Change Goals Robustly Predict Trait Growth: A Mega-Analysis of a Dozen Intensive Longitudinal Studies Examining Volitional Change

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Abstract

Research suggests that change goals (desires to change personality traits) predict subsequent trait growth. In this article, we (re)analyzed all data our labs have collected as of May 2019 that included measures of change goals and repeated measures of personality traits (12 studies; total $n = 2{,}238$). Results indicated that change goals robustly predicted growth in all five traits. Effect sizes were largest for extraversion and emotional stability (people with high change goals were predicted to experience ~ 0.16 SDs greater growth across 16 weeks than their peers with average goals) and smallest for agreeableness and openness (people with high change goals were predicted to experience ~ 0.05 SDs greater growth across 16 weeks than their peers with average goals). Thus, our analyses reinforce that people change in ways that align with their desires across time.

Previous research suggests most people want to change their personality traits (Baranski, Morse, & Dunlop, 2017; Hudson & Fraley, 2016b; Hudson & Roberts, 2014; Miller, Baranski, Dunlop, & Ozer, 2019; Robinson, Noftle, Guo, Asadi, & Zhang, 2015). Specifically, most individuals want to increase with respect to the socially desirable pole of each big five domain: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Studies have generally found that these *change goals* are negatively correlated with existing trait levels (e.g., introverted individuals are likely to desire increases in extraversion; Baranski et al., 2017; Hudson & Fraley, 2016b) as well as satisfaction with relevant life domains (e.g., college students who are dissatisfied with their academic experiences tend to want to increase in conscientiousness; Hudson & Roberts, 2014). These findings have been interpreted to indicate that people want to (a) increase in desirable traits they lack and (b) change traits they believe will ameliorate sources of dissatisfaction in their lives (Baumeister, 1994; Hudson & Roberts, 2014; Kiecolt, 1994).

There seems to be no question that people want to change their traits. But can they actually do so? There are now several studies which suggest they can. Generally, these studies have employed two paradigms. First, Hudson and Fraley (2015, 2016a) have published three intensive longitudinal studies showing that change goals predict subsequent corresponding trait growth across 16 weeks. In other words, people

naturalistically tend to change in ways that align with their desires. For example, participants in their studies who wanted to increase in extraversion tended to experience faster growth in extraversion across the studies' duration as compared with their peers who did not wish to change. Second, researchers have tested interventions and found that modifying one's behavior predicts corresponding trait changes (e.g., behaving in an extraverted fashion predicts gains in extraversion across time; Hudson, Briley, Chopik, & Derringer, 2019; Hudson & Fraley, 2015; Jacques-Hamilton, Sun, & Smillie, 2019; Roberts et al., 2017). These findings are important because they suggest people may be able to take an active role in changing their traits through behavioral modifications (see Allemand & Flückiger, 2017; Hudson, 2019; Hudson & Fraley, 2017; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014; Roberts & Jackson, 2008). This may have important implications for

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understanding personality development more broadly. For example, individuals' desires and attempts to change their own personality traits may contribute to the observed maturational trends in the big five (e.g., the fact that most people want to become more conscientious may partially explain normative increases in the trait across the life span; Hennecke, Bleidorn, Denissen, & Wood, 2014; Hudson & Fraley, 2017).

The goal of the present study was to provide a replication—using all available data from our labs—of the correlation between change goals and subsequent trait growth (Hudson & Fraley, 2015, 2016a). This is an important effect to replicate because (a) it has inspired a growing body of literature (e.g., Allemand & Flückiger, 2017; Baranski et al., 2017; Miller et al., 2019; Quintus, Egloff, & Wrzus, 2017) yet (b) a relatively limited number of published studies have investigated it and (c) the effects have been somewhat inconsistent across published studies. Specifically, Hudson and Fraley have published three studies in which change goals predicted subsequent trait growth across 16 weeks. In their first study (Hudson & Fraley, 2015; $n = 135$), change goals predicted growth in all traits (average $b = .05$) except openness ($b = .02$). In other words, people with high change goals were expected to experience 0.05 *SD*s greater growth in the corresponding traits each month as compared with people who did not wish to change. In their second study ($n = 151$), change goals predicted subsequent trait growth in all five traits (average $b = .05$). Third, Hudson and Fraley (2016a; $n = 158$) found that change goals predicted growth in extraversion, agreeableness, and emotional stability (average $b = .03$) but not conscientiousness or openness (bs $= -.01$). Finally, using a single-item (per trait) measure of change goals, one nonintensive[1] longitudinal study ($n = 170$) found that change goals were unrelated to trait change, assessed twice 1 year apart (Robinson et al., 2015). Thus, the extent to which change goals predict trait growth—and for which traits—remains somewhat unclear.

Overview of the Present Study

In the present study, we conducted a mega-analysis of all longitudinal data collected by Hudson and colleagues as of May 2019 that includes both (1) measures of change goals and (2) repeated measures of traits. Mega-analysis is a statistical technique for combing data across studies. In contrast to meta-analysis—in which *studies* are the unit of analysis (e.g., effect sizes from studies are averaged together)—in mega-analysis, all participant-level data from studies are merged together into a single data set and analyzed using traditional statistical techniques (e.g., regression). Mega-analysis offers numerous advantages over meta-analysis, such as allowing investigation of person-level predictors that vary within studies (e.g., Steinberg et al., 1997). Both meta-analysis and mega-analysis are preferable to attempting to publish multiple individual studies (Schimmack, 2012).

We analyzed data from 2,238 people in 12 samples. This analysis includes data that have been published previously ($n = 444$ [20%]; Hudson & Fraley, 2015, 2016a) as well as studies that are currently under review or otherwise unpublished ($n = 1,794$ [80%]).[2] Because this mega-analysis includes more than 5 times as much data as the collective existing literature, it provides much more precise estimates of the correlations between change goals and trait growth than any prior study. Moreover, because we analyzed all data from our labs on the topic with zero exclusions, this mega-analysis provides an unbiased estimate of the true effect sizes across all data we have collected as of May 2019—with no publication bias or file-drawer effects (see, e.g., LeBel & Peters, 2011; Simmons, Nelson, & Simonsohn, 2011).[3]

In all samples included in this study, participants provided weekly ratings of their personality traits across the course of a 15- to 16-week college semester. At the beginning of each semester, participants also rated their change goals. These data were used to estimate the extent to which change goals predict growth in the corresponding traits.

Method

Participants

From Fall 2013 to Spring 2019, a total of 2,238 participants were recruited from psychology courses at Southern Methodist University (5%), the University of Illinois at Urbana–Champaign (74%), and Michigan State University (21%). These participants comprise 12 samples, some of which have been published (Hudson et al., 2019; Hudson & Fraley, 2015, 2016a, 2018) and some of which are currently under review, in preparation, or unpublished. These participants constitute *the entirety* of intensive longitudinal data we have collected as of May 2019 that included measures of change goals and trait growth. No studies or participants were excluded for any reason. This combined sample size provided approximately 90% power to detect bivariate associations as small as $r = .07$.

Students in participating courses could complete waves of the study in exchange for (extra) course credit. Students were provided a link to the study website and were required to register an account to participate. Participants in all studies were instructed to complete one wave per week of the 15- to 16-week semester; however, to afford leniency/flexibility, the study website allowed participants to complete new waves as frequently as once every 5 days. Participants who waited longer than 7 days between waves were sent automated e-mail reminders.[4]

The combined sample was 71% female, with an average age of 20.34 years ($SD = 3.45$). Participants were instructed to select all applicable racial/ethnic identities: The racial composition was 57% White, 25% Asian, 10% Hispanic/Latino, 9% Black, 3% Asian Indian, 1% Middle Eastern, and 1% Pacific Islander. On average, participants provided 10.98 waves of data ($SD = 4.93$), with 2,111 (94%), 1,878 (84%), 1,493 (67%), and 835 (37%) participants providing data at Waves 2, 5, 10, and 15, respectively. Attrition analyses revealed that people tended to provide more numerous waves if, at Wave 1, they were female ($r = .14$, 95% confidence interval [CI] = [.10, .18]),

Table 1. Descriptive Statistics and Correlations at Wave 1.

Variable	BFI (n = 777)		BFI2 (n = 1,326)		Hybrid (n = 135)		Correlations (n = 2,238)								
	M	SD	M	SD	M	SD	1	2	3	4	5	6	7	8	9
Traits															
1. Extraversion	3.12	.74	3.29	.68	3.47	.50	—								
2. Agreeableness	3.71	.58	3.68	.53	3.84	.60	**.14**	—							
3. Conscientiousness	3.40	.59	3.50	.62	3.55	.58	**.19**	**.22**	—						
4. Stability	2.93	.75	2.96	.76	3.13	.67	**.28**	**.22**	**.24**	—					
5. Openness	3.60	.56	3.80	.60	3.64	.54	**.16**	**.15**	**.05**	.03	—				
Change goals															
6. Extraversion	0.68	.50	0.68	.43	0.57	.32	**−.39**	.06	**−.10**	**−.19**	.01	—			
7. Agreeableness	0.60	.50	0.52	.45	0.59	.45	−.03	**−.16**	−.05	**−.16**	.02	**.37**	—		
8. Conscientiousness	0.88	.50	0.79	.46	0.82	.53	**−.09**	.00	**−.45**	**−.19**	**.12**	**.44**	**.53**	—	
9. Stability	0.97	.54	0.92	.53	0.89	.52	**−.16**	−.02	**−.10**	**−.61**	**.09**	**.49**	**.49**	**.53**	—
10. Openness	0.70	.44	0.69	.45	0.64	.40	**−.09**	.03	−.08	**−.08**	.03	**.48**	**.46**	**.53**	**.41**

Note. The 95% confidence intervals for correlations in boldface do not include zero. BFI = traits measured using the Big Five Inventory; BFI2 = traits measured using the Big Five Inventory 2; hybrid = extraversion measured using the International Personality Item Pool (IPIP-120) and all other traits measured using the BFI.

more conscientiousness ($r = .19$, 95% CI [.15, .23]), less open to experience ($r = −.09$, 95% CI [−.13, −.05]), or had lower conscientiousness change goals ($r = −.12$, 95% CI [−.16, −.08]). No other study variables, as measured at Wave 1, predicted attrition (all $|r|$s $\leq .04$).

Measures

Participants in each study completed various measures that were sometimes related to volitional personality change and sometimes related to other research aims (e.g., attachment dynamics, personality mind-sets). Below, we report all measures of personality traits and change goals collected in the 12 samples.

Personality traits. Depending on the semester, participants self-reported their personality traits each wave using either the 44-item Big Five Inventory (BFI; John & Srivastava, 1999; $n = 777$ [35%]), the 60-item BFI2 (Soto & John, 2017; $n = 1,326$ [59%]), or a hybrid measure in which extraversion was assessed with 24 items from the International Personality Item Pool (IPIP-120; Goldberg et al., 2006), and the remaining four domains were assessed with the BFI ($n = 135$ [6%]). Each of these measures has separate subscales for extraversion (e.g., "I see myself as someone who is talkative"), agreeableness (e.g., "I see myself as someone who is respectful, treats others well"), conscientiousness (e.g., "I see myself as someone who keeps things neat and tidy"), emotional stability (e.g., "I see myself as someone is emotionally stable, not easily upset"), and openness (e.g., "I see myself as someone who is inventive, finds clever ways to do things"). All items were rated on a scale from *strongly disagree* (1) to *strongly agree* (5) and averaged to form separate composites for each trait.

Change goals. Generally only at Wave 1, participants rated their change goals using either the Change Goals BFI (C-BFI; Hudson & Roberts, 2014), C-BFI2 (Hudson et al., 2019), or a hybrid of the C-IPIP-120 and C-BFI (Hudson & Fraley, 2015). The change goals measure always matched the trait measure within semesters (e.g., if participants rated their traits with the BFI2, they rated their change goals with the C-BFI2).

In the Change Goals Scales, items from the respective personality measures were reworded to assess the extent to which participants wanted to change with respect to each item. For example, the personality 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 desires to increase, decrease, or stay the same with respect to each item. Items were averaged to form separate composites for goals to change each big five trait.

Overview of Procedure

Participants generally rated their change goals only at Wave 1. In three studies ($N = 405$; 18%), participants provided multiple ratings of their change goals. In such situations, we analyzed only Wave 1 change goals (see Hudson & Fraley, 2015). At every wave, participants provided self-report trait ratings. These data were used to examine the extent to which Wave 1 change goals predicted subsequent trait growth across 16 weeks.

Results

Because different participants completed different trait and change goals measures (the BFI, BFI2, or hybrid IPIP-120/BFI), we put all measures on the same (standard) scale by separately standardizing them across all applicable observations (see Ackerman, Donnellan, & Kashy, 2011). Once we had separately standardized the personality and change goals scores for each separate measure, we combined all responses into a single large data set.

Table 1 contains the Wave 1 descriptive statistics for each of the separate personality and change goals measures as well as

Table 2. Change Goals Predicting Growth in Traits Across Time.

| | Outcome: Traits | | | | | | | | | |
| | Extraversion | | Agreeableness | | Conscientiousness | | Stability | | Openness | |
Predictor	*b*	95% CI	*b*	95% CI	*b*	95% CI	*b*	95% CI	*b*	95% CI
Month										
Intercept	−.018	[−.056, .021]	−.003	[−.043, .037]	**−.038**	[−.076, −.000]	**−.061**	[−.095, −.027]	−.006	[−.046, .035]
Month	**.016**	[.011, .020]	−.003	[−.008, .002]	**−.012**	[−.018, −.008]	**.049**	[.044, .053]	**.024**	[.019, .029]
Goal	**−.268**	[−.301, −.236]	**−.102**	[−.137, −.066]	**−.358**	[−.390, −.325]	**−.520**	[−.552, −.490]	**.036**	[.004, .068]
Month × Goal	**.030**	[.025, .034]	**.011**	[.006, .016]	**.019**	[.014, .024]	**.038**	[.033, .042]	**.008**	[.003, .013]
Study										
Intercept	−.018	[−.056, .021]	−.003	[−.043, .037]	**−.038**	[−.076, −.000]	**−.061**	[−.095, −.027]	−.006	[−.046, .035]
Study	**.075**	[.055, .095]	−.015	[−.039, .010]	**−.062**	[−.085, −.039]	**.234**	[.212, .256]	**.116**	[.093, .139]
Goal	**−.268**	[−.301, −.236]	**−.102**	[−137, −.066]	**−.358**	[−.390, −.325]	**−.520**	[−.552, −.490]	**.036**	[.004, .068]
Study × Goal	**.142**	[.122, .162]	**.053**	[.028, .078]	**.092**	[.069, .115]	**.181**	[.159, .203]	**.039**	[.015, .062]

Note. The top half of the table contains the parameter estimates with Time scaled in terms of month. Thus, persons with average change goals were predicted to increase 0.016 *SD*s in extraversion each month. The bottom half of the table contains the same parameter estimates with time scaled in terms of the entire 16-week semester. Thus, persons with average change goals were predicted to increase a cumulative total of 0.075 *SD*s in extraversion across the entire study duration. 95% CIs for parameters in *boldface* do not include zero. CI = confidence interval; Goal = change goal.

the correlations in the combined sample. Positive values on the change goals measures represent goals to increase. The average participant wanted to increase in each trait: emotional stability ($M = 0.93$, $SD = 0.53$), conscientiousness ($M = 0.82$, $SD = 0.48$), openness ($M = 0.69$, $SD = 0.45$), extraversion ($M = 0.67$, $SD = 0.45$), and agreeableness ($M = 0.55$, $SD = 0.47$). As in prior research (Baranski et al., 2017; Hudson & Roberts, 2014), goals to change each trait were negatively correlated with existing trait levels for all traits (average $r = −.40$) except openness ($r = .03$, 95% CI [−.03, .09]); people who had lower levels of each trait reported that they wanted to increase.

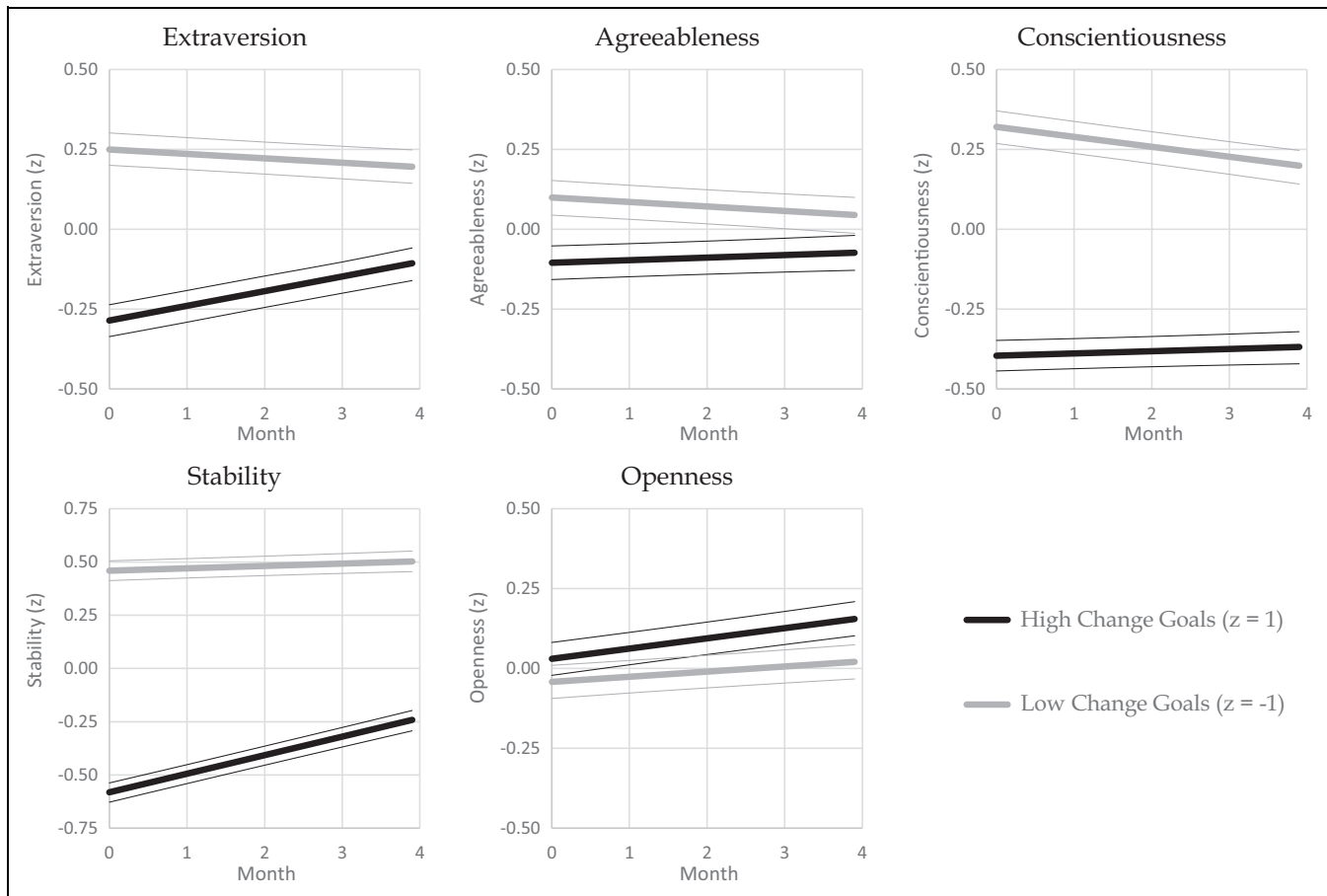## Do Change Goals Predict Trait Change?

For our primary analyses, we tested whether change goals predicted subsequent trait growth. We used multilevel models (MLMs) that modeled traits for person, *p*, at wave, *w*, as a function of their Wave 1 change goals and time. In line with previous studies on volitional change, we constructed separate MLMs for each big five domain. For example, the model for extraversion was:

$$(\text{Extraversion})_{wp} = b_0 + b_1(\text{Time})_{wp}$$
$$+ b_2(\text{Extraversion change goals})_p$$
$$+ b_3(\text{Time})_{wp}(\text{Extraversion change goals})_p$$
$$+ U_p + \varepsilon_{wp}.$$

As described above, traits and change goals were standardized separately within each measure (and when combined into a single dataset, the means and *SD*s for all variables were still 0 and 1, respectively). Time was centered at Wave 1 and scaled in Months.[5] Thus, the b_1 parameter captures monthly linear growth in extraversion (scaled in *SD*s/month) for people with average change goals ($z = 0$; original scale score ∼ 0.67). The b_3 interaction term captures the extent to which people with

greater change goals experienced greater monthly growth as compared with their peers with lower desires to change. A positive interaction term would indicate that people who wanted to change experienced greater growth each month than did their peers who did not wish to change.

The parameter estimates from these models are presented in Table 2. The top half of Table 2 contains the parameters with time scaled in months (as described above). The bottom half of Table 2 contains the same parameter estimates with time scaled in terms of the full, 16-week study (i.e., time runs from 0 to 1) such that the parameters capture total cumulative growth across the entire study duration. For all traits, change goals predicted trait growth (interactions ranged from $b_{\text{Month} \times \text{Goal}} = .008$, 95% CI [.003, .013] for openness to $b_{\text{Month} \times \text{Goal}} = .038$, 95% CI [.033, .042] for emotional stability). These parameters indicate that someone with high goals to increase in extraversion ($z = 1$; original scale score = 1.12), for example, was predicted to experience 0.030 *SD*s *greater* growth in extraversion each month, relative to their peers with average change goals ($z = 0$; original scale score = 0.67). Or, scaled in terms of the entire study duration, a person with high extraversion change goals ($z = 1$) would be expected to experience 0.142 *SD*s greater cumulative growth in extraversion over 16 weeks, above and beyond the change experienced by their peers with average change goals ($z = 0$). Thus, as depicted in the top-left panel of Figure 1, a person with high extraversion change goals ($z = 1$; original scale score = 1.12) was predicted to increase 0.045 *SD*s in extraversion each month (95% CI [.039, .051])—or 0.217 *SD*s across the entire semester (95% CI [.189, .245])—whereas a person with low extraversion change goals ($z = −1$; original scale score = 0.22) was predicted to *decrease* 0.014 *SD*s each month (95% CI [−.020, −.008])—accumulating to −0.068 *SD*s of cumulative growth across the semester (95% CI [−.096, −.039]). Similar patterns were observed for the other four traits.

Figure 1. Linear growth in traits as a function of change goals. For all five traits, change goals predicted subsequent trait growth such that people who wanted to increase in the trait experienced greater growth each month as compared with their peers who did not wish to change. All graphs depict 1 SD along the y-axis, except the emotional stability graph, which depicts 1.50 SDs in order to fully display the interaction. Ninety-five percent confidence bands are depicted.

Exploratory Follow-Up Analyses

Controlling baseline traits. The models in Table 2 did not include any control variables (and thus the table and figure present the data without adjusting for covariates). However, models that included Wave 1 (baseline) traits to control for regression to the mean produced similar findings: The critical Month × Change Goals interactions all remained identical (to three decimal places) except for emotional stability, which changed from $b = .038$ (with no controls) to $b = .037$, 95% CI [.032, .041] (controlling Wave 1 traits).

Random slopes models. Reviewers requested estimates of the variance in trait growth. Thus, we reran all models including a random slope for time. As seen in Table 3, there was significant variation in growth in all five traits. Including the random slope for time slightly increased the size of the fixed Month × Change Goals interactions for extraversion ($b_{\text{Month} \times \text{Goal}} = .034$, 95% CI [.027, .042]), agreeableness ($b_{\text{Month} \times \text{Goal}} = .012$, 95% CI [.004, .021]), conscientiousness ($b_{\text{Month} \times \text{Goal}} = .028$, 95% CI [.019, .036]), and emotional stability ($b_{\text{Month} \times \text{Goal}} = .048$, 95% CI [.039, .001])—but it

Table 3. Variance in Random Slope of Personality Traits Across Time.

Trait	Variance in Random Slope	p
Extraversion	.018	<.001
Agreeableness	.026	<.001
Conscientiousness	.024	<.001
Emotional stability	.026	<.001
Openness	.027	<.001

Note. p Values were computed using the change in −2 log likelihood (Δ-2LL) between models with and without the random slope term included, with $\Delta\text{-2LL} \sim \chi^2(1)$.

slightly decreased the interaction for openness ($b_{\text{Month} \times \text{Goal}} = .006$, 95% CI [−.002, .015]).

Nonlinear growth. Per reviewers' requests, we examined whether change goals moderated nonlinear trait growth. Change goals moderated quadratic growth in extraversion ($b_{\text{Month} \times \text{Month} \times \text{Goal}} = −.010$, 95% CI [−.014, −.005]), conscientiousness ($b_{\text{Month} \times \text{Month} \times \text{Goal}} = −.010$, 95% CI [−.014, −.004]), and emotional stability ($b_{\text{Month} \times \text{Month} \times \text{Goal}} = −.012$, 95% CI [−.017, −.007]) but not agreeableness
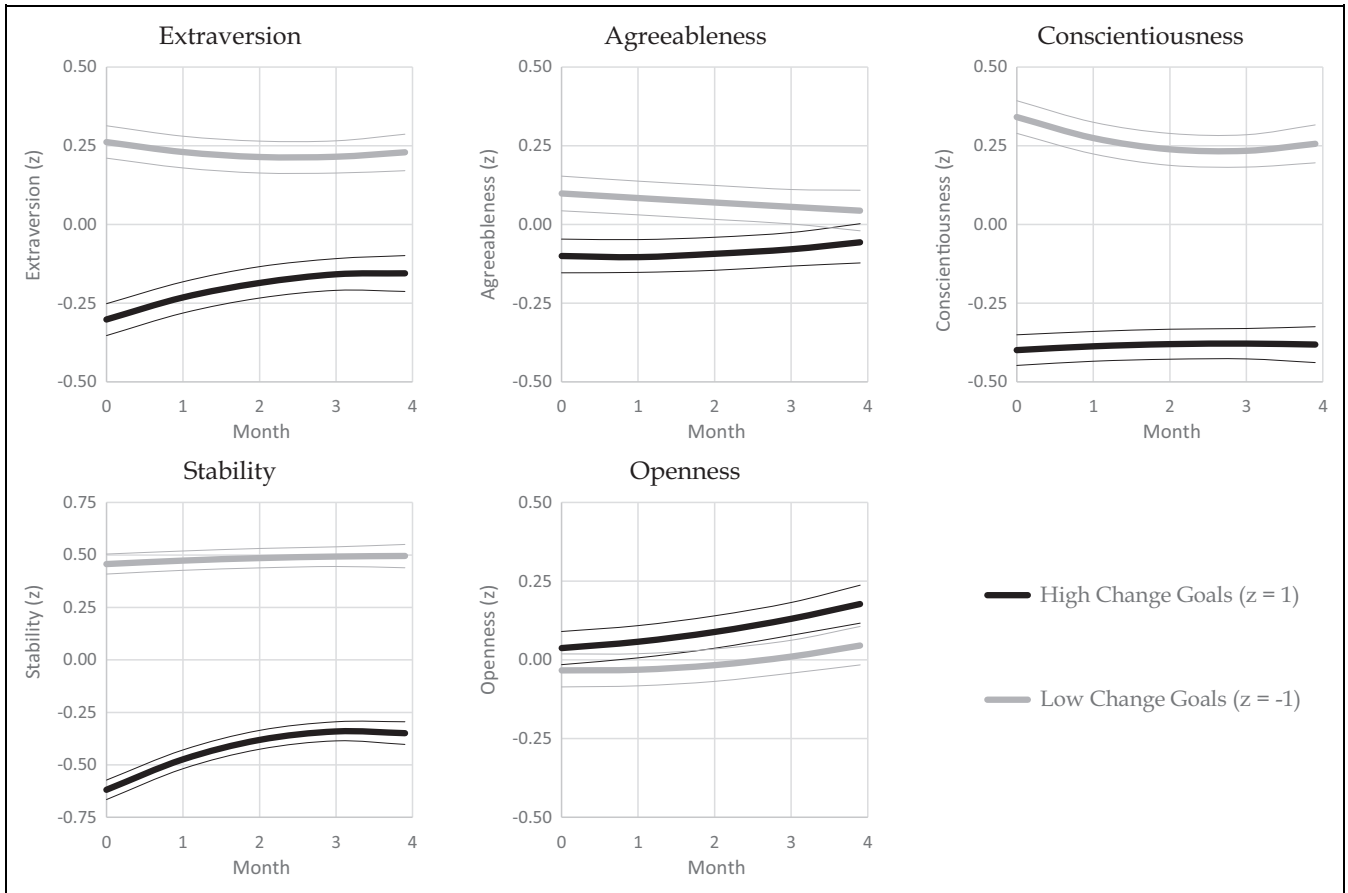
Figure 2. Quadratic growth in traits as a function of change goals. Change goals predicted quadratic growth for extraversion, conscientiousness, and emotional stability—but not agreeableness or openness. The quadratic effects generally indicate that change goals predict trait growth especially strongly at first but their predictive ability wans with time. All graphs depict 1 *SD* along the *y*-axis, except the emotional stability graph, which depicts 1.50 *SD*s in order to fully display the interaction. Ninety-five percent confidence bands are depicted.

Table 4. Cross-Domain Change Goals Predicting Growth in Traits.

	Outcome: Traits								
	Extraversion		Agreeableness		Conscientiousness		Stability		Openness	
Predictor: Month × Goal	*b*	95% CI	*b*	95% CI	*b*	95% CI	*b*	95% CI	*b*	95% CI
E	—	—	−**.007**	[−.012, −.002]	.001	[−.004, .006]	.005	[−.000, .009]	**.007**	[.002, .011]
A	.003	[−.001, .007]	—	—	.003	[−.002, .008]	**.013**	[.008, .017]	.002	[−.003, .007]
C	−.001	[−.005, .003]	−**.007**	[−.012, −.002]	—	—	**.005**	[.001, .010]	−**.006**	[−.011, −.001]
S	.001	[−.004, .005]	−.004	[−.009, .001]	−.004	[−.009, .001]	—	—	−.001	[−.006, .004]
O	**.005**	[.001, .009]	.002	[−.003, .007]	.001	[−.003, .006]	**.013**	[.008, .017]	—	—

Note. 95% CIs for parameters in *boldface* do not include zero. CI = confidence interval; goal = change goal; E = extraversion; A = agreeableness; C = conscientiousness; S = stability; O = openness.

($b_{\text{Month} \times \text{Month} \times \text{Goal}} = .002$, 95% CI [−.004, .007]) or openness ($b_{\text{Month} \times \text{Month} \times \text{Goal}} = .000$, 95% CI [−.006, .005]). As depicted in Figure 2, the significant quadratic effects appear to indicate that change goals predict trait growth especially strongly at first, but their predictive validity wans with time.

Do change goals have predictive specificity? Next, we examined whether change goals have specificity in predicting changes in *only* the corresponding trait (e.g., Do extraversion change goals predict growth in extraversion, but not other traits?). These analyses help bolster the criterion validity of the change goals measures (i.e., Do they predict only the outcome variables they should predict?). As seen in Table 4, on average, change goals did not predict growth in nontarget domains (average cross-domain $b_{\text{Month} \times \text{Goal}} = .002$). However, approximately 40% of the cross-domain effects were statistically

significant—albeit in seemingly random directions. For example, people who wanted to become more extraverted were predicted to decrease in agreeableness ($b_{\text{Month} \times \text{Goal}} = -.007$, 95% CI [$-.012, -.002$]) but increase in openness ($b_{\text{Month} \times \text{Goal}} = .007$, 95% CI [$.002, .011$]).

Methodological moderators. For our final analyses, we examined whether several methodological factors moderated our findings: The measure used (BFI vs. BFI2; dummy coded),[6] study year (2013–2019), and whether data were collected during spring or fall semesters (dummy coded). Each moderator was tested in separate models. With respect to measures, as compared to the BFI2, effects were smaller for the BFI for extraversion ($b_{\text{BFI} \times \text{Month} \times \text{Goal}} = -.011$, 95% CI [$-.020, -.003$]), agreeableness ($b_{\text{BFI} \times \text{Month} \times \text{Goal}} = -.026$, 95% CI [$-.036, -.015$]), and emotional stability ($b_{\text{BFI} \times \text{Month} \times \text{Goal}} = -.011$, 95% CI [$-.021, -.002$]) but not conscientiousness or openness $|b|\text{s} \leq .003$. Thus, considering only the BFI2 data, the Month × Change Goals interaction for agreeableness was comparable in magnitude to that for other traits in Table 2 (simple $b_{\text{Month} \times \text{Goal}}$ for BFI2 = $.022$, 95% CI [$.015, .028$]). With respect to year/semester of data collection: Year did not moderate growth in any trait, all $|b|\text{s} \leq .003$. Moreover, there were no differences between spring and fall semester for any trait, all $|b|\text{s} \leq .009$.

Discussion

Our mega-analysis suggests that, across all available data from our labs, change goals robustly predict corresponding growth in all big five personality traits. This suggests that study-to-study variation in effects (e.g., Hudson & Fraley, 2016a, found that conscientiousness change goals did not predict growth in the trait) likely represents sampling error and lower-than-ideal power to detect effects for individual traits.

Indeed, the effect sizes in our study were quite modest for some traits, further supporting this possibility. The effect sizes were largest for extraversion and emotional stability. On average, people with high change goals (1 *SD* above the mean) were predicted to increase 0.03 *SD*s in extraversion or emotional stability *to a greater extent* each month than their peers with average change goals. Thus, across an entire 16-week college semester, someone with high desires to become more extraverted or emotionally stable would be expected to grow approximately 0.16 *SD*s more than their peers with average change goals. In contrast, effects were smallest for agreeableness and openness. Across a 16-week semester, individuals with high desires to become more agreeable or open would be expected to grow only approximately 0.05 *SD*s more than their peers with average change goals. Future research is needed to understand why change goals appear to most strongly predict changes in extraversion and emotional stability. For example, it may be the case that these traits are more affective in nature (e.g., Goldberg et al., 2006) and/or socially desirable than the remaining three traits (e.g., Dunlop, Telford, & Morrison, 2012), making them easier and/or seemingly more

important for participants to attempt to change. However, these possibilities are speculative and should be explicitly tested.

Nevertheless, although our effect sizes were small, they are within the realm of what should be expected. Namely, personality develops slowly. Meta-analyses suggest that, averaging across the big five, individuals between the ages of 18 and 22 (such as those included in our study) tend to increase approximately 0.16 *SD*s in each trait over a median time span of 2 years (Roberts, Walton, & Viechtbauer, 2006). Based on these findings, we should expect personality traits to normatively increase an average of approximately 0.007 *SD*s per month (in our study, average mean-level monthly growth in the five traits was 0.015 *SD*s). Thus, the fact that the moderating effects of change goals were in the realm of 0.020–0.040 *SD*s per month for some traits (extraversion, conscientiousness, and emotional stability) may indicate that change goals predict nontrivial variation in the people's developmental trajectories. Indeed—as just one concrete example—meta-analyses suggest that people aged 18–22 tend to increase 0.12 *SD*s in emotional stability across 2 years (Roberts et al., 2006). Yet in our study, participants with high emotional stability change goals were predicted to increase 0.18 *SD*s across only 16 weeks—and that increase occurred *above and beyond* the already-positive normal maturational trajectories observed in our study (i.e., the trajectories for individuals with average change goals).

That said, it is important to note that in exploratory analyses, we found evidence that change goals may predict nonlinear growth in extraversion, conscientiousness, and emotional stability. Specifically, change goals appear to most strongly predict temporally proximate growth; but as time progresses, change goals appear to be less predictive of how individuals' personality traits change across time. This may indicate that change goals, as measured at a single timepoint, only predict how personality traits change over relatively short periods of time (such as several months). In other words, a person's change goals, as measured at a single snapshot in time, may not predict how their traits are changing many months—or perhaps even years—later (see, e.g., Robinson et al., 2015). Indeed, prior research has found that change goals are only moderately stable over time (12-week test–retest rs $\sim .50$; Hudson & Fraley, 2015). Thus, studies spanning extended periods of time may need to collect repeated measures of change goals to accurately track how participants' goals are changing—and use these data to model dynamic associations between change goals and traits across time. Future research with longer time spans and repeated measures of both traits and change goals should investigate these and other potentially more complex dynamics among traits and change goals across time.

Implications, Limitations, and Future Directions

The single biggest implication of our study is that change goals robustly predict trait change across time (Hudson & Fraley, 2015, 2016a). Our study has several desirable features, including a large sample (for an intensive longitudinal design) that enabled precise effect estimates. Moreover, our study analyzed

all data collected to-date on the topic by our labs, and thus our estimates are not affected by publication biases or file-drawer effects (see LeBel & Peters, 2011; Simmons et al., 2011). Our findings suggest that volitional change effects (i.e., change goals predict trait growth) can be observed across all five traits—but the effect sizes appear to be smallest for agreeableness and openness (although the effect size for agreeableness may depend, in part, on which measures are used). Thus, studies examining agreeableness or openness may wish to employ larger sample sizes than are typically used in the volitional change literature in order to detect effects.

That being said, our analyses suffer from similar limitations to prior volitional change studies (see Hudson & Fraley, 2015). Namely, our data were correlational and cannot strongly speak to causal processes underlying volitional changes (though experimental interventions do suggest that behavioral modification can lead to desired trait changes; Hudson et al., 2019; Hudson & Fraley, 2015; Jacques-Hamilton et al., 2019). Moreover, our data were collected over a relatively short time frame—16 weeks. Thus, it remains an open question whether participants can maintain volitional changes to their personality traits over extended periods of time. Although a recent quantitative review suggests that personality change (e.g., as a result of psychotherapy) can occur in as few as 6 weeks and endure for years afterward (Roberts et al., 2017), it is nevertheless possible that volitional change processes may operate cyclically (e.g., people may "reset" to their baseline levels of traits once they stop "working on" changing them). Thus, future research should examine volitional change processes over multiple years (see Robinson et al., 2015). Finally, future studies on volitional change would benefit from using a variety of methods to assess change goals (e.g., open-ended reports; Baranski et al., 2017) and personality traits (e.g., observer reports; Paulhus & Vazire, 2007; Vazire, 2010). Although there is no single "best" measure of change goals or traits, various measures have different strengths and may be able to compensate for one another's weaknesses—and ultimately triangulate a robust pattern of findings.

As a final note, we are aware of at least one other study on volitional change, which we did not include in our mega-analysis. Robinson, Noftle, Guo, Asadi, and Zhang (2015) measured 170 graduating college seniors' change goals (using a single item per domain) and found that change goals were unrelated to changes in personality traits, assessed on two measurement occasions separated by 1 year. There are at least five differences between the paradigm used in the present 12 samples ($n = 2,238$) and that employed by Robinson and colleagues ($n = 170$). First, we measured change goals using multi-item measures, whereas Robinson and colleagues used a single-item (per domain) measure. Second, our studies included an average of 11 waves per participant and estimated trajectories in growth across time, whereas Robinson and colleagues examined change across two timepoints. Third and related, participants in our studies were frequently contacted and likely reminded of their change goals, whereas participants in Robinson and colleagues' study were not. Fourth, our studies

followed students across only 4 months, whereas Robinson and colleagues tracked students across 1 year. Finally, our samples consisted of students in a relatively constant environment—a single college semester. In contrast, Robinson and colleagues followed students across a major life transition: graduation.

Thus, it remains unclear why our findings differ from those of Robinson and colleagues. It may be the case that methodological differences (e.g., sample size, change goal measures, number of waves, repeated contact with participants) can explain the discrepant findings across these studies. In contrast, it is possible that the differences among our studies foreshadow important theoretical issues. For example, it may be possible that volitional personality changes are short-lived and/or cyclical in nature and thus decay or revert across extended time frames (such as 1 year). Alternatively, volitional personality change may only be possible among very young adults—or perhaps major life transitions disrupt self-change efforts. Much future research is needed to disentangle the extent to which both methodological issues (e.g., measures, number and frequency of waves) and theoretical issues (e.g., length of self-change efforts, resilience of changes to life transitions) affect volitional change processes.

Conclusion

In conclusion, our study provides the most comprehensive mega-analysis of change goals and trait change to date. Our findings suggest that across all data collected by our labs—whether published or not—change goals reliably predict corresponding trait growth, though the effects for some traits are quite small.

Authors' Note

Hudson conceptualized the study and analyzed the data. All authors contributed to data collection and to the drafting of the article.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

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Notes

1. We use "intensive" to refer to studies with many closely spaced waves (see Bolger & Laurenceau, 2013).
2. Each included study had separate foci/research questions. However, they all included measures of change goals and trait growth and thus can be merged together to address the present question. We included all relevant data we have collected (including some previously published data) to provide the most precise and least-biased estimates possible.

3. Although other researchers have investigated volitional change, too, we focused specifically on data collected in our labs for two reasons. First, these studies use a common method, making an aggregate analysis straightforward. Second, although we can be confident that we have included all data collected by our labs (and thus our estimates are not biased), there is no way for us to be sure that we have contacted every lab that has conducted research on this issue and to be sure that we have obtained a comprehensive and unbiased set of all data collected by all labs.

4. There was no upper limit to the time participants could wait between waves. Thus, waves might be unequally spaced for individuals (e.g., for a hypothetical participant, Waves 1–4 might be on Days 0, 6, 28, and 34, respectively). This is not a problem for our analyses—which modeled *time* and not *wave number*.

5. Thus, if a participant completed Wave 2 six days after Wave 1, time at Wave 2 for them would be $6/30 = 0.20$.

6. The "hybrid" measure used the Big Five Inventory (BFI) for all traits except extraversion. Thus, the samples using the hybrid measure were collapsed with the BFI samples for all traits except extraversion. We did not explore whether the International Personality Item Pool (IPIP-120) version of extraversion (used in the hybrid sample) differed from the BFI or BFI2 versions of extraversion due to small sample sizes for the IPIP-120 Scale.

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Handling Editor: Maike Luhmann