# Authentic leader(ship) development and leaders' psychological well-being: an outcome-wide analysis

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## Abstract

**Purpose** – Despite a fast-growing interest in leadership development programs, there is limited research on the impacts of leadership development and a narrow focus on professional competencies as outcomes. The authors' aim was to test whether authentic leadership development (ALD), an identity-based leadership development approach, is associated with positive changes in leaders' psychological well-being.

**Design/methodology/approach** – In a large sample of leaders ($N = 532$) from five different ALD programs, the authors conducted a pre-registered outcome-wide analysis and tested within-person changes in key indicators of psychological well-being and explored individual differences moderating these changes.

**Findings** – Results showed significant increases in self-concept clarity, sense of purpose in life and personal growth about two to three weeks after the programs ended. Changes in stress and health were not consistent. These changes did not differ across socio-demographic status (gender, age), work-related factors (leadership, industry and tenure) and most personality factors (extraversion, agreeableness, openness to experience). Those with high emotional variability experienced greater improvements in some outcomes of well-being while individuals with higher income and conscientiousness (who had high baseline self-concept clarity) experienced smaller improvements. Longer follow-up assessments were associated with smaller changes.

**Originality/value** – As one of the most comprehensive assessments of ALD outcomes to date, this study shows the potential of ALD for improving outcomes beyond leadership skills, the well-being of leaders, highlighting the return on value in leadership development and pointing to learning and development as a workplace well-being intervention.

**Keywords** Stress, Learning and development, Leadership development, Authentic leadership development, Well-being

**Paper type** Research paper

# Introduction

Leadership development is an important topic for organizations and human resource management practices as it implies improvements in the effectiveness of leaders and organizational success (Day *et al.*, 2021a). Given the fast-growing leadership development industry (Moldoveanu and Narayandas, 2019), scholars and practitioners have been interested in knowing whether leadership development indeed makes a difference (Day *et al.*, 2021a). Although there is limited research on this topic, in the last decade, we have made some progress in understanding how leadership competencies (Kragt and Guenter, 2018; Swinford *et al.*, 2019) and subordinates' well-being may change when leaders develop (Kelloway and Barling, 2010; Nielsen and Taris, 2019). This literature, however, has neglected a critical outcome that matters increasingly more for organizations (Vogel *et al.*, 2021): leaders' psychological well-being.

Leaders' psychological well-being entails not only the absence of mental disease and distress but also positive feelings and thoughts which indicate that leaders are well-functioning and evaluating their lives favorably (Boehm and Kubzansky, 2012). Leader well-being is important both as an ethical imperative – well-being should be valued for its own sake – (Guest, 2017) and also because it could have positive effects on leaders' performance or the functioning of subordinates and teams (Nielsen and Taris, 2019), especially after the mental health challenges of the Covid-19 pandemic (Giurge *et al.*, 2021). Yet, despite the considerable attention being paid to employee well-being, leader well-being has received relatively less research interest (Barling and Cloutier, 2017). It is, therefore, important to understand whether and how leaders' well-being can be supported.

In this research, we build on emerging perspectives that highlight workplace learning and development as a pathway to well-being (Watson *et al.*, 2018) and propose that leadership development could be a novel intervention to promote leaders' psychological well-being. Approaching well-being as a new outcome in leadership development forges a new understanding of its efficacy by highlighting the promise of "mutual gains" whereby leaders cultivate broader psychological functioning while advancing professional competencies. In this respect, leadership development may be an improvement over workplace programs that target well-being outcomes only, through stress-management (Asplund *et al.*, 2018) or psychological resilience (Robertson *et al.*, 2015), for example. Improvements in well-being could also explain the strong interest for leadership development, which persists even in the absence of evidence of improvements in professional skills (Day *et al.*, 2021b).

There is a clear theoretical link between learning and development and psychological well-being which makes leadership development a potentially fruitful avenue for promoting well-being. Theories consider growth and development as essential and universal human needs, the satisfaction of which would result in greater psychological well-being (Deci and Ryan, 2000). In the present research, we propose that leadership development would contribute to well-being especially in programs that are identity-based. In identity-based leadership development, leaders integrate self-perceptions and relationships within the broader context of their lives to their leadership roles and answer questions like "who am I as a leader?" and "what does effective leadership looks like for me?" (Clapp-Smith *et al.*, 2019). As such, these programs offer opportunities to grow not only professionally but as 'the whole person' which could lead leaders to evaluate their overall life and self favorably.

Building on these ideas, we suggest that authentic leadership development (ALD), with its focus on leaders' identity, could serve as a novel context for improving leaders' well-being. There have been many conceptualizations of authenticity, however, as scholars noted (Hewlin *et al.*, 2020), most of these refer to an alignment between one's internal sense of self and their external expression of it. One common definition, for instance, is "the unobstructed operation of one's true- or core-self in one's daily enterprise" (Kernis and Goldman, 2006, p. 294). Others have referred to an ability to present oneself to others in a truthful manner as a precursor to authenticity (Cable and Kay, 2012). In line with these conceptualizations, George *et al.* (2007) laid the foundation of ALD by arguing that authentic leadership can be cultivated

through a greater understanding of oneself (e.g. values, strengths and life stories) and by aligning one's leadership approach and behaviors with valued aspects of one's identity.

Authenticity has been empirically linked to psychological well-being outcomes such as meaning in life and life satisfaction (Rivera *et al.*, 2019); it also predicts lower energy depletion and stress among leaders (Weiss *et al.*, 2018). Greater congruency between how people behave and their perceived true identities is intrinsically desired and result in a sense of well-being (Sheldon, 2014). It is, however, not empirically tested whether these beneficial psychological outcomes may change in naturalistic environments where leaders actively work on the development of authenticity by participating in ALD programs [1]. Most studies on the outcomes of ALD employed small samples ($N = 25$ in Fusco *et al.*, 2016; $N = 51$ in Evans *et al.*, 2016) or demonstrated increases in leadership competencies such as integrity, empathy and judgment (Swinford *et al.*, 2019) or perceived authenticity and mindfulness (Baron, 2012, 2016). Altogether, the current library of empirical research has overlooked the potential implications of ALD for leaders' psychological well-being.

*Hypotheses development*
A widely-acknowledged objective of ALD programs is to foster greater self-awareness (Steffens *et al.*, 2021); it is assumed that the more aware leaders are about their identity, the easier it is to align their leadership with their inner sense of self. The main tool ALD programs use in promoting self-awareness is adaptive self-reflection, a process of constructively and critically examining oneself and life events to promote personal development and learning (Avolio *et al.*, 2010). These self-reflections are prompted by questions in assignments or group discussions and aim at generating insights into different aspects of the self (e.g. values, strengths, motivations). Given the emphasis in organizing one's self-beliefs and perceptions, we expected ALD to be linked to self-concept clarity, a marker of optimal psychological functioning that indicates "the extent to which self-beliefs are clearly and confidently defined, internally consistent, and stable" (Campbell *et al.*, 1996), which led to our first hypothesis.

*H1.* Participants of ALD programs will report greater self-concept clarity after the program than before.

Another common objective of reflections in ALD is to help leaders build their leadership on intrinsically valued goals and motivations since authentic leaders are described as being driven by internal values as opposed to external rewards or social expectations (George *et al.*, 2007). To develop this internal drive, leaders in ALD review their life stories and critical events in their life to understand what is important to them and the unique values and strengths that they can express through leadership (Craig and Snook, 2014). Leaders also create formal plans to outline how they can more deliberately align their leadership with their values and goals in the future. In doing so, as stated in our second hypothesis, leaders participating in ALD could cultivate another component of well-being, sense of purpose in life, which indicates having goals and a sense of direction that gives meaning to life (Ryff, 1989).

*H2.* Participants of ALD programs will report greater sense of purpose in life after the program than before.

With self-reflection as its main apparatus, ALD can be described as a journey of self-discovery in which participants gather new insights about who they are, how their professional and life trajectories evolved over time, and how they should grow further by shaping their leadership in light of this newly found wisdom about their true self (George *et al.*, 2007). In line with the identity-based leadership development approach, these developmental exercises target the "whole person" (Clapp-Smith *et al.*, 2019), so leaders make sense of their professional and non-work identities to identify opportunities for growth. Leaders also learn about other leaders' journeys through

personal disclosures in classroom groups or case studies, which could further stimulate growth. Through this process, we expect leaders to experience personal growth, a sense of continual improvement of the self in ways that reflect expanded self-knowledge and greater self-realization (Ryff, 1989), which forms our third hypothesis.

*H3.* Participants of ALD programs will report greater personal growth after the program than before.

An important feature of ALD is that it can serve as a prolonged self-affirmation in which leaders recollect valued parts of their identity, which is expected to boost their psychological resources and abilities to tackle the stressors in the environment (Cohen and Sherman, 2014). It is argued that when valued aspects of an identity are salient, individuals have a more optimistic view of what they are capable of and can draw from their full range of adaptive resources in tackling challenging events and resource-depleting factors (Cohen and Sherman, 2014). In ALD, individuals also share their reflections with teachers, mentors, and peers and receive positive support, which could further boost self-affirmation. Deriving our fourth hypothesis from these insights, we expect leaders in ALD to be more resilient to stressors, feel more in control, and consequently experience lower stress.

*H4.* Participants of ALD programs will report lower stress after the program than before.

Finally, the expanded resources that result from self-affirmation and social support in ALD could also have implications for leaders' health. Studies have found that supportive social relationships can improve health by activating adaptive neural and physiological functioning or healthy behaviors (e.g. increased mental and physical activity) (Uchino *et al.*, 2018). Empirical research also found self-affirmation to improve health, for example, by initiating healthy responses to stress (Dutcher *et al.*, 2020). These findings imply that improvements in health may be possible among leaders who are engaged with supportive identity-affirming relationships as part of ALD. Given this background and emerging perspectives that address physical health as part of comprehensive well-being and flourishing (VanderWeele, 2017a), we predicted a positive trajectory in perceptions of health among ALD participants.

*H5.* Participants of ALD programs will report better health after the program than before.

### The present research
To test these pre-registered hypotheses, we measured leader well-being in pre- and post-program surveys in five different ALD programs organized by private leadership development organizations and business and policy schools ($N = 532$). Our analysis of within-person changes showed consistent increases in self-concept clarity, sense of purpose in life and personal growth two-three weeks after the programs. Changes in stress and health varied across programs and no changes were observed in programs with longer follow-ups (18–20 weeks). We also investigated how changes in well-being differed across socio-demographic status (age, gender, race and income), work-related factors (leadership status, job tenure and industry), Big Five personality traits (John and Srivastava, 1999) and time between surveys. As per our preregistration, we did not have *a priori* hypotheses for this moderation analysis and consider it exploratory.

### Method
#### The procedures
We collected data from five ALD programs (Programs 1–5) that have a shared focus on the foundational pedagogical approach to ALD that is outlined in George *et al.* (2007), Craig and Snook (2014) and Craig *et al.* (2015). This approach includes (1) readings and lectures based on these seminal articles and field books; (2) self-reflection prompts that aim to cultivate self-awareness through a greater understanding of life stories, values, strengths and leadership purpose,

(3) discussions with teachers, coaches and peers to share and deepen personal reflections, (4) future development plans to integrate self-insights into one's leadership and development. Table 1 and Table S3 provides detailed information about each program.

We surveyed participants electronically through self-administered online questionnaires before and after the program. As preregistered, we sent out the survey about a week after each program ended and the responses were completed about two to three weeks after completion of Program 1, 2 and 3. Due to administration issues, the post-program survey was delayed and the responses were collected 18–20 weeks after Programs 4 and 5 (also see Table S1 in Supplementary Material).

*The sample*

The sample sizes differed across programs and were 516 in Program 1, 103 in Program 2, 33 in Program 3, 83 in Program 4, and 67 in Program 5. Retention rates ranged from 48% to 69% and average retention was 66% across samples (see also Table 1). Including participants who responded to both surveys left a total sample of 532 leaders. Table 1 (also Tables S3 and S4 in Supplementary Material) describes program-specific participant characteristics.

*Measures*

*Self-concept clarity.* A 12-item scale asked respondents their degree of agreement with statements like "My beliefs about myself often conflict with one another" on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*) (Campbell *et al.*, 1996). Item ratings were averaged, and negatively worded items were reverse-coded. The internal consistency of the measure was high as indicated by a Cronbach's alpha ($\alpha$) of 0.87.

*Purpose in life.* We used a seven-item scale to assess respondents' agreement with statements such as "I have a sense of direction and purpose in life" (Ryff, 1989). The responses ranged from 1 (*extremely disagree*) to 6 (*extremely agree*). Item ratings were averaged, and negatively worded items were reverse-coded ($\alpha = 0.70$).

*Personal growth.* We used a seven-item scale that assessed respondents' agreement with statements such as "For me, life has been a continuous process of learning, changing, and growth." (Ryff, 1989). The response scale ranged from 1 (*extremely disagree*) to 6 (*extremely agree*). Item ratings were averaged, and negatively worded items were reverse-coded ($\alpha = 0.69$).

*Perceived stress.* We used the 10-item Perceived Stress Scale by Cohen *et al.* (1983), which includes questions such as "In the last month, how often have you felt that you were unable to control the important things in your life". The response scale ranges from 1 (*never*) to 5 (*often*). Item ratings were averaged to receive a final score ($\alpha = 0.88$).

*Self-rated health.* A single question was used to assess self-rated health: "In general, would you say your health is: excellent, very good, good, fair, or poor?" This single-item measure is associated with objective physical health conditions (Pinquart, 2001).

Please see Supplementary Material for measures of individual differences (demographic, work-related and Big-5 personality).

| Program | Program 1: Senior executive fellows | Program 2: Authentic leadership training | Program 3: Purpose to impact | Program 4: Primary leader development | Program 5: Authentic leadership development |
| --- | --- | --- | --- | --- | --- |
| Participants | Public sector senior executives | Graduate students | Senior executives | Graduate students with prior experience in leadership development | Senior executives |
| Duration | 4 weeks | 2 days | 4 days | 10 days | 5 days |

Table 1.
Brief program
information

*Statistical analysis*

Following an epidemiological approach ("outcome-wide analysis", VanderWeele, 2017b), we simultaneously assessed multiple outcomes associated with a single exposure and used a five bivariate fixed-effects regression analysis with a binary predictor of time that equaled 1 for the post-program survey and 0 for the pre-program survey. The coefficient for this predictor measured average within-person differences in the outcomes before and after the program. Since the fixed-effects analysis controls for factors that are fixed within a person but may change across individuals, we did not need to control for individual difference measures in the analysis.

We clustered the errors at the individual level to account for correlations across repeated measures from the individuals and standardized all outcomes to report standardized effect sizes. We have preregistered our hypotheses and analysis plan (links were only available to reviewers to maintain programs' anonymity).

We conducted robustness checks with a Bonferroni correction, a method that adjusts our analysis for multiple hypothesis testing. Given small samples in program-specific analyses and because this method has been criticized for being too conservative as a criterion for statistical testing (Gordon, 2007), we present these results in Supplementary Material.

Next, we followed the gold-standard methodology in synthesizing the results from multiple studies and used a mega-analysis (also known as individual-participant data meta-analysis, see Eisenhauer, 2021 and Higgins *et al.*, 2001) by pooling the data across programs and tested our hypotheses in this data. We used a random effects model to account for the clustered nature of the data (i.e. individuals nested in programs). For all outcomes, our models included a random intercept. Only when the outcome was stress, we added a random slope to account for sample-specific differences in slope estimates of time predicting stress and as supported by the model selection criteria (Bell *et al.*, 2019). Compared to random intercept, random slope was a significantly better fit based on likelihood ratio test ($\chi^2(1) = 22.50$, $p < 0.000$); The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were also lower for random slope (2,627, 2,657) vs. intercept (2,647, 2,672). Since mega-analysis also enables moderation analysis, as per our preregistration, we also used it to explore whether within-person changes differed systematically across individuals.

## Results

*Within-person changes in psychological well-being*

Figure 1 reports the main results for within-person changes in each of the psychological well-being measures in each program (also see Table S6). In Program 1, all hypotheses were supported and changes in self-concept clarity, purpose in life, personal growth, stress and health were significant in the expected direction. In Program 2, self-concept clarity, purpose in life and personal growth increased; changes in stress and health were in the hypothesized direction but smaller in size and not statistically significant. Program 3 showed increases in self-concept clarity, sense of purpose in life and decreases in stress (marginally significant). Changes in growth were positive and had a comparable size but did not reach significance in Program 3, potentially due to small sample size. Health also showed a small change in the hypothesized direction but not statistically significant. In Program 4 and 5, no changes were observed, potentially because of the substantially larger follow-up length in these programs (18–20 weeks).

We continued with a mega-analysis using pooled data. All four hypotheses were supported: leaders reported higher self-concept clarity ($\beta = 0.12$, $p < 0.001$, 95% CI = [0.057, 0.184]), purpose in life ($\beta = 0.15$, $p < 0.001$, 95% CI = [0.078, 0.223], personal growth ($\beta = 0.20$, $p < 0.001$, 95% CI = [0.117, 0.279]) and self-rated health ($\beta = 0.06$, $p = 0.039$, 95% CI = [0.003, 0.126]) after the programs. Changes in stress were not significant ($\beta = -0.08$, $p = 0.518$, 95%
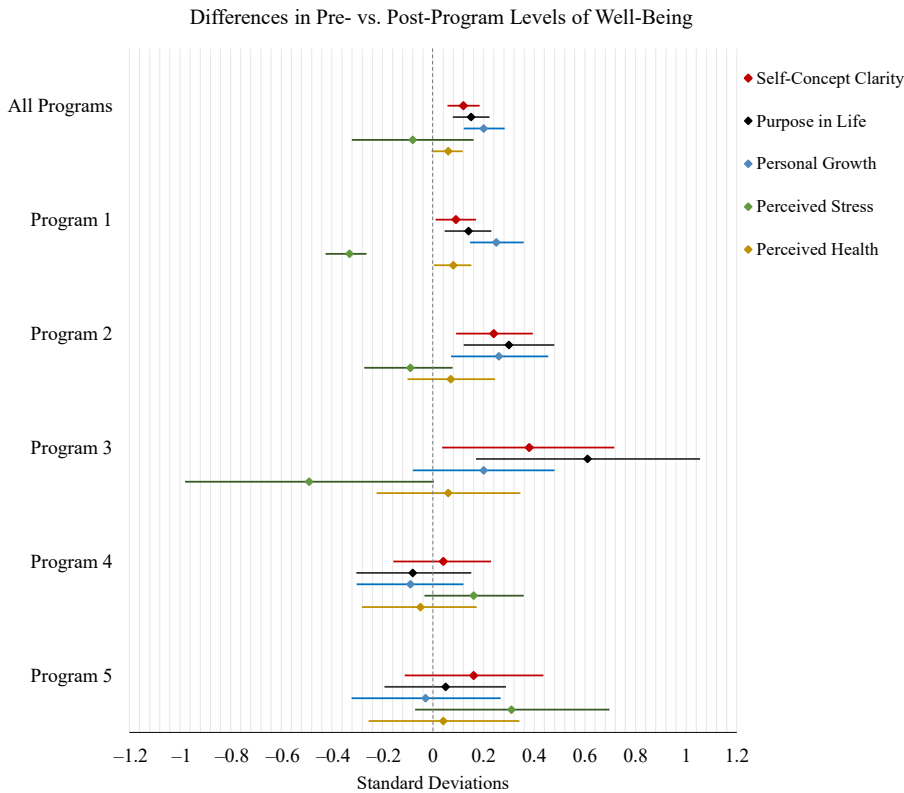
Differences in Pre- vs. Post-Program Levels of Well-Being



**Note(s):** Estimates are average within-person changes in each program as measured by coefficients in fixed-effects regression models of time ( = 1 if post-program and = 0 if pre-program) predicting each well-being outcome. Error bars represent 95% confidence intervals

CI = [−0.320, 0.161]). All results from the mega-analysis (except for health) and most results from the program-specific analyses continued to hold after the Bonferroni correction (see Table S7).

*Heterogeneity analysis*

Moderation analysis showed that for higher income individuals, self-concept clarity increased less ($\beta_{\text{interaction}} = -0.14$, $p = 0.020$, $\%95$ CI = [−0.252, −0.022]). Higher conscientiousness was also associated with smaller changes in self-concept clarity ($\beta_{\text{interaction}} = -0.16$, $p = 0.005$, 95% CI = [−0.267, −0.049]) and perceived stress ($\beta_{\text{interaction}} = 0.16$, $p = 0.008$, 95% CI = [0.041, 0.274]). The changes became smaller in magnitude as the follow-up period increased for purpose in life ($\beta_{\text{interaction}} = -0.02$, $p = 0.006$, 95% CI = [−0.031, −0.005]) and stress ($\beta_{\text{interaction}} = 0.05$, $p = 0.001$, 95% CI = [0.021, 0.080]). Individuals with higher emotional variability reported larger reductions in stress ($\beta_{\text{interaction}} = -0.16$, $p = 0.001$, 95% CI = [−0.256, −0.069]). These results remained robust when we excluded Programs 4 and 5, which showed null results did not drive the results. For the

sake of parsimony, we only report the statistically significant results that hold with or without Programs 4–5 here; the full set of results can be found in the Supplementary Material (Table S8).

## Discussion

Complementing emerging research that shows associations of ALD with improvements in leadership skills (Baron, 2012, 2016; Evans *et al.*, 2016; Fusco *et al.*, 2016; Swinford *et al.*, 2019), we used one of the most comprehensive assessments in the literature to find leaders' psychological well-being as a new outcome in ALD. Changes in well-being were mostly independent of individual differences (i.e. gender, age, race, leadership, tenure, industry and most personality factors) highlighting the benefits of ALD for diverse groups of leaders.

It is encouraging that ALD is associated with positive – albeit small – changes in self-concept clarity, an identity-related construct that has been found to be relatively stable in adulthood (Lodi-Smith *et al.*, 2017). The positive changes in sense of purpose in life also indicate that leaders' reflections on their goals and intentions may give meaning and direction to their lives (Ryff, 1989). Coupled with positive changes in personal growth, these results suggest that it is not only authenticity (Rivera *et al.*, 2019) but also the *pursuit* of authenticity that is conducive for well-being among leaders. However, greater baseline self-concept clarity, especially among leaders with higher-income and -conscientiousness (see Tables S9, S10) partly buffered improvements in well-being, suggesting that having 'too much' clarity in self-beliefs may limit the benefits of ALD (also see Csank and Conway, 2004).

Although we did not find consistent evidence for hypothesized changes in stress and health, which are less directly related to identity-related processes compared to other outcomes, greater stress reductions for leaders with high emotional variability suggest that leaders who are predisposed to chronic stress (Gunthert *et al.*, 1999) may derive more benefits from ALD. The changes in well-being were also smaller when time-spans between surveys were longer which is consistent with adaptation theories that predict well-being to return to its baseline after life events (Lucas, 2007). Using longitudinal assessments over longer time spans can help answer whether the boost in well-being completely disappears after leadership development and when.

Given that leader(ship) development is often not grounded in theory (Day *et al.*, 2021a); an important contribution of this research is to support the psychological benefits of ALD as a theory-based leadership development approach that emphasizes understanding and aligning one's true self with their leadership (George *et al.*, 2007) through adaptive self-reflection (Avolio *et al.*, 2010) and in a socially supported setting with peers and coaches (Craig and Snook, 2014; Fusco *et al.*, 2016). Relatedly, these findings also suggest that leadership development approaches that are grounded in other theories can be psychologically enriching for leaders to the extent that they integrate developmental activities that focus on leaders' identity (Clapp-Smith *et al.*, 2019). Future studies can uncover the unique contributions of other theory-based leadership development approaches to well-being in comparison to ALD.

The present research also expands the scope of competency-based approaches to leadership development (Day *et al.*, 2021a) by highlighting the psychological value of professional learning and development (Deci and Ryan, 2000). So far, most leadership theories have been concerned with identifying behaviors and characteristics that can maximize performance; therefore, leadership development has been targeted at the cultivation of those characteristics (Nielsen and Taris, 2019). However, evidence shows that performance at times may come at the expense of leaders' well-being (Barling and Cloutier, 2017) and reduced well-being among leaders is both ethically concerning and can impact performance in leaders and organizations at large (Guest, 2017). The current research highlights a new possibility that

leadership development can deliver 'mutual gains' in well-being and performance. Future studies can simultaneously measure well-being and performance outcomes to more directly test the mutual gains hypothesis.

Integrating well-being as a potential consideration in leadership development theories inspire new hypotheses for further research. For example, given that well-being predicts a host of other beneficial outcomes (Guest, 2017), it can be the mechanism (in place of or complementary to skill-learning) through which developing leaders impact organizations and subordinates (Kelloway and Barling, 2010). Well-being can also change leaders' personal lives by creating healthful habits (Yemiscigil and Vlaev, 2021) or better relationships (VanderWeele, 2017a). Or, well-being could be the implicit reason driving leaders toward leadership development programs and if so, it can explain the strong demand for leadership development even when its effects on professional learning are limited (Day et al., 2021b).

The insights from this research inform practitioners by addressing several key concerns that underlie investments and delivery of leadership development programs. First, practitioners can approach leadership development not only as a professional learning opportunity but also as a novel and viable workplace intervention for promoting leader well-being (Watson et al., 2018). Specifically, to the extent that identity-based leadership development delivers mutual gains in psychological and professional development, it could offer a higher return on value for investments than initially thought and a higher return compared to programs that target well-being or professional outcomes only. These potential benefits strengthen the rationale for organizations to invest in identity-based leadership development programs, especially during times when mental health at work is challenged. The positive changes observed in Program 3 – which was conducted during the Covid-19 pandemic and had the highest baseline stress – further supports these implications.

The current research also speaks to a second important consideration for practitioners who invest in, design, or deliver leadership development programs, that is, to achieve intended outcomes efficiently with respect to time (Day et al., 2021b). We show that desired well-being outcomes, at least in ALD, could be achieved in relatively short durations (program lengths ranged from two days to four weeks in our study), which promises more efficiency for leaders and trainers. Finally, the current findings suggest that ALD can benefit diverse groups of leaders, addressing concerns about equity in learning and development (Day et al., 2021a). At the same time, we highlight differential outcomes for certain groups (i.e. based on income or personality) which can encourage practitioners to identify and cater to the special needs of these groups in their program offers or design.

*Limitations*
Our study required collaborations with multiple organizations, which made it logistically challenging to organize an experimental design to provide causal evidence. We hope that this study provides the groundwork for future experimental studies, convincing organizational partners and researchers for experimental designs. Although it is largely accepted that well-being is a subjective experience and our well-being measures have validity in predicting objective outcomes (Lewandowski and Nardone, 2012; Sherman et al., 2012; Pinquart, 2001), using informant ratings and/or objective measures could improve reliability in future studies.

**Conclusion**
Leadership development is often considered an avenue for professional learning and generates massive demand by organizations (Day et al., 2021b). This research suggests that identity-based leadership development can initiate more than professional development; it can also foster personal well-being among leaders, create positive changes in leaders' beliefs

about their whole selves and lives and serve as a workplace well-being intervention that can potentially deliver mutual gains in professional learning and well-being. These findings advance our understanding of leadership development and leader well-being and shed light on the return on value for leaders and organizations investing time and money in leadership development.

## Note

1. ALD programs focus on leader development – fostering intra-individual skills like self-awareness – and they relate these skills to interpersonal relationships and enactment of leadership, which capture leadership development. We therefore reference both leader (human capacity) and leadership (social capacity) (Day *et al.*, 2014) in authentic leader(ship) development.

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**Supplementary material**

|  | Mean | SD | Min | Max |
| --- | --- | --- | --- | --- |
| All Data | 8.21 | 5.59 | 1 | 24 |
| PROGRAM 1 | 6.86 | 1.22 | 4 | 11 |
| PROGRAM 2 | 2.12 | 1.04 | 1 | 8 |
| PROGRAM 3 | 3.49 | 2.01 | 1 | 7 |
| PROGRAM 4 | 21.02 | 1.13 | 19 | 24 |
| PROGRAM 5 | 18.76 | 1.24 | 17 | 21 |

**Table S1.**
No of weeks between
pre- and post-program
surveys

|  | Time 1 | Time 2 | Retention rate T2/T1 |
| --- | --- | --- | --- |
| All Data | 802 | 532 | 0.66 |
| PROGRAM 1 | 516 | 358 | 0.69 |
| PROGRAM 2 | 103 | 70 | 0.68 |
| PROGRAM 3 | 33 | 20 | 0.61 |
| PROGRAM 4 | 83 | 52 | 0.63 |
| PROGRAM 5 | 67 | 32 | 0.48 |

**Table S2.**
Sample size and
retention

### Measures of individual differences

*Socio-demographic status*
We measured age, gender (= 1 if female and = 0 if male), and race (White, Black, Asian, Hispanic, Mixed Race, Other Race). Income was measured as the gross annual salary including bonuses, stock options, and other forms of cash compensation in U.S. dollars. The skewness for the income variable was 7.04, which was above the acceptable limit of $\pm 2$ for determining normal distribution (Gravetter and Wallnau, 2014). Additionally, because the unit of measurement is generally multiplicative for income (changes are based on %), we used log-transformed values of income in the analysis.

*Work-related factors*
We assessed leadership status with a single question, "Please indicate how much of your job includes managerial/leadership tasks? (0–100%)." We measured tenure by asking the length of service in the current position in months. The tenure variable had a skewness greater than 2 (Gravetter and Wallnau, 2014) and equaled 3.06 and, therefore, was also logarithmically transformed. We also assessed whether respondents were working in public administration or not.

*Personality*
We used the Big Five Inventory (BFI) to capture the five dimensions of personality: openness to experience, conscientiousness, extraversion, agreeableness, and emotional variability (John and Srivastava, 1999). Respondents answered 44 questions using a scale from 1 (strongly disagree) to 5 (strongly agree). Extraversion was assessed by eight items ($\alpha = 0.86$), agreeableness with nine items ($\alpha = 0.75$), conscientiousness by nine items ($\alpha = 0.81$), emotional variability (formerly referred to as "neuroticism") by eight items ($\alpha = 0.84$), and openness to experience by 10 items ($\alpha = 0.77$). Table S7 in the Supplementary Material describes personality scores by program.

|  | P1 | P2 | P3 | P4 | P5 |
|---|---|---|---|---|---|
| Course Dates | Oct 2016–June 2018 | Feb 2019 | Jun 2020, October 2020 | Jul 2019 | Jul 2019 |
| Program Length | 4 weeks/20 sessions | 2 days/2 sessions | 4 days/4 sessions | 10 days/10 sessions | 5 days/5 sessions |
| Participants | Public sector senior executives | Graduate students | Senior executives | Graduate students with prior experience in leadership development | Senior executives |
| No of Cohorts | 7 | 2 | 2 | 1 | 1 |
| No of participants in each cohort | 65–75 | 50–60 | 30 | 70–80 | 70–80 |
| Organization | Graduate school I | Graduate school I | Private organization | Graduate school II | Graduate school II |
| Lecture topics | Self-awareness, crucibles, Big 5 personality, learning mindset, vulnerability, purpose | Self-awareness, learning mindset, vulnerability, purpose | Leadership crucibles, intrinsic motivations, purpose | Life stories, crucibles, self-awareness, values, intrinsic motivations, integrated life, purpose, empowerment, leader effectiveness | Life stories, crucibles, self-awareness, values, intrinsic motivations, integrated life, purpose, empowerment, leader effectiveness |
| Readings | George et al. (2007) and Craig and Snook (2014) | George et al. (2007) and Craig and Snook (2014) | George et al. (2007); Craig and Snook (2014) | Craig et al. (2015) | Craig et al. (2015) |
| Reflection exercises | * | * | * | * | * |
| Group Discussions | * | * | * | * | * |
| Future Plans | * |  | * | * | * |

**Table S3.**
Program information

|  |  | P1 | P2 | P3 | P4 | P5 | ALL |
|---|---|---|---|---|---|---|---|
| Age | Mean | 48.05 | 33.09 | 44.08 | 39.58 | 45.28 | 40.99 |
|  | SD | 7.52 | 7.01 | 14.07 | 6.32 | 8.2 | 9.72 |
| Female | Mean | 0.26 | 0.66 | 0.75 | 0.4 | 0.34 | 0.37 |
|  | SD | 0.44 | 0.48 | 0.45 | 0.5 | 0.48 | 0.48 |
| White[a] | Mean | 0.36 | 0.47 | 0.5 | 0.33 | 0.56 | 0.39 |
|  | SD | 0.48 | 0.5 | 0.51 | 0.47 | 0.5 | 0.49 |
| Black | Mean | 0.09 | 0.03 | NA | 0.04 | 0.03 | 0.07 |
|  | SD | 0.29 | 0.17 |  | 0.19 | 0.18 | 0.26 |
| Asian | Mean | 0.08 | 0.2 | NA | 0.21 | 0.19 | 0.11 |
|  | SD | 0.27 | 0.4 |  | 0.41 | 0.4 | 0.31 |
| Hispanic | Mean | 0.07 | 0.16 | NA | 0.21 | 0.06 | 0.09 |
|  | SD | 0.26 | 0.37 | NA | 0.41 | 0.25 | 0.29 |
| Mixed Race | Mean | 0.01 | 0.09 | 0.05 | 0.1 | 0.03 | 0.03 |
|  | SD | 0.12 | 0.28 | 0.22 | 0.3 | 0.18 | 0.18 |
| Income | Mean | 146,656 | 88,652 | 153,228 | 265,838 | 367,600 | 181,464 |
|  | Median | 133,689 | 80,000 | 200,000 | 205,000 | 242,500 | 138,000 |
|  | SD | 108,631 | 55,408 | 102,091 | 260,102 | 518,632 | 228,910 |
| Public Admin | Mean | 0.39 | 0.37 | 0.08 | 0.02 | 0.03 | 0.28 |
|  | SD | 0.49 | 0.49 | 0.29 | 0.14 | 0.18 | 0.45 |
| Leadership | Mean | 71.35 | 44.3 | 72.5 | 74.13 | 78.75 | 67.1 |
|  | SD | 27.32 | 35.51 | 26.59 | 24.97 | 26.61 | 30.84 |
| Tenure | Mean | 4.42 | 5.52 | 9.51 | 4.34 | 4.47 | 4.72 |
|  | Median | 3.00 | 3.00 | 3.75 | 3.00 | 2.50 | 3 |
|  | SD | 4.48 | 7.12 | 11.96 | 5.12 | 4.55 | 5.42 |

**Table S4.**
Sample characteristics per cohort

**Note(s):** [a]Non-Hispanic whites

|  |  | Self-concept clarity | Purpose in life | Personal growth | Perceived stress | Perceived health |
|---|---|---|---|---|---|---|
| All Data | Mean | 3.81 | 4.97 | 5.31 | 2.27 | 3.85 |
|  | SD | 0.69 | 0.67 | 0.57 | 0.61 | 0.81 |
| PROGRAM 1 | Mean | 3.92 | 5.01 | 5.28 | 2.19 | 3.82 |
|  | SD | 0.65 | 0.64 | 0.58 | 0.56 | 0.8 |
| PROGRAM 2 | Mean | 3.35 | 4.84 | 5.29 | 2.43 | 4 |
|  | SD | 0.78 | 0.75 | 0.59 | 0.61 | 0.8 |
| PROGRAM 3 | Mean | 3.79 | 4.77 | 5.33 | 3.12 | 4.05 |
|  | SD | 0.67 | 0.87 | 0.55 | 0.8 | 0.83 |
| PROGRAM 4 | Mean | 3.8 | 4.95 | 5.48 | 2.32 | 3.73 |
|  | SD | 0.61 | 0.72 | 0.46 | 0.61 | 0.89 |
| PROGRAM 5 | Mean | 3.68 | 4.95 | 5.45 | 2.31 | 3.88 |
|  | SD | 0.66 | 0.57 | 0.49 | 0.55 | 0.83 |

**Table S5.**
Average scores of outcomes in baseline data

| | Self-concept clarity | | | Purpose in life | | | Personal growth | | | Perceived stress | | | Perceived health | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI |
| Program 1 | 0.09*** | 0.01 | 0.171 | 0.14*** | 0.046 | 0.229 | 0.25*** | 0.142 | 0.354 | −0.32*** | −0.397 | −0.235 | 0.08*** | 0.009 | 0.157 |
| Program 2 | 0.24*** | 0.091 | 0.394 | 0.30*** | 0.121 | 0.479 | 0.26*** | 0.065 | 0.449 | −0.08 | −0.257 | 0.092 | 0.07 | −0.105 | 0.241 |
| Program 3 | 0.38*** | 0.036 | 0.716 | 0.61*** | 0.170 | 1.055 | 0.20 | −0.080 | 0.480 | −0.49*** | −0.983 | −0.000 | 0.06 | −0.225 | 0.343 |
| Program 4 | 0.04 | −0.157 | 0.229 | −0.08 | −0.302 | 0.15 | −0.09 | −0.3 | 0.122 | 0.16 | −0.038 | 0.354 | −0.05 | −0.272 | 0.181 |
| Program 5 | 0.16 | −0.112 | 0.436 | 0.05 | −0.192 | 0.288 | −0.03 | −0.327 | 0.262 | 0.31 | −0.077 | 0.691 | 0.04 | −0.261 | 0.335 |
| All Data | 0.12*** | 0.057 | 0.184 | 0.15*** | 0.078 | 0.223 | 0.20*** | 0.117 | 0.279 | −0.08 | −0.320 | 0.161 | 0.06 | 0.003 | 0.126 |

**Note(s):** Stars denote $p < 0.05$. Confidence intervals are reported at 95%. Program specific results were from fixed-effects analysis of time ($= 1$ if post-program and $= 0$ if pre-program) predicting each well-being outcome. All data results used random-intercept models except for stress which included a random slope in addition to random intercept

**Table S6.**
Main results

| | Self-concept clarity | | | Purpose in life | | | Personal growth | | | Perceived stress | | | Perceived health | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI | Beta | Lower CI | Upper CI |
| Program 1 | 0.09 | −0.016 | 0.196 | 0.14*** | 0.017 | 0.258 | 0.25*** | 0.109 | 0.388 | −0.32*** | −0.423 | −0.209 | 0.08 | −0.014 | 0.18 |
| Program 2 | 0.24*** | 0.041 | 0.444 | 0.30*** | 0.062 | 0.538 | 0.26*** | 0.002 | 0.511 | −0.08 | −0.315 | 0.149 | 0.07 | −0.162 | 0.298 |
| Program 3 | 0.38 | −0.089 | 0.841 | 0.61*** | 0.008 | 1.217 | 0.20 | −0.183 | 0.582 | −0.49 | −1.163 | 0.180 | 0.06 | −0.329 | 0.448 |
| Program 4 | 0.04 | −0.221 | 0.294 | −0.08 | −0.377 | 0.225 | −0.09 | −0.37 | 0.192 | 0.16 | −0.103 | 0.419 | −0.05 | −0.348 | 0.256 |
| Program 5 | 0.16 | −0.206 | 0.53 | 0.05 | −0.275 | 0.371 | −0.03 | −0.428 | 0.364 | 0.31 | −0.21 | 0.824 | 0.04 | −0.364 | 0.438 |
| All Data | 0.12*** | 0.037 | 0.204 | 0.15*** | 0.055 | 0.246 | 0.20*** | 0.092 | 0.304 | −0.08 | −0.396 | 0.237 | 0.06 | −0.016 | 0.146 |

**Note(s):** Stars denote $p < 0.05$. Confidence intervals are reported at 99%. Program specific results were from fixed-effects analysis of time ($= 1$ if post-program and $= 0$ if pre-program) predicting each well-being outcome. All data results used random-intercept except for stress which included a random slope in addition to random intercept

**Table S7.**
Bonferroni-adjusted
estimates of main
results

| | Self-concept clarity | Purpose in life | Personal growth | Perceived stress | Perceived health |
|---|---|---|---|---|---|
| *Predictor Interacted with Time Dummy* | | | | | |
| Age | 0.00 | −0.01 | 0.00 | −0.01 | 0.00 |
| | (0.00) | (0.01) | (0.01) | (0.01) | (0.01) |
| Female vs Male | 0.03 | −0.02 | 0.01 | 0.01 | 0.02 |
| | (0.08) | (0.08) | (0.09) | (0.09) | (0.08) |
| White vs Other | −0.05 | −0.04 | −0.07 | 0.09 | −0.02 |
| | (0.07) | (0.08) | (0.08) | (0.07) | (0.06) |
| Black vs Other | −0.16 | −0.10 | −0.13 | −0.05 | −0.00 |
| | (0.13) | (0.14) | (0.16) | (0.14) | (0.12) |
| Asian vs Other | 0.20' | 0.19 | 0.12 | −0.23** | 0.06 |
| | (0.10) | (0.12) | (0.13) | (0.11) | (0.10) |
| Hispanic vs Other | 0.03 | −0.09 | 0.02 | 0.12 | 0.01 |
| | (0.11) | (0.13) | (0.14) | (0.12) | (0.11) |
| Income (log) | −0.14** | −0.09 | −0.12' | 0.16** | −0.01 |
| | (0.06) | (0.06) | (0.07) | (0.07) | (0.06) |
| % Leadership | 0.00 | −0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Public Administration | −0.01 | 0.15 | 0.22** | −0.07 | 0.18' |
| | (0.09) | (0.10) | (0.11) | (0.11) | (0.10) |
| Tenure (log) | −0.01 | −0.03 | −0.04 | 0.05 | −0.07' |
| | (0.04) | (0.04) | (0.05) | (0.04) | (0.04) |
| Extraversion | −0.04 | −0.04 | −0.07 | 0.04 | 0.01 |
| | (0.04) | (0.05) | (0.05) | (0.04) | (0.04) |
| Agreeableness | 0.04 | −0.03 | −0.07 | 0.05 | −0.06 |
| | (0.06) | (0.07) | (0.08) | (0.06) | (0.06) |
| Conscientiousness | −0.16*** | −0.09 | −0.14** | 0.16*** | 0.01 |
| | (0.06) | (0.06) | (0.07) | (0.06) | (0.05) |
| Emotional Variability | 0.08 | 0.03 | 0.03 | −0.16**** | −0.02 |
| | (0.04) | (0.05) | (0.06) | (0.05) | (0.04) |
| Openness | −0.10 | −0.04 | −0.09 | 0.07 | −0.02 |
| | (0.06) | (0.07) | (0.07) | (0.06) | (0.06) |
| Length of Follow-Up | −0.01 | −0.02*** | −0.02**** | 0.05**** | −0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |

**Note(s):** All predictors were interacted with a time dummy (=1 if post-program and = 0 if pre-program). Random-intercept models were used in all outcomes except stress, for which a model with random intercept + slope was used. Standard errors are reported in parenthesis. Stars denote levels of statistical significance:'.10, ** 0.05, *** 0.01., ****.001. Excluding Sample 3 and 4 showed that for higher income individuals, self-concept clarity increased less ($\beta_{interaction}$ = −0.24, $p$ = 0.003, %95 CI = [−0.391, −0.082]) but changes in stress did not differ ($\beta$inter = 0.07, $p$ = 0.438, %95 CI = [−0.105, 0.242]). Higher conscientiousness was also associated with smaller changes in self-concept clarity ($\beta_{interaction}$ = −0.15, $p$ = 0.013, %95 CI = [−0.267, −0.031]) and perceived stress ($\beta_{interaction}$ = 0.16, $p$ = 0.011, %95 CI = [0.037, 0.279]), but only marginally for personal growth ($\beta_{interaction}$ = −0.13, $p$ = 0.099, %95 CI = [−0.285, 0.024]). The differences in growth per public administration was not significant ($\beta_{interaction}$ = 0.12, $p$ = 0.350, %95 CI = [−0.126, 0.355]). Similarly, differences in stress per Asian was only marginally significant ($\beta_{interaction}$ = −0.23, $p$ = 0.073, %95 CI = [−0.480, 0.021]). Individuals with higher emotional variability reported larger reductions in stress ($\beta_{interaction}$ = −0.17, $p$ = 0.001, %95 CI = [−0.269, −0.068]). For purpose in life ($\beta_{interaction}$ = −0.04, $p$ = 0.022, %95 CI = [−0.080, −0.006]) and stress ($\beta_{interaction}$ = 0.09, $p$ = 0.003, %95 CI = [0.030, 0.145]) but only marginally for personal growth ($\beta_{interaction}$ = −0.04, $p$ = 0.099, %95 CI = [−0.076, 0.007]) the changes became smaller in magnitude as the follow-up period increased

Table S8.
Heterogeneity analysis of pre-post changes in psychological well-being: coefficient estimates for interaction terms of moderators × time predicting changes in well-being outcomes

| | Self-concept clarity | Purpose in life | Personal growth | Perceived stress | Perceived health |
|---|---|---|---|---|---|
| *Predictor Interacted with Time Dummy* | | | | | |
| Self-Concept | −0.36**** | −0.10' | −0.09 | 0.17*** | −0.05 |
| Clarity | (0.04) | (0.05) | (0.06) | (0.05) | (0.05) |
| Purpose | −0.09' | −0.65**** | −0.36*** | 0.11** | −0.02 |
| | (0.05) | (0.05) | (0.06) | (0.05) | (0.05) |
| Growth | −0.12** | −0.37**** | −0.97**** | 0.13** | −0.02 |
| | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Stress | 0.19**** | 0.09 | −0.08 | −0.59**** | 0.01 |
| | (0.05) | (0.06) | (0.05) | (0.05) | (0.05) |
| Health | −0.05 | −0.01 | −0.08 | 0.09** | −0.29**** |
| | (0.04) | (0.05) | (0.06) | (0.04) | (0.04) |

**Note(s):** All predictors were interacted with time dummy (=1 if post-program and = 0 if pre-program). Standard errors are reported in parenthesis. Stars denote levels of statistical significance: '.10, ** 0.05 *** 0.01., ****.001

After excluding Sample 3 and 4, the only changes were that growth only marginally moderated self-concept clarity ($\beta_{\text{interaction}} = -0.11$, $p = 0.08$). Self-concept clarity moderated growth ($\beta_{\text{interaction}} = -0.15$, $p = 0.024$)

Table S9.
Heterogeneity analysis of pre-post changes in psychological well-being: coefficient estimates for interaction terms of baseline well-being × time predicting changes in well-being outcomes

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) Self-Concept Clarity | 1.000 | | | | | | | | | |
| (2) Purpose in Life | 0.439* | 1.000 | | | | | | | | |
| | (0.000) | | | | | | | | | |
| (3) Personal Growth | 0.318* | 0.558* | 1.000 | | | | | | | |
| | (0.000) | (0.000) | | | | | | | | |
| (4) Perceived Stress | −0.544* | −0.342* | −0.252* | 1.000 | | | | | | |
| | (0.000) | (0.000) | (0.000) | | | | | | | |
| (5) Perceived Health | 0.213* | 0.181* | 0.176* | −0.230* | 1.000 | | | | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | | | | | | |
| (6) Conscientiousness | 0.477* | 0.401* | 0.270* | −0.408* | 0.167* | 1.000 | | | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | | | | | |
| (7) Income (log) | 0.134 | −0.028 | 0.087 | −0.084 | −0.004 | 0.139 | 1.000 | | | |
| | (0.023) | (0.630) | (0.138) | (0.154) | (0.939) | (0.020) | | | | |
| (8) Public Admin | −0.048 | −0.055 | −0.090 | −0.049 | −0.086 | −0.043 | −0.204* | 1.000 | | |
| | (0.395) | (0.332) | (0.111) | (0.390) | (0.127) | (0.458) | (0.001) | | | |
| (9) Asian | −0.145* | −0.102 | −0.076 | 0.099 | −0.022 | −0.124* | −0.025 | −0.027 | 1.000 | |
| | (0.001) | (0.019) | (0.081) | (0.022) | (0.609) | (0.005) | (0.669) | (0.634) | | |
| (10) Emotional Variability | −0.579* | −0.340* | −0.285* | 0.658* | −0.237* | −0.418* | −0.056 | −0.027 | 0.119* | 1.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.346) | (0.637) | (0.007) | |

**Note(s):** *Shows significance at the 0.01 level. $p$ values are reported below the correlation estimates

**Table S10.**
Pairwise correlations
between key variables
measured at the
baseline