



# Your Personality Does Not Care Whether You Believe It Can Change: Beliefs About Whether Personality Can Change Do Not Predict Trait Change Among Emerging Adults

NATHAN W. HUDSON<sup>1\*</sup>, R. CHRIS FRALEY<sup>2</sup>, DANIEL A. BRILEY<sup>2</sup> and WILLIAM J. CHOPIK<sup>3</sup>

<sup>1</sup>Department of Psychology, Southern Methodist University, Dallas, TX USA

<sup>2</sup>Department of Psychology, University of Illinois at Urbana-Champaign, Champaign, IL USA

<sup>3</sup>Department of Psychology, Michigan State University, East Lansing, MI USA

*Abstract:* Theorists have suggested that beliefs about whether personality can change might operate in a self-fulfilling fashion, leading to growth in personality traits across time. In the present two studies, we collected intensive longitudinal data from a total of 1339 emerging adults ( $n_s = 254$  and 1085) and examined the extent to which both global beliefs that personality can change (e.g. 'You can change even your most basic qualities') and granular beliefs that the individual Big Five personality domains can change (e.g. 'You can change how extraverted and enthusiastic you generally are') predicted trait change across approximately 4 months. Results indicated that traits did change across time, yet beliefs that personality can change were almost completely unrelated to actual change in personality traits. Our findings suggest that personality development during emerging adulthood does not depend to any meaningful degree on whether or not individuals believe that their traits can change. © 2020 European Association of Personality Psychology

**Key words:** adult personality development; implicit theories of personality; personality mindsets; fixed vs. growth mindsets; entity vs. incremental orientation

A large body of research shows that personality traits can and do change across time (e.g. Lucas & Donnellan, 2011; Roberts, Walton, & Viechtbauer, 2006; Soto & John, 2017). For example, as people age, they tend to become more agreeable (e.g. tender and kind-hearted), conscientious (e.g. thorough and hardworking), and emotionally stable (e.g. relaxed and calm). However, individuals vary in the extent to which they believe that their core attributes—such as personality—can change (Chiu, Hong, & Dweck, 1997; Dweck, 2013; Dweck & Leggett, 1988). Moreover, theorists have suggested that beliefs about the malleability of personality—sometimes called *personality mindsets*—may be an important determinant of how traits develop across time (e.g. Allemand & Flückiger, 2017; Dweck, 2008; Hennecke, Bleidorn, Denissen, & Wood, 2014). For example, in reviewing interventions designed to change participants' mindsets, Dweck (2008) wrote that such interventions yield 'surprisingly large changes with seemingly modest input' that 'cut across many of the broad traits that are often thought to be relatively stable: openness to experience (e.g., challenge-seeking), conscientiousness (e.g., hours studied), sociability (e.g., reaching out to others), and negative affectivity (e.g., resilient vs. negative reactions to setbacks)' (p. 393).

Although several studies have linked mindsets with specific behaviours and outcomes (e.g. academic performance; Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018), no studies to date have directly tested the extent to which beliefs about whether or not personality can change predict actual change in personality traits across time. The purpose of the present studies was to fill this gap in the empirical literature by investigating whether individuals' personality mindsets moderated change in their self-report personality traits across approximately 4 months.

## Adult personality development

Across adulthood, personality traits are thought to develop through biological mechanisms, as well as in response to life experiences (Kandler & Zapko-Willmes, 2017; Roberts, Wood, & Caspi, 2008). For example, the Big Five personality traits tend to change in predictable ways with age: As people get older, they tend to become more agreeable, conscientious, and emotionally stable (e.g. Lucas & Donnellan, 2011; Soto, John, Gosling, & Potter, 2011). These normative trends are thought to be partially driven by biologically preprogrammed maturation (analogous to physical maturation) (McCrae et al., 1999). Indeed, twin studies suggest that individual variation in how traits develop with age is partially heritable, with roughly half the variation due to genetic influences and half due to environmental influences (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; but for an opposing perspective, see five-factor theory, which suggests traits develop only in

\*Correspondence to: Nathan W. Hudson, Department of Psychology, Southern Methodist University, PO Box 750442, Dallas, TX 75275, USA.  
E-mail: nwhudson@smu.edu

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biologically determined ways; McCrae & Costa, 2008; Mõttus, 2017). These environmental influences have been interpreted to indicate that personality traits change in idiosyncratic ways in response to life experiences (e.g. Bleidorn, Hopwood, & Lucas, 2018). For example, individuals who commit to their careers tend to become more conscientious across time (Hudson & Roberts, 2016), and people who commit to romantic relationships tend to increase in emotional stability at a faster rate than their single peers (e.g. Lehnart, Neyer, & Eccles, 2010). In contrast, smoking marijuana or withdrawing from one's career is associated with relative decreases in conscientiousness across time (Bogg & Roberts, 2004; Roberts, Walton, Bogg, & Caspi, 2006). Thus, environmental influences can both spur change and create stability in traits (Briley & Tucker-Drob, 2014).

The specific mechanisms underlying *why* personality traits change in concert with life experiences are not particularly well-understood. Many modern theories suggest that personality traits are a complex interplay between individuals' patterns of thoughts, feelings, and behaviours; their identities (e.g. how they see themselves); their biology; and environmental inputs (e.g. social roles/reputations/reflected self-appraisals) (e.g. Burke, 2006; Funder, 2008; Kandler & Zapko-Willmes, 2017; Lodi-Smith & Roberts, 2007; McAdams & Pals, 2006; Roberts & Jackson, 2008; Tucker-Drob & Briley, 2019; Wrzus & Roberts, 2017). For example, workplaces are thought to spur changes in conscientiousness because individuals psychologically commit to adopting a new identity (e.g. 'I want to be a good employee') while simultaneously incorporating a variety of new patterns into their cognitive, affective, and behavioural repertoires (e.g. performing thorough work). Over extended periods of time (perhaps as short as 6 weeks; Roberts et al., 2017), these new, conscientious patterns of thoughts, feelings, and behaviours are thought to become learned, automatized, and habitual (i.e. people start behaving more conscientiously in a relatively automatic fashion); accommodated into individuals' identities (i.e. they start to see themselves as more conscientious); and perhaps even etched into their biology through changes to the nervous system or epigenome (Allemand & Flückiger, 2017; Burke, 2006; Hennecke et al., 2014; Hudson & Fraley, 2017; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014; Roberts, 2018; Roberts & Jackson, 2008). Stated more simply, many modern theories of personality development suggest that any changes to patterns of thoughts, feelings, and behaviours that are maintained for a sufficiently long time can eventually coalesce into enduring trait change, through a variety of psychological and biological mechanisms (Allemand & Flückiger, 2017; Hennecke et al., 2014; Magidson et al., 2014; Roberts, Hill, & Davis, 2017).

However, many theories also specify that individuals' beliefs and motives have the potential to shape how developmental processes unfold. For example, some models of personality development suggest that psychological commitment to social roles (e.g. marriage) and the accompanying role-typed behaviours (e.g. lovingkindness and warmth) are critical to facilitating trait change (Lodi-Smith & Roberts, 2007; Roberts & Wood, 2006). Other models of development more generally emphasize that people's motives

and desires to adopt new behavioural patterns are key (Baumeister, 1994; Hennecke et al., 2014; Hudson & Fraley, 2017; Kiecolt, 1994). Namely, motives influence behaviour (e.g. Winter, Stewart, John, Klohnen, & Duncan, 1998). For example, individuals with goals to foster relationships may alter their behaviour to be more prosocial over extended periods of time, eventually leading to enduring gains in agreeableness (e.g. Roberts, O'Donnell, & Robins, 2004). Similarly, many people explicitly want to change their personality traits—and they appear to be able to do so to some extent (e.g. people who want to become more agreeable tend to actually increase in agreeableness across time; Hudson, Briley, Chopik, & Derringer, 2019; Hudson & Fraley, 2015, 2016a; Hudson, Fraley, Chopik, & Briley, 2020; but cf. Robinson, Nofle, Guo, Asadi, & Zhang, 2015). Thus, research suggests that intrapsychic forces, such as motives, have the potential to influence trait development.

### Do beliefs that personality can change affect trait development?

Individuals vary in the extent to which they believe that their core attributes—including personality traits—can change (Chiu et al., 1997; Dweck, 2008, 2013; Dweck & Leggett, 1988). These beliefs are sometimes called *implicit theories of personality* or *personality mindsets*. Personality mindsets vary along a continuum from *fixed mindsets* (the belief that personality is a fixed attribute that cannot change) to *growth mindsets* (the belief that personality is fluid and can grow and change). Several theorists have suggested that personality mindsets may be a critical component in facilitating trait change (Allemand & Flückiger, 2017; Dweck, 2008; Hennecke et al., 2014). Specifically, people who *believe* that their personality can change may experience more dynamic change in their personality traits—especially if those individuals are actively working on trying to change their traits.

Why might mindsets affect how people's traits develop? From a sociogenomic perspective, traits are thought to grow when both (i) individuals' patterns of thoughts, feelings, and behaviours change over extended periods of time, and (ii) individuals accept those changes into their identities (Burke, 2006; Lodi-Smith & Roberts, 2007; Wrzus & Roberts 2017). People with fixed personality mindsets—who believe that personality cannot change—may be resistant to incorporating new thoughts, feelings, or behaviours into their cognitive, affective, and behavioural repertoires. To the extent that they do nevertheless adopt new thoughts, feelings, and behaviours (e.g. because situational presses such as the workplace force them to change), such individuals may also construe their new patterns of thoughts, feelings, and behaviours as exogenous to themselves. Because they may consider these new patterns to be imposed upon them, they may not assimilate such changes into their identities (e.g. 'I haven't become more organized; I just have to keep my desk clean so that I don't get fired'). Both of these processes would have the potential to undermine trait change (Wrzus & Roberts, 2017). Thus, people who do not enact new patterns of thoughts, feelings, and behaviours, or those

who refuse to accommodate new behavioural patterns into their identities might experience less trait change across time (although presumably such individuals would still experience naturally occurring biological maturation; Bleidorn et al., 2009).

Supporting this line of reasoning, studies have found that, as compared with their peers with fixed mindsets, people with growth mindsets have higher academic performance (Blackwell, Trzesniewski, & Dweck, 2007, although there is no universal support for this finding Foliano, Rolfe, Buzzeo, Runge, & Wilkinson, 2019; Sisk et al., 2018): better negotiation skills (Kray & Haselhuhn, 2007), greater social confidence (Erdley, Loomis, Cain, & Dumas-Hines, 1997), better conflict-resolution abilities (Kammrath & Dweck, 2006; Yeager & Dweck, 2012), and greater self-regulation with downstream consequences for higher goal attainment (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013). Generally, these findings have been interpreted to suggest that individuals' beliefs about whether or not their core attributes can change have self-fulfilling properties (Jussim, 1986). For example, students who believe that their intelligence can change may be more motivated to study and learn—leading to actual gains in intelligence/performance. In contrast, students who believe that intelligence is fixed may fear that academic tasks (e.g. studying and exams) will reveal that they are unintelligent—and thus they may ironically avoid the very behaviours (e.g. studying) that would boost their academic performance.

Similar logic can be applied to personality change (Allemand & Flückiger, 2017; Dweck, 2008; Hennecke et al., 2014). For example, workers who believe that conscientiousness can change may be more likely to adopt new conscientious behaviours (e.g. staying organized and performing well on tasks). In contrast, their peers who believe that conscientiousness is fixed may not even try to incorporate new, more conscientious behaviours into their routines. Indeed, Dweck (2008) concluded that interventions that target people's beliefs about the malleability of their core attributes may lead to 'surprisingly large changes' in broad personality domains, such as the Big Five (p. 393).

Although it seems reasonable that personality mindsets might have self-fulfilling properties and predict trait change, it is also possible that people's beliefs about whether traits can change may be irrelevant to trait development. There are at least two reasons for this hypothesis. First, social roles may require new patterns of thoughts, feelings, and behaviours, irrespective of whether individuals occupying those roles believe their traits can change (Hudson & Roberts, 2016; Hudson, Roberts, & Lodi-Smith, 2012; Lodi-Smith & Roberts, 2007). For example, workplaces may require some heightened level of conscientious behaviours (e.g. Barrick & Mount, 1991), which leads to changes in trait conscientiousness irrespective of individuals' beliefs. Second, research suggests that individuals are not particularly aware of how their personality traits have changed across time (Costa & McCrae, 1989; Gunty et al., 2011; Robins, Nettle, Trzesniewski, & Roberts, 2005). Thus, even if people believe that their traits cannot change, they may unwittingly incorporate behavioural changes into their

identities. For example, an employee who is forced by his or her job to engage in conscientious behaviours may slowly start to see himself or herself as more conscientious, without appreciating that change has taken place.

## Overview of the present studies

In this article, we present two longitudinal studies examining the extent to which people's personality mindsets predict change in their Big Five personality traits across time. Both studies were intensive longitudinal designs in which participants rated their personality mindsets at the beginning of the study and then provided weekly self-report ratings of their personality traits for up to 16 weeks—a full college semester. In Study 1, we examined the extent to which an existing measure of global personality mindsets (Dweck, 2013) predicted change in the Big Five personality traits across time. In Study 2, we collected a sample of more than 1000 emerging adults and examined whether trait-specific mindsets (e.g. the belief that *extraversion* can or cannot change) predicted change in the relevant traits. In Study 2, we also took advantage of our large sample (and the accompanying higher statistical power) to test whether personality mindsets might predict trait change more strongly for individuals who wanted to change their personality traits (who presumably are more motivated to attempt to change their traits; Hudson, Briley, et al., 2019; Hudson & Fraley, 2015, 2016a). In other words, we tested whether changes in personality were most likely for those who (i) wanted to change and (ii) believed they could. Collectively, these studies provide valuable data on the extent to which beliefs that personality can change predict trait change for emerging adults across nearly 4 months.

## STUDY 1

Study 1 was designed to examine whether global beliefs that personality can change are related to change in personality traits across 16 weeks. To do so, we measured participants' global fixed versus growth mindsets with respect to personality using existing measures (Dweck, 2013). We then examined whether growth mindsets (i.e. believing that personality can change) predicted subsequent trait change.<sup>1</sup>

## Method

### *Participants and procedure*

For both Studies 1 and 2, we conducted secondary analyses of existing data—some of which have been published (Hudson et al., 2020; Hudson, Briley, et al., 2019; Hudson & Fraley, 2016a, 2018) and some of which are currently being prepared for publication. We have not previously published any analyses of the mindset variables. All data for both Studies 1 and 2 were collected from students in psychology courses at Southern Methodist University, the

<sup>1</sup>These studies were not preregistered. Materials, data, and analysis scripts are provided on Open Science Framework (<https://osf.io/bq7xz/>).

University of Illinois at Urbana-Champaign, and Michigan State University. Data collection occurred across multiple semesters. Students in participating courses could complete waves of the study in exchange for (extra) course credit. Participants were required to register a user account on the study website and were instructed to complete one wave of the study per week of the 15- to 16-week semester. To afford leniency and flexibility, the study website allowed students to complete waves as frequently as once every 5 days. Students who waited longer than 7 days between waves were sent automated email reminders to continue the study.

Study 1 included all students in any longitudinal study that we have conducted to date that included global measures of personality mindset. No studies or participants were excluded for any reason. A total of 254 participants provided at least one wave of data in a study that included global personality mindset measures—and thus comprise our sample for Study 1. This sample size afforded 92% power to detect average-sized effects (equivalent to  $r \sim .21$ ; Richard, Bond, & Stokes-Zoota, 2003). The sample was 68% female, with an average age of 20.13 years ( $SD = 1.54$ ). Participants were asked to select all racial/ethnic groups with which they identified; the racial composition was 47% White, 35% Asian, 11% Hispanic/Latino, 8% Black, and 1% Native American. On average, participants provided 11.43 waves of data ( $SD = 5.42$ ), with 208 (82%), 173 (68%), and 124 (49%) participants providing data at Waves 5, 10, and 15, respectively. Conscientious students (as measured at Wave 1) tended to provide more numerous waves of data ( $r = .22$ , 95% CI [0.10, 0.33]). No other study variables, as measured at Wave 1, were statistically significantly related to attrition (all  $|r| \leq .11$ ).

*Measures*

Study 1 constitutes a reanalysis of existing data from several samples.<sup>2</sup> Various additional measures were collected in each included sample that do not pertain to the present study. We report all measures of global mindset or personality traits in any included sample. Approximately half of the participants in this sample also completed measures of change goals (which we analyse among different participants in Study 2). We did not analyse interactions between mindsets and change goals in predicting trait change in Study 1 (as we do in Study 2) owing to the relatively small sample size—and low statistical power—such analyses would entail.

*Personality traits*

Participants self-reported their personality traits using the 44-item Big Five Inventory (BFI; John & Srivastava, 1999). The BFI contains separate subscales to measure extraversion (e.g. ‘I see myself as someone who is talkative’), agreeableness (‘I see myself as someone who has a forgiving nature’), conscientiousness (e.g. ‘I see myself as someone who perseveres until the task is finished’), emotional stability (e.g. ‘I see myself as someone who is relaxed, handles stress well’), and openness (e.g. ‘I see myself as someone who likes to

reflect, play with ideas’). All items were rated on a 5-point scale from *strongly disagree* (1) to *strongly agree* (5) and were averaged to form separate composites for extraversion (Wave 1  $\alpha = .86$ ), agreeableness (Wave 1  $\alpha = .79$ ), conscientiousness (Wave 1  $\alpha = .81$ ), emotional stability (Wave 1  $\alpha = .81$ ), and openness (Wave 1  $\alpha = .80$ ).

*Global personality mindset.* At Wave 1 only, participants rated their global beliefs that personality can change using the eight-item ‘Kind of Person’ Implicit Theory measure (Dweck, 2013). Items [e.g. ‘You can always substantially change the kind of person you are’; ‘You are a certain type of person, and there is not much that can be done to really change that’ (reversed)] were rated on a 5-point scale from *strongly disagree* (1) to *strongly agree* (5). In this measure, we treated mindsets as unidimensional (i.e. running along a single dimension from fixed mindset to growth mindset). All items were keyed such that higher numbers represented greater beliefs that personality *can* change (i.e. higher growth mindset) and were averaged to form a composite ( $\alpha = .86$ ).

**Results and discussion**

Wave 1 descriptive statistics and correlations are presented in Table 1. In general, people felt neutral about the idea that personality can change—with the mean score on the mindset measure hovering around the scale’s midpoint ( $M = 2.89$ ,  $SD = 0.70$ ) (however, see Blanton & Jaccard, 2006, on taking appropriate caution in absolutely interpreting the scalar midpoint). Beliefs that personality can change were correlated with extraversion ( $r = .13$ , 95% CI [0.002, 0.24]) and conscientiousness ( $r = .17$ , 95% CI [0.04, 0.28]) as measured at Wave 1—but not any other trait (all  $|r| \leq .12$ ).

For our primary analyses, we examined whether global beliefs that personality can change predicted change in personality traits across 16 weeks. To do so, we used multilevel models (MLMs) to predict personality traits for person,  $p$ , at wave,  $w$ , as a function of their beliefs that personality can change (i.e. growth mindset). We created separate MLMs for each trait. For example, the MLM for extraversion was as follows:

Table 1. Study 1 descriptive statistics and correlations at Wave 1

Variable	M	SD	Correlations					
			1	2	3	4	5	6
1. E	3.13	0.73	—					
2. A	3.67	0.60	<b>.21</b>	—				
3. C	3.38	0.59	<b>.13</b>	<b>.24</b>	—			
4. S	2.92	0.69	<b>.21</b>	<b>.17</b>	<b>.19</b>	—		
5. O	3.62	0.58	.07	.06	.06	-.01	—	
6. Mindsets	2.89	0.70	<b>.13</b>	.01	<b>.17</b>	.12	.01	—

*Note:* Descriptive statistics are the weighted average across the Big Five Inventory (BFI) and BFI2 measures. Ninety-five per cent confidence intervals for correlations in boldface do not contain zero. E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; Mindsets, growth mindset.

<sup>2</sup>Some of these data have been published previously (Hudson et al., 2020; Hudson & Fraley, 2016a, 2018).

$$\begin{aligned}
 (\text{Extraversion})_{wp} &= b_0 + b_1(\text{Time})_{wp} \\
 &+ b_2(\text{Growth Mindset})_p \\
 &+ b_3(\text{Time})_{wp} (\text{Growth Mindset})_p + U_p \\
 &+ \varepsilon_{wp}
 \end{aligned}$$

In all models, personality traits and growth mindset were standardized across all observations before being entered into the model (Ackerman, Donnellan, & Kashy, 2011), and Time was centred at Wave 1 and scaled in Months. Thus, the  $b_2$  (Time) parameter captures monthly change in the trait, scaled in SDs per month, for people with average growth mindsets. The  $b_3$  interaction term captures whether monthly trait change was greater for people who believed personality could change as opposed to those who believed personality is more fixed (e.g. a positive interaction term would indicate that people who believed that personality could change experienced greater trait change each month).

As can be seen in the top half of Table 2, global growth mindset did not moderate change in any trait (all  $|b_{\text{Month} \times \text{Mindset}}| \leq 0.02$ ). In fact, averaging across all five traits, the moderating effect of growth mindset on change in personality traits was  $b_{\text{Month} \times \text{Mindset}} = -0.002$ —essentially zero. Even if we use a more generous scaling on time and examine the average moderating effect of mindset on cumulative change in personality traits *across the entire 16-week semester*, the average effect across all five traits was  $b_{\text{Semester} \times \text{Mindset}} = -0.007$ —still nearly zero (and in the opposite direction from what would be expected if growth mindsets promoted trait change). Thus, even examining cumulative change across nearly 4 months, our study suggests that the association between global personality growth mindset and trait change is miniscule—and very close to zero. Importantly, this is not due to a lack of personality change (or variation therein) in these samples. Indeed, as seen in the bottom half of Table 2, there was statistically significant variation in change in all five traits (all  $s^2_s \geq 0.02$ ,  $ps < .001$ ). Moreover, prior research using similar designs and sample sizes has found that other variables—such as desires to change or weekly behaviours—do moderate change

in personality across time (Hudson, Briley, et al., 2019; Hudson & Fraley, 2015, 2016a).

**STUDY 2**

Study 1 suggested that global personality growth mindset does not predict change in personality traits across time. Nonetheless, Study 1 was limited in that it used existing scales that measured personality growth mindset in a global fashion (Dweck, 2013). It is possible that questions similar to ‘The kind of person you are is something very basic about you and it can’t be changed very much’ are too vague to predict change in specific traits—and thus that more specific beliefs (e.g. ‘You can change your level of extraversion’) might be more predictive of change in corresponding traits. Therefore, in Study 2, we developed a new personality growth mindset measure that directly tapped participants’ beliefs about whether each of the Big Five traits can change.

In Study 2, we also examined whether participants’ desires to change their traits (Hudson & Fraley, 2016b; Hudson & Roberts, 2014; Quintus, Egloff, & Wrzus, 2017) might moderate the effects of personality mindsets on trait change. Namely, it is possible that beliefs predict changes only for people who want to change their personality traits—and who are potentially actively working on doing so. Stated differently, for individuals who wish to change their personality, growth mindset may directly correspond to goal feasibility. Popular motivational models suggest that goal attainment varies as a function of both the value of the goal and its expected feasibility (e.g. Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). Consequently, individuals who both (i) want to change their personality and (ii) believe that such changes are possible may experience the greatest changes to their traits.

Thus, Study 2 provides information on potential contextual moderators of the links between mindsets and trait change (e.g. beliefs might only predict trait change for people who want to change)—and it also provides data with respect to theoretical claims that self-change efforts might be easiest

Table 2. Study 1 growth in personality traits as a function of global personality mindset

	Outcome: Traits														
	E			A			C			S			O		
	<i>b</i>	95% CI		<i>b</i>	95% CI		<i>b</i>	95% CI		<i>b</i>	95% CI		<i>b</i>	95% CI	
Fixed effects															
Intercept	-0.01	-0.13	0.11	-0.01	-0.13	0.11	-0.07	-0.18	0.05	-0.06	-0.18	0.06	0.04	-0.08	0.16
Month	0.01	-0.01	0.02	-0.01	-0.03	0.01	<b>-0.03</b>	-0.04	-0.01	<b>0.04</b>	0.01	0.07	-0.01	-0.04	0.02
Mindset	0.10	-0.02	0.22	-0.08	-0.21	0.04	0.09	-0.03	0.22	0.11	-0.01	0.24	<b>0.17</b>	0.05	0.29
Month × Mindset	0.01	-0.00	0.02	0.02	-0.00	0.03	-0.01	-0.02	0.01	-0.01	-0.04	0.02	-0.02	-0.05	0.01
Random effects	$s^2$	<i>p</i>		$s^2$	<i>p</i>		$s^2$	<i>p</i>		$s^2$	<i>p</i>		$s^2$	<i>p</i>	
Intercept	0.89	—		0.90	—		0.88	—		0.91	—		0.88	—	
Month	0.02	<.001		0.03	<.001		0.02	<.001		0.03	<.001		0.03	<.001	

Note: The 95% CIs for parameters in boldface do not include zero.

E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; CI, confidence interval.

for people who believe that such self-change is possible (Allemand & Flückiger, 2017; Hennecke et al., 2014; Hudson & Fraley, 2017).

## Method

### Participants and procedure

Recruitment procedures for Study 2 were identical to those in Study 1. The sample for Study 2 included all participants in any longitudinal study that we have conducted to date in which trait-specific personality mindsets were measured (there was no overlap in participants between Studies 1 and 2). No studies (or participants therein) that included trait-specific mindsets were excluded for any reason. Importantly, participants in some (but not all) studies received an intervention designed to help them make desired changes to their personality traits (Hudson, Briley, et al., 2019).

A total of 1085 participants provided at least one wave of data in one of our studies measuring trait-specific mindsets and thus comprise our final sample for Study 2. This sample size afforded more than 99% power to detect average-sized effects (equivalent to  $r = .21$ ; Richard et al., 2003) and more than 80% power to detect effects as small as  $r = .09$ . Participants were 71% female, with an average age of 20.48 years ( $SD = 3.85$ ). Participants checked all racial/ethnic groups with which they identified; the racial composition of the sample was 56% White, 25% Asian, 11% Hispanic/Latino, 10% Black, 4% Asian Indian, 1% Middle Eastern, and 1% Pacific Islander.

On average, participants provided 10.82 waves of data ( $SD = 4.72$ ), with 923 (85%), 714 (66%), and 353 (33%) participants providing data at Waves 5, 10, and 15, respectively. Attrition analyses revealed that participants provided more waves of data if they were female ( $r = .16$ , 95% CI [0.10, 0.21]), more conscientious ( $r = .17$ , 95% CI [0.11, 0.23]), less open to experience ( $r = -.12$ , 95% CI [-0.17, -0.06]), or believed that it was not possible to change conscientiousness ( $r = -.09$ , 95% CI [-0.15, -0.03]) or emotional stability ( $r = -.09$ , 95% CI [-0.15, -0.03]). No other study variables, as measured at Wave 1, predicted attrition (all  $|r|s \leq .06$ ).

### Measures

Study 2 constitutes a reanalysis of existing data from several samples.<sup>3</sup> Various measures were collected in each included sample that do not pertain to the present study. We report all measures of Big Five traits, growth mindset, and Big Five change goals collected in any included sample.

### Personality traits

Participants provided self-report ratings of their personality traits using either the 44-item BFI or the 60-item BFI2 (Soto & John, 2017). A total of 372 participants completed the BFI. Separate composites were formed for extraversion ( $\alpha = .86$ ), agreeableness ( $\alpha = .77$ ), conscientiousness ( $\alpha = .80$ ), emotional stability ( $\alpha = .85$ ), and openness

( $\alpha = .80$ ). A total of 713 participants completed the BFI2, which is an improved version of the BFI that contains 12 items per dimension. Separate composites were formed for extraversion ( $\alpha = .87$ ), agreeableness ( $\alpha = .81$ ), conscientiousness ( $\alpha = .85$ ), emotional stability ( $\alpha = .90$ ), and openness ( $\alpha = .87$ ).

**Personality mindsets.** To measure people's beliefs about whether individual Big Five traits can change, we created a new, 20-item measure by adapting the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003). Specifically, we reworded each item in the TIPI to measure the extent to which participants believed personality can change. For example, the TIPI item, 'I see myself as someone who is extraverted, enthusiastic' was reworded as, 'You can change how extraverted and enthusiastic you generally are'. All of the original TIPI items were directly translated as positively keyed items (i.e. 'You can change ...').

To increase the reliability of our measure and include reverse-key items, we also reversed each item in the TIPI and prefaced it with, 'People cannot change ...'. For example, the item 'I see myself as someone who is extraverted, enthusiastic' was also reversed and reworded into 'People cannot change how introverted and low key they generally are'. Critically, the TIPI contains a positively keyed item and a negatively keyed item for each Big Five dimension. Thus, the procedure we used generated four items for each trait that, using extraversion as an example, measured concepts similar to (i) 'you *can* change how extraverted you are', (ii) 'you *can* change how introverted you are', (iii) 'people *cannot* change how extraverted they are', and (iv) 'people *cannot* change how introverted they are'. The full scale is presented in Appendix A. All items were rated on a 5-point scale from *strongly disagree* (1) to *strongly agree* (5). Items were keyed such that higher numbers represent greater growth mindset (i.e. beliefs that the trait can change) and were averaged to form separate composites for beliefs that people can change extraversion ( $\alpha = .71$ ), agreeableness ( $\alpha = .63$ ), conscientiousness ( $\alpha = .68$ ), emotional stability ( $\alpha = .66$ ), and openness ( $\alpha = .63$ ).

**Change goals.** Participants provided ratings of their desires to change their personality traits using either the 44-item Change Goals BFI (C-BFI; Hudson & Roberts, 2014) or 60-item C-BFI2 (Hudson, Derringer, & Briley, 2019). Within individual samples, the change goals measure always matched the personality trait measure (e.g. if participants rated their traits using the BFI2, then the C-BFI2 was used to measure change goals). In the change goals scales, the wording on the regular BFI/BFI2 items was modified to allow participants to rate the extent to which they wish to change each item. For example, the BFI/BFI2 item, 'I see myself as someone who is talkative' was rewritten as, 'I want to be talkative'. All items were rated on a 5-point scale from *much less than I currently am* (-2) to *I do not wish to change this trait* (0) to *much more than I currently am* (+2). Thus, participants could indicate goals to increase, decrease, or stay the same with respect to each item in the measure.

<sup>3</sup>Some of these data has been previously published (Hudson et al., 2020; Hudson, Briley, et al., 2019; Hudson, Derringer, & Briley, 2019).

Items were averaged to form separate composites for goals to increase in extraversion, agreeableness, conscientiousness, emotional stability, and openness. In terms of interpretation, positive values for these composites represent goals to increase in a trait, whereas negative values represent goals to decrease.

**Results and discussion**

Because some participants in our sample completed different measures of the Big Five (the BFI versus BFI2), we created separate data files for (i) participants who completed the BFI and (ii) participants who completed the BFI2. We computed composite scores for each trait, mindset, and change goal variable within these separate files. We subsequently standardized all variables across all observations within each of the individual data files so that all variables would be on the same (standard) scale (Ackerman et al., 2011). After standardizing all variables individually within the separate datasets, we combined the two datasets together into a single large dataset of 1085 participants. All subsequent statistical analyses were run on the combined dataset.

Table 3 contains the descriptive statistics and correlation matrix for all study variables at Wave 1. On average, people somewhat agreed that each trait could change [means ranged from 3.55 (*SD* = 0.48) for agreeableness to 3.95 (*SD* = 0.53) for emotional stability]—and beliefs that each trait could change were highly intercorrelated (average *r* = .51). Openness to experience was related to the belief all dimensions can change (average *r* = .14). Extraversion, agreeableness, emotional stability, and openness were positively correlated with the belief that those respective traits could change (e.g. extraverts thought extraversion could change; average *r* = .11)—whereas conscientiousness was unrelated to the

belief that conscientiousness could change (*r* = .03, 95% CI [−0.05, 0.11]). Finally, goals to change each trait were positively correlated with the belief that the corresponding trait could change for all traits (average *r* = .13) except emotional stability (*r* = .06, 95% CI [−0.00, 0.11]) (Quintus et al., 2017).

*Does growth mindset predict trait change?*

For our primary analyses, we examined whether beliefs that each individual trait could change predicted change in the corresponding trait. We used the same MLM as in Study 1—with the exception that we examined how trait-specific growth mindset (instead of global mindset) predicted change in the relevant trait (e.g. how extraversion growth mindset predicted change in trait extraversion). As seen in the top half of Table 4, once again, beliefs that personality can change were unrelated to change in any trait (all  $|b_{\text{Month} \times \text{Mindset}}| \leq 0.01$ ). Thus, even measuring people’s more specific beliefs that the individual Big Five personality traits can change—and in a relatively large sample of more than 1000 emerging adults—yielded identical results to Study 1: Beliefs that personality can change were unrelated to trait change, with an average  $b_{\text{Month} \times \text{Mindset}}$  coefficient that was miniscule and essentially zero (average *b* = 0.002). Notably, there was significant variation in change in personality (see the bottom half of Table 4); thus, the lack of predictive validity cannot be attributed to insufficient variance in trait change.

*Do change goals moderate the association between growth mindset and trait change?*

For our final series of preplanned analyses, we examined whether change goals moderated the associations between growth mindset and trait change. Specifically, these analyses

Table 3. Study 2 descriptive statistics and correlations at Wave 1

Variable	<i>M</i>	<i>SD</i>	Correlations													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
Traits																
1. E	3.22	0.70	—													
2. A	3.69	0.55	<b>.08</b>	—												
3. C	3.46	0.60	<b>.17</b>	<b>.24</b>	—											
4. S	2.94	0.75	<b>.27</b>	<b>.22</b>	<b>.24</b>	—										
5. O	3.71	0.60	<b>.17</b>	<b>.16</b>	.03	.05	—									
Mindsets																
6. E	3.69	0.46	<b>.09</b>	<b>.08</b>	.06	<b>.12</b>	<b>.11</b>	—								
7. A	3.55	0.48	.05	<b>.09</b>	<b>.07</b>	.04	<b>.13</b>	<b>.44</b>	—							
8. C	3.82	0.47	.06	<b>.08</b>	.03	.05	<b>.18</b>	<b>.40</b>	<b>.55</b>	—						
9. S	3.95	0.53	.06	<b>.08</b>	.04	<b>.11</b>	<b>.15</b>	<b>.50</b>	<b>.48</b>	<b>.47</b>	—					
10. O	3.69	0.44	.05	<b>.07</b>	.02	.05	<b>.14</b>	<b>.54</b>	<b>.51</b>	<b>.50</b>	<b>.55</b>	—				
Change goals																
11. E	0.57	0.64	<b>−.44</b>	<b>.06</b>	−.06	<b>−.20</b>	−.01	<b>.08</b>	<b>.12</b>	<b>.14</b>	<b>.09</b>	<b>.09</b>	—			
12. A	0.71	0.57	−.01	<b>−.19</b>	−.05	<b>−.15</b>	.01	<b>.06</b>	<b>.18</b>	<b>.14</b>	<b>.08</b>	<b>.09</b>	<b>.36</b>	—		
13. C	0.88	0.56	−.05	−.02	<b>−.44</b>	<b>−.20</b>	<b>.13</b>	.04	<b>.08</b>	<b>.14</b>	<b>.09</b>	<b>.07</b>	<b>.39</b>	<b>.55</b>	—	
14. S	0.52	0.64	<b>−.16</b>	−.04	<b>−.11</b>	<b>−.64</b>	.06	−.01	<b>.12</b>	<b>.15</b>	.06	<b>.07</b>	<b>.46</b>	<b>.49</b>	<b>.54</b>	—
15. O	0.47	0.62	<b>−.08</b>	.02	<b>−.06</b>	−.06	.01	<b>.07</b>	<b>.08</b>	<b>.13</b>	<b>.10</b>	<b>.12</b>	<b>.48</b>	<b>.46</b>	<b>.53</b>	<b>.39</b>

Note: Descriptive statistics are the weighted average across the Big Five Inventory (BFI) and BFI2 measures. Ninety-five per cent confidence intervals for correlations in boldface do not contain zero.

E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; Mindsets, growth mindset.

Table 4. Study 2 growth in personality traits as a function of trait-specific mindset

Predictor	Outcome: Traits														
	E			A			C			S			O		
Fixed effects	<i>b</i>		95% CI												
Intercept	0.00	-0.06	0.06	0.00	-0.05	0.06	<b>-0.05</b>	-0.10	0.01	-0.05	-0.11	0.01	0.01	-0.05	0.06
Month	<b>0.01</b>	0.00	0.02	<b>-0.01</b>	-0.02	-0.00	<b>-0.02</b>	-0.02	-0.01	<b>0.03</b>	0.03	0.04	<b>0.02</b>	0.02	0.03
Mindset	<b>0.07</b>	0.02	0.12	0.04	-0.01	0.10	0.03	-0.02	0.08	0.08	0.03	0.14	<b>0.09</b>	0.04	0.15
Month × Mindset	0.00	-0.00	0.01	0.01	-0.00	0.01	0.00	-0.00	0.01	0.00	-0.01	0.01	0.00	-0.01	0.01
Random effects	<i>s</i> <sup>2</sup>		<i>p</i>												
Intercept	0.90		—	0.84		—	0.87		—	0.88		—	0.91		—
Month	0.02		<.001	0.03		<.001	0.03		<.001	0.03		<.001	0.03		<.001

Note: The 95% CIs for parameters in boldface do not include zero.

E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; CI, confidence interval; Mindsets, growth mindset.

tested whether the unique combination of both wanting to change traits and believing that those traits can change predicted trait change. To do so, we allowed change goals to interact with all terms in our prior MLM (all predictors included in the model, with the exception of a random intercept, are listed in Table 5).

As seen in Table 5, change goals generally predicted change in personality traits. For example, people who wanted to become more extraverted, conscientiousness, or emotionally stable were predicted to experience greater change in the corresponding trait each month, as compared with their peers who did not wish to change ( $b_{\text{Month} \times \text{Goals}}$  ranged from 0.01, 95% CI [+0.00, 0.02] for conscientiousness to 0.03, 95% CI [0.02, 0.04] for extraversion and emotional stability). Thus, people tended to change in ways that aligned with their desires—at least with respect to extraversion, conscientiousness, and emotional stability.

In contrast, change goals did not consistently moderate the link between growth mindset and trait change. The three-way interaction was positive for emotional stability ( $b = 0.01$ , 95% CI [+0.00, 0.02]; change was greater for those who wanted to change and believed they could) but negative for extraversion ( $b = -0.01$ , 95% CI [-0.01, -0.00]; change was greater for those who wanted to change *but believed they could not*)—and it was zero for the remaining three traits. Thus, the average three-way interaction was zero—indicating that beliefs about whether personality can change do not predict trait change among emerging adults, even for people who want to change (and equivalently, that self-change efforts do not appear to be moderated by beliefs about the malleability of personality; Allemand & Flückiger, 2017; Hennecke et al., 2014; Hudson & Fraley, 2017).

It is worth noting that a positive three-way interaction did emerge for emotional stability only. This could potentially be interpreted to indicate that the combination of both (i) wanting to change emotional stability and (ii) believing that it can change predicts the greatest amount of change in emotional stability specifically. However, such an interpretation would need to be tempered by an inverse and non-intuitive conclusion for extraversion—that wanting to change the trait is most effective if *people believe that it cannot change*. Thus,

it seems most parsimonious to conclude that the average moderating effect across all five traits was trivial—and that the opposite-magnitude effects for extraversion and emotional stability likely represent sampling error around a distribution centred on zero or some other trivial value.

#### Exploratory follow-up analyses

As a series of exploratory follow-up analyses, we examined whether change goals moderated the relationship between growth mindset and trait change in a non-linear fashion (i.e. whether trait growth varies as a function of [Change Goals]<sup>2</sup>). Such analyses test whether wanting to increase versus decrease on a trait predicted differential patterns of trait change across time. For example, it might be the case that wanting to *increase* in a trait predicts positive trait change, whereas goals to *decrease* in a trait are inert.

As can be seen in Table 6, quadratic change goals negatively predicted growth in extraversion ( $b = -0.01$ , 95% CI [-0.01, -0.00]), agreeableness ( $b = -0.02$ , 95% CI [-0.02, -0.01]), and openness ( $b = -0.01$ , 95% CI [-0.01, -0.00]). As depicted in Figure 1, these quadratic effects were quite subtle and nearly indistinguishable from the linear effects (also Hudson et al., 2020). Thus, these findings align with the notion that the *direction* of one's change goals (i.e. to increase or decrease) is important and that positive versus negative change goals do not seem to operate qualitatively differently from one another (i.e. both positive and negative change goals predict corresponding trait change).

Finally, as seen in Table 6, quadratic change goals interacted with mindsets to predict growth in only agreeableness ( $b = 0.01$ , 95% CI [0.00, 0.01]). This isolated interaction may represent sampling error. However, to the extent that it represents a real effect, as depicted in Figure 2, the interaction was quite subtle, and it seems to indicate that those with both low growth mindsets and low change goals experienced the largest decreases in agreeableness across time.

## GENERAL DISCUSSION

Fixed versus growth mindsets—the respective beliefs that one's core attributes cannot versus can change—have been

Table 5. Study 2 growth in personality traits as a function of change goals and trait-specific mindset

Predictor	Outcome: Traits														
	E			A			C			S			O		
	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	
Intercept	0.00	-0.05	0.05	0.01	-0.05	0.06	-0.02	-0.08	0.03	-0.04	-0.09	0.00	0.01	-0.05	0.07
Month	<b>0.01</b>	0.00	0.02	- <b>0.01</b>	-0.02	-0.00	- <b>0.02</b>	-0.02	-0.01	<b>0.03</b>	0.02	0.04	<b>0.03</b>	0.02	0.03
Mindset	<b>0.12</b>	0.07	0.17	<b>0.07</b>	0.02	0.13	<b>0.09</b>	0.03	0.13	<b>0.12</b>	0.08	0.16	<b>0.10</b>	0.05	0.15
Mindset × Month	0.00	-0.01	0.01	0.01	-0.00	0.01	0.00	-0.01	0.01	0.00	-0.01	0.00	0.00	-0.01	0.01
Goal	- <b>0.42</b>	-0.48	-0.37	- <b>0.18</b>	-0.24	-0.13	- <b>0.43</b>	-0.49	-0.38	- <b>0.62</b>	-0.66	-0.57	0.00	-0.06	0.05
Month × Goal	<b>0.03</b>	0.02	0.04	0.00	-0.01	0.01	<b>0.01</b>	0.00	0.02	<b>0.03</b>	0.02	0.04	0.01	-0.00	0.01
Goal × Mindset	- <b>0.04</b>	-0.07	-0.01	-0.01	-0.06	0.04	0.00	-0.04	0.05	0.00	-0.04	0.04	-0.01	-0.06	0.03
Goal × Mindset × Month	- <b>0.01</b>	-0.01	-0.00	0.00	-0.01	0.01	0.00	-0.00	0.01	<b>0.01</b>	0.00	0.02	0.00	-0.01	0.01

Note: The 95% CIs for parameters in boldface do not include zero.

E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; CI, confidence interval; Mindsets, growth mindset; Goal, change goal.

Table 6. Study 2 growth in personality traits as a function of non-linear change goals and trait-specific mindset

Predictor	Outcome: Traits														
	E			A			C			S			O		
	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI	
Intercept	-0.06	-0.12	0.01	-0.03	-0.10	0.04	-0.06	-0.13	0.00	-0.03	-0.09	0.03	- <b>0.08</b>	-0.15	-0.01
Month	<b>0.02</b>	0.01	0.02	0.00	-0.00	0.01	- <b>0.02</b>	-0.03	-0.01	<b>0.03</b>	0.03	0.04	<b>0.03</b>	0.02	0.04
Mindset	<b>0.16</b>	0.11	0.22	<b>0.08</b>	0.02	0.14	0.00	-0.06	0.07	<b>0.09</b>	0.03	0.15	<b>0.12</b>	0.05	0.18
Mindset × Month	0.01	-0.00	0.01	0.00	-0.01	0.01	0.01	-0.00	0.01	0.00	-0.01	0.01	0.00	-0.01	0.01
Goal	- <b>0.43</b>	-0.49	-0.38	- <b>0.20</b>	-0.26	-0.14	- <b>0.46</b>	-0.52	-0.41	- <b>0.62</b>	-0.66	-0.57	-0.03	-0.09	0.03
Month × Goal	<b>0.03</b>	0.03	0.04	0.01	-0.00	0.02	<b>0.01</b>	0.00	0.02	<b>0.03</b>	0.02	0.03	0.01	-0.00	0.01
Goal × Mindset	0.00	-0.05	0.05	-0.01	-0.07	0.04	-0.04	-0.08	0.02	-0.01	-0.05	0.04	-0.01	-0.06	0.04
Goal × Mindset × Month	0.00	-0.01	0.00	0.01	-0.00	0.01	<b>0.01</b>	0.00	0.01	<b>0.01</b>	0.00	0.02	0.00	0.00	0.01
Goal <sup>2</sup>	<b>0.06</b>	0.02	0.10	0.04	-0.01	0.08	0.03	-0.00	0.01	-0.02	-0.06	0.02	<b>0.08</b>	0.04	0.13
Month × Goal <sup>2</sup>	- <b>0.01</b>	-0.01	-0.00	- <b>0.02</b>	-0.02	-0.01	0.00	-0.00	0.01	0.00	-0.01	0.00	- <b>0.01</b>	-0.01	-0.00
Goal <sup>2</sup> × Mindset	- <b>0.04</b>	-0.07	-0.01	-0.01	-0.04	0.03	<b>0.07</b>	0.04	0.11	0.03	-0.01	0.06	-0.02	-0.05	0.01
Goal <sup>2</sup> × Mindset × Month	0.00	-0.01	0.00	<b>0.01</b>	0.00	0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00

Note: The 95% CIs for parameters in boldface do not include zero.

E, extraversion; A, agreeableness; C, conscientiousness; S, emotional stability; O, openness; CI, confidence interval; Mindsets, growth mindset; Goal, change goal.

*Linear and Quadratic Change Goals Predicting Growth in Extraversion*

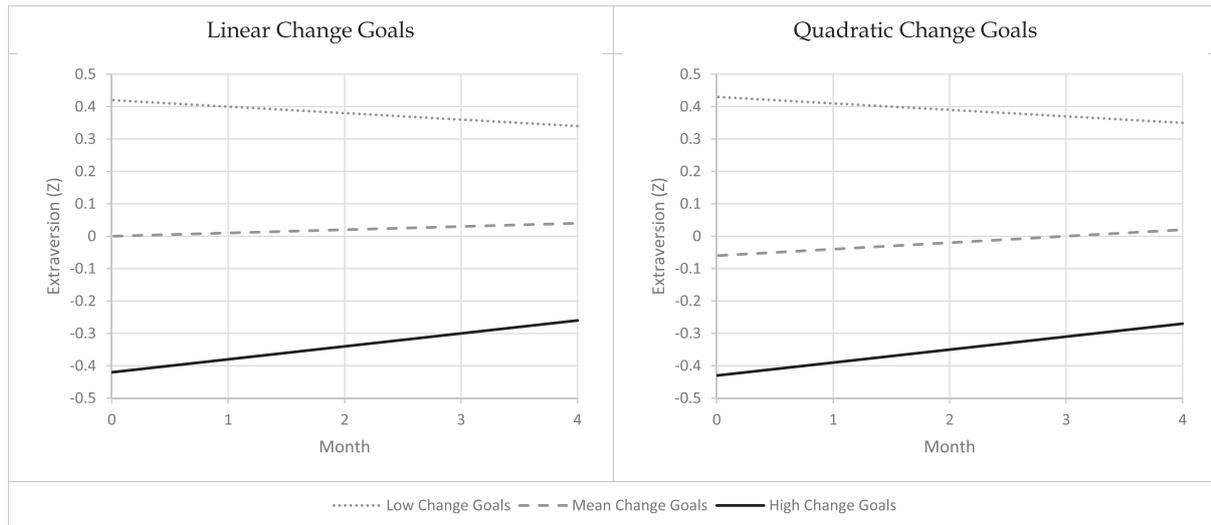


Figure 1. Linear and quadratic change goals predicting growth in extraversion. *Note.* The left-hand panel depicts trait growth as a function of linear change goals (i.e.  $Trait = Month + Goal + Month \times Goal$ ), whereas the right-hand panel depicts trait growth as a function of quadratic change goals (i.e.  $Trait = Month + Goal + Month \times Goal + Goal^2 + Month \times Goal^2$ ). The ‘low change goals’ line is plotted at 1 *SD* below the mean. The ‘high change goals’ line is plotted at 1 *SD* above the mean.

*Quadratic Change Goals and Growth Mindsets Predicting Growth in Agreeableness*

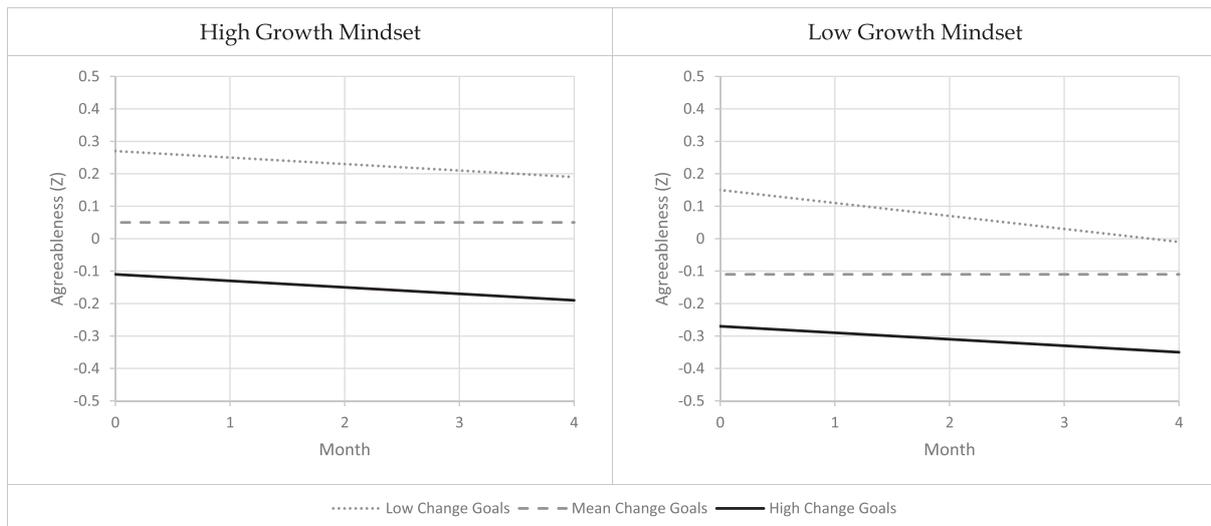


Figure 2. Quadratic change goals and growth mindsets predicting growth in agreeableness. *Note.* The ‘low change goals’ line is plotted at 1 *SD* below the mean. The ‘high change goals’ line is plotted at 1 *SD* above the mean.

linked to several consequential outcomes, such as academic performance (Blackwell et al., 2007), conflict-resolution skills (Kammrath & Dweck, 2006; Yeager & Dweck, 2012), and goal attainment (Burnette et al., 2013). Such findings have led theorists to speculate that personality growth mindsets—believing that one’s personality can change—might be a consequential determinant of trait development (Allemand & Flückiger, 2017; Dweck, 2008; Hennecke et al., 2014).

In the present studies, we collected intensive longitudinal data across up to 16 weeks from more than 1300 emerging adults. Our findings indicated that their beliefs about whether

personality can change—whether construed on a global level (‘You can change even your most basic qualities’) or trait-specific level (‘You can change how extraverted and enthusiastic you generally are’)—were unrelated to trait change across time: The average effect size across all five domains in both studies was essentially zero. Thus, this is not a case where beliefs might predict trait change, but our studies were underpowered to detect effects. Rather, our studies suggest the presence of no effect—or at most a trivial one.

To concretely illustrate this point: Even if we were to scale our (non-significant) parameter estimates from Study

2 across a full year (i.e. projecting into the future beyond the time frame within which data were collected), our findings suggest that an individual who believed his or her personality could change (1 *SD* above the mean) would experience 0.02 *SDs* of *cumulative* greater change *across a year*, as compared with their average peers. To be as generous as is reasonable, even if we consider only the *upper bound* of our 95% confidence intervals from Study 2 as a maximum reasonable estimate of the effect sizes: Those with a high growth mindset would be predicted to experience only 0.12 *SDs* greater *cumulative* change *over a year* as compared with their average peers. In sum, our effect sizes (0.02 *SDs*/year) cannot be construed as evidence for the idea that beliefs have an appreciable impact on trait change, much less a *large* effect.

Finally, we also tested whether growth mindset might be more predictive of trait change among individuals who wanted to change their personality traits. For example, it might be the case that the individuals who (i) want to change their traits and (ii) believe that personality can change would make the greatest efforts to change their traits and thus experience the greatest change across time (Allemand & Flückiger, 2017; Hennecke et al., 2014; Hudson & Fraley, 2017). We found no evidence for such an effect; by averaging across the Big Five, the interaction between beliefs that personality can change and desires to change one's personality in predicting trait change was zero.

### How could beliefs be unrelated to trait change for emerging adults?

The idea that growth mindsets operate in a self-fulfilling fashion is so intuitively compelling that it is difficult to imagine how it might not be true—at least among emerging adults. For example, it seems eminently reasonable that individuals who believe that their extraversion can change might be more willing to stretch themselves and take social risks (e.g. Erdley et al., 1997) that ultimately—through repetition—would lead to trait change (Hudson, Briley, et al., 2019; Hudson & Fraley, 2015; Jacques-Hamilton, Sun, & Smillie, 2018). How is it possible, then, that our findings suggest that such beliefs are unrelated to trait development for emerging adults?

There are several possibilities. For one, trait change is thought to emerge partially from social roles that demand certain patterns of thoughts, feelings, and behaviours from individuals (Lodi-Smith & Roberts, 2007; Roberts & Wood, 2006). For example, workplaces require that employees adhere to some basic minimum level of conscientiousness. Repeatedly performing conscientious behaviours—even if only for one's job and even if one believes that personality cannot change—may nevertheless spur change in conscientiousness across time (Hudson, Briley, et al., 2019; Hudson & Fraley, 2015; Roberts, 2018; Roberts & Jackson, 2008). Similarly, some trait change is thought to emerge from people's intentional efforts to remedy problems in their lives (Baumeister, 1994; Hudson & Fraley, 2015; Hudson & Roberts, 2014; Kiecolt, 1994). Thus, for example, someone who feels lonely may engage in socialization efforts in an attempt to assuage negative affect. These behavioural changes

may lead to trait change over time—irrespective of whether such individuals believe that their levels of extraversion can change. And moreover, people are bad at accurately perceiving changes to their traits (Costa & McCrae, 1989; Gunty et al., 2011; Hudson, Derringer, & Briley, 2019; Robins et al., 2005). Thus, such individuals may even maintain beliefs that traits cannot change, despite the fact that their traits *have* changed—and as the result of their own volition, nonetheless.

Of course, these explanations are speculative and should be tested by future research. Ultimately, however, our findings are not compatible with the hypothesis that emerging adults' beliefs about the malleability of personality affect their trait change. Thus, scholars might consider revising theories that suggest that trait change is contingent upon individuals' beliefs about the possibility of change.

### Implications, limitations, and future research directions

The single biggest implication of our studies is that beliefs about whether or not personality can change are almost completely unrelated to trait change—at least among emerging adults. Although our study was correlational in nature—in this rare case it can also comment on causal processes as well. Namely, causality requires correlation (Mill, 1843). Thus, given the lack of correlation in our study, our data seem to suggest that emerging adults' beliefs about whether personality can change do not affect how their traits actually change across time.

Moreover, features of our study that are traditionally perceived as limitations might actually have the potential to be construed as strengths in the present context. For example, our study relied exclusively upon self-reports of the relevant variables. If anything, we should expect self-serving biases or placebo effects (etc.) to produce *illusory* correlations between beliefs that traits can change and self-report trait change. For example, people who *believe* that personality can change should be most likely to report illusory or placebo-like changes to their traits. Yet even in the most generous possible test of the idea that beliefs predict trait change—that had the potential to play on confounds such as self-serving biases—our average effect size was zero. Thus, these features of our study increase confidence that there is no relationship—real or illusory—between beliefs that traits can change and trait change for emerging adults. Along these lines, some participants received an intervention designed to help them change their traits in desired ways (Hudson, Briley, et al., 2019). If anything, these interventions might have bolstered participants' beliefs that their personalities can change and facilitated successful attainment of their change goals.

That said, the reliance on self-report data is nevertheless a limitation of the present studies. All measures of personality traits have strengths and limitations (Paulhus & Vazire, 2007; Vazire, 2010). For example, self-reports may suffer from biases that influence how individuals see themselves, which could potentially mask trait changes that are occurring outside of the self's awareness. In contrast, the self has the greatest insight into its own personality and observers may

not accurately perceive changes to the self. Thus, the use of multiple methods such as self-report, observer report, and behavioural observation can allow each type of measure to compensate for each other's weaknesses, triangulating a robust pattern of findings. Therefore, future research might consider replicating our findings with other personality measures, such as observer reports, in addition to self-reports.

Relatedly, one limitation of our study is that we did not include an intervention designed to affect participants' mindsets. Although there are questions regarding the replicability of their effects (Foliano et al., 2019; Sisk et al., 2018), several studies have found that interventions designed to influence participants' mindsets can affect personality-related outcomes, such as social confidence (extraversion), academic performance (conscientiousness), anxiety and depression (emotional stability), or conflict-resolution skills (agreeableness) (e.g. Erdley et al., 1997; Kammrath & Dweck, 2006; Schleider & Weisz, 2018). Our study *did* explicitly measure the mechanisms such interventions presumably manipulate—mindsets *per se*—and found that natural variation in mindsets does not predict trait change. Nevertheless, it remains possible that experimental interventions have the potential to produce greater variation in mindsets than that which naturally occurs; consequently, such interventions may lead to greater trait change than that which was observed in our study. Somewhat casting doubt on this notion, our study suggests that increasing individuals' mindsets by even two or three standard deviations would predict trivial change in their personality traits at most—0.04 to 0.06 *SDs* of increased trait change per year. Nevertheless, future research might consider replicating our study with experimental interventions.

A second implication of our study pertains to the volitional change literature (Hudson & Fraley, 2015, 2017). Theorists have speculated that people who want to change their personality traits might experience the greatest success if they *believe* their traits can change (Allemand & Flückiger, 2017; Hennecke et al., 2014; Hudson, 2020; Hudson & Fraley, 2017). Our findings cast doubt on that notion and suggest that individuals who want to change their personality traits tend to change in ways that align with their desires, irrespective of whether they believe they can change.

#### *Other limitations*

In addition to those we have already mentioned, there are several other limitations of our study that deserve consideration. First, our sample consisted exclusively of college students. Thus, it is possible that beliefs about how personality changes are more consequential in determining personality development for younger individuals (e.g. school-aged children) or older adults and/or people in different (i.e. non-college) life contexts. For example, college may represent an unstable transitional time in people's lives, which may overwhelm any effects of mindsets; beliefs may be more influential among those in more stable circumstances. That said, the mean levels of change goals in our college samples were comparable to those found using a general online sample of adults (Hudson & Fraley, 2016b). However, mean levels of trait agreeableness and conscientiousness decreased

across time in our second sample—which runs counter to the expected normative trends (Roberts, Walton, & Viechtbauer, 2006). Thus, it is possible that our findings would generalize to other samples, including non-college students, children, and older adults. However, future research should replicate our findings and explicitly test whether non-college samples display similar effects. In other words, future research might test the possibility that the association between mindsets and personality change vary across the lifespan and in different contexts.

A second limitation of our studies is that the personality mindset measures did not perfectly match the trait measures. We used an existing measure of global mindsets in Study 1 (Dweck, 2008) and created a new 20-item measure of trait-specific mindsets based on the TIPI in Study 2. Although the TIPI correlates strongly with the BFI (Gosling et al., 2003), it is possible that our observed effect sizes would have been larger had we directly adapted the BFI/BFI2 into a mindset measure.

A third limitation is that our studies included only one measurement of participants' personality growth mindsets. Thus, our studies suggest that growth mindsets, measured at a single point in time, do not predict change over the following 4 months. However, it is possible that non-enduring, shorter-term dynamics unfold. For example, people's growth mindsets might change on a regular basis and predict more temporary fluctuations in trait change. Related to this point, students' mindsets may have changed across the course of the semester (e.g. because they learned more about scientific research regarding personality development in their classes during the study). Our studies cannot speak to these possibilities—despite suggesting that mindsets assessed at one time do not predict longer-term change in traits.

A fourth limitation of our studies is that we did not include measures of potential moderators of the link between mindsets and trait change (e.g. self-efficacy). For example, previous research suggests that mindsets may be more predictive of outcomes under circumstances that are deemed setbacks or threatening to the self (e.g. negative feedback about the self; Burnette et al., 2013). Thus, it remains possible that personality mindsets might predict trait change during particularly challenging circumstances in people's lives. That said, our findings are somewhat difficult to reconcile with this notion. Specifically, the main effect of mindsets in predicting trait change should be a weighted average of the correlation between mindsets and trait change across all subpopulations. Thus, if mindsets predicted trait change for those undergoing difficult life circumstances but had zero effect for everyone else, there should nevertheless be a nonzero (albeit attenuated) main effect of mindsets in predicting trait change. The fact that our study found no main effects of mindsets in predicting trait change suggests either (i) that mindsets may predict trait change for very small subpopulations that cannot be detected in the main effect (e.g. those undergoing extremely severe challenges) or alternatively (ii) that mindsets have opposing effects in different subpopulations (e.g. perhaps mindsets predict positive change among those experiencing life challenges but *negative* change among

those who are not experiencing challenges). Nevertheless, it remains possible that variables such as personal challenges, social support, or self-regulation might interact with mindsets to predict trait change. Thus, future research might test whether personality mindsets are more predictive of trait change for those in various contexts, such as substantially difficult personal circumstances (e.g. among clinical populations; Schleider & Weisz, 2018).

A fifth limitation of our studies is that we did not explore potential explanations for why mindsets might not predict trait change. For example, it may be the case that people with *fixed mindsets* (i.e. those who believe that personality cannot change) do, in fact, change their behaviours and update their identities (i.e. how they see themselves) without consciously realizing that change has occurred (Geukes, Nestler, Hutteman, Küfner, & Back, 2017; Robins et al., 2005; Wrzus & Roberts, 2017). Alternatively, it may be the case that individuals who do not believe that personality can change retroactively misremember their past personality traits in order to facilitate a narrative that their traits have not changed across time (e.g. Wilson & Ross, 2001). Future research should explore these possibilities and others.

A sixth limitation of our study is its relatively limited duration. Namely, personality change can be construed on a variety of levels, ranging from situational fluctuation in traits (e.g. Fleeson, 2001), to longer-term albeit still temporary deviations, to enduring growth (e.g. Roberts, Walton, & Viechtbauer, 2006). Especially in terms of examining the extent to which change goals predict changes in traits, our study cannot differentiate between personality ‘deviations’, which might last for several months and then revert, as opposed to enduring trait growth. Longer-term studies should examine these effects across the span of multiple years.

Finally, it is important to emphasize that our studies examined only the associations between personality mindsets and change in personality traits. Thus, our studies’ findings cannot comment on whether mindsets might predict other consequential outcomes, such as academic performance, ability to attain goals, or prognoses for clinical treatment (e.g. Blackwell et al., 2007; Burnette et al., 2013; Schleider & Weisz, 2018).

## CONCLUSION

Theorists have speculated that personality development might depend—to some degree—on individuals’ beliefs about whether or not personality can change. Our studies included intensive longitudinal data from more than 1300 participants and suggest that people’s beliefs about whether or not their personality traits can change are almost completely unrelated to change in their personality traits across approximately 4 months—at least among emerging adults. Thus, it appears that personality development processes do not ‘care’ about individuals’ change-related beliefs—such processes appear to unfold in a similar fashion irrespective of whether or not people believe that their traits can change.

## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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## APPENDIX

### TIPI Change Mindset Scale

Do you believe personality can change?

The following questions ask you whether you believe it is possible for people to change their personality traits. Please indicate your level of agreement or disagreement with each statement.

- 1 You can change how extraverted and enthusiastic you generally are.
- 2 You can change how you reserved and quiet you generally are.
- 3 People cannot change how introverted and low key they generally are (R).
- 4 People cannot change how outgoing and active they generally are (R).
- 5 You can change how critical and quarrelsome you generally are.
- 6 You can change how sympathetic and warm you generally are.
- 7 People cannot change how accepting and agreeable they generally are (R).
- 8 People cannot change how unsympathetic and cold they generally are (R).
- 9 You can change how dependable and self-disciplined you generally are.
- 10 You can change how disorganized and careless you generally are.
- 11 People cannot change how unreliable and undisciplined they generally are (R).
- 12 People cannot change how organized and attentive to detail they generally are (R).
- 13 You can change how calm and emotionally stable you generally are.
- 14 You can change how anxious and easily upset you generally are.
- 15 People cannot change how stressed and moody they generally are (R).
- 16 People cannot change how peaceful and even-tempered they generally are (R).
- 17 You can change how open to new experiences and complex you generally are.
- 18 You can change how conventional and uncreative you generally are.
- 19 People cannot change how conservative and routinized they generally are (R).
- 20 People cannot change how original and creative they generally are (R).

Items should be presented in random order. All items are rated on a scale ranging from *strongly disagree* (1) to *strongly agree* (5). Items marked with an (R) should be reversed prior to forming composites. Form separate composites for mindsets related to extraversion (items 1–4), agreeableness (items 5–8), conscientiousness (items 9–12), emotional stability (items 13–16), and openness to experience (items 17–20) by averaging items together.