in particular, used to assess malleability? More broadly, how, why, and when do personal

attributes affect lay theories of different characteristics? Answering such questions will help to build a more comprehensive understanding of lay theories' target-specificity.

### **Conclusion**

Our beliefs about whether people can change – our lay theories of malleability – are known to be consequential for social judgments across a number of domains, including relationships, self regulation, education, health, and the law. Yet by failing to specify *whose* malleability, specifically, we are considering, and assuming that lay theories of an attribute are homogeneous within individuals across targets, we may obscure nuance both in the nature of these beliefs and in the ways they inform judgment and behavior. The current studies show that one characteristic in particular – target age – exerts strong influence on one's lay theories of malleability, and with important consequences. In doing so, this work also contributes to the needed and growing literature on how age affects social perception, judgment, and policy (Carstensen & Hartel, 2006), and suggests that target-specificity will prove a valuable direction for lay theories research.

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### Footnotes

<sup>1</sup>To minimize repeat responders, for each dataset, we examined IP addresses and when one was found to repeat, retained only the first case. In addition, we examined repeat IP addresses across datasets collected around the same time (Studies 1, 2, 4a, and 5; and Studies 3a and 3b). When a computer IP address repeated within one of these groups of studies, only the first case was retained. In all studies, samples sizes for analyses vary because some participants did not complete all measures.

Table 1. Malleability belief means, standard deviations, and confidence intervals in Studies 1 and 3b.

Malleability belief type									
Study 1:									
Target age	Lay theory of personality			Likelihood of change			Possibility of change		
	<i>M</i>	<i>SD</i>	95% CI	<i>M</i>	<i>SD</i>	95% CI	<i>M</i>	<i>SD</i>	95% CI
1	<b>4.50</b>	1.33	[4.19, 4.80]	<b>5.45</b>	1.10	[5.19, 5.70]	<b>5.48</b>	1.03	[5.24, 5.72]
15	<b>4.61</b>	1.17	[4.34, 4.87]	<b>5.20</b>	1.00	[4.97, 5.43]	<b>5.28</b>	1.02	[5.05, 5.52]
25	<b>4.29</b>	1.25	[4.01, 4.58]	<b>4.65</b>	1.20	[4.37, 4.93]	<b>4.98</b>	1.11	[4.72, 5.24]
45	3.65	1.26	[3.37, 3.94]	3.63	1.35	[3.31, 3.95]	<b>4.51</b>	1.29	[4.21, 4.81]
65	3.20	1.23	[2.92, 3.48]	2.79	1.33	[2.48, 3.10]	<b>4.14</b>	1.34	[3.83, 4.46]
85	2.94	1.28	[2.65, 3.23]	2.33	1.39	[2.00, 2.65]	3.73	1.53	[3.38, 4.09]

Study 3b:									
Target age	Lay theory of personality			Lay theory of intelligence			Lay theory of memory ability		
	<i>M</i>	<i>SD</i>	95% CI	<i>M</i>	<i>SD</i>	95% CI	<i>M</i>	<i>SD</i>	95% CI
15	<b>4.52</b>	1.02	[4.31, 4.73]	<b>4.10</b>	1.30	[3.83, 4.37]	<b>4.24</b>	1.08	[4.02, 4.46]
30	<b>4.01</b>	1.07	[3.79, 4.23]	<b>3.84</b>	1.27	[3.58, 4.11]	<b>3.91</b>	.94	[3.72, 4.10]
45	3.64	1.25	[3.38, 3.90]	3.50	1.29	[3.23, 3.76]	3.58	1.07	[3.35, 3.80]
60	3.39	1.08	[3.17, 3.62]	3.34	1.34	[3.07, 3.61]	3.49	1.21	[3.25, 3.74]
75	<i>3.01</i>	1.10	[2.79, 3.23]	<i>3.09</i>	.99	[2.89, 3.29]	<i>3.23</i>	1.05	[3.02, 3.44]

Note: Means whose confidence intervals are higher than 3.5 (indicating change belief) are bolded.  
 Means whose confidence intervals are lower than 3.5 (indicating fixed belief) are italicized.

Table 2. Correlations of target age-specific malleability beliefs in Study 1.

Target age	Lay theory of personality					Target age	Perceived likelihood of change					Target age	Perceived possibility of change				
	1	15	25	45	65		1	15	25	45	65		1	15	25	45	65
15	<b>.28*</b>					15	<b>.69***</b>					15	<b>.54***</b>				
25	.06	<b>.79***</b>				25	<b>.37**</b>	<b>.72***</b>				25	<b>.35**</b>	<b>.83***</b>			
45	.00	<b>.42***</b>	<b>.75***</b>			45	.03	<b>.26*</b>	<b>.59***</b>			45	.23	<b>.52***</b>	<b>.75***</b>		
65	.04	<b>.34***</b>	<b>.63***</b>	<b>.87***</b>		65	-.16	.04	<b>.37**</b>	<b>.81***</b>		65	.05	<b>.39**</b>	<b>.61***</b>	<b>.84***</b>	
85	.01	.15	<b>.41***</b>	<b>.73***</b>	<b>.91***</b>	85	-.52***	-.32***	.02	<b>.47***</b>	<b>.71***</b>	85	-.02	.20	<b>.41***</b>	<b>.68***</b>	<b>.82***</b>

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Significant positive correlations are bolded.

Table 3. Correlations of participant age with measures of self-perceived malleability, by attribute, collapsed across reference group (target age) conditions.

## Correlations of participant age with...

Table 4. Regression results for direct comparisons of malleability in Study 3b.

Attribute	Regression									
	Estimated reference group age condition mean (intercept)			Simple effect of participant age within reference group age condition (slope)						
	B	SE	95% CI	B	SE	95% CI	$\beta$	t	p	
<b>Personality</b>										
Full model R <sup>2</sup> = .59, F(9, 454) = 27.41, p < .001										
Interaction ΔR <sup>2</sup> = .02, F(4, 454) = 3.48, p = .008										
<i>Reference group age</i>										
15	1.47	.07	[1.34, 1.60]	.001	.006	[-.012, .013]	.01	.12	.91	
30	2.03	.07	[1.90, 2.16]	<b>-.026</b>	<b>.006</b>	<b>[-.038, -.014]</b>	<b>-.36</b>	<b>-4.29</b>	<b>&lt;.001</b>	
45	2.40	.07	[2.27, 2.53]	<b>-.018</b>	<b>.006</b>	<b>[-.031, -.005]</b>	<b>-.25</b>	<b>-2.81</b>	<b>.005</b>	
60	2.56	.07	[2.44, 2.69]	-.002	.007	[-.014, .011]	-.02	-.23	.82	
75	2.67	.06	[2.54, 2.80]	-.005	.005	[-.015, .005]	-.07	-.95	.34	
<b>Intelligence</b>										
Full model R <sup>2</sup> = .56, F(9, 454) = 22.68, p < .001										
Interaction ΔR <sup>2</sup> = .02, F(4, 454) = 3.79, p = .005										
<i>Reference group age</i>										
15	1.67	.06	[1.54, 1.79]	-.011	.006	[-.023, .001]	-.16	-1.72	.09	
30	2.19	.06	[2.07, 2.32]	<b>-.030</b>	<b>.006</b>	<b>[-.042, -.019]</b>	<b>-.45</b>	<b>-5.20</b>	<b>&lt;.001</b>	
45	2.46	.06	[2.34, 2.59]	<b>-.028</b>	<b>.006</b>	<b>[-.040, -.016]</b>	<b>-.42</b>	<b>-4.52</b>	<b>&lt;.001</b>	
60	2.57	.06	[2.44, 2.69]	-.008	.006	[-.020, .004]	-.12	-1.29	.20	
75	2.60	.06	[2.48, 2.72]	-.007	.005	[-.017, .003]	-.11	-1.41	.16	
<b>Memory ability</b>										
Full model R <sup>2</sup> = .63, F(9, 454) = 33.01, p < .001										
Interaction ΔR <sup>2</sup> = .05, F(4, 454) = 10.20, p < .001										
<i>Reference group age</i>										
15	1.55	.06	[1.43, 1.68]	<b>-.018</b>	<b>.006</b>	<b>[-.030, -.006]</b>	<b>-.25</b>	<b>-2.88</b>	<b>.004</b>	
30	2.09	.06	[1.96, 2.22]	<b>-.040</b>	<b>.006</b>	<b>[-.051, -.028]</b>	<b>-.55</b>	<b>-6.70</b>	<b>&lt;.001</b>	
45	2.51	.06	[2.38, 2.63]	<b>-.037</b>	<b>.006</b>	<b>[-.050, -.025]</b>	<b>-.52</b>	<b>-5.97</b>	<b>&lt;.001</b>	
60	2.53	.06	[2.40, 2.65]	-.007	.006	[-.020, .005]	-.10	-1.17	.24	
75	2.69	.06	[2.56, 2.81]	.002	.005	[-.008, .012]	.03	.40	.69	

Note: Participants responded to a 3-point scale anchored at 1 and 3, with higher values indicating greater relative malleability. Full model includes main effects of participant age, reference group age, and their interaction. Interaction ΔR<sup>2</sup> refers to the variance accounted for by the interaction of participant age and reference group age when this interaction is included as a separate step in the regression. Significant simple effects of participant age are bolded.

Table 5. Means, standard deviations, 95% confidence intervals, and correlations of variables in Studies 4a and 4b.

	<i>M</i>	<i>SD</i>	<i>n</i>	95% CI	L-B	Other	I	P	Correlation			
									I - 55	I - 25	P - 55	P - 25
<b>Study 4A</b>												
Type of senior service												
Learning-based	3.79	1.40	100	[3.51, 4.06]								
Other	5.66	0.96	100	[5.47, 5.85]	.30**							
Age-specific lay theory												
Intelligence - 55	3.68	1.13	100	[3.46, 3.91]	.39***	.20*						
Intelligence - 25	4.53	1.14	98	[4.30, 4.76]	.16	.02			.64***			
Personality - 55	3.67	1.17	97	[3.44, 3.91]	.15	.14			.60***	.35***		
Personality - 25	4.59	1.07	96	[4.37, 4.81]	.04	.10			.39***	.52***	.61***	
Participant age	31.38	9.91	96	[29.4, 33.4]	.12	.33**			.15	-.07	.14	.02
<b>Study 4B</b>												
Type of senior service												
Learning-based	4.18	1.42	248	[4.01, 4.36]								
Other	5.83	0.89	248	[5.72, 5.95]	.28***							
General lay theory												
Intelligence	3.84	1.13	248	[3.69, 3.98]	.07	.13*						
Personality	3.92	1.08	247	[3.79, 4.06]	.07	.11	.68***					
Age-specific lay theory												
Intelligence - 55	3.55	1.17	247	[3.40, 3.70]	.26***	.15*	.78***	.59***				
Intelligence - 25	3.99	1.18	246	[3.84, 4.14]	.13*	.11	.85***	.63***	.82***			
Personality - 55	3.55	1.17	246	[3.41, 3.70]	.22**	.07	.58***	.75***	.74***	.61***		
Personality - 25	4.12	1.10	246	[3.99, 4.26]	.16*	.13*	.60***	.76***	.61***	.74***	.72***	
Participant age	36.49	12.50	246	[34.9, 38.1]	.07	.17**	.02	.06	.11	.05	.12	.08

\*\*\**p* < .001, \*\**p* < .01, \**p* < .05

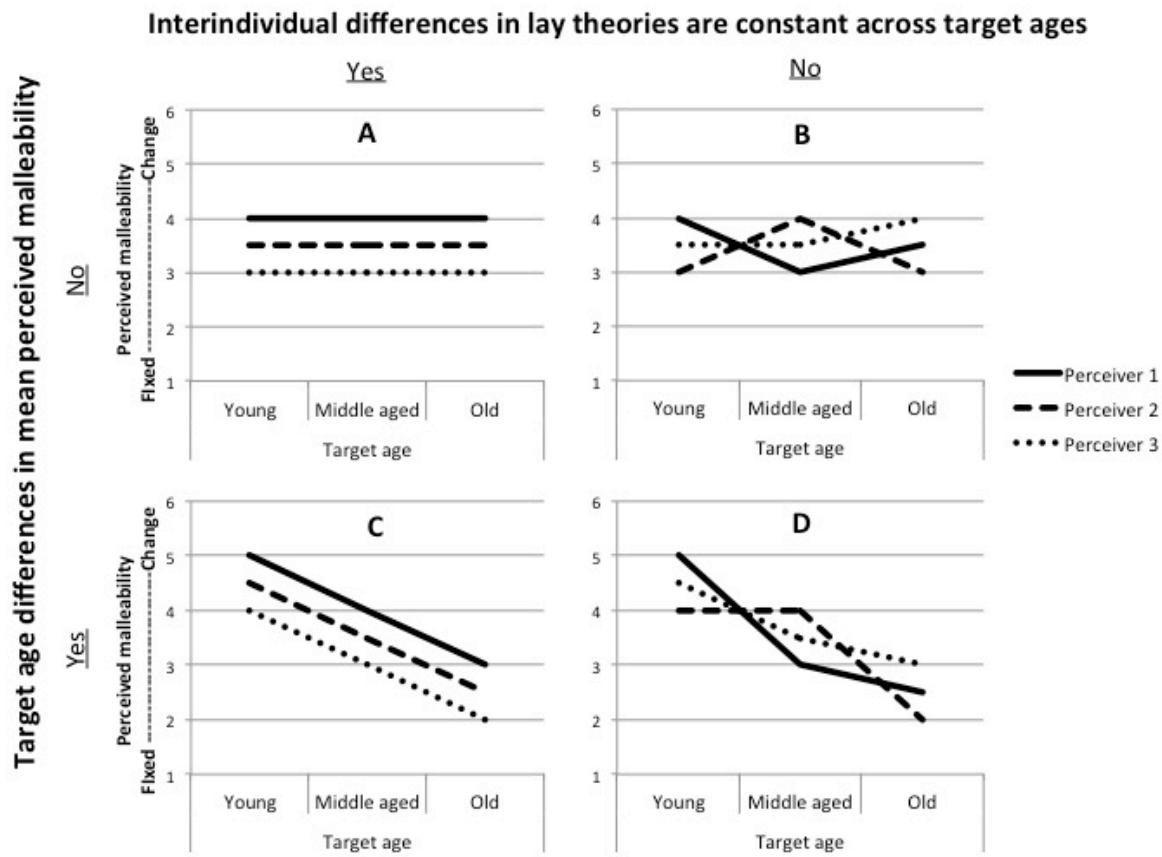


Figure 1. Four models illustrate two ways in which lay theories may depend on target age: Target age differences in mean perceived malleability, and interindividual differences in lay theories that are not constant across target ages. In model A, target age has no effect: perceivers do not believe as a group that older people are differently malleable than younger people, and interindividual differences in lay theories are constant across target ages (i.e., a perceiver's lay theory of one age positively predicts his or her lay theory of another age). In model B, perceivers as a group do not perceive older people to be differently malleable than younger people, but interindividual differences in lay theories are not constant across target ages (i.e., a perceiver's lay theory of one age does not predict his or her lay theory of another age). In model C, perceivers as a group perceive older people to be less malleable than younger people, but

interindividual differences in lay theories are constant across target age (i.e., a perceiver's lay theory of younger targets positively predicts his or her lay theory of older targets). In model D, perceivers as a group perceive older people to be less malleable than younger people, and interindividual differences in perceptions are not constant across target age (i.e., a perceiver's lay theory of young people does not predict his or her lay theory of old people).

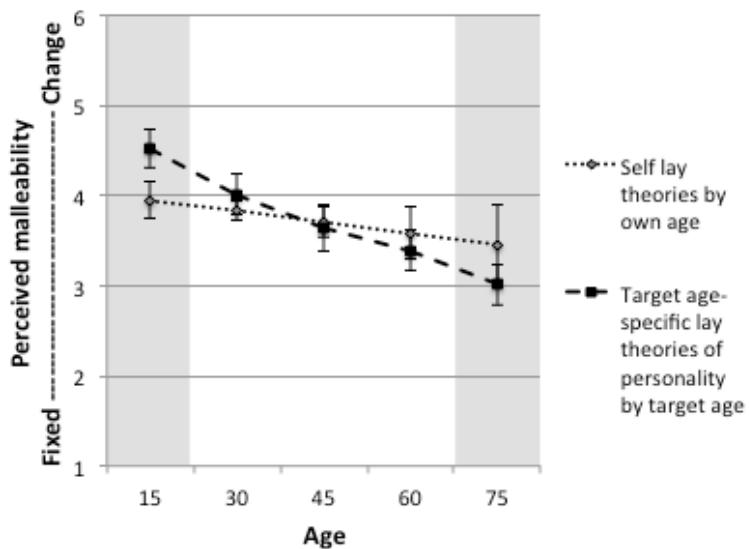


Figure 2. Self lay theories by own age and target age-specific lay theories of personality by target age in Study 3b. Error bars represent 95% confidence intervals. Target age-specific lay theories values are means for each target condition. Self lay theories values are estimates from linear regression with age as the predictor. Shaded areas indicate values beyond the sample's age range (i.e., there were no 15 or 75 year old participants in the sample).

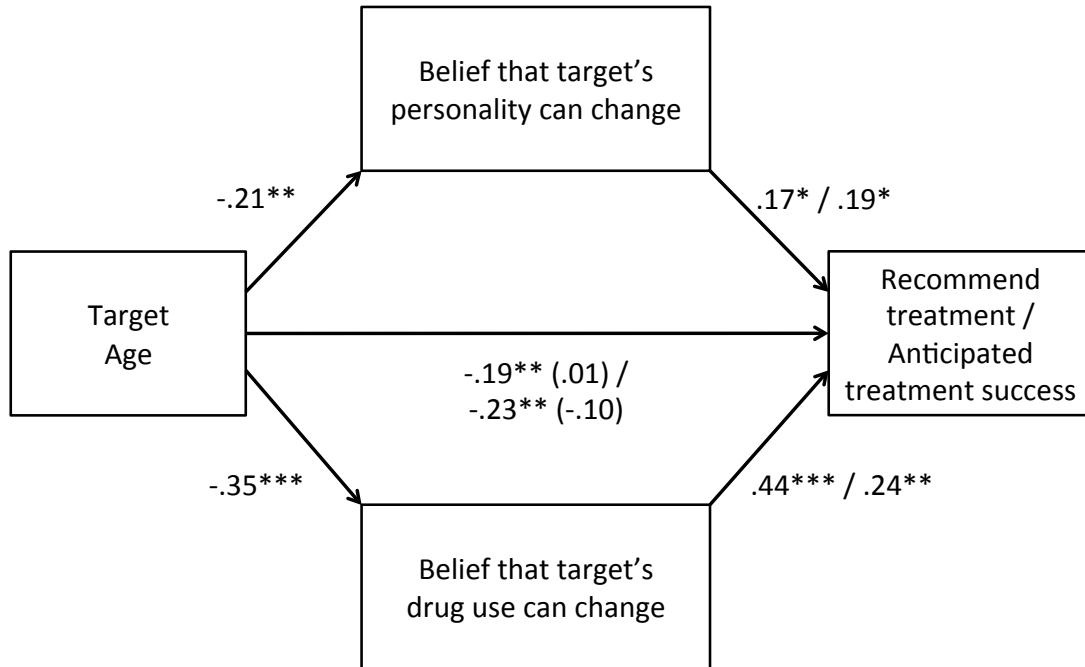


Figure 3. Standardized regression coefficients for the effect of target age on treatment recommendation and anticipated treatment success in Study 5, as mediated by lay theories of the target's personality and drug use.  $*p < .05$ ,  $^{**}p < .01$ ,  $^{***}p < .001$ .