**LEADERSHIP Development THROUGH EXPERIMENTATION:**

**A THEORETICAL FRAMEWORK AND EMPIRICAL TEST**

**Julian Birkinshaw & maya gudka**

**Abstract**

Many theories have been proposed to understand and improve the process of leadership development. One useful way to structure the literature is around three complementary perspectives, briefly summarised as the “knowing, doing and being” dimensions of leadership. While the complementarities between these perspectives have been discussed, the mechanisms by which they are linked are less clear. The purpose of this paper is to examine the role of experimentation as one such mechanism.

Building on interviews and prior literature, we argue that experimentation consists of two processes, task-prototyping focused on the work overseen by the leader, and self-prototyping focused on how the leader relates to others.

We propose a theoretical framework linking experimentation to action-taking (e.g. being entrepreneurial, taking on challenging assignments), which in turn links to leader effectiveness. We test the hypotheses on two groups of leaders (481 business school alumni, 310 financial services leaders). We find evidence that both forms of experimentation provide significant explanatory power in understanding why some individuals engage in higher levels of action-taking than others. Additionally, our study confirms the central role of action-taking in leadership development.

Conceptually, we distinguish two dimensions of experimentation and their connection to action-taking, knowledge development and identity development. Empirically, we show that these two experimentation activities are significant predictors of action-taking, even after controlling for all other factors, and that action-taking (along with self-prototyping) is an important predictor of leader effectiveness.

The results offer a practical framework for L&D professionals to use in designing and evaluating leadership development activities.

Keywords: Action-Taking, Executive Coaching, Experimentation, Identity-development, Leadership Development.

**Introduction**

The process of leadership development – through which an individual becomes more effective in his/her role as a leader within an organization (Day and Sin, 2011) – has been a topic of scholarly research since the 1950s, and over the years many perspectives and theories have been put forward to understand how it occurs and how to improve it.

A useful way to structure the literature is around three complementary perspectives: the knowledge development perspective (e.g. Ausubel, 1968) focuses on the personal skills and capabilities leaders need to do their jobs effectively; the action-taking perspective emphasizes learning on-the-job, for example by taking on challenging assignments (e.g. McCall, et al., 1988); and the identity-development perspective focuses on how people become leaders (in their own self-concept) through the relationships they build with others around them (e.g. Ibarra, 1999). These represent the “knowing, doing and being” dimensions of leadership respectively (Snook et al., 2012).

While the potential complementarities between these perspectives have been discussed (e.g. Day & Harrison, 2007; Lord & Hall, 2005), the mechanisms by which they are linked are less clear. The purpose of this paper is to examine the role of *experimentation* as one such mechanism, specifically the idea that leaders might engage in a conscious iterative process, going back-and-forth between action-taking on one hand and the development of knowledge and identity on the other. Our central argument is that the process of experimentation enables individuals in their pursuit of challenging assignments and new experiences, which in turn helps them to become more effective as leaders.

In the body of the paper, we flesh out this argument in detail, putting forward a theoretical framework where we break experimentation into two sub-processes (task-prototyping and self-prototyping), which are linked to individual action-taking, which in turn is linked to leader effectiveness. We test the hypotheses on two groups of leaders (a sample of 481 alumni from a business school and a sample of 310 executives from Finco, a large financial services company) using different respondents to mitigate the threat of common-method bias. There is support for all our hypotheses.

Our study makes several contributions. First, we unpack and operationalize the notion of experimentation, which is used frequently in discussions of leadership development, but usually in a colloquial way rather than with any specificity. Second, we provide empirical evidence that the two forms of experimentation (task-prototyping and self-prototyping) provide significant explanatory power in understanding why some individuals engage in higher levels of action-taking than others. In our interpretation, this conscious approach to iterating back-and-forth between action and reflection makes individuals better informed and more motivated, thereby accelerating their efforts to become more effective. Third, our study confirms the central role of action-taking (specifically, being entrepreneurial, taking on challenging assignments and engaging in novel experiences) in leadership development. We find support for this relationship across both samples, using self-rated *and* boss-rated outcome measures.

More broadly, our integrative approach helps to close the gap between theory and practice in leadership development (Zaccaro and Horn, 2003). In terms of practical implications, it has become popular in recent years to talk about experimentation, but with little precision around what it means. This research offers clarity about what forms experimentation takes and how it relates to other approaches to leadership development. We also show (through our empirical evidence) that it is associated with higher levels of leader effectiveness.

**Theoretical Background**

Leadership development is the process of growth individuals go through to become more effective in leadership roles. This can occur in formal learning interventions, such as lectures or workshops. Equally, or possibly of more importance, Day et al (2014) argue that to understand how people become more effective leaders we should give more attention to the ‘white space’ between interventions to see where the *actual* development occurs. By white space, they refer to the everyday and ongoing workplace experiences and practices which shape an individual’s development. They acknowledge that such practices might not always be deliberate or conscious, making them hard to study and therefore not clearly understood. This is a gap we wish to address with our research.

Consistent with this observation that leaders develop in a variety of formal and informal ways, we build explicitly on Day's (2000: 586) definition of leadership development – it is not just about how individuals develop their own skills and capabilities, it is also concerned with how they become effective in their network of interactions with others, and in the application of their personal skills in a particular context[[1]](#endnote-2). There have been many studies of leadership development over the years, which we cluster into three perspectives.

*Knowledge development perspective*

An early line of research focused on knowledge development, specifically the personal skills and capabilities leaders needed to do their jobs more effectively (Ausubel, 1968; Bray, 1964). This research focused on cognitive development, i.e. the notion that individuals gain understanding by taking in new information (e.g. by attending a class or reading an article), linking it to what they already know, and building up schema or mental models that help them to make sense of a complex world (Ausubel, 1963; Piaget, 1936).

The knowledge development perspective became influential, and indeed an entire industry of training and development built up around it (see Avolio, et al., 2009, for a meta-analytic review). It was particularly in vogue during the 1960s and 1970s, both in terms of identifying specific leadership and management skills (Bray, 1964; Russell & Kuhnert, 1992) as well as explicating the process of learning (Ausubel, 1963). It has also led to a body of research concerned with the ‘transfer of training’ from the classroom to the workplace ( Baldwin & Ford, 1988; Huczynski & Lewis, 1980).

Over the years, studies have examined the techniques used by individuals for knowledge development (e.g. Orvis and Ratwani, 2010), and have explored the link between knowledge development and leader effectiveness, with most showing a positive but weak relationship (Avolio et al, 2009; Burke & Day, 1986; Collins & Holton, 2004; Mumford, et al., 2000). This perspective continues to be applicable today (DeRue & Myers, 2014; Zaar et al., 2020).

*Identity-development perspective*

A perspective that has gained a lot of interest in recent years is to emphasize identity work as a central feature of leader development (Yip et al., 2020). Identity is a set of meanings that individuals attach to themselves. An individual’s leader identity is situated within their broader self-concept which consists of multiple personal and social identities (Gecas, 1982; Schein, 1978).

Interest in the identity-development perspective has grown strongly, for example in the application of psychodynamics to the study of leaders (Petriglieri & Petriglieri, 2020; De Vries, 1984), There are also several empirical studies finding, for example, a positive link between leader identity and leadership skills (Miscenko et al., 2017) and the influence of a strong identity on leader effectiveness (Johnson et al., 2012).

Where the knowledge development perspective is grounded in cognition, identity development is largely socially-constructed, suggesting that individuals ‘become’ leaders through the relationships they build around them (Ibarra, 2015; Lord & Hall, 2005). This perspective builds on social identity theory (Tajfel and Turner, 1986), i.e. that identity incorporates a social component related to the social roles enacted by a person and his or her identification with the categories he or she belongs to. Identity construction occurs in social interaction as individuals convey images that signal how they view themselves and intend to be viewed by. As they perceive their own behavior and others’ reactions, acceptance or rejection of these images, they evolve these self-conceptions (Swann 1987). This perspective has become increasingly influential within the leadership and career progression literature more generally (Ibarra, 2004; 2015; Lord & Hall, 2005), because it plays to the notion that leaders are not just formally-designated bosses, they can also be the ones who influence others informally through their statements and actions (Day and Harrison, 2007). Identity-development, in this view, is an interactive social process, whereby you claim an identity as a leader that others affirm by choosing to follow you (DeRue & Ashford, 2010; Pratt et al., 2006).

Overall, professional identities have long been seen as evolving with varied experiences, interactions and meaningful feedback, allowing people to gain insight about their central and enduring preferences, talents and values (Schein, 1978).] Therefore in practice, leader identity construction involves observation and processing of interpersonal interactions as well as formal feedback from colleagues and subordinates (for example through 360 surveys). There is also a self-reflection component to identity development, often facilitated by input from external coaches and advisors (Ibarra, 2015). For example, Yip et al. (2020) describe how narrative coaching can support leaders as they transition into new positions, gaining and shedding new personal and social identities.

*Action-taking perspective*

A third perspective emphasizes the importance of action-taking as the central feature of leadership development. Development, according to this view, occurs experientially, with leaders taking on challenging assignments and having stretching experiences (McCall et al, 1988; McCall Jr, 2004).

Many theories of learning and development have built on this action-first perspective over the years. For example, Action Learning (Revans, 1983) is a technique for the development of people in organizations “which takes the task as the vehicle for learning” (Pedler, 1997: xxii). Argyris and Schon’s (1974; 1978) ‘theories of action’ offer insight into why there is often a gap between what people espouse and what they do; and the theory of situated learning (Lave & Wenger, 1991; Brown & Duguid, 2002) explains how people build expertise through a social process of learning-by-doing. Other well-known theories include informal learning (Marsick and Watkins, 2001) and natural learning (Burgoyne and Hodgson, 1983). In addition to these theoretical perspectives, there have been a number of empirical studies finding support for the link between various aspects of action-taking and leader effectiveness (e.g. DeRue & Wellman, 2009; Hirst et al., 2004).

*Complementarities between perspectives*

It is analytically useful to separate these three perspectives out, because each emphasises a distinct aspect of leadership development: the knowledge development perspective is *cognitive*, the identity-development perspective is *relational* and the action-taking perspective is *behavioural.* This ‘trinity’ of perspectives surfaces in a range of different contexts, for example the study of management styles (Handy, 1978) and team roles (Belbin, 1981). It is also used in applied contexts, with obvious parallels, for example, with Snook, Nohria and Khurana’s (2012) “knowing, being, and doing” as the three key aspects of leadership development.

However, as we touched on in the previous section, there are also obvious complementarities between these perspectives, and in recent years several studies have sought to bring them together. For example, Lord and Hall (2005) put forward a theory of leadership progression whereby individuals build leadership skills initially through changes in their knowledge base and through experience and observational learning, and then increasingly through higher-level schemas that develop alongside changes in personal identity. Day and Harrison (2007) proposed a “multi-level identity-based approach,” that examined the changes in identity and expertise individuals go through as they move into higher level roles within their organizations. It is reasonable to conclude from these and other studies that leadership development is most effective when it combines elements of all three perspectives.

But if the potential complementarities between these three perspectives seem obvious, the mechanisms by which they are linked are less clear. Notwithstanding the studies mentioned above, the literature on how knowledge development, identity-development and action-taking work together is relatively limited. An important goal of this paper is therefore to make progress on how they might be brought together, and in particular to examine the role of *experimentation* as a mechanism that enables action-taking to be linked, in an iterative manner, with knowledge and identity development. The notion of experimentation has been around for many years, but it is often used in a very general sense e.g. Kolb’s (1984) learning style of ‘active experimentation’. Our intention is to flesh out the meaning of experimentation in detail and to develop and test a framework linking experimentation, action-taking and leader effectiveness.

*Outcome of development: Leader effectiveness*

Before developing our arguments in detail, it is important to clarify how one might define and measure the outcomes of leadership development (Day et al 2014; Hiller, et al., 2011). It is customary in a business context to evaluate individuals on the basis of performance (i.e. the ‘outcomes’ listed in their job description), but this is arguably too narrow a view because each of the perspectives above potentially helps individuals to develop in different ways. For example, an individual who learns how to empower others, or becomes more aware of her own strengths and weaknesses, would say that she has “developed” as a leader, even in the absence of changes in business performance. As observed by Day et al (2014: 77), we should therefore seek to evaluate “development and its markers” rather than performance per se.

There are also well-established links between satisfaction and positive business outcomes (Harter, et al., 2002). Positive emotions and job experiences have been found to stimulate leadership capabilities and can create positive development spirals which reinforce learning processes or a positive leader identity (DeRue & Workman, 2012; DeRue et al., 2009).

Consistent with our multi-faceted perspective, our approach in this paper is to operationalize leader effectiveness in a rounded way, by considering leaders’ achievement of task-based objectives alongside their personal satisfaction and career development and their ability to get the best out of those around them. We also employ a narrower measure of effectiveness, based on the rating of the individual’s overall performance by their boss, to provide additional robustness to our analysis, especially with regard to potential concerns about common method bias.

**The Experimentation Agenda**

An important trend in the broader management literature over the last decade has been the increased interest in experimentation withinorganizations[[2]](#endnote-3), for example A/B testing methodologies in digital marketing (Gupta, 2018), prototyping in design thinking and lean start-up methodologies (Brown, 2009; Ries, 2011), and ‘business experiments’ in many born-digital firms (Lee et al., 2004; Thomke, 2020). These bodies of literature all emphasize the value of experimentation as a way of learning about cause-effect relationships in a low-risk way, prior to making a firm commitment to a new course of action.

The leadership development literature has also embraced this language, for example Petriglieri, Wood, & Petriglieri (2011) discuss the importance of ‘behavioral experiments’ in program design and Kets de Vries & Korotov (2007) talk about executives being “willing to engage in self-exploration and self-experimentation.” However, the term is often used in an informal way, and with little precision about what it means or how it might be useful. One of our goals in this paper is to build greater precision around the notion of experimentation, in the context of leadership development. In setting up our definitions and arguments, we draw on a set of exploratory interviews with executives conducted at the start of the research, as well as a couple of influential studies (Heifetz and Linsky, 2002; Ibarra, 1999).

*Insights from practice*

We interviewed fifteen mid to senior-level managers to understand their approach to professional development and what had impacted their development over time. Rather than framing our questions around specific interventions (such as training programs), we focused on the ‘white space’ development opportunities in everyday work (Day et al, 2014). We used open-ended questions such as: “how have you built the skills and mindset to make you more effective in your work?"; “describe specific incidents you learned from, and how your behavior changed as a result”; and “on a day-to-day basis how do you keep learning and developing?”

An important insight that emerged early on was the separation of experimentation (as an approach to development) into two dimensions that we subsequently labeled task prototyping and self-prototyping. In the following paragraphs, we share examples and descriptions of task-prototyping versus self-prototyping as discovered within the interviews, linking these to existing literature.

As one respondent said:

“There are two kinds of development. One is becoming a better manager, building social skills […] the other is, we are going into a new economy, more social and web based, and we need to find new ways of making sales. how to sell with social tools.”

This respondent went on to talk about how he had applied insights gained from a business school programme to marketing and sales initiatives (i.e. task-prototyping), whereas other respondents focused more on their attempts to improve their style of leadership, their behaviours, and how they were perceived by others (i.e. self-prototyping). We observed that this dichotomy paralleled the distinction between knowledge development and identity development alluded to earlier, and it became a central feature in our subsequent analysis.

Considering *task-prototyping* first, several respondents described how they tried out ideas they had read about in a business book or been exposed to during a formal training programme (“the frameworks delivered from the programme applied to my new opportunity at the bank…it helped to have the proper frameworks when presenting to the board”). They also recounted the iterative nature of the process, with the results of their experiments feeding back into their understanding of how things worked. One respondent who tried out a new way of selling products in a pharmacy said:

“We are still trying to use the information we gathered. Having done the experiment, it’s certainly something I will continue to use. And I will try to roll it out into the organization, with very small changes, and to train sales reps [in the new technique].”

This notion of task-prototyping was a central theme in Heifetz and Linsky’s (2002) well-known book *Leadership on the Line* (though they did not use this terminology)*.*  The authors described how leaders put in place conscious interventions that “involve testing hypotheses, looking for contrary data, and making midcourse corrections as you generate new knowledge” (2002: 277). Examples in the book included how to help a marginalized employee (p34), interpreting declining sales figures (p120), managing group conflict (p150) and trialling new retail concepts at Christmas (p173). In their view, the range of tasks on which experiments might be conducted was very wide, as long as the process of conscious hypothesis-testing, reflecting and learning was adhered to.

Returning to our interviews, the notion of *self-prototyping* was typically described by respondents as a journey of personal discovery. Some were stimulated to try a new style of leading because they found themselves in a new role (“I was given the role of HR vice president. It humanized me – developed skills I didn’t have”) or because of a change in their personal circumstances (“I was in a new role, it helped me to reset my image. [otherwise] I might not have been able to let go”). Others were inspired to change by observing others (“the biggest eye opener was a manager from several years ago, very inspirational. I saw how effective he was. He unlocked a more natural style in me”). Again, the causal path described by these respondents flowed both ways, with a new role enabling a shift in behavioural style, which in turn fed back to a shift in the respondent’s sense-of-self.

This self-prototyping process was a key theme in Ibarra’s (1999) article *Provisional Selves.* In a detailed study of junior professionals in the banking sector, she showed how they adapted by observing role models, experimenting with provisional selves, and seeking feedback on their changes in behaviour. In her words, they adapted “by experimenting with images that serve as trials for possible but not yet fully elaborated identities.” As with the task-prototyping process described above, self-prototyping was a conscious and deliberate process, and one that required careful reflection and multiple iterations. However, a key difference is that the experiments were being done by the individuals *on themselves* not on the tasks and activities surrounding them. By behaving differently and generating feedback from those around them, individuals were able gradually to change their identity or ‘sense-of-self’ (Ibarra, 2015).

The conceptual separation of experimentation into two components – task-prototyping and self-prototyping – was an important step in our research, and it opened up the opportunity to operationalize and test our arguments in an empirical setting. Definitionally, an experiment is *a conscious and discrete intervention made by an individual to test a hypothesis about some aspect of their work*, and the process of experimentation by individuals is a *conscious cycling back-and-forth between action and reflection with the intention of increasing their effectiveness*. In this conceptualization, we are agnostic with regard to the amount of structure or duration of experiments – some are informal and quick, others carefully structured and monitored over months (Heifetz and Linsky, 2002: 277).

Building on these ideas, we now proceed to develop formal hypotheses, looking first at the link between action-taking and individual effectiveness, and second at the role of experimentation in facilitating action-taking and effectiveness (Figure 1). Then we describe how we operationalized our constructs and tested our ideas in two different empirical settings.

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Insert Figure 1 about here

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**Hypotheses**

In this section we set out the four hypotheses tested in our research. For each hypothesis, the supporting empirical literature and rationale for testing is first described.

*Individual action-taking and effectiveness*

Considering the literature on leadership development as a whole, there is a near-consensus view that “learning from experience …is the primary mechanism through which leaders develop (Petriglieri et al, 2011: 432; also Day, 2011: 41; McCall, 1988). It is also generally recognized that learning from experience doesn’t mean ‘just doing one’s job’, it means being proactive and entrepreneurial, taking on challenging work assignments, and being exposed to new and difficult situations. This view has been around for many years (e.g. Revans, 1978). In an early study, Davies and Easterby Smith (1984) concluded that “it is necessary for manager to learn from taking action...[by]being given responsibility and taking decisions under conditions of risk and uncertainty.” More recently, (McCall Jr, 2010) observed that “Whatever makes an experience challenging – unexpected, high stakes, complexity, pressure novelty and so on – is what makes it a potentially powerful learning experience.” Empirical studies have also shown support for the link between action-taking and individual learning and development (DeRue &Wellman, 2009; Hirst, et al., 2004; McCauley et al., 1994).

Our first hypothesis therefore states that individuals who engage in higher levels of ‘action-taking’ will have higher levels of effectiveness. This is consistent with the extant literature but it is important to test in the context of the current study for confirmatory reasons, and also because we will be arguing that the other factors contribute to leadership development *through* action-taking rather than directly.

As noted already, action-taking in this context is not individual leaders simply doing their job, it refers specifically to the types of action that stretch them, for example taking on challenging work assignments, being exposed to novel situations, and proactively seeking out new opportunities (Davies and Easterby Smith, 1984; McCall et al, 1988). The rationale is that these types of experiences are the ones that take leaders out of their comfort zone, therefore enabling them to grow and become more effective over time. Leader effectiveness, as discussed earlier, is a multi-dimensional measure of the extent to which an individual is achieving positive business outcomes while also expressing satisfaction with their career progression and their impact on others.

Hypothesis 1: The higher the level of action-taking by an individual, the higher their effectiveness as a leader.

*Antecedents of action-taking*

If taking on challenging and novel work assignments is the ultimate ‘driver’ of individual development, what are the factors that enable and encourage such behaviours? One important factor – and the focus of our empirical inquiry – is an experimentation approach, whereby individuals takes personal responsibility for the iterative process of trial-and-reflection described above. By engaging actively in the process of experimentation, individuals are better positioned to take on more challenging assignments and novel experiences, because the experimentation offers a safer and lower-risk pathway for creating task-based and behavioural change.

As already discussed, we consider two dimensions of experimentation, one focused on the task-based aspects of leadership as described by Heifetz and Linsky (2002) and the other focused on the self-based aspects of leadership as described by Ibarra (1999). We recognise there may be some overlap between them in practice, but as a means of providing analytical clarity it is useful to consider them separately.

Consider task-prototyping first. As Heifetz and Linsky (2002) describe, leaders accumulate knowledge over time about all the different aspects of their work. And as our interviews revealed, some of this knowledge is based on direct personal experience but a lot of it comes through attending courses, reading books and magazines, and conversing with peers and colleagues.

We argue that the greater the richness and diversity of the individual’s knowledge base, the more engaged they will be in the type of action-taking that enables their development, for two reasons. First, investing time in knowledge development means individuals are well-informed about the latest thinking about what works and what doesn’t, so they can try out the most promising new techniques, and are more likely to end up with useful solution to workplace challenges. Second, learning about new concepts and techniques is motivational – it is likely to increase an individual’s confidence that their efforts might have beneficial results for themselves and for their organization (Bandura, 1977; Revans, 1978).

We therefore propose a direct path between the individual’s engagement in the back-and-forth of task prototyping and their level of action-taking. We control for the underlying level of new insights and ideas individuals are exposed (e.g. DeRue and Wellman, 2009), and we focus on the notion that conscious experimentation of the type described by Heifetz and Linsky (2002) has a positive incremental effect. Individuals who invest effort in experimentation, we argue, will be accelerating their personal development process through these frequent iterative loops. They will therefore, all else equal, seek to engage in new and challenging work assignments more than those who does not.

Hypothesis 2. The more an individual engages in task-prototyping, the higher their level of action-taking.

Moving on to self-prototyping of the type proposed by Ibarra (1999), we put forward a parallel line of argument. Identity-development is a process whereby individuals receive or solicit feedback from their bosses, peers and subordinates and then seek to interpret this information, often with the help of a coach, to understand their strengths and weaknesses, identify areas for improvement, and ultimately build up a clearer picture of who they are, i.e. their identity (Ibarra & Barbulescu, 2010; Seifert & Yukl, 2010; Warech, et al., 1998). This process has been shown to be effective in a variety of contexts, for example the ‘identity workspaces’ of Petriglieri & Petriglieri, (2010). Mirroring the earlier logic, we expect that individuals who consciously seek to try out and learn from new ways of interacting with others (i.e. self-prototyping) will exhibit a higher level of action-taking than those who do not. Stated formally:

Hypothesis 3. The more an individual engages in self-prototyping, the higher their level of action taking.

*Mediation Effect*

Our final proposition considers the potential mediation effect in our framework. Mediation is the mechanism through which antecedents affect outcomes, so in our case this would mean task-prototyping and self-prototyping enable leader effectiveness *through* the individual’s engagement in action-taking.

The underlying logic is that the process of experimentation is intentionally low-risk: it is a way for leaders to build insight and develop expertise without subjecting themselves to high levels of external scrutiny. In contrast, we see action-taking (building on McCall et al., 1988) as individuals exposing themselves to difficult and challenging situations in which their true leadership qualities are revealed and hopefully enhanced. Experimentation can therefore be seen as the precursor to action-taking, the practice sessions that enable the live performance. While our empirical analysis does not allow to make strong causal inference, we see task-prototyping and self-prototyping as enabling individuals in their pursuit of challenging assignments and new experiences (‘action taking’), which in turn helps them become more effective as leaders.

This mediation argument is open to scrutiny, and indeed it would be possible to make an alternative case, namely that task-prototyping and self-prototyping have a direct effect on leader effectiveness. However, in formulating our hypothesis we are guided not only by our own conceptualization of the process of leadership development but also by methodological considerations regarding how to test a mediation hypothesis. Aguinis, Edwards and Bradley (2016: 12), for example, caution that “research should use the full mediation model as a baseline,” because such a hypothesis can be falsified whereas an argument for partial mediation cannot. Stated formally:

Hypothesis 4. Action-taking mediates the relationship between (a) task-prototyping and leader effectiveness, and (b) self-prototyping and leader effectiveness.

**Methodology**

*Sample*

The research was conducted on two different samples of leaders, and we present the results separately (rather than aggregating them) to provide greater transparency. Sample 1 was 481 alumni from the executive programs of a leading business school, Sample 2 was 310 executives from Finco, a large financial services company, who had either been through, or been identified as eligible for, a particular leadership development programme. In both instances, the sampling frames were chosen because the programmes they had been selected for ensured the required mid-senior level was achieved. The mid-senior banding offered sufficient seniority whilst also providing a sufficiently large sampling frame for analysis.

Sample 1. The sampling frame was 30,000 alumni from executive programs offered by a leading Business School, typically mid-senior leaders working in a wide variety of roles and industries across the world. We focused on a subset of this group, people who had taken one of five specific executive education programmes (1-4 weeks in length) during the previous 15 years[[3]](#endnote-4). We sent an online survey to almost 5,000 individuals with a cover note explaining the purpose of the study. After two reminders we had 576 responses, and after taking out incomplete surveys, we ended up with a sample of 497. We excluded people who had no-one reporting to them, leaving us with a final sample of 481 on which we conducted the quantitative analysis. Table 1 summarizes the key characteristics of the sample. A test of response bias showed that there were no significant differences in key characteristics (age, gender, nationality, programme type) between those responding and those that did not.

Sample 2. The sampling frame was roughly 9000 people in executive roles in Finco, a very large financial services company. We focused on a subset of these executives, 1349, who had been on a program/been identified as having potential for development etc. They were sent an online survey to complete, with a message from the researchers and from the company. After one reminder, 310 completed the survey. The data from these individuals was then matched to additional data held by the company about their age, gender and roles, and (importantly) their performance as rated by their line manager. The anonymized data (i.e. with individual names stripped out) was then provided to the researchers.

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Insert Table 1 about here

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*Measures*

Our research built on a variety of prior studies, and where possible we used existing questions to operationalize the main constructs of interest. However, there were several areas where we had to develop our own measures, especially around the notion of experimentation. Scale development occurred through a three-step process. In the first step, we reviewed our preliminary interviews and the existing literature carefully, identifying the key features of each construct, and put together a first draft of questions. Second, we administered these to an internal group of 30 expert colleagues and received feedback on the questions through several workshops. Third, we reworked the questions carefully and conducted a pilot study with a group of 45 alumni (who were excluded from the final sample). Analyzing the responses from this group led to several further changes, with several items being dropped and the language of others being tweaked further.

*Action-Taking*. Building primarily on McCall et all (1988) but also on Revans (1978) and Davies and Easterby-Smith (1984) we focused on three dimensions of action-taking, specifically: (a) Taking on challenging assignments outside my comfort zone, (b) Being exposed to a variety of experiences in day-to-day work, and (c) Being entrepreneurial – doing things that challenge the status quo. Answers were on a Likert-type scale where individuals indicated the frequency of undertaking each activity (1=never, 2=occasionally, 3=often, 4=frequently. 5=all the time). Cronbach’s Alpha for the scale was 0.67.

*Task-prototyping*.Without any prior empirical studies to refer back to, we developed our own measure to capture the conscious and iterative nature of this activity. Specifically, two items in the scale were about applying insights from readings and training programs to new ways of working, and the other two items were the reverse, i.e. using practical experience to build additional understanding. This, we argue, is a better way of tapping into the construct than asking general questions about “to what extent did you engage in experimentation” because it focuses on the relevant activities and behaviors. The specific items, using the same 1-5 Likert-type scale as above, were worded as follows: (a) Applying ideas from training programmes, reading and other sources to challenges I face in the workplace, (b) Using techniques from training programmes, reading and other sources to try out new ways of working, (c) Reflecting on my day to day work experience to enrich my understanding of how the business world works, (d) Analyzing how I handle challenges to build insight into the practice of management and leadership. Answers were on the same Likert-type scale as above. Cronbach’s Alpha = 0.72

*Self-prototyping***.**  We used a similar logic as above, with two items linking the individual’s sense-of-self (their identity) to their attempts to do things differently, and two following the reverse causal path. The specific items, again using the -5 Likert-type scale above, were worded as follows: (a) Taking the opportunities that come my way because of my reputation as a leader or manager, (b) Trying out new ways of working based on how peers and subordinates have responded to me in the past, (c) Learning from my day to day work experience to improve how I manage my relationships at work, (d) Building my leadership credibility with others through a track record of dealing with difficult challenges. Alpha = 0.74

*Leader Effectiveness*. As discussed earlier, it is important to evaluate what an individual has achieved in terms of business outcomes, but also their impact on those around them and their personal sense of growth and fulfillment (Hiller et al., 2011). Wallace et al., (2021) note this complexity, and in their integrated model of outcomes acknowledge the importance of team support, level of leader-self concept and self awareness. We therefore put together a scale that reflected our integrative approach (i.e. the notion that a fully-rounded leader is effective on multiple dimensions), with items relating to impact on business results and relationship development (items a-c and f below) (Militello and Benham, 2010) as well as personal growth, self-awareness and fulfillment (Day & Sin, 2011; Orvis & Ratwani, 2010) (items d & e below).

We note the specific challenges of individuals evaluating their own self-development activities, so we sought to measure facts rather than opionions (e.g. I have been promoted and/or given significant additional responsibilities) where possible (Orvis, 2007). However, the limitations of self-reporting can never be fully mitigated, so in addition to the self-rated leadership effectiveness measure, we also included a boss-rated leadership effectiveness measure in the second sample (Finco), which was provided by the line manager of each individual respondent. As before, we used the multistage method of expert feedback, piloting and revision, to finalise the wording for this scale. Specific item wording was as follows:

Self-rated Leader Effectiveness. Respondents were asked about the extent to which they agreed with the following statements (1=not at all, 5=to a very large degree): (a) I have made a positive and significant impact on how the business performs, (b) I have enabled those around me to do their jobs well and deliver on their potential, (c) I am well-known among my colleagues as someone who delivers results, (d) I am very happy about how my career has developed, (e) I have become more self-aware and well-rounded as an individual, (f) I have been promoted and/or given significant additional responsibilities. Alpha = 0.70.

Boss-rated leader effectiveness. This is a single-item measure. For each respondent, their boss (line manager) provided a rating of their overall performance, on a 1-5 scale: 1= Top Performer, exceeds performance expectations; 2= Strong Performer, Frequently exceeds performance expectations; 3=Good Performer, Achieves performance expectations; 4= Inconsistent Performer, Does not consistently meet performance expectations; 5= Not Applicable, has worked for less than three months of the year.

*Control Variables*. We measured respondent *age* and *gender* because it seems plausible that development experiences might vary significantly between older and younger groups and between men and women *Size of team* (number of people reporting up to the respondent) was a categorical variable to proxy the level of seniority of the respondent and the extent to which they spent their time managing others. *Time in current role* was a categorical measure of how long an individual had held their current role. *Number of recent roles* was a categorical variable (how many different roles have you had over last five years?) to account for the likelihood that those which more different experiences would have had greater development opportunities. *Days training* was included as an indicator of investment in formal business education. *Sponsor or mentor* measured whether an individual had help from a sponsor or mentor in the last few years. *Working from home* was measured only in the Finco sample because the data was collected during 2020 when most but not all people were working remotely. Descriptive statistics for all these variables are summarized in Table 2.

As noted earlier, we controlled for the individual’s level of personal investment in knowledge and identity development, because our focus is on the effect of experimentation holding these other factors constant. *Knowledge development* was measured using the same 1-5 Likert-type scale as earlier, asking respondents about the frequency of: (a) Reading books and articles about relevant aspects of business, (b) using social media and other digital technologies to stay informed, (c) taking part in face-to-face training/development programs, and (d) Taking part in online training/development programs and webinars. Alpha = 0.56[[4]](#endnote-5). *Identity* *development* was measured in similar fashion: (a) Receiving challenge and feedback from my boss (and others senior to me), (b) Receiving feedback (e.g. through 360 surveys) from peers and subordinates, (c) Reflecting on my own qualities as a leader or manager of others, (d) Observing how my boss and others senior executives operate, (e) getting support from a personal coach or mentor. Alpha = 0.70.

Finally, we also included a measure of *self-analysis* which is similar to task- and self-prototyping in that it is about the back-and-forth process between knowledge development and identity development. Wording as follows: (a) Reflecting on my relationships with others to determine the personal learning I need to undertake, (b) Enriching my perspective by observing how those around me interact with one another (c) Applying ideas gained from reading, video and training programmes to how I manage my relationships at work, (d) Enriching my ‘sense of self’ by using frameworks and techniques picked up through reading, video and training programmes, Alpha = 0.75.

*Common method bias*. There is always a risk when collecting data on dependent and independent variables via the same survey instrument that the correlations between items are inflated, as an artefact of the instrument used. To mitigate this risk, we followed the advice of Podsakoff et al (2003), by mixing the ordering of the questionnaire items in the online survey and using different scales for the independent and dependent variables, and by conducting a post hoc Harman one-factor test. Principal component analysis on all independent and dependent variables uncovered six factors with eigenvalues greater than 1.00, explaining 56% of total variance, with the first factor accounting for only 26% of total variance. For sample 2 we also mitigated this risk by measuring individual effectively both through self-rating and through the rating of the boss. We report the findings for both measures. Notwithstanding all these points, we recognize that there is still a potential common-method bias in this analysis, and that this is a limitation of this research.

*Data Analysis*

We used OLS regression analysis to test the hypotheses. Table 2 is a summary of the means and standard deviations of the variables, and the correlations between them. Tables 3 and 4 report the OLS regression analysis.

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Insert Tables 2 - 4 about here

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Hypothesis 1 (higher levels of action-taking are associated with greater leader effectiveness) is supported in all models – the coefficient is significant at p<.01 in both the alumni and Finco samples when we use the self-rated measure of effectiveness. The boss-rated measure of effectiveness (which is narrower because of its focus on business outcomes) is also significant at p<.05. It is worth noting that several other variables are also important: self-prototyping is significant in all models (i.e. individuals with higher self-prototyping frequency are more effective, with either self-rated or boss-rated measures), as is team size (i.e. people with larger teams are more effective). More time spent on training is significant in the Finco self-rated model, and age is significant in the Finco boss-rated model (i.e. younger leaders are rated higher).

Hypotheses 2 and 3 examined the effect of task-prototyping (H2) and self-prototyping (H3) on action-taking. As shown in Table 4 there was support for both hypotheses. It is also interesting to look at the control variables: in the alumni sample those with larger teams have higher levels of action-taking, and in the Finco sample men have higher levels of action taking than women. The measures of knowledge and identity-development were also significant in most models.

Hypothesis 4 examined the potential *mediating* effect of action-taking on the relationship between experimentation and leader effectiveness. The OLS regression models suggest the possibility that there may be both direct and mediated effects, given that the coefficient for self-prototyping is significant in Table 3. To explore this issue more carefully, we used the bootstrapping mediation approach recommended by Hayes (2017) using the add-on ‘Process’ module in SPSS. This allowed us to test whether the *indirect* effect of the two independent variables on leader effectiveness was significantly different from zero. Table 5 shows the results of this analysis: the rows show the direct, indirect and total effect for the independent variable in turn (with all the other independent variables and controls as covariates), and we repeat the analysis three times, for the different measure of leader effectiveness.

This analysis shows that the effect of self-prototyping on leader effectiveness is *partially mediated* by action taking, because the direct and indirect paths remain significant throughout. In other words, individuals who engage in self-prototyping behavior are more effective than those who do not, *irrespective* of the extent of their action-taking. Turning to the mediation effect for task-prototyping, the results are weak, with some limited evidence of full or partial mediation, depending on the sample. We would caution against drawing any strong conclusions for this variable. In sum, Hypothesis 4 is partially supported with self-prototyping having a direct *and* indirect effect on leader effectiveness.

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Insert Table 5 about here

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**Discussion and Implications**

The findings can be summarized as follows. First, the most effective leaders across our two samples are those who engage in high levels of action taking, specifically taking on challenging assignments, engaging in novel experiences and acting entrepreneurially (Hypothesis 1). Second, those reporting high levels of action-taking are actively supporting their own professional growth, through conscious experimentation in the form of task-prototyping (Hypothesis 2) and self-prototyping (Hypothesis 3). Third, self-prototyping contributes both directly *and* indirectly to leader effectiveness (Hypothesis 4).

The findings offer insights into the best ways to promote and develop effective leaders. They support our core argument that experimentation is an important but relatively poorly-understood aspect of leadership development. This highlights the need for time and opportunity both in an academic and organizational context to allow leaders to experiment in preparation for action-taking. With specific reference to the findings from Hypotheses 2 and 3, our contribution here is twofold. First, we ‘unpacked’ the concept of experimentation, separating out task-prototyping, which is about the leader working (often with team members) to try out new ways of getting tasks and activities done, and self-prototyping, which is about the leader adjusting how they present themselves and relate to others. Second, we showed how experimentation fits within the broader body of literature on leadership development. In relation to the three established perspectives of knowledge-development, identity-development and action-taking, experimentation is usefully conceptualized as a mechanism that *links* these existing perspectives: task-prototyping is about iterating between knowledge development and action-taking (Kolb, 1984; Heifetz and Linsky, 2002), self-prototyping is about iterating between identity development and action taking (Ibarra, 1999; 2015).

A couple of related ideas arise from this research, and it is useful to sketch them out here, particularly with regard to future research directions. First, our study builds on Day et al’s (2014) notion that leadership development occurs in part through ‘white space’ activities which are not always intentional. Our argument is that while leaders may indeed develop through unintentional or *ad* *hoc* activities, they are likely to get *more* value out of such activities if they engage in them in an experimental way, i.e. taking small, lower risk steps, with consideration for what they are hoping to achieve, reflecting on the outcomes, adjusting accordingly and iterating. Our study therefore contributes to the understanding of certain types of white-space activity, and how they relate to other types of development.

Secondly, there is one aspect of our theoretical framework that was downplayed in this study, namely the notion that leaders might also iterate back-and-forth between knowledge- and identity-development, for example by adapting their self-image on the basis of what they read in a book or learned in a classroom. We called this *self-analysis* and we controlled for it in the empirical analysis. However, there is scope for giving it more attention in subsequent research. For example, we know this form of self-analysis is an important part of many leadership development programs offered at business schools, as described by Petriglieri & Petriglieri (2010) in their discussion of ‘identity workspaces’. Unlike the experimentation processes we studied here, this is a discrete activity conducted away from the workplace, typically involving reflection by individuals (e.g. in a one-to-one or group coaching session) about their leadership style and then a conscious plan for what they might do differently back in the workplace. In the overall context of leadership development this is recognized as an important activity, but perhaps with an indirect rather than direct effect on action-taking or leader effectiveness.

Thirdly, we operationalized leader effectiveness in a broad-based way, by tapping into aspects of personal growth and satisfaction as well as positive business outcomes. This approach was consistent with much of the recent literature (e.g. Day et al, 2014; DeRue and Workman, 2012), and in terms of construct measurement our 6-item scale reached an acceptable level of reliability (Alpha = 0.7) despite its multi-faceted nature. Nonetheless, it might be interesting in subsequent research to divide leader effectiveness into subcomponents, e.g. one focused on task-based outcomes and extrinsic validation, the other focused on personal satisfaction and intrinsic validation.

Finally, our framework might potentially serve as a meta-perspective within which other theories and constructs can be situated, such as behavioral approaches to development, or the frequently explored relationship between personality and leadership. It might also help researchers contextualize their own work, for example the literature on transfer of training (Baldwin & Ford, 1988; Blume et al., 2010; Huczynski & Lewis, 1980) provides useful insight into aspects of task-prototyping.

*Implications for Practice*

There are several practical implications following from this research. One is the straightforward point that we have provided evidence for the importance of experimentation in leadership development, and we would thus encourage leaders (and those running leadership development programs) to engage more in such activities. Not only does our research demonstrate the connection between experimentation, action-taking and performance, but also that these activities support the personal satisfaction of leaders themselves. This should offer both intrinsic and extrinsic motivation to leaders to engage in such activities.

There is of course much work to be done to turn these concepts into practical steps, thus the extent to which these findings offer practical solutions is limited as further research will be required as to what this will look like for both academic and organizational best practice.  At present, we note that some of the applied literature discussed in this paper (e.g. Heifetz & Linsky, 2002); Ibarra, 2015 Thomke, 2020) provides suggestions and frameworks in this regard.

Another link to practice is to consider how our research might inform the debate within the leadership and development (L&D) profession about the merits of different approaches to development. L&D professionals are all familiar with the 70/20/10 learning model that says 70% of learning happens on-the-job, 20% through interaction with others and 10% through formal programs. This model is loosely based on McCall et all (1988), though regrettably there is no proper evidence to support it. Our findings offer a slightly different way of looking at McCall et al’s ideas: we endorse the centrality of learning on the job through challenging assignments, but we show that it is in the iterative pathways between elements that development happens, not in those elements themselves. The process of leadership development, in other words, should not be broken out in a simplistic “70/20/10” way. We would encourage L&D professionals to take our more nuanced and integrative perspective on board in the way they design programs and facilitate the learning of their leaders.

More broadly, we would encourage practitioners to use our integrative theoretical framework as a way of discussing their approach to L&D and identifying gaps and opportunities in the learning interventions in their own organizations. For example, where there is resistance to identity-based or more experimentally-based development, the findings offer clear support for the centrality of these elements to a rigorous leadership development process, rather than viewing them as distinct or optional components. We suggest referring to our framework in planning leadership development activities. Additionally, it can be used to understand and process the learning impacts after such activity, through written feedback at the group level, or verbal discussion with a coach at the individual level, using the framework as a discussion tool.

For business schools, in addition to the learning design considerations above, our findings offer evidence and a framework for elevating their functions as facilitators of transformative learning experiences (Petriglieri, 2020) and leader identity development (Zaar, et al., 2020). The framework and underlying questionnaire might be used by individuals to reflect on their current preferences or frequently used modes of development, and to help them identify opportunities to build on and strengthen these. For example, if individuals complete the survey and note a strong tendency to learn through action-taking and self-prototyping relative to a benchmark, they might add some reflective practices or coaching to understand what this teaches them about their identity and understanding of the world. This would enable them to explore some of the other aspects of development that they might have otherwise neglected, thereby enhancing their effectiveness and increasing their sense of career satisfaction.

*Limitations and Future Research*

Several limitations should be noted. First, our quantitative methods were cross-sectional and one of the two samples was based on a single survey instrument (the other sample used a separate, boss-rated measure of leader effectiveness). There is therefore a risk that the correlations between constructs are inflated. This problem is not easily resolved, given that the individual is typically best-placed to assess all the constructs of interest (Orvis & Ratwani, 2010), but it would be worth trying to supplement this with independent proxies, for example by asking subordinates for their ratings, or by reviewing 360-feedback forms.

A more ambitious research design for future research would be to conduct a longitudinal study, given the inherent longitudinal nature of leadership development (Day, et al., 2014). This might involve administering this survey to a group of individuals before and after a specific intervention (e.g. a training program), alongside a control group that did not experience the intervention. Or it could involve administering the survey to a cohort at one point in time, then tracking their progression over a year or two before administering it again.

Another limitation was the sample of individuals surveyed. The alumni from the business school were diverse in sector and age but they had all taken part in formal business education of their own volition, which makes them a somewhat unusual group. The Finco executives were more homogeneous in age and experience, but with different levels of exposure to formal training programs. It would be interesting to widen the analysis in future to a broader sample including people who have not had any sort of formal business education, and also those who do not have formal leadership roles within their organization. Such individuals could potentially learn and develop in very different ways to those in our samples.

It would also be valuable to give explicit attention to hierarchical level as a factor in the leadership development process. A number of theories (e.g. Lord and Hall, 2005; Day and Harrison, 2007) have argued that the nature of development varies by increasing level of seniority, as people gain leadership skills and adjust their identity. While our study did not find any such effect (the control variable “Number of people reporting to you” was mostly not significant), a study design that intentionally sampled people at multiple levels could potentially be revealing.

Finally, we note that our analysis takes an individual perspective, highlighting their agency in engaging in particular development activities. It would therefore be useful to complement this approach with a systemic one, in which individual-level development is viewed as occurring within a broader cultural and environmental setting that is shaped those leading the organization as well as by factors outside their control (Hawkins and Turner, 2019). We included ‘organizational support’ as a control variable in our analysis (and indeed it was highly significant in the statistical analyses) but there are many other systemic forces affecting how an individual develops, with the Covid19 pandemic as one recent example.

These limitations can of course be seen as opportunities for further research. There is considerable scope for longitudinal research, either following individual development profiles over time, or understanding the consequences of a specific learning intervention through a quasi-experimental design. There is scope for extending the research into other populations, for example managers who have not experienced formal business education of the type provided by business schools, to see if the process and outcomes vary significantly. It might also be interesting to monitor how the process of executive development is affected by exogenous events. For example, the Covid19 pandemic led to most people working entirely from home for at least six months, and it is potentially very interesting to see what the effect of that social experiment might be on individual development processes and pathways.

**Conclusion**

In today’s business world, leaders face complex and ambiguous challenges, and it is important that they develop the skills and insights to cope effectively with these challenges. Our purpose in this study was to develop and test an experimentation perspective on this important set of challenges. Our main conceptual contribution was to separate out two dimensions of experimentation (task- and self-prototyping) and to show how they link the three perspectives of action-taking, knowledge development and identity development. Our main empirical contribution was to show that these two experimentation activities were significant predictors of action taking, even after controlling for all other factors, and that action-taking (along with self-prototyping) was an important predictor of leader effectiveness. The results also have important managerial implications, offering a practical framework which L&D professionals and organizations can use to design and evaluate leadership development activities.

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**Table 1. Characteristics of Samples**

|  |  |  |
| --- | --- | --- |
|  | Sample 1 – Alumni | Sample 2 - Finco |
| Age | 30-39 years 15%, 40-49 years 36%, 50-59 years 41%, 60+ 7% | 30-39 years 13%, 40-49 years 58%, 50-59 years 29%, [60+ 0.3%] |
| Gender | Male 77%, Female 23% | Male 61%, Female 39% |
| No. roles over five years | 1 role 24%, 2 roles 37%, 3-4 roles 33%, 5+ roles 6% | 1 role 11%, 2 roles 47%, 3-4 roles 37%, 5+ roles 5% |
| No. of people reporting to leader | 12 or fewer 30%, 13 to 99 people 36%, 100 or more people 34% | 12 or fewer 40%, 13 to 99 people 39%, 100 or more people 21% |

**Table 2: Variable Means and Correlations**

**Sample 1: Business School Alumni**



**Sample 2: Finco Executives**



\*p<.05, \*\*p<.01. \*\*\*p<.001. Boss rated effectiveness and working from home were not measured in the Alumni sample

**Table 3. Regression Analysis**

*Dependent variable: Leader Effectiveness*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1  Alumni  self-rated measure | 2  Alumni  self-rated measure | 3  Finco  self-rated measure | 4  Finco  self-rated measure | 5  Finco  Boss-rated measure | 6  Finco  Boss-rated measure |
| Age | -.11 (-2.0) | -.10 (-1.8) | -.10 (-1.9) | -.09 (-1.8) | -.12 (-2.1)\* | -.12 (-2.0)\* |
| Gender | -.03(-.5) | -.03(-.5) | .02 (.5) | .05 (.9) | -.00 (-.4) | -.01 (-.3) |
| Size of team | .12(2.3)\* | .11(2.0)\* | .24 (4.7)\*\*\* | .23 (4.5)\*\*\* | .16 (2.6)\*\* | .15 (2.4)\* |
| Time in current role | .03(.5) | .04(.6) | .00 (.0) | .00 (.0) | .02 (.3) | .02 (.3) |
| Number of recent roles | .04 (.6) | .04 (.7) | .01 (.1) | -.01(-.2) | .02 (.4) | .01 (.1) |
| Days training | .04 (.6) | .04 (.6) | .11 (2.0)\* | .11 (2.2)\* | -.04 (.7) | -.04 (.7) |
| Sponsor or mentor | .09 (1.6) | .09 (1.6) | .07 (1.3) | .07 (1.3) | -.02(.3) | -.02(.3) |
| Working from home | -- | -- | -.00(-.4) | -.02(-.4) | -.04 (-.6) | -.05 (-.9) |
| Self-analysis | .04 (.5) | .06 (.8) | -.10 (-1.3) | -.08 (-1.0) | -.04 (.4) | -.03 (.3) |
| Knowledge development | .04(.6) | .04(.6) | -.01(-.1) | -.03(-.5) | -.07 (1.0) | -.09 (1.3) |
| Task-prototyping | .07(.9) | .04(.6) | .04 (.5) | .00 (.1) | -.09 (-.9) | -.11 (-1.3) |
| Identity development | .06(.9) | .03(.5) | .14 (2.1)\* | .07 (1.1) | -.01 (.1) | -.06 (.7) |
| Self-prototyping | .20(3.1)\*\* | .14(2.1)\* | .32 (4.5)\*\* | .27 (3.8)\*\* | .26 (3.2)\*\* | .22 (2.7)\*\* |
| Action Taking (H1) |  | .19 (3.1)\*\* |  | .21 (3.4)\*\* |  | .18 (2.5)\* |
| **Overall Model** |  |  |  |  |  |  |
| R-Square | .18 | .21 | .31 | .34 | .09 | .107 |
| F statistic (sig) | 5.6 | 6.03\*\*\* | 9.9\*\*\* | 10.4\*\*\* | 2.1\* | 2.5\*\* |
| Change in R-Square / F (sig) |  | 0.03 / 9.7\*\* |  | 0.03 /11.4\*\* |  | 0.02 / 6.0\* |

Linear regression, numbers are adjusted beta coefficients with t values in parentheses, \*p<.05 \*\*p<.01 \*\*\*p<.001

**Table 4. Regression Analysis**

*Dependent variable: Action-taking*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1  Alumni | 2  Alumni | 3  Finco | 4  Finco |
| Age | -.01(-.2) | -.02 (-.5) | -.06 (-1.2) | -.03 (0.6) |
| Gender | 0.00 (0.1) | 0.01 (-.3) | -.09 (-1.6) | -.10 (-2.2)\* |
| Size of team | .18 (3.5)\*\* | .12 (2.5)\* | .15 (2.8)\*\* | .06(1.3) |
| Time in current role | -.14(-2.6)\*\* | -.07 (-1.4) | -.03 (-.5) | -.02 (-.3) |
| Number of recent roles | .10 (1.8) | 0.87 (1.7) | .1 (1.7) | .10 (1.8) |
| Days training | .02 (.3) | .03 (.6) | -.03 (-.5) | -.03) (0.7) |
| Sponsor or mentor | .04 (.8) | -.02 (-.4) | .11 (2.1)\* | .00 (.0) |
| Working from home | -- | -- | .06 (1.2) | .08 (1.7) |
| Self-analysis | .23 (4.3)\*\* | -.12 (-1.8) | .35 (6.7)\*\*\* | -.07 (-1.0) |
| Knowledge development |  | .01 (.1) |  | .11(2.1)\* |
| Identity development |  | .18 (3.1)\*\* |  | .32 (4.9)\*\*\* |
| Task-prototyping (H2) |  | .18 (2.5)\* |  | .14 (2.0)\* |
| Self-prototyping (H3) |  | .29 (4.9)\*\*\* |  | .23 (3.5)\*\* |
| **Overall Model** |  |  |  |  |
| R-Square | .124 | .267 | .226 | .397 |
| F statistic (sig) | 6.1\*\*\* | 10.3\*\*\* | 9.5\*\*\* | 14.6\*\*\* |
| Change in R-Square / F (sig) |  | .143 / 16.6\*\*\* |  | 0.17 / 20.4\*\*\* |

Linear regression, numbers are adjusted beta coefficients with t values in parentheses, \*p<.05 \*\*p<.01 \*\*\*p<.001

**Table 5. Mediation Analysis**

Direct and indirect effects of independent variables on leader effectiveness, mediated by action-taking

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Alumni Subjective measure | | | Finco Subjective measure | | | Finco boss-rated measure | | | Outcome |
|  | Direct | Indirect | Total | Direct | Indirect | Total | Direct | Indirect | Total |  |
| Task prototyping | 0.04 | 0.03 | 0.07\* | 0.01 | 0.03 | 0.03 | -.11 | .02 | -.08 | Weak results – no clear mediation effect |
| Self prototyping | 0.14\* | 0.06\* | 0.20\* | 0.27\* | 0.05\* | 0.32\* | .22\* | .04\* | .26\* | Partial mediation |

Standardized coefficients used throughout. p<.05 bootstrapping

**Notes**

1. We acknowledge there is also a broader view of leadership development, the notion that leadership is a distributed or collective capacity of a system (Day and Harrison 2007). However, we take the slightly narrower view favored by Lord and Hall (2005) which focuses on the individual operating within their network of relationships in a specific context, [↑](#endnote-ref-2)
2. To be clear, we are not talking about experimentation (e.g. field experiments or quasi-experiments) as an analytical methodology pursued by researchers. Our focus is explicitly on people within companies *themselves* conducting experiments. [↑](#endnote-ref-3)
3. The programmes in question were: Senior Executive Programme, Accelerated Development Programme, Essentials of Leadership, Developing Strategies for Value Creation, and Executing Strategy for Results. All of these were included because they included some sort of leadership perspective. Respondents had taken these courses between 1 and 20 years previously, with a mean elapsed time of 6 years. [↑](#endnote-ref-4)
4. Clearly 0.56 is significantly below the usual threshold of 0.7 for acceptable scale reliability. We believe it is more appropriate to think of this as a formative rather than a reflective construct (Diamantopoulos and Siguaw, 2006), because people access codified information in different ways – some prefer reading, others prefer video or lecture based courses. This same logic also to action-taking to some degree, as some individuals may take on challenging assignments (for example) whereas others might prefer to be exposed to new experiences. [↑](#endnote-ref-5)