Running Head: Commitment, Empowerment and Change

Longitudinal associations between employees' beliefs about the quality of the change management process, affective commitment to change and psychological empowerment

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Acknowledgements. This study was made possible through a grant from the Fond Quebecois de Recherche Société et Culture (FQRSC) awarded to the first author. This article was also made possible by a grant from the Australian Research Council (LP140100100) awarded to the first and last authors.

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This is the final pre-publication version of a manuscript accepted for publication (28 July 2015):

Morin, A.J.S., Meyer, J.P., Bélanger, É., Boudrias, J.-S., Gagné, M., & Parker, P.D. (Accepted, 28 July 2015). Longitudinal associations between employees' perceptions of the quality of the change management process, affective commitment to change and psychological empowerment. *Human Relations* [ISI 2014: 2.398].

Abstract

Organizational changes are costly ventures that too often fail to deliver the expected outcomes. Psychological empowerment (PE) and affective commitment to change (ACC) are proposed as especially important in turbulent contexts characterized by multiple and ongoing changes requiring employees' continuing contributions. In such a context, employees' beliefs that the changes are necessary, legitimate, and will be supported, are presumed to increase PE and ACC. In a three-wave longitudinal panel study of 819 employees, we examined autoregressive and cross-lagged relations among latent constructs reflecting change-related beliefs (necessity, legitimacy, support) and psychological reactions (PE, ACC). Our findings suggest that PE and ACC represent largely orthogonal reactions, that PE is influenced more by beliefs regarding support, whereas ACC is shaped more by beliefs concerning necessity and legitimacy.

Keywords. Organizational change, Commitment, Psychological Empowerment, Longitudinal.

The need for organizational change is not new, but the pressures for change are arguably more complex today than in the past. They come in different forms (e.g., technological, economic or social) and from multiple sources (competitors, clients, employees, government), often at the same time. Consequently, organizations increasingly need to tackle multiple issues simultaneously and in a continuous manner in order to maintain optimal functioning (Kang and Snell, 2009; Van Looy et al., 2005). It is now well recognized that employees reactions can be crucial to the success of organizational change, and various theories and research have attempted to account for the nature, antecedents, and consequences of these reactions (e.g., Anders and Cassidy, 2014; Armenakis and Bedeian, 1999; Armenakis and Harris, 2009; Bazzoli et al., 2004; Kotter, 1996; Rafferty et al., 2013; Stevens, 2013). However, managing complex and continuous changes introduces some unique considerations. For example, the concept of organizational "ambidexterity" (e.g., Kang and Snell, 2009; Van Looy et al., 2005) was recently introduced to recognize the need for organizations to combine orthogonal strategies (e.g., exploitation/exploration; top-down/bottom-up) as a way to sustain adaptation to turbulent environments while ensuring continuous improvement and competitiveness. For complex and continuous change initiatives, it may thus be critical for management to build employees' approval for the whole transformation process, rather than to focus on each specific change. Similarly, because complex ongoing changes make it unrealistic for management to anticipate all possible adaptive challenges for years to come, it might be particularly important to encourage employees to engage in active self-determined contributions (Hofboll, 2002). Therefore, organizations exposed to complex continuous change might need to combine a top-down communication approach aiming to build employees' approval for the change initiative with a bottom-up approach aiming to build change capabilities among employees (e.g., Argyris, 1999; Brown and Eisenhardt, 2002).

Consistent with these recommendations, we argue that organizations involved in complex and continuous changes need to build and maintain commitment to the change as well as strive to empower their employees to enact the change in ways that are best suited to the challenges they encounter (e.g., Argyris, 1999; Armenakis and Harris, 2009; Brown and Eisenhardt, 2002; Hultman, 1998; Kotter and Cohen, 2002). Accordingly, this study focuses on the development of two complementary yet distinct psychological reactions: affective

commitment to change (ACC; Herscovitch and Meyer, 2002) and psychological empowerment (PE; Spreitzer, 1995; 2008). For present purposes, we embed these two important reaction variables within Armenakis' (Armenakis and Bedeian, 1999; Armenakis and Harris, 2009; Armenakis et al., 1993) well-established theory of change readiness. More specifically, we use change-readiness theory to identify potential proximal determinants of ACC and PE (i.e., change necessity, legitimacy, and support). Consequently, our findings contribute to change readiness, ACC, and PE theories by (a) combining facets of the three theories in a single study (b) investigating relations among these facets within and across time, and (c) doing so under conditions of complex continuous change.

The study was conducted in a Canadian public health-care organization undergoing a series of changes aimed at maintaining and continuously improving the quality and efficiency of patient-care services in a context of evolving demands (e.g., regulations, scarcity of resources, evolving needs, see Laschinger et al., 2004). Importantly, as changes become more complex and continuous, it becomes increasingly important to use multi-wave longitudinal designs with appropriate statistical controls to clarify the finer grained processes by which employees' reactions evolve over time (e.g., Kim et al., 2011). Ultimately, clarifying the directionality of associations and the stability of employees' reactions will help develop more effective theories and interventions based on data characterizing the process of human adaptation to changing realities (Marks, 2007). This was our objective in the present research. For this reason, we used a multi-wave panel design to allow for a better identification of the directionality of relations between the constructs than has been possible in previous research. That is, as we test for relations between perceptions of the change and subsequent ACC and PE, we can control for stability in each of these variables as well as potential reciprocal relations whereby ACC and/or PE might also predict more positive beliefs about the change. In the following sections, we explain why ACC and PE are important in this context, introduce the theoretical framework used to guide our study, elaborate on the nature, development, and consequences of ACC and PE, and present our hypotheses.

Managing Employee Reactions to Organizational Change

As organizations undergo extensive and prolonged changes, empowered and committed workers are necessary to 'give life' to the changes, to take initiatives to refine them, and to

proactively address new problems as they continually arise (e.g., Argyris, 1999; Brown and Eisenhardt, 2002). It is for this reason that we selected ACC and PE as the focal outcome variables in our investigation. ACC reflects recognition of the importance and value of the change, and has been linked to the willingness to do what it takes to make the change work (e.g., Herscovitch and Meyer, 2002). Likewise, PE (Spreitzer, 1995, 2008) is crucial because, to remain engaged in the change implementation process, employees must feel that they have control over their work and are capable of having an impact on the way changes are implemented. At the same time, they need to have sufficient freedom in deciding how to juggle the requirements of the changes and along with their other work responsibilities.

Many factors are likely to contribute to ACC and PE under conditions of ongoing change. At this early stage of research, we chose to focus on three of the factors previously identified and investigated precursors to change readiness (Armenakis and Harris, 2009; Caldwell et al., 2004; Fugate et al., 2002; Rafferty et al., 2013). According to Armenakis and his colleagues (Armenakis and Bedeian, 1999; Armenakis and Harris, 2009; Armenakis et al., 1993) there are five key beliefs that change agents should seek to develop in employees: (a) the changes are *necessary* for the continued success of the organization, (b) the changes being implemented are a *legitimate* approach to achieving the organization's objectives, (c) the employees will receive the *support* (e.g., training) they need to cope effectively with the demands for change, (d) the changes have *value* for the employees personally, and (e) the employees have the *capacity* to implement change. The last two of these beliefs (d, e) are conceptually similar to our focal construct of ACC and PE. Indeed, belief that the change has value for employees is a key component of ACC (Herscovitch and Meyer, 2002), and perceived competencies are a key dimension of PE (Spreitzer, 1995). Although a somewhat broader construct, ACC encapsulates the belief that change has value for the employee (Herscovitch and Meyer, 2002). Similarly, the PE construct refers to a generic assessment of one's capability to perform effectively at work (Spreitzer, 1995, 2008), and thus incorporates the capacity to deal effectively with changes, especially when those become an ongoing part of one's job reality.

Interestingly, the first three beliefs (a, b, c) are intimately related to change management practices and are highly similar to antecedents of ACC and PE identified in previous research

under conditions of change (see below). Therefore, we selected the first three beliefs as our primary antecedent variables. It is important to note that change readiness theory in its current form does not address sequential ordering of the five beliefs implied in our investigation (i.e., that necessity, legitimacy and change will contribute to the development of value [ACC] and capacity [PE]). Therefore, our findings have the potential to enrich change readiness theory by proposing and testing a set of dynamic sequence through which the first three beliefs may give rise to two distinct and complementary psychological reactions (ACC and PE) argued to be critical for the success of a continuous organizational change.

We turned to self-determination theory (SDT: Deci and Ryan, 1985; Gagné and Deci, 2005; Ryan and Deci, 2000) as an overarching framework to support the proposed dynamic process model. SDT proposes that employees seek to satisfy three basic psychological needs at work: autonomy, competence, and relatedness. The satisfaction of these needs appears particularly important in a change context (Gagné et al., 2000) where both the tasks and context tend to be ill-defined or unstable (Gagné and Deci, 2005). When these needs are satisfied, employees experience autonomous rather than controlled regulation of their behavior, giving rise to higher levels of performance and well-being (Gagné and Deci, 2005). Our reason for focusing on SDT is that it has previously been linked to both commitment (Gagné et al., 2008; Meyer, 2014; Meyer et al., 2004; Meyer and Gagné, 2008) and PE (Gagné et al., 1997; Spreitzer, 2008), and shown to be relevant to many work contexts (Gagné and Deci, 2005), including organizational changes (Gagné et al., 2000). SDT provides theoretical grounds for predictions regarding the effects of change-related beliefs (necessity, legitimacy and support) on ACC and PE.

Affective Commitment to Organizational Change

Adapting Meyer and Allen's (1991) tripartite model of commitment, Herscovitch and Meyer (2002) defined commitment to change as a force that binds individuals to a course of action deemed necessary for successful implementation of the change, and noted that it can be characterized by three distinct mindsets: a desire to support the change based on its inherent benefits (affective commitment), a sense of obligation to support the change (normative commitment), and a need to support the change to avoid the cost of failing to do so (continuance commitment). Here, we focus on ACC because it has been shown to have the

strongest and most consistent positive relations with behavioral support for specific change initiatives (Herscovitch and Meyer, 2002; Meyer et al., 2007; Neves, 2009; Parish et al., 2008). Employees with strong ACC see the value in a change initiative and are therefore willing to do what is requested of them as well as engage in more discretionary activities intended to ensure the success of the change (e.g., work extra hours; promote the change).

To date, investigation of factors contributing to the development of ACC is limited and has been largely unsystematic. Among the factors found to be positively associated with ACC in cross-sectional studies are trust in management and supervisor (Neves and Caetano, 2006; Michaelis et al., 2009), participation in decision making with regard to the change (Cook et al., 2008; Sverke et al. 2008), just treatment and fairness of the change process (Bernerth et al., 2007; Foster, 2010), perceived favorableness of the change for the employee (Fedor et al., 2006) and satisfaction with communication (Conway and Monks, 2008; Rafferty and Restubog, 2010). Conditions contributing to uncertainty (e.g., job insecurity, role ambiguity, role conflict) were found to relate negatively to ACC (Bernerth et al., 2007; Foster, 2010), as was a history of negative change experiences (Rafferty and Restubog, 2010).

Although these findings offer some guidance to change managers, they are limited is several ways. With a few exceptions (Amiot et al., 2006; Axtell et al., 2002; Bommer et al., 2005; Fugate et al., 2002), most research on ACC has been cross-sectional, which severely limits causal inference. Moreover, even the few longitudinal studies of commitment within a change context (Coyle-Shapiro et al., 2002; Fugate et al., 2002; Rafferty and Restubog, 2010) generally fail to consider the possibility of reverse or reciprocal causality whereby ACC might also contribute to later change-related beliefs. In addition, a majority of studies have focused on ACC with regard to a specific change initiative. Interestingly, the amount of change that employees experience has been found to negatively relate to their willingness to continue supporting the change (Fedor et al., 2006; Herold et al., 2007). Importantly, in adapting the ACC measure (Herscovitch and Meyer, 2002) for this study, we continue to direct attention to actual changes rather than to change in general.

This study was designed to provide a more systematic investigation of the development of ACC over time during large-scale organizational change. As noted previously, we focus on beliefs about of the necessity, legitimacy, and managerial support for the changes. Although

these specific beliefs have not been addressed in previous research concerning ACC, they are logically connected to several of the factors identified earlier that have been found to have positive (trust in management, justice, communication) or negative (uncertainty, negative change history) relations with ACC. For example, clear and open communication combined with past experience of effective change management is likely to be associated with greater confidence that the changes are necessary and legitimate for continuing organizational success (e.g., Kotter and Cohen, 2002). Similarly, trust in management and perceptions of justice are likely to be associated with the belief that management will continue to provide employees with the support they need to adapt to changing conditions (e.g., Rafferty et al., 2013).

The implications of change-related beliefs of necessity, legitimacy, and support for ACC can also be explained from an SDT perspective. It has been shown that employees with a strong affective commitment tend to feel more autonomous than those with more controlled forms of motivations as they perform their job (Gagné et al., 2008, 2010; Meyer et al., 2012). Moreover, both affective commitment and autonomous motivation have been linked to greater need satisfaction (Gagné and Deci, 2005; Meyer and Maltin, 2010). Indeed, within SDT, need satisfaction is viewed as a key mediator in the relations between work conditions and autonomous forms of regulation – such as ACC. Therefore, we reasoned that employees who view the ongoing changes as necessary and legitimate are more likely to endorse them than are those who question the necessity and legitimacy but nevertheless feel forced to comply (need for autonomy). Similarly, employees who perceive management as supportive are more likely than those who do not to believe they will receive the resources needed to meet the challenges they encounter (need for competence and relatedness). Therefore, based on their intuitive links with (a) established antecedents of ACC and (b) theoretical mechanisms underlying the development of affective commitment, we tested the following hypothesis regarding the time-lagged effects of beliefs of necessity, legitimacy and support on ACC.

Hypothesis 1. Beliefs at Time t that the changes are (a) necessary, (b) legitimate, and (c) supported by management, relate positively to ACC at Time t+1 (see Figure 1).

Psychological Empowerment

Spreitzer (2008, p. 56) defined psychological empowerment as a "set of psychological states that are necessary for an individual to feel a sense of control in relation to their work".

Specifically, PE reflects an integration of four job-related cognitions (Spreitzer, 1995, 2008): meaning, competence, self-determination, and impact. *Meaning* refers to the degree of fit between job requirements and one's values, beliefs, and standards. *Competence* is the self-evaluated belief that one possesses the abilities to perform one's job effectively and is closely related to self-efficacy. *Self-determination* involves having a sense of control in the initiation and regulation of one's actions. Finally, *impact* is the belief that one can have significant influence on administrative, strategic, and operational outcomes. Seibert et al. (2011) demonstrated that these cognitions reflect unitary higher-order PE construct.

PE has been linked to a variety of positive behavioral outcomes across situations, including job performance, organizational citizenship behaviors, and change support behaviors (Choi, 2007; Seibert et al., 2011; Spreitzer, 2008). Unlike ACC, PE per se has not been studied extensively as a factor contributing to support for organizational change. However, employees' support for change has been linked positively to constructs related to PE, or specific dimensions of PE, such as self-efficacy (e.g., Cunningham et al., 2002; Herold et al., 2007) or perceived control (e.g., Fugate et al., 2002). Furthermore, PE becomes even more relevant under conditions of continuous change, where dealing with changes becomes an integral part of one's job that must be balanced with regular job responsibilities. In these circumstances, PE should have effects similar to those obtained in previous research under stable conditions (e.g., Seibert et al., 2011). Furthermore, this focus on a more generic tendency to function in a self-determined empowered manner across situations is in line with recommendations made within the change management literature (e.g., Argyris, 1999; Brown and Eisenhardt, 2002) that organizations create a more general capacity for change that goes well beyond the ability to implement a single change initiative. In the context of ongoing changes, employees are often in the best position to determine how to enact changes within their specific jobs. That is, changes might be implemented more effectively with employees empowered to do what is required on a moment-to-moment basis.

In the absence of previous research, our expectations regarding the implications of beliefs about change necessity, legitimacy, and support are shaped in part by PE theory and research regarding its structural determinants. Theoretically, PE is instilled and sustained by ensuring a good match between individual competencies and job requirements (Laschinger et al., 2006),

and providing individuals with control in their work roles (Lawler, 1992). For example, one of the factors found to contribute to PE is participation in decision making (Spreitzer, 2008). Such participation is likely to contribute to beliefs about change necessity and legitimacy. Similarly, the adequacy of training and quality of leadership contribute to the development of PE (Seibert et al., 2011) and are likely to be reflected in beliefs regarding the support received from management. This is important as ongoing changes can directly affect employees' PE by forcing them to learn new procedures and develop new competencies over and above usual work requirements – thus limiting the amount of control they can really exert on their work. For this reason, ongoing support will be necessary if organizations want employees to feel empowered to handle change as effectively as possible within their domain of influence (Boudrias et al., 2009, 2012; Lawler, 1992; Spreitzer, 1995).

As was the case for ACC, we can also draw on links between PE theory and SDT as a rationale for our study hypotheses. According to SDT, employees are more likely to experience autonomous regulation when their basic psychological needs for competence, autonomy and relatedness are met by the organization (e.g., Gagné and Deci, 2005; Gagné, 2014). These needs are conceptually similar to the four factors underlying PE (i.e., meaning, competence, self-determination, and impact). Moreover, PE has been conceptualized in previous research as an indicator of the fit between personal needs and job characteristics (Spreitzer, 2008; Laschinger et al., 2006), and shown to be intimately related to autonomous motivation (Gagné et al., 1997). Thus, just as we explained how beliefs regarding necessity, legitimacy and support can satisfy basic needs, and in doing so, contribute to strong ACC, we expect that employees will more readily find meaning in their role in the implementation of changes that are necessary and legitimate, and will feel more competent in enacting this role when they are supported. Therefore, on the basis of both previous research and basic principles from SDT, we predict that beliefs concerning necessity, legitimacy, and support will all contribute positively to PE within and across time.

Hypothesis 2. Beliefs at Time t that the changes are (a) necessary and (b) legitimate, and (c) will be supported, relate positively to PE at Time t+1 (see Figure 1).

Relations between ACC and PE

To this point, we have treated ACC and PE in isolation, but proposed that both could be

predicted by a similar set of beliefs (necessity, legitimacy and support). This implies that there might be some overlap between ACC and PE, but we are unaware of any studies that have examined the relationship between these constructs. Previous studies have reported a positive correlation between PE and affective organizational commitment (ACO) (Seibert et al., 2011), as well as between ACO and ACC (Herscovitch and Meyer, 2002; Meyer et al., 2007), which suggests that ACC and PE should relate positively. However, in the absence of clear evidence, we address the ACC-PE associations as a research question rather than a specific hypothesis.

Research Question. Are ACC and PE interrelated within- and across-time during ongoing organizational changes and, if so, what is the nature of the time-lagged relation?

Including both ACC and PE in the same analyses has another important advantage; it helps to address concerns over the influence of unmeasured variables on parameter estimation (see Meade et al., 2009). By including PE and ACC in the same model to examine time-lagged relations with change-related beliefs, we control for at least one other variable in our focal analyses. To the extent that ACC and PE relate to other unmeasured variables, each also serves as at least a partial control for these other variables. Moreover, by allowing PE and ACC to influence one another, we can also determine whether any observed relation between them influences their time-lagged relations with change-related beliefs (see Figure 1).

Method

Participants

Participants were recruited in a closely-linked (i.e. sharing buildings, services, employees, etc.) consortium of health-care organizations (specializing in long-term care and rehabilitation) affiliated with a Canadian University located in the province of Québec. This study relied on a three-wave panel design, which started in 2007. All measures were collected at approximately the same time period for three consecutive years. A total of 409 employees (response rate = 50%) completed questionnaires at Time 1, 485 (50%) at Time 2 and 423 (43%) at Time 3. Responses rates are based on the total number of employees on the consortium's payroll at the time of data collection. Employees not active on the payroll at that time (e.g., unpaid leave, maternity leave) were considered unavailable. Given the nature of the ongoing changes occurring in this consortium, employees' listing underwent drastic changes over the course of the study (including a notable intake of employees between times 1 and 2).

A total of 819 employees completed at least one time point, 371 completed at least 2 time points, and 127 completed three time points (a more extensive discussion of missing data is provided in section S2 of the online supplements). Among the 819 participants: (a) 81% were women; (b) 21% were less than 30 years old, 51% were are between 30 and 50, and 27% were more than 50 years old; (c) 39% had less than 5 years of organizational tenure, 42% had between 5 and 20 years, and 19% had more than 20 years; (d) 43% had a high school diploma or less, 24% completed college, and 33% had a university diploma; (e) 90.2% provided direct health care services to patients (nurses, nurses assistants, etc., doctors were not included in this study), 6.6% were support employees, and 3.2% were managers.

Procedures

Procedures were explained to unit managers and employees via internal communications and meetings with researchers. Then, the research team distributed paper questionnaires to all employees present during sessions scheduled by the organization. Absent employees received the study information and questionnaire by internal mail. Participants were informed that their confidentiality would be preserved and that they could withdraw from the study at any time. Written consent was obtained from all participants at each wave. Completed questionnaires were returned to the research team in a sealed envelope.

Study Context

The Canadian context leading to the changes implemented in this organization is well-described in Laschinger et al. (2004) and includes over a decade of hospital restructuring initiatives, downsizing initiatives, lay-offs, and attempts to reduce the length of patient stays, all ultimately aiming to was to deliver more efficient patient-care in a context of limited resources, population aging, and a lack of qualified personnel. In the current organization, a five year plan guided by the same set of objectives was implemented starting in 2005 (and ongoing for the full duration of the study). The initial component of this plan was a merger of various institutions providing community and health care services in the same geographic area. This merger occurred in 2005 so that the organization could be considered as a single entity at the start of the data collection in 2007. This overarching change management plan involved a complete revision of the policies and practices used in the initial organizations, relocations of employees into new buildings and work groups, and a complete restructuration

of services, health care practices, and work roles. Officially, the change process was completed in 2011, and implementation of the required changes and their repercussions were still very much visible at the end of the study. These changes were ongoing during the study.

Employees were asked to complete the measures of change-related beliefs and ACC as they pertained to the ongoing and overarching change process occurring in their organization. Interviews and focus groups conducted over the course of the study with employees, managers, and human resources professionals confirmed that it was clear for the employees that the referent was this overarching change context, rather than any specific change initiative composing it. These processes were already underway at the beginning of this study, and still ongoing at the end of the study.

Measures

Beliefs about the Quality of the Change Management Process. The Change Management Questionnaire, available in French (Desjardins, 2005), was used to assess beliefs regarding change *necessity* (four items, e.g., *Our former methods appeared to have reached their limits*), change *legitimacy* (six items, e.g., *I understand fully what has motivated the organization to introduce certain changes*) and of the adequacy of the *support* provided by management (five items, e.g., *There were sufficient training opportunities available for me to adapt to the changes introduced in the organization*). Employees rated each item on a 5-point Likert scale (1= strongly disagree; 5 = strongly agree). Desjardins (2005), using a sample of 581 employees from two organizations undergoing important changes to their information technology systems, reported acceptable scale score reliability (necessity $\alpha = .76$; legitimacy $\alpha = .75$; support $\alpha = .89$) and factorial validity (using CFA) for these subscales. Desjardins' (2005) results also supported the convergent validity of the scales in relation to measures of employees' self-efficacy in relation to the implementation of the changes and behavioral involvement in the implementation of the changes.

Affective Commitment to Change. Employees' affective commitment to the changes was assessed with five items developed in French by Morin et al. (2013) based on Herscovitch and Meyer (2002) affective commitment to change scale. These items ($\alpha = .93$; e.g., "I endorse the values underlying these changes") were rated on a 5-point Likert scale (1= strongly disagree; 5 = strongly agree) used by Morin et al. (2013).

Psychological Empowerment. PE was assessed using the French version of Spreitzer's (1995) multi-dimensional measure, developed and validated by Boudrias et al. (2010). The measure includes three items for each of four dimensions: meaning (e.g., *The work I do is meaningful to me*), competence (e.g., *I am self-assured about my capabilities to perform my work activities*), self-determination (e.g., *I can decide on my own how to go about doing my work*), and impact (e.g., *My impact on what happens in my work group is large*). Employees rated each item on a 4-point Likert scale (1= strongly disagree; 4 = strongly agree). Boudrias et al. reported that this scale presents good psychometric properties, similar to those of the original version (Spreitzer, 1995), and showed that the instrument measured the four dimensions of PE with adequate reliability (α = .85-90 for meaning, .73-.87 for competence, 80-.84 for autonomy, .87-.90 for impact), and factor validity based on exploratory factor analyses and CFA. CFA confirmed the fit of a higher-order model including a global PE factor based on four first-order dimensions in two samples (also see Seibert et al., 2011).

Analyses

Our objective was to test our study hypotheses regarding the time-lagged relations between employees' change-related beliefs and their levels of ACC and PE. To this end, we took advantage of a number of advanced data analytic procedures that allowed us to fully utilize all available data, control for autoregressive and reciprocal effects that can influence the effects of focal interest, and test for the invariance of the measurement models and equilibrium of the relations over two time periods. Although important, details regarding some of these procedures may be of less interest to more substantively-oriented readers. Therefore, we describe our basic analytic strategy in enough detail to allow those readers to proceed to the Results section. However, given that we rely on state-of-the-art statistical procedures that have yet to be integrated into mainstream organizational research, we also provide a more detailed description of key analytical issues in the online supplements.

Model Estimation

All models were estimated using the robust weighted least square estimator (WLSMV) available in Mplus 7.0 (Muthén and Muthén, 2012), which has been found to outperform Maximum Likelihood estimation with ordered-categorical Likert-type items involving 5 or less categories such as those used in the present study (e.g., Finney and DiStephano, 2013).

To account for the fact that only 371 employees answered at least two measurement points, all models were estimated based on the full information that was available, based on algorithms implemented in Mplus for WLSMV estimation. Extensive discussions of missing data, WLSMV, and shared-method variance are provided in online supplements S1, S2 and S3 .

Preliminary Analyses

Among the assumptions underlying fully latent longitudinal models, like those tested in the present study, are the expectations that the constructs measured by the different indicators remain the same across time (i.e., measurement invariance: e.g., Millsap, 2011), and that the overall longitudinal system has reached equilibrium. Equilibrium means that the pattern of associations between constructs remains the same across time periods, showing that the observed results can generalize/replicate across time periods (Cole and Maxwell, 2003). To test these assumptions, we conducted a series of preliminary CFA. The results, which are reported in the online supplements (sections S4, S5, and S6), supported the appropriateness of the measurement models, their invariance across time, and the equilibrium of the system. From these models (Table 1), scale score reliability was calculated with McDonald's (1970) ω, which is similar to alpha, but takes into account the strength of association between items and constructs as well as item-specific measurement errors. These coefficients were all relatively high and satisfactory (0.719 to 0.984; M = 0.884).

Main Model Specification

Following these preliminary CFA, we moved to predictive models. The measurement components of these predictive models were specified as invariant across time-waves on the basis of the CFA described above. This ensured stable and comparable measurement of the constructs over time and greater stability in the estimation of the predictive paths. These predictive models are illustrated in Figure 1. For clarity, the measurement part of the models relating items and latent constructs are not included in the figure, and the three change-related beliefs are treated together as the paths linking them to the other constructs are fully parallel. The thin dotted arrows reflect the measurement model relating the fist-order Meaning, Autonomy, Competence, and Impact factors to the higher-order PE factor.

We started with a baseline autoregressive model in which each latent construct measured at Time t predicted itself at Time t+1 (grayscale arrows). All other longitudinal relations were

constrained to be zero, but correlations between constructs were freely estimated within time-waves (but not represented in the figure to avoid cluttering). Then, we estimated a model in which change-related beliefs at Time t also predicted PE and ACC at Time t+1 (the full and dashed black arrows), while including the reverse cross-lagged paths controlling for effects of PE and ACC on later change-related beliefs (grayscale dashed arrows). Finally, we estimated a model also including the cross-lagged paths whereby PE predicted later levels of ACC, and ACC predicted later levels of PE (dotted back arrows).

Even with longitudinal data, it is possible to observe large cross-sectional associations between constructs, showing that individuals high on one construct also tend to be high on another construct, even though the longitudinal associations between these constructs turn out to be non-significant (e.g., Morin et al., 2011). The models used in this study allow for the verification that changes in levels of PE and ACC can be predicted over and above their longitudinal stability and potential reciprocal effects of ACC and PE on change-related beliefs – providing a clear disaggregation of the cross-sectional and longitudinal associations between the constructs (Morin et al., 2011). These models provide direct tests of the directionality of the associations between constructs (Morin et al., 2011).

At each step, we started with a model in which all predictive paths were freely estimated, and contrasted it with a model in which Time 1-Time 2 paths were constrained to be equal to the matching Time 2-Time 3 paths. This tested the predictive equilibrium of the system (Cole and Maxwell, 2003), evaluating whether Time 1-Time 2 relations could be replicated across Time 2-Time 3, which is important given missing data (see online supplements).

Model fit

The fit of all models was evaluated based on: the Chi-square (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and its 90% confidence interval. Values greater than .90 and .95 for both the CFI and TLI considered to indicate adequate and excellent fit to the data, respectively, while values smaller than .08 or .06 for the RMSEA reflects acceptable and excellent model fit (Hu and Bentler, 1999; Yu, 2002). WLSMV chi-square values are not exact, but "*estimated*" as the closest integer necessary to obtain a correct *p*-value – meaning that only the *p*-value should be interpreted. This explains why sometimes the chi-square values and resulting CFI values can

be non-monotonic with model complexity so that improvement in these indices when constraints are added should thus simply be interpreted as random. Chi square difference tests were conducted via Mplus' DIFFTEST function ($MD\Delta\chi^2$). As with the χ^2, $MD\Delta\chi^2$ are oversensitive to sample size and minor misspecifications so that nested model comparisons generally rely on examinations of changes in fit indices (Chen, 2007; Cheung and Rensvold, 2002). A CFI decline of .01 or less, and a RMSEA increase of .015 or less, between nested models indicates that the more parsimonious model (e.g., invariant) should not be rejected. With complex models, the inspection of fluctuations in fit indices that correct for parsimony (TLI and RMSEA) is also important as these indices can improve when constraints are added to a model (Marsh et al., 2005). However, we reinforce that all of these proposed cut-off scores should be considered as rough guidelines rather than golden rules (Mash et al., 2005).

Results

Preliminary Analyses

Latent correlations from the CFA models are reported in Table 1. These show significant relations between constructs, and no apparent problem of multicollinearity, which was confirmed by a detailed examination of the parameter estimates and model-implied correlations in later predictive models (online supplements S4 and S5 provide further evidence of the distinctiveness of the constructs). The highest correlations are between the constructs and themselves at later time points (M = .700, SD = .088; versus M = .503, SD = .164 for within-time correlations between different constructs and M = .444, SD = .142 for longitudinal correlations between different constructs), showing substantial longitudinal stability. This high longitudinal stability reinforces the need to rely on models taking into account these autoregressive relations when the objective is to investigate the directionality of the association between constructs. Examination of these correlations shows some preliminary support for the study hypotheses, showing mostly significant positive relations between change-related beliefs and both PE and ACC. Furthermore, correlations between change-related beliefs at Time t and PE and ACC at Time t+1 (M = .466, SD = .181) were slightly higher than the reciprocal relations between PE and ACC at Time t and change-related beliefs and Time t+1 (M = .433, SD = .143). However, these reciprocal relations remained high enough to reinforce the importance of controlling for them in the main predictive models.

Finally, within-time correlations between PE and ACC were moderate (M = .430, SD = .005), and higher than the longitudinal relations between them (M = .368, SD = .058).

Predictive Models

We first estimated an autoregressive model in which each construct predicted itself over time (Model P2), and then constrained the autoregressive paths to invariance over time (Model P3). The results (see Table 2), reveal that Model P3 fits the data well, supporting the invariance of the autoregressive paths over time. The autoregressive paths are all substantial and significant, showing the longitudinal stability of the constructs. Model P3 fitted the data almost as well as the fully saturated CFA where all possible relations between constructs were freely estimated (Model P1), suggesting that most of the longitudinal associations can be reflected through the autoregressive paths. However, the $MD\Delta\chi^2$ associated with this comparison remained large and suggested that a better representation of the data was possible.

Next, to verify Hypotheses 1 and 2, we tested a second model allowing change-related beliefs to predict later levels of PE and ACC while controlling for the reciprocal effects of PE and ACC on change-related beliefs (Model P4). These additional paths again proved to be fully invariant over time (Model P5), confirming the equilibrium of the predictive system over time periods. Models P4-P5 fitted the data slightly better than Model P3 according to a small improvement in fit indices and a substantial improvement in $MD\Delta\chi^2$. When reciprocal effects between PE and ACC were added to model P5 in order to test our Research Question (i.e., Models P6), and constrained to invariance (Model P7), the results showed no improvement in the fit to the data. There was no increase in the $MD\Delta\chi^2$ and the CFI, and even a slight decrease in fit indices controlling for parsimony (i.e., RMSEA and TLI). Moreover, there was no change in the estimated reciprocal relations between change-related beliefs and ACC and PE. The results from these models revealed non-significant reciprocal paths between PE and ACC, failing to support longitudinal associations between PE and ACC (providing a null answer to our Research Question). Similarly, although the within-time correlations between PE and ACC were significant in the CFA (r = .426 to .436; see Table 1), this changed in the predictive models when the longitudinal stability of the constructs was controlled through autoregressive paths. Indeed, the correlation between PE and ACC was significant at Time 1 (r = .396, p < .01), potentially due to un-modelled common antecedents, whereas correlations

between PE and ACC residuals were non-significant at Time 2 (r = .285, p >.05) and 3 (r = .175, p >.05) once construct stability was controlled for.

Model P5 was thus retained as the final model. Parameter estimates from this model are reported in Table 3. These results showed clear autoregressive relations, whereby each construct measured at Time t was moderately to strongly related to itself at Time t+1 (*ß* = .378 for ACC to .864 for PE), attesting to the presence of dispositional or otherwise stable determinants, especially for PE. Once these were controlled, some effects of PE on later beliefs about *necessity* and *support*, and of ACC levels on beliefs concerning *support*, were also evident, supporting the need to account for these reciprocal relations in the models.

Turning to the findings of direct relevance to our hypotheses, beliefs regarding *necessity* and *legitimacy* (but not *support*) at Time t related significantly to ACC levels at Time t+1. Although the relation was positive for beliefs about *legitimacy* as predicted, the relation was negative for beliefs concerning *necessity*. These findings partially supported Hypothesis 1. Similarly, beliefs about *support* (but not *necessity* and *legitimacy*) at Time t related significantly and positively with PE levels at Time t+1, partially supporting Hypothesis 2.

The results revealed a relatively small but significant negative cross-lagged relation between beliefs about *necessity* and ACC (*ß* = -.140 to -.142), compared to a much stronger positive relation between beliefs concerning *legitimacy* and ACC (*ß* = .549 to .556). This result was surprising, particularly in light of the fact that the latent correlations between beliefs regarding *necessity* and ACC remained positive within each time-wave (r = .293-.557), as well as across time-waves in the longitudinal CFA (r = .501-.525, see Table 2). However, as can also be seen in Table 2, employees' beliefs about *necessity* and *legitimacy* also share a substantial amount of variance (within-time r = .670-.732). Thus, when both are included as predictors, multivariate analyses estimate the unique effect of each predictor on the outcome (i.e., on changes in the outcomes over and above the autoregressive effects) controlling for the variance it shares with the other predictor. We note here that a detailed examination of parameter estimates from the predictive models, as well as of the model-implied correlations among constructs, confirm that this result is not due to any problem of multicollinearity. Furthermore, although the high autoregressive paths estimated for some of the constructs may cast doubts on this conclusion, we emphasize here that multicollinearity

problems, when they occur, occur when variables specified as predictors (i.e., constructs measured at the same time points in the models estimated here) share elevated correlations among them (resulting in redundancy), not when the relations between some predictors and some outcomes are elevated. Thus, this negative relation suggests that beliefs that changes are necessary (i.e., the previous ways of doing things are no longer effective), but not legitimate (i.e., the new practices proposed are not adequate to solve the problem), will tend to predict lower levels of future ACC. This interpretation was confirmed in additional models where both predictors where considered separately. In these alternative models including only either *necessity* or *legitimacy* as predictors, the effects of beliefs regarding *necessity* on ACC were positive (*ß* = .105-.107; $p < .01$), and lower than the effects of beliefs concerning *legitimacy* (*ß* = .414-.417; $p < .01$). Other results remained unchanged.

Discussion

In this study, we demonstrated that employees' change-related beliefs contribute, within and across time, to the prediction of ACC and PE under conditions of continuous change. This is an important finding given existing evidence for the positive links between ACC and behavioral support for specific changes (Herscovitch and Meyer, 2002; Meyer et al., 2007), and between PE and effective performance more generally (Seibert et al., 2011; Spreitzer, 2008). It is noteworthy that the longitudinal cross-lagged relations between employees' change-related beliefs and subsequent ACC and PE were obtained after controlling for construct stability, reciprocal effects of ACC and PE on change-related beliefs, and within-time relations between ACC and PE. Including these controls allowed us to have greater confidence about the directionality of these relations over time than has been the case in the past. Indeed, when we examine the bivariate correlations reported in Table 1, these appear to support previous cross sectional studies, showing that most of the relations among constructs are positive and significant, both within and across time. However, when proper controls for the longitudinal stability of the constructs, and reciprocal effects among them, are properly estimated, a completely different pattern of results emerge. According to this model, ACC and PE appear to be relatively independent of one another as they change over time, and to be predicted by different beliefs. More precisely, our results showed PE to be particularly responsive to beliefs about management support for the changes, whereas ACC was impacted

more by the perceived legitimacy and necessity of the changes, although the effects of necessity controlling for legitimacy turned out to be negative. It is important to note that although we can be more confident in the nature and direction of the relations we observed, some findings were contrary to our predictions. At this point, any explanation we can offer remains speculative, but might serve to guide future hypothesis development.

Although unexpected, it was particularly interesting to find that, controlling for construct stability and reciprocal relations, employees' beliefs regarding change necessity were *negatively* related to ACC over time. We were able to rule out multicollinearity as an explanation for this unexpected result. Instead, we propose that this negative relation may reflect the fact that, when employees perceive that changes are necessary (i.e., that something needs to be done) but are not convinced of their legitimacy (i.e., they doubt the potential effectiveness of the proposed change to address the problem), they may be less willing to commit to supporting them. SDT (e.g., Gagné et al., 2000) proposes that people are more likely to embrace change when they are provided with an attractive reason for it (e.g., a direction and a rationale) rather than feeling pressured to change or fear the negative consequences of not changing. From an experiential standpoint, situations where a change appears necessary without also being seen as legitimate could undermine intrinsic motivation to change and result in more controlled forms of motivation. Furthermore, employees who realize that the organization is not currently functioning effectively (i.e., change is necessary), but is not on a legitimate path to correct the problem, may become less committed to the organization itself. Based on previous research, we would expect this reduction in ACO to be accompanied by weaker commitment to the changes (Herscovitch and Meyer, 2002; Meyer et al., 2007). This can create a downward spiral in which reduced ACC leads to less positive change-related beliefs, which leads to further reduction and ACC, as reflected in our findings of reciprocal time-lagged relations.

Another unexpected finding was that ACC did not relate positively to beliefs about managerial support as predicted. Again, it must be kept in mind that beliefs concerning support and ACC did correlate positively in the within-time analyses, and that the lack of a relationship in the time-lagged analyses involves residualized variables. That is, the time-lagged relation between beliefs regarding support and ACC at a later time was examined with

prior ACC, PE, and the other beliefs controlled. Thus, it is possible that any positive influence of support on subsequent ACC was indirect through one of these other variables. Also contrary to our predictions, management support was the only belief to predict PE in the time-lagged analyses. One possible explanation for this finding is that managerial support is relevant to employees' sense of PE in general, even under conditions when the changes are not particularly salient (i.e., during the periods of stability in the ebb and flow of change). Thus, once this salient predictor is controlled, belief about the necessity and legitimacy of change become relatively unimportant. Of course, these finding requires replication but, if found to hold, will necessitate refinement to the framework that guided the present research.

Contributions to Theory

In this study, we used change readiness theory and SDT to develop a theoretical framework integrating ACC and PE, two important psychological reactions (ACC and PE) to organizational change. Consequently, even though our hypotheses were not fully supported and the framework may require some modification, our findings have important implications for ACC and PE theories and their integration.

ACC Theory. Our study contributes to the theory of commitment to organizational change in several important ways. First, it examines how ACC develops under conditions of continuous change. Second, it addresses one of the biggest gaps in existing theory and research on ACC, namely the relative lack of attention to antecedents relative to consequences (e.g., Coyle-Shapiro et al., 2002; Rafferty and Restubog, 2010). By drawing predictors from an established theory of change readiness (Armenakis and Bedeian, 1999; Armenakis and Harris, 2009; Rafferty et al., 2013), bolstered by SDT (Deci and Ryan, 1985; Gagné and Deci, 2005; Ryan and Deci, 2000), we were able to provide more structure to the antecedent side of ACC theory than has been available to date. Third, by utilizing sophisticated longitudinal analytic procedures, our study provides clear evidence that the relations identified in our study are directional and likely to reflect causal effects. Through the use of these sophisticated procedures we were able to demonstrate not only that change-related beliefs related to subsequent levels of ACC, but also that ACC related positively to subsequent change-related beliefs (i.e., the time-lagged relations are reciprocal). We also discovered that there is considerable stability over time in both change-related beliefs and ACC. This sets the stage

for future research examining forces for stability and change in the way employees perceive and react to ongoing changes.

PE Theory. As noted previously, PE was not originally conceptualized as a change-related variable. Nevertheless, PE has obvious implications for continued effectiveness in the context of complex and continuous change when dealing with change becomes a part of employees' regular routine. Therefore, our inclusion of PE within an established theoretical framework addressing the key determinants of employees' change readiness (Armenakis and Bedeian, 1999; Armenakis and Harris, 2009; Rafferty et al., 2013) helps to expand PE theory as well as it breadth of relevance. Although we expected that PE would be positively influenced by beliefs concerning change necessity, legitimacy, and support (Hypothesis 2), we found that only beliefs about being supported had unique positive effects on PE. This suggests that providing support to help employees face new challenges and demands is more critical to maintenance and improvement of employees' sense of control, motivation and competence to meet work demands (including those resulting from change) than nurturing beliefs about the necessity or legitimacy of the changes themselves.

Integration of ACC, PE, and Change Readiness Theories. Our study brought together two theories, ACC and PE, that have to date been investigated in isolation, and used them in conjunction with change readiness theory and SDT to propose an overarching theoretical framework pertaining to employees' reactions to complex and continuous change. Although we suspected that ACC and PE would relate positively, we did not have solid grounds for predicting how they would relate over time in the context of ongoing changes. Overall, our findings suggest that, although ACC and PE did relate positively within time, they developed somewhat independently over time, and were influenced by different change-related beliefs.

Although used primarily as a framework to guide our investigation of ACC and PE, our finding might also have relevance for change readiness theory. Armenakis and colleagues (e.g., Armenakis and Bedeian, 1999; Armenakis and Harris, 2009) proposed that five key beliefs (necessity, legitimacy, support, value, and capacity) should be nurtured among employees to further their readiness for change. These five beliefs have always been conceptualized as complementary, and never been sequentially-ordered. In the present study, based on the nature of the constructs, SDT, and previous research, we argued that two of these

beliefs, value and capacity, are subsumed by ACC and PE, respectively, and that the remaining beliefs would serve as antecedents to these more general 'reaction' variables. Although we initially hypothesized that ACC and PE would each be predicted by necessity, legitimacy, and support, your findings suggested that, as they evolve over time, ACC and PE are relatively independent and predicted be different beliefs. This modified theoretical framework must be verified in subsequent research, but provides preliminary evidence suggesting that the five beliefs identified by Armenakis and his colleagues may indeed have a sequential ordering. More precisely, our results suggest two distinct, complementary and orthogonal, pathways in line with organizational "ambidexterity" conceptions of organizational change (e.g., Kang, & Snell, 2009; Van Looy et al., 2005).

The first pathway is likely to emerge from top-down communication approaches aiming to build employees' approval for the change initiative. Through this pathway, belief that change is necessary, when coupled with beliefs that it is also legitimate, contribute to building the perceived value of the change among employees, leading to higher levels of ACC. The second pathway emerges from efforts to build change capability among employees in a more ongoing manner (e.g., Argyris, 1999). Through this pathway, beliefs that change will be supported by management contribute to building employees' capacity for change, in turn leading to PE. The orthogonality of these pathways makes perfect sense. The fact that one is drawn to a change does not necessarily mean that one also perceive having the require ability to implement the change. Similarly, having the ability to embark on a specific course of action does not necessarily mean that this course of action has value.

Previous research further supports the idea that these two orthogonal pathways may lead to distinct behavioral outcomes. Although there are no studies available to compare the effects of PE and ACC on outcomes in the same dataset, available results suggest that, while ACC is key to building support for the change itself, PE is critical to the ability to maintain satisfactory performance levels when facing challenging situations and proactive or innovative behaviors (e.g., Voigt & Hirst, 2015). Indeed, the first pathway, going through ACC, is more likely to lead to behavioral support for the change itself (e.g., Herscovitch and Meyer, 2002; Meyer et al., 2007). In contrast, the second pathway, going through PE, is more likely to lead to the preservation of stable levels of performance in a context of change and to

efforts to improve change implementation (e.g., Boudrias et al., 2014; Maynard et al., 2014; Seibert et al., 2011). These complementary pathways should be further investigated in future studies, and tested in models including both objective indicators of change management practices, and behavioral outcomes on the part of employees.

Practical Implications

In practice, the fact that ACC and PE were largely orthogonal reactions suggests that change agents should monitor both reactions, as they could indicate how well the organization is doing in communicating a top-down overarching vision of the change while preserving and nurturing capabilities in employees to support bottom-up initiatives to improve change implementation and maintain their performance levels. As the concept of organizational ambidexterity suggests, both processes can occur simultaneously. Therefore, there is added value in studying both reactions, rather than relying on a single overarching measure of change readiness. As noted previously, employees are more likely to develop ACC when they perceive the changes to be legitimate. Although demonstrating that the changes are necessary may be a precursor to making a case for legitimacy, our findings suggest that necessity in the absence of legitimacy can actually have negative effects on ACC over time. An organization that needs to change but has not identified an approach that will address the presenting problem(s) is unlikely to garner the kind of support needed to be successful. Change agents therefore need to provide a convincing case for why a particular course of action was chosen for the change and why they believe it will be successful in achieving the desired outcomes. This might be achieved by providing evidence of the success of similar changes in the past, bolstered by continuous feedback on how well the change is working. This may prove more difficult when change is continuous than when it is highly circumscribed, but evidence of early successes, what Kotter and Cohen (2002) refer to as “small wins,” might help to reinforce perceptions of both the necessity and legitimacy of the chosen path to change. Similarly, for long term change initiatives, proposing a coherent vision of the future emerging from a legitimate set of actions may also represent a key lever to develop and sustaining ACC over time. Whether, as we proposed, these mechanisms really play a more critical role in the context of complex ongoing changes, were ACC needs to be maintained over a longer time period, than in the context of more circumscribed change initiatives, remains an open question

for future research exploring similar issues in a longitudinal manner across various types of changes initiatives.

In contrast to ACC, the most important belief for the development of PE seems to be support from management. This is not surprising because, regardless of the necessity or legitimacy of the change, employees cannot feel empowered unless they have sufficient training and resources to cope with the demands created by the changes. Interestingly, developing the employees' capability to take initiatives does not appear to depend on providing an overall direction, or rationale, for the change itself. This suggests that the initiatives needed to promote and maintain PE, providing managerial support for change initiatives in particular, may be independent of those required for ACC. In line with models of organizational learning (e.g., Argyris, 1999; Kang & Snell, 2009), we argued that PE becomes particularly relevant under conditions of continuous change, where dealing with changes is an integral part of one's job that must be balanced with regular job responsibilities. Therefore, change agents might think of developing PE among employees through ongoing training and development opportunities as a way to cultivate a fertile ground for proactive actions aimed at improving both organizational functioning and change implementation. The observed high levels of stability in PE (as documented by high the autoregressive paths) suggest that successfully influencing PE might generate benefits that are enduring in terms of change capacity. This property could be especially interesting in large-scale ongoing changes, in comparison to short-term specific changes, requiring that employees contributions and adjustment efforts be maintained over a longer-term period.

Another important finding of our study is the fact that change-related beliefs, ACC, and PE were all relatively stable over a three-year period, despite the broad range of changes taking place. We did not specifically address the source of that stability in the present study, but it is likely that it reflects dispositional differences as well as situational consistency (or at least perceived consistency; e.g., Morin et al., 2011). Organizations that anticipate undergoing continuous change may need to ensure that they hire employees' who are adept at coping, or even thriving, under conditions of change. Moreover, they must realize that changing ACC or PE is not something that can be done overnight. Indeed, our findings suggest that employees who have weak ACC and PE may be inclined to have more negative change-related beliefs

over time, whereas those with strong ACC and PE will tend to have more positive beliefs. Therefore, it is important for organizations and change managers to establish a reputation for effectiveness in managing changes because these perceptions are likely to be long-lasting.

Limitations and Directions for Future Research

Some limitations of the current research need to be acknowledged, including our focus on a limited set of perception variables (necessity, legitimacy, and support) and psychological reactions to organizational changes (ACC and PE). In particular, although SDT assumes that the relations between work conditions (or perceptions of work conditions) and autonomous forms of regulation (such as ACC or PE) is mediated by need satisfaction, this specific mediational mechanism was not directly assessed on the present study. Of course, the generalizability of our findings is also limited by our focus on a single organization from the healthcare industry and the implementation of a broad, albeit somewhat specialized, set of ongoing changes. Although we see no reason to assume that the results would differ if assessed in a different context, their generalizability still remains on open research question. Like many, if not all, longitudinal studies conducted, we were forced to deal with the issue of missing data. As noted previously (see online supplement S2), we addressed this issue using state-of-the art procedures allowing us to utilize all available data to its fullest potential in testing our theoretical models (Enders, 2010; Graham, 2009; Newman, 2009).

The one-year time lag used in this study needs to be considered carefully. We found evidence that most constructs were quite stable over a one (r = .576 to .886), or two (r = .604 to .789) year period, which is in line with estimates reported in previous studies of similar constructs (e.g., Bommer et al., 2005; Fugate et al., 2002; Laschinger et al., 2004) and supports the idea that studying change in these constructs requires relatively long time lags. Still, longitudinal research always needs to be interpreted in relation to a specific time frame (Cole and Maxwell, 2003). A shorter time frame may have allowed us to detect finer associations occurring at the state level, while a longer time frame might have revealed relations occurring at a more fundamental trait level. Ultimately, longitudinal evidence needs to be built incrementally from an accumulation of studies exploring alternative time frames.

Our study also focused on the affective mindset of commitment to change. In addition to ACC, Herscovitch and Meyer (2002) proposed that employees can also experience normative

(NCC) and continuance (CCC) commitment to change, and present profiles characterized by varying combinations of ACC, NCC, and CCC. Expanding the theoretical framework to include these other commitment mindsets would allow for the detection of conditions that could thwart the long-term success of change. For example, when change is believe to necessary but not legitimate, it might undermine ACC, while also leading to the development of CCC. Meyer et al. (2007) found that CCC was positively related to 'mere compliance' (i.e., do what is asked but nothing more). Indeed, they may do what is asked, even if they believe that it is contrary to the objectives of the change.

All variables were assessed using self-reports, a legitimate approach when dealing with psychological variables. However, although our results are unlikely to be biased by this characteristic (see online supplement S3), we encourage future researchers to expand this investigation beyond the psychological variables examined here while including more objective measures of the conditions likely to influence these beliefs, as well as the consequences of these reactions.

Finally, our study relies on the assumption that there are ways for management (e.g., communication, involvement, planning, etc.) to impact change-related beliefs of legitimacy, necessity, and support, and that increased levels of ACC and PE will be translated into more positive outcomes for change programs. As noted above, previous cross sectional and longitudinal research provides compelling evidence of the benefits of both ACC and PE for organizations (e.g., Herscovitch and Meyer, 2002; Meyer et al., 2007; Seibert et al., 2011; Spreitzer, 2008), generally supporting the idea that ACC and PE represent valuable outcomes in their own right. Ultimately, our results should lead to studies going beyond investigations of the impact of change-related beliefs on psychological states in order to predict actual changes in behaviours. This would provide a more complete picture of the mechanisms at play as organizations try to implement broad and continuous changes.

Conclusion

This study sought to integrate change readiness theory with SDT as guides to understanding how ACC and PE develop and evolve during the course of complex and ongoing organizational changes. We studied these two psychological reactions using longitudinal analyses introducing appropriate controls for the stability of each construct over

time and for time-lagged relations among them, allowing us to obtain a cleaner picture of the directionality of the associations between ACC, PE, and employee's change-related beliefs. In line with the organizational "ambidexterity" approach to change management (e.g., Kang and Snell, 2009; Van Looy et al., 2005), our results suggest that ACC and PE represent orthogonal reactions corresponding to two complementary change management pathways. The first pathway stems from top-down communication approaches aiming to legitimize the change process and contributing to ACC, a known antecedent of behavioral support for change initiatives. The second pathway reflects a bottom-up approach involving managerial efforts to empower their employees to implement the change in ways that are best suited to the challenges they encounter. Through the provision of managerial support, managers contribute to sustain PE, a psychological state likely to influence employees' ability to take initiatives and to maintain satisfactory performance levels when facing challenging situations. Our findings contribute to change readiness theory by suggesting a sequential ordering of the five key beliefs identified by Armenakis and colleagues (1999, 2009) as well as the existence of orthogonal pathways reflecting top-down and bottom-up change management processes.

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Table 1. *Latent Factor Correlations and Reliabilities for the Longitudinal Higher-Order Confirmatory Factor Analytic Model (N = 819)*

	Time 1					Time 2					Time 3				
	L	N	S	PE	ACC	L	N	S	PE	ACC	L	N	S	PE	ACC
Time 1: L	*.904*	.702*	.533*	.362*	.804*	.754*	.541*	.542*	.413*	.730*	.789*	.593*	.584*	.327*	.786*
Time 1: N		*.865*	.363*	.138	.566*	.583*	.612*	.350*	.221*	.511*	.595*	.604*	.328*	.134	.525*
Time 1: S			*.939*	.471*	.471*	.396*	.260*	.682*	.536*	.458*	.545*	.403*	.611*	.463*	.475*
Time 1: PE				*.719*	.430*	.384*	.146	.514*	.886*	.394*	.363*	.255*	.351*	.655*	.331*
Time 1: ACC					*.978*	.698*	.491*	.495*	.437*	.757*	.664*	.477*	.493*	.282*	.775*
Time 2: L						*.916*	.670*	.554*	.413*	.766*	.675*	.475*	.473*	.376*	.710*
Time 2: N							*.901*	.322*	.221*	.562*	.502*	.633*	.381*	.146	.501*
Time 2: S								*.938*	.518*	.510*	.442*	.255*	.576*	.520*	.551*
Time 2: PE									*.788*	.436*	.344*	.225*	.400*	.742*	.418*
Time 2: ACC										*.977*	.567*	.418*	.514*	.348*	.753*
Time 3: L											*.920*	.732*	.586*	.431*	.763*
Time 3: N												*.864*	.418*	.263*	.553*
Time 3: S													*.940*	.456*	.660*
Time 3: PE														*.784*	.426*
Time 3: ACC															*.983*

Note. L = change legitimacy; N= change necessity; S = change support; PE = psychological empowerment; ACC = affective commitment to change. Scale score reliability reported in the diagonal (italicized) and were computed from the standardized parameter estimates, using McDonald's (1970) omega coefficient: $\omega = (\Sigma|\lambda i|)^2 / ([\Sigma|\lambda i|]^2 + \Sigma\delta ii)$ where λi are the factor loadings and δii, the error variances. * = p ≤ .01.

Table 2. *Results from the Predictive Models (N = 819).*

Models	χ^2	*dl*	*RMSEA (90% CI)*	*CFI*	*TLI*	*MDΔχ²*	*Δdl*	*ΔRMSEA*	*ΔCFI*	*ΔTLI*
P1. Fully saturated CFA model	7382.561*	4892	.025 (.024-.026)	.972	.972	-	-	-	-	-
P2. Autoregressive model	7567.539*	4958	.025 (.024-.026)	.971	.972	237.138*	66	.000	-.001	.000
P3. P2 + Predictive invariance	7541.721*	4963	.025 (.024-.026)	.971	.972	14.670	5	.000	.000	.000
P4. P3 + Initial cross lagged predictions	7467.463*	4939	.025 (.024-.026)	.972	.972	98.335*	12	.000	+.001	.000
P5. P4 + Predictive invariance	7364.989*	4951	.024 (.023-.026)	.972	.974	19.854	12	-.001	.000	+.002
P6. P5 + Final cross lagged predictions	7390.047*	4947	.025 (.023-.026)	.972	.973	8.428	4	+.001	.000	-.001
P7. P6 + Predictive invariance	7369.534*	4949	.024 (.023-.026)	.972	.974	5.206	2	-.001	.000	+.001

Note. χ^2 = WLSMV chi square; *df*= degrees of freedom; *RMSEA* = Root mean square error of approximation; *90% CI* = 90% Confidence Interval for the RMSEA; *CFI* = Comparative fit index; TLI = Tucker-Lewis index; Δ since previous model; MDΔχ^2 : chi square difference test based on the Mplus DIFFTEST function for WLSMV estimation; Given that the χ^2 and MDΔχ^2 tend to be sensitive to sample size and minor misspecifications, and to account for the multiple tests used in this study, significance level was set at .01 (Bollen, 1989; Morin et al., 2009; Rensvold and Cheung, 1998). * $p < .01$.

Table 3. *Parameter estimates from the final predictive model (Model P5) (N= 819).*

Predictors (t)	*Outcomes (t +1)*	*Time 1 → Time 2 ß (E.S.)*	*Time 2 → Time 3 ß (S.E.)*	*Time t → Time t+1 b (S.E.)*
Autoregressive paths				
Necessity	Necessity	0.578 (0.046)**	0.615 (0.050)**	0.576 (0.046)**
Legitimacy	Legitimacy	0.789 (0.059)**	0.703 (0.050)**	0.802 (0.061)**
Support	Support	0.552 (0.052)**	0.485 (0.049)**	0.514 (0.050)**
ACC	ACC	0.378 (0.050)**	0.404 (0.052)**	0.406 (0.053)**
PE	PE	0.790 (0.056)**	0.864 (0.061)**	0.852 (0.063)**
Predictive paths				
Necessity	ACC	-0.142 (0.055)**	-0.140 (0.055)**	-0.497 (0.198)*
Legitimacy	ACC	0.549 (0.079)**	0.556 (0.082)**	1.244 (0.191)**
Support	ACC	0.078 (0.050)	0.073 (0.047)	0.130 (0.085)
Necessity	PE	0.035 (0.079)	0.038 (0.085)	0.050 (0.111)
Legitimacy	PE	-0.061 (0.083)	-0.064 (0.087)	-0.054 (0.074)
Support	PE	0.135 (0.052)**	0.157 (0.059)**	0.097 (0.037)**
ACC	Necessity	0.140 (0.053)**	0.160 (0.062)**	0.043 (0.017)**
ACC	Legitimacy	0.121 (0.061)	0.114 (0.058)	0.058 (0.030)
ACC	Support	0.253 (0.047)**	0.256 (0.048)**	0.152 (0.029)**
PE	Necessity	0.043 (0.053)	0.045 (0.055)	0.033 (0.040)
PE	Legitimacy	0.025 (0.044)	0.022 (0.038)	0.030 (0.053)
PE	Support	0.102 (0.043)*	0.095 (0.041)*	0.151 (0.066)*

Note. ACC = Affective Commitment to Change; PE = Psychological Empowerment. The final model included invariant predictive paths, which explains why the non-standardized coefficients (*b*) are invariant across time periods. Conversely, the standardized coefficients (*ß*) are a function of the variances of latent constructs on which no constraints were imposed, and thus differ slightly across time periods. ** $p < .01$; * $p < .05$

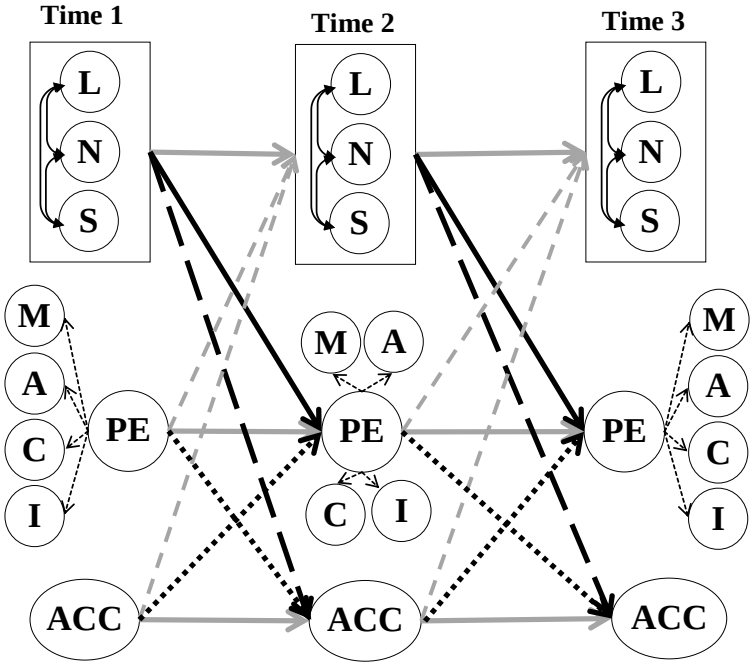

Figure 1. Alternative predictive models.

Note. L = beliefs of change legitimacy; N= beliefs of change necessity; S = beliefs that change will be supported; M = meaning; A = autonomy; C = competence; I = impact; PE = psychological empowerment; ACC = affective commitment to change. The thin dotted arrows reflect the measurement model relating M, A, C, and I to the higher-order PE factor. The full grayscale arrows reflect the autoregressive paths whereby each construct at Time t predicts itself at Time t+1. The dashed black arrows represent hypothesis 2 whereby change perceptions predict ACC. The full black arrows represent hypothesis 2 whereby change-related beliefs predict PE. The grayscale dashed arrows represent the reversed paths controlling for potential effects of PE and CC on later change-related beliefs. The dotted black arrows represent the possible reciprocal relations between PE and ACC that is tested as part of the research question.

Online Supplemental Materials for:

Longitudinal associations between employees' beliefs about the quality of the change management process, affective commitment to change and psychological empowerment

Sections

S1. Model Estimation for Ordered-Categorical Items

The items used to estimate all latent constructs were rated on ordered-categorical scales including 4 to 5 responses categories. Structural equation models are typically estimated using Maximum Likelihood (ML; Bollen, 1989) estimation, or robust alternatives (MLR; Satorra & Bentler, 1994). However, ML/MLR estimation assumes that the underlying response scale is continuous, and that responses are normally distributed. Although ML, and especially MLR, are robust to non-normality, assumptions of underlying continuity are harder to approximate when few response categories are used. To better reflect the ordered-categorical nature of the response scales typically used in applied research, alternatives to ML/MLR estimation have been proposed, starting with Weighted Least Square (WLS, also called Asymptotic Distribution-Free, ADF) estimation (Browne, 1984; Muthén, 1984). However, WLS/ADF estimation is very demanding in terms of sample size, and generally fails to properly recover the population model underlying the data (Finney & DiStephano, 2006, 2013; Flora, & Curran, 2006). Robust alternatives to WLS estimation using diagonal weight matrices, such as WLSMV estimation (Muthén, 1993; Muthén, Du Toit, & Spisic, 1997), have been recently proposed as alternatives to WLS/ADF. Recent simulation studies (for a review, see Finney & DiStephano, 2006, 2013; also see Bandalos, 2014) clearly indicate that when response scales includes 5 or fewer categories, such as in the present study, robust WLS estimation (e.g., WLSMV) outperforms ML/MLR estimation, which tends to produce biased (sometimes severely) results. For this reason, all models were estimated using the WLSMV estimator available in Mplus 7.0 (Muthén & Muthén, 2012).

S2. Missing Data

As is commonly the case in applied, particularly longitudinal, research, we were required to address the issue of missing data. Indeed, only 371 of our 819 participants completed at least two measurement points. Although it has been common practice in the past to only retain participants who provided multiple waves of data–which technically represents the listwise deletion of participants who participated in a single wave, there is now an emerging consensus within the statistical community that "The best data-analytic method for dealing with missing data follows a simple yet fundamental principle: Use all of the available data" (Newman, 2009, p. 11). In longitudinal studies, this consensus translate in the need to include all participants, irrespective of completeness (e.g., Bollen & Curran, 2006; Fitzmaurice, Laird, & Ware, 2004; Enders, 2010; Graham, 2009; Hedeker & Gibbons, 2006).

For present purposes, all models were estimated based on the full information that was available, based on algorithms implemented in Mplus for WLSMV estimation (Asparouhov & Muthén, 2010). This procedure has been found to result in generally unbiased parameter estimates under even very high levels of missing data (e.g., 50% or more) or time points under Missing At Random (MAR) assumptions (i.e. the propensity for missing data on a variable can be correlated to other variables in an analysis, but not to levels of the variable itself), and even in some cases to violation of this assumption (Enders, 2010; Graham, 2009; Shin, Davidson, & Long, 2009). Such procedures are generally recognized as having comparable efficacy as more computer intensive multiple imputation procedures (Enders, 2010; Graham, 2009; Larsen, 2011), and have the advantage of using all of the model-based available information without relying on suboptimal imputation strategies. This strategy is not an imputation method (i.e. no missing values are replaced) but directly estimates parameters (versus specific missing values on specific variables) based on all available information in the variance-covariance matrix. A significant advantage of this strategy is that it maximizes sample size and achieves greater stability in estimation, which is important here given the complexity of the models. Although the algorithm implemented in Mplus to handle missingness under WLSMV slightly differs from algorithms used with ML/MLR, the end result is similar for models such as those used here. In these models, all latent variables are involved in predictive relations (see Asparouhov & Muthén, 2010), and missing data

algorithms allow missing values to be conditional on all variables included in the analyses – which is the definition of the Missing at Random (MAR) assumption. Given that preliminary verifications showed that missing data in this study where generally unrelated to any of the variables included in our models, or to demographic variables available in the data set but not included in the analyses, we can be confident that the results are unbiased by missing data. For greater precision, we now provide some additional information on these procedures.

Our models are fully latent, and the final models are based on invariant measurement models. This means that, although data from participants who responded at a single time point could not be used to estimate the longitudinal paths, they contributed to the estimation of more stable measurement models at each time point (with larger time-specific samples). Consequently, the information provided by these participants is taken into account in estimation of other parts of the model given that the measurement models are specified as invariant (i.e., equal) over time. Similarly, given the invariance constraints placed on the predictive paths themselves across time points, all predictive information provided by participants who answered Time 1-Time 2, but not Time 3, still serves to enrich the estimation of the Time 2-Time 3 relation. It should be noted that none of the estimated paths covered three time points. Thus, the subsample that completed all three measurement points (n = 127) is not relevant here beyond their contributions to the measurement model and estimation of the invariant paths between Time t and Time t+1. Our design thus allowed us to estimate paths between Time 1 and Time 2 using all participants who provided data on these two time points, and then to see whether these results generalize to the relations between Time 2 and Time 3 based on all participants who completed these two measurement points.

To verify that our approach did not have any major impact on our findings, we re-estimated all models using data from the 371 participants who responded on at least two occasions. The results, which we report in sections S7 to S10 of the online supplements, were very similar and did not alter conclusions with regard to any of our study hypotheses. Consequently, we focus here on the results of the more appropriate models estimated using the full available information. The fact that the results remain unchanged across the two sets of models (using the full information or the reduced sample) further supports our assertion that missing data were MAR. As a further test of this assertion, we attempted to include a

number of demographic controls (i.e., age, gender, tenure, employment status, education level, familial income) in our analyses. Finding similar results with and without controlling for these variables would provide further evidence that there were no systematic patterns to the missingness related to variables not included in the main models (i.e. the demographics). Because the models were already very complex, models including demographic controls failed to converge on fully proper solutions. However, the main conclusions from this additional model did not differ from those reported here, providing further support to the idea that missing data were MAR. This assumption is finally bolstered by the fact that autoregressive cross-lagged models explicitly control for cross-sectional associations between variables, as well as for the longitudinal stability of the constructs, before estimating the cross-lagged relations. By controlling for the stability of the constructs, these models thus really estimate the impact of constructs on other constructs over and above their temporal stability – i.e., the influence of one construct on *changes* in the other construct. Thus, it would be surprising for stable covariates (e.g., demographics) to modify these relations as these relations themselves reflect time-related fluctuations. The same logic applies to the possible impact of stable characteristics on missing data, which are unlikely to exert an impact that changes across time.

S3. Shared Method Variance

Although all constructs assessed in the present study were measured with self-reported instruments, common-method bias is unlikely to play a role. First, following Podsakoff, MacKenzie, and Podsakoff's (2003) recommendations, constructs were measured in different sections of a longer questionnaire to minimize patterned responses biases, surveys were returned sealed directly to the research team, and participants were ensured confidentiality. Second, Siemsen Roth, and Oliveira (2010) provided an equation-based demonstration that multivariate analyses including multiple predictors assessed with the same method include a natural control for shared method variance given that multivariate effects are estimated from each predictor's unique (i.e., not shared) contribution to the equation. Third, autoregressive cross-lagged models include a second natural control for shared method variance. Indeed, including the autoregressive paths allows for the estimation of predictions that are net of what each construct shares with itself over time, including all forms of method variance known to display substantial longitudinal stability (Marsh, Scalas, & Nagengast, 2010). Fourth, the final longitudinal CFA used in this study was re-estimated including one additional orthogonal method factor related to all items, as recommended by Podsakoff et al. (2003) to estimate the proportion of shared method variance in the model. This model showed that the method factor only accounted for 22% of the total variance (versus 51% for the constructs), which is close to the 11%–25% reported as characteristic of models not biased by method variance (Lance, Dawson, Birkelbach, & Hoffman, 2010; Podsakoff et al., 2003; Williams, Cote, & Buckley, 1989). Our main conclusions also remained unchanged when this method factor was included. It should also be noted that this method factor is known to induce biases in the estimation of relations between variables due to the fact that the method factor also absorbs meaningful variance from the constructs – consequently, it only provides an upper bound on the potential amount of shared method variance in a model rather than a precise estimate (e.g., Marsh et al., 2010; Richardson, Simmering, & Sturman, 2009). Thus, all things considered, we are confident that our findings were not biased by the use of self-report measures. That said, we encourage future researchers to expand the focus of investigation beyond the psychological variables examined here while including more objective measures of the conditions likely to influence perceptions, as well as the consequences of these reactions.

S4. Confirmatory Factor Analyses

We first verified the adequacy of two a priori longitudinal factor models. First we estimated a confirmatory factor analytic model including, at each time point, 8 a priori first-order factors reflecting change legitimacy, change necessity, change support, meaning, self-determination, competence, impact, and ACC, for a total of 24 correlated factors (8 factors * 3 time points = 24). Then, we estimated our a priori model in which a higher-order PE factor was estimated from the four first-order PE factors (for a total of three higher-order factors across the three time points). All models were specified as congeneric, with each item allowed to load on a single factor, and all factors freely allowed to correlate within time-points as well as across time-points. In these models, a priori correlated uniquenesses between matching indicators of the factors utilized at the different time-points should be included in longitudinal models to avoid converging on biased and inflated stability estimates (Jöreskog, 1979; Marsh, 2007). This inclusion reflects the fact that indicators' unique variance is known to emerge, in part, from shared sources of influences over time.

Tests of measurement invariance across time points were performed in a sequential strategy devised through a combination of recommendations for first-order (Meredith,1993; Millsap, 2011) and higher-order (Cheung, 2008) factor models, extended to longitudinal research and WLSMV estimation (Millsap, 2011; Morin, Moullec, Maïano, Layet, Just, & Ninot, 2011). For identification purposes, the measurement invariance of the first-order factor model needed to be estimated first, without the higher-order structure, in the following sequence where each steps adds the invariance of a new parameters to those constrained to be invariant at the previous step: (i) configural invariance (same measurement model), (ii) weak invariance (invariance of the factor loadings); (iii) strong invariance (invariance of the thresholds; with ordered categorical items, thresholds replace the intercepts and reflect the points at which the scores change from one category to another); (iv) strict invariance (invariance of the uniquenesses), (v) invariance of correlated residuals among matching indicators (invariance of the correlated uniquenesses); (vi) invariance of the variances and within-time covariances between the constructs, (vii) latent means invariance. Whereas step (i) to (v) tested the invariance of the measurement model and helped to verify whether the meaning of the constructs had switched over time (in addition to helping stabilizing the

predictive models), steps (vi) and (vii) were designed to verify the equilibrium of the longitudinal system. The invariance of the higher-order structure was then verified in a similar sequence, with the baseline model specified as invariant over time according to the conclusions of steps (i) to (v) of the preceding sequence.

The fit results from the preliminary confirmatory factor analyses are reported in Table S5. These results confirm the adequacy of both a priori longitudinal measurement models with indices indicating excellent fit (RMSEA $\leq$ .06; CFI and TLI $\geq$ .95). When the models with and without the higher-order PE factor are contrasted, the results confirm that the decrement of fit related to the addition of the higher-order factor is negligible and compensated by the increased parsimony of the higher-order factor model (ΔRMSEA $\leq$ .015; ΔCFI $\leq$ .010; ΔTLI $\leq$ .010). Similar conclusions emerged when the measurement models were estimated separately for each time point. This more parsimonious higher-order model was thus retained for the following analyses. Given that some within-time correlations proved to be slightly higher than anticipated (> .700; see Table 1 in the main manuscript), we also contrast the a priori model with models in which ACC and change legitimacy on the one hand (Models 1-3, 2-3, and 3-3), and change legitimacy and change necessity on the other hand (Models 1-4, 2-4, and 3-4), were specified as forming a single factor. These alternative models systematically provided a substantial decrement in fit (ΔRMSEA = .10 to .024; ΔCFI $\leq$ .007 to .013; ΔTLI $\leq$ .008 to .017) when compared to the a priori models (1-2, 2-2, 3-2), confirming the distinctiveness of the constructs.

Detailed parameter estimates for this higher-order longitudinal model are reported in Table S6 and confirm the adequacy of the measurement model with strong and significant loadings in the expected direction. Tests of measurement invariance for both the first-order and higher-order measurement models (see Table S2), confirmed the complete measurement invariance of these models across time-points (configural, loadings, thresholds/intercepts, uniquenesses, correlated uniquenesses) and the complete equilibrium of the system over time (variances, covariances, means). This shows that the longitudinal system has reached stability and that results can be expected to generalize to longer periods than the three years considered here. Indeed, none of the changes in fit indices exceeded the recommended cut-offs of .01 for the CFI and .015 for the RMSEA and the TLI likewise showed no changes exceeding .002.

Although some of the MD$\Delta\chi^2$ were significant, they always remained relatively small when considering the differences in degrees of freedom, confirming their known oversensitivity to sample size and minor misspecifications. The model of complete measurement invariance (M12) was retained as the basis for the predictive models.

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Table S5.

Results from the Alternative Measurement Models

Models	*χ²*	*dl*	*RMSEA (90% CI)*	*CFI*	*TLI*	*MDΔχ²*	*Δdl*	*ΔRMSEA*	*ΔCFI*	*ΔTLI*
Time 1 (N = 409)										
Time 1-1. A priori 8 first-order factors	1218.783*	467	.063 (.058-.067)	.980	.977	-	-	-	-	-
Time 1-2. A priori higher-order factor	1659.343*	481	.077 (.073-.081)	.969	.966	188.633*	14	+.014	-.011	-.011
Time 1-3. Merging ACC and Legitimacy	2001.711*	485	.087 (.083-.091)	.960	.956	130.407*	4	+.010	-.009	-.010
Time 1-4. Merging Necessity and Legitimacy	2000.176*	485	.087 (.083-.091)	.960	.956	136.886*	4	+.010	-.009	-.010
Time 2 (N = 485)										
Time 2-1. A priori 8 first-order factors	1455.830*	467	.066 (.062-.070)	.976	.973	-	-	-	-	-
Time 2-2. A priori higher-order factor	1637.010*	481	.070 (.067-.074)	.972	.969	121.830*	14	+.004	-.004	-.004
Time 2-3. Merging ACC and Legitimacy	2289.164*	485	.088 (.084-.091)	.956	.953	213.735*	4	+.018	-.016	-.016
Time 2-4. Merging Necessity and Legitimacy	2323.857*	485	.088 (.085-.092)	.956	.952	215.665*	4	+.018	-.016	-.017
Time 3 (N = 423)										
Time 3-1. A priori 8 first-order factors	1252.759*	467	.063 (.059-.067)	.985	.982	-	-	-	-	-
Time 3-2. A priori higher-order factor	1275.121*	481	.062 (.058-.067)	.984	.983	65.479*	14	-.001	-.001	+.001
Time 3-3. Merging ACC and Legitimacy	2002.698*	485	.086 (.082-.090)	.970	.967	202.098*	4	+.024	-.014	-.016
Time 3-4. Merging Necessity and Legitimacy	1636.286*	485	.075 (.071-.079)	.977	.975	146.463*	4	+.013	-.007	-.008
Time-Specific Measurement Models (N = 819)										
Longitudinal-1. A priori 8 first-order factors	6076.511*	4377	.022 (.020-.023)	.981	.979	-	-	-	-	-
Longitudinal-2. A priori higher-order factor	6792.453*	4515	.025 (.024-.026)	.975	.973	537.153*	138	+.003	-.006	-.006
Longitudinal invariance of the first order factor model (N = 819)										
M1. Configural Invariance	6076.520*	4377	.022 (.020-.023)	.981	.979	-	-	-	-	-
M2. Weak invariance (loadings)	6125.644*	4427	.022 (.020-.023)	.981	.979	65.077	50	.000	.000	.000
M3. Strong invariance (intercepts)	6292.885*	4585	.021 (.020-.023)	.981	.980	205.019*	158	-.001	.000	+.001
M4. Strict invariance (uniquenesses)	6360.569*	4651	.021 (.020-.022)	.981	.980	157.404*	66	.000	.000	.000
M5. Invariance of correlated uniq.	6422.532*	4717	.021 (.020-.022)	.981	.980	95.296*	66	.000	.000	.000
M6. Variance-covariance invariance	6359.857*	4789	.020 (.019-.021)	.981	.982	118.579*	72	.000	.000	+.001
M7. Latent means invariance	6408.670*	4805	.020 (.019-.021)	.981	.982	44.076*	16	.000	.000	.000
Longitudinal invariance of the HO factor (N = 819)										
M8. HO Configural Invariance (from M5)	7372.800*	4865	.025 (.024-.026)	.972	.972	-	-	-	-	-
M9. HO Weak invariance (loadings)	7369.152*	4871	.025 (.024-.026)	.972	.972	16.229	6	.000	.000	.000
M10. HO Strong invariance (intercepts)	7384.077*	4877	.025 (.024-.026)	.972	.972	26.559*	6	.000	.000	.000
M11. HO Strict invariance (uniquenesses)	7386.866*	4885	.025 (.024-.026)	.972	.972	26.270*	8	.000	.000	.000
M12. HO Invariance of the correl. uniq.	7382.561*	4892	.025 (.024-.026)	.972	.972	6.429	7	.000	.000	.000
M13. HO Variance-covariance invariance	7262.977*	4914	.024 (.023-.025)	.974	.974	37.074	22	-.001	+.002	+.002
M14. HO Latent means invariance	7258.876*	4916	.024 (.023-.025)	.974	.974	0.626	2	.000	.000	.000

Note. *χ²* = WLSMV chi square; *df*= degrees of freedom; *RMSEA* = Root mean square error of approximation; *90% CI* = 90% Confidence Interval for the RMSEA; *CFI* = Comparative fit index; TLI = Tucker-Lewis index; Δ since previous model; MDΔχ^2 : chi square difference test based on the Mplus DIFFTEST function for WLSMV estimation; Given that the MDΔχ^2 tends to be oversensitive to sample size and to minor model misspecifications, as the chi-square itself, and to take into account the overall number of MDΔχ^2 tests used in this study, the significance level for these tests was set at .01 (Bollen, 1989; Morin et al., 2009; Rensvold, & Cheung, 1998). * $p < 0{,}01$.

Table S6.

Standardized Parameter Estimates from the Longitudinal Higher-Order Confirmatory Factor Analytic Model (N = 819)

	L		N		S		M		A		C		I		HO-PE[1]		ACC	
	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ
Time 1																		
Indicator 1	0.735	0.460	0.583	0.660	0.822	0.324	0.847	0.283	0.799	0.362	0.759	0.424	0.931	0.133	0.581	0.662	0.924	0.146
Indicator 2	0.789	0.377	0.790	0.376	0.888	0.211	0.785	0.384	0.822	0.324	0.832	0.308	0.870	0.243	0.208	0.957	0.966	0.067
Indicator 3	0.801	0.358	0.851	0.276	0.912	0.168	0.864	0.254	0.934	0.128	0.801	0.358	0.787	0.381	0.895	0.199	0.934	0.128
Indicator 4	0.803	0.355	0.890	0.208	0.843	0.289									0.731	0.466	0.957	0.084
Indicator 5	0.751	0.436			0.873	0.238											0.910	0.172
Indicator 6	0.812	0.341															0.936	0.124
Reliability (ω)	0.904		0.865		0.939		0.871		0.889		0.840		0.898		0.719		0.978	
Time 2																		
Indicator 1	0.778	0.395	0.639	0.592	0.827	0.316	0.916	0.161	0.814	0.337	0.578	0.666	0.857	0.266	0.667	0.555	0.928	0.139
Indicator 2	0.796	0.366	0.851	0.276	0.871	0.241	0.864	0.254	0.893	0.203	0.797	0.365	0.808	0.347	0.433	0.813	0.955	0.088
Indicator 3	0.898	0.194	0.898	0.194	0.903	0.185	0.847	0.283	0.826	0.318	0.879	0.227	0.818	0.331	0.865	0.252	0.909	0.174
Indicator 4	0.799	0.362	0.925	0.144	0.863	0.255									0.774	0.401	0.911	0.170
Indicator 5	0.758	0.425			0.868	0.247											0.952	0.094
Indicator 6	0.783	0.387															0.955	0.088
Reliability (ω)	0.916		0.901		0.938		0.908		0.882		0.802		0.867		0.788		0.977	
Time 3																		
Indicator 1	0.857	0.266	0.563	0.683	0.871	0.241	0.855	0.269	0.851	0.276	0.610	0.628	0.892	0.204	0.711	0.494	0.945	0.107
Indicator 2	0.798	0.363	0.750	0.438	0.887	0.213	0.816	0.334	0.885	0.217	0.835	0.303	0.799	0.362	0.507	0.743	0.971	0.057
Indicator 3	0.866	0.250	0.838	0.298	0.855	0.269	0.842	0.291	0.922	0.150	0.841	0.293	0.840	0.294	0.792	0.373	0.933	0.130
Indicator 4	0.757	0.427	0.949	0.099	0.858	0.264									0.735	0.460	0.960	0.078
Indicator 5	0.737	0.457			0.881	0.224											0.961	0.076
Indicator 6	0.848	0.281															0.953	0.092
Reliability (ω)	0.920		0.864		0.940		0.976		0.917		0.810		0.882		0.784		0.983	

Note. [1] All factor loadings, save one, are higher than .400. The factor loading relating the competence first-order factor to the higher-order PE factor proved to be non-satisfactory at Time 1 (0.208), but not at other times. Furthermore, the results from the tests of measurement invariance suggest that once the system is stabilized through invariance constraints, then the PE factor is properly defined by all four first-order factors at all time-points (0.407 to 0.838). All predictive models were estimated starting from longitudinally invariant measurement model. λ = standardized factor loadings; δ = standardized uniquenesses; L = change legitimacy; N= change necessity; S = change support; M = meaning; A = autonomy; C = competence; I = impact; HO-PE = higher-order factor reflecting psychological empowerment (estimated from the M, A, C, and I first-order factors); ACC = affective commitment to the change. Scale score reliability was computed from the standardized parameter estimates, using McDonald's (1970) omega coefficient: $\omega = (\Sigma|\lambda i|)^2 / ([\Sigma|\lambda i|]^2 + \Sigma\delta ii)$ where λi are the factor loadings and δii, the error variances. Compared with traditional scale score reliability (e.g., alpha; see Sijtsma, 2009), ω has the advantage of taking into account the strength of association between items and constructs (λi) as well as item-specific measurement errors (δii). All parameter estimates significant at $p \leq .01$.

Table S7.

Results from the Alternative Measurement and Predictive Models Tested on Participants who Completed at Least Two Time Points (N = 371)

Models	*χ^2*	*dl*	*RMSEA (90% CI)*	*CFI*	*TLI*	*MD$\Delta\chi^2$*	*Δdl*	*ΔRMSEA*	*ΔCFI*	*ΔTLI*
Measurement models										
Longitudinal-1. A priori 8 first-order factors	*5717.489**	*4377*	*.029 (.027-.031)*	*.978*	*.976*	-	-	-	-	-
Longitudinal-2. A priori higher-order factor	*6311.634**	*4515*	*.033 (.031-.035)*	*.970*	*968*	*537.153**	*138*	*+.004*	*-.008*	*-.008*
Longitudinal invariance of the first order factor model										
M1. Configural Invariance	5717.525600*	4377	.029 (.027-.031)	.978	.976	-	-	-	-	-
M2. Weak invariance (loadings)	5764.562*	4427	.029 (.026-.031)	.978	.976	64.803	50	.000	.000	.000
M3. Strong invariance (intercepts)	5931.415*	4585	.028 (.026-.030)	.978	.977	225.526*	158	-.001	.000	+.001
M4. Strict invariance (uniquenesses)	6009.723*	4651	.028 (.026-.030)	.978	.977	151.436*	66	.000	.000	.000
M5. Invariance of correlated uniq.	6075.802*	4717	.028 (.026-.030)	.978	.977	98.799*	66	.000	.000	.000
M6. Variance-covariance invariance	6013.391*	4789	.026 (.024-.028)	.980	.980	101.521	72	-.002	+.002	+.003
M7. Latent means invariance	6041.356*	4805	.026 (.024-.028)	.980	.980	35.882*	16	.000	.000	.000
Longitudinal invariance of the HO factor										
M8. HO Configural Invariance (from M5)	6952.835*	4865	.034 (.032-036)	.966	.966	-	-	-	-	-
M9. HO Weak invariance (loadings)	6949.981*	4871	.034 (.032-036)	.966	.966	15.623	6	.000	.000	.000
M10. HO Strong invariance (intercepts)	6965.645*	4877	.034 (.032-036)	.966	.966	31.678*	6	.000	.000	.000
M11. HO Strict invariance (uniquenesses)	6976.752*	4885	.034 (.032-036)	.966	.966	28.713*	8	.000	.000	.000
M12. HO Invariance of the correl. uniq.	6974.953*	4892	.034 (.032-036)	.966	.967	6.484	7	.000	.000	+.001
M13. HO Variance-covariance invariance	6861.708*	4914	.033 (.031-035)	.968	.969	28.286	22	-.001	+.002	+.002
M14. HO Latent means invariance	6862.440*	4916	.033 (.031-034)	.968	.969	3.692	2	.000	.000	.000
Alternative predictive models (from M12)										
P1. Fully saturated CFA model (M12)	6974.953*	4892	.034 (.032-036)	.966	.967	-	-	-	-	-
P2. Autoregressive model	7238.019*	4958	.035 (.033-.037)	.963	.964	250.427*	66	+.001	-.003	-.003
P3. P2 + Predictive invariance	7196.280*	4963	.035 (.033-.037)	.964	.965	9.558	5	.000	+.001	+.001
P4. P3 + Initial cross lagged predictions	7164.392*	4939	.035 (.033-.037)	.964	.965	87.867*	12	.000	.000	.000
P5. P4 + Predictive invariance	7064.403*	4951	.034 (.032-.036)	.966	.966	13.939	12	-.001	+.002	+.001
P6. P5 + Final cross lagged predictions	7097.646*	4947	.034 (.032-.036)	.965	.966	4.863	4	.000	-.001	.000
P7. P6 + Predictive invariance	7072.665*	4949	.034 (.032-.036)	.966	.966	3.059	2	.000	+.001	.000

Note. χ^2 = WLSMV chi square; *df*= degrees of freedom; *RMSEA* = Root mean square error of approximation; *90% CI* = 90% Confidence Interval for the RMSEA; *CFI* = Comparative fit index; TLI = Tucker-Lewis index; Δ since previous model; MD$\Delta\chi^2$: chi square difference test based on the Mplus DIFFTEST function for WLSMV estimation; Given that the MD$\Delta\chi^2$ tends to be oversensitive to sample size and to minor model misspecifications, as the chi-square itself, and to take into account the overall number of MD$\Delta\chi^2$ tests used in this study, the significance level for these tests was set at .01 (Bollen, 1989; Morin et al., 2009; Rensvold, & Cheung, 1998). * $p < 0{,}01$.

Table S8.

Standardized Parameter Estimates from the Higher-Order Longitudinal Confirmatory Factor Analytic Model for Participants who Completed at Least Two Time Point (N = 371)

	L		N		S		M		A		C		I		HO-PE[1]		ACC	
	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ	λ	δ
Time 1																		
Indicator 1	0.716	0.488	0.552	0.696	0.836	0.301	0.870	0.242	0.799	0.362	0.777	0.396	0.936	0.123	0.512	0.738	0.931	0.133
Indicator 2	0.789	0.378	0.770	0.408	0.875	0.235	0.774	0.401	0.805	0.352	0.869	0.246	0.866	0.25	0.127	0.984	0.970	0.059
Indicator 3	0.801	0.359	0.885	0.217	0.913	0.166	0.886	0.214	0.952	0.094	0.786	0.382	0.753	0.433	0.893	0.203	0.942	0.113
Indicator 4	0.833	0.306	0.903	0.184	0.862	0.257									0.755	0.429	0.966	0.068
Indicator 5	0.808	0.348			0.866	0.251											0.914	0.164
Indicator 6	0.830	0.311															0.945	0.107
Reliability (ω)	0.912		0.865		0.940		0.882		0.890		0.852		0.890		0.690		0.980	
Time 2																		
Indicator 1	0.802	0.357	0.613	0.625	0.838	0.298	0.925	0.144	0.814	0.337	0.653	0.573	0.861	0.258	0.658	0.567	0.927	0.141
Indicator 2	0.805	0.352	0.849	0.279	0.903	0.184	0.857	0.265	0.886	0.215	0.837	0.299	0.814	0.337	0.420	0.824	0.952	0.094
Indicator 3	0.907	0.177	0.871	0.241	0.950	0.098	0.827	0.317	0.817	0.333	0.884	0.219	0.812	0.341	0.901	0.188	0.919	0.155
Indicator 4	0.816	0.333	0.928	0.139	0.874	0.236									0.779	0.394	0.941	0.114
Indicator 5	0.772	0.403			0.868	0.246											0.960	0.078
Indicator 6	0.781	0.390															0.964	0.070
Reliability (ω)	0.922		0.892		0.949		0.904		0.877		0.838		0.869		0.794		0.980	
Time 3																		
Indicator 1	0.852	0.274	0.577	0.667	0.896	0.196	0.894	0.200	0.861	0.258	0.542	0.706	0.867	0.248	0.706	0.502	0.934	0.128
Indicator 2	0.807	0.348	0.785	0.384	0.889	0.210	0.790	0.376	0.906	0.180	0.861	0.259	0.776	0.397	0.490	0.760	0.974	0.052
Indicator 3	0.869	0.245	0.834	0.304	0.838	0.297	0.808	0.347	0.935	0.126	0.840	0.294	0.840	0.294	0.828	0.314	0.927	0.141
Indicator 4	0.753	0.433	0.959	0.080	0.856	0.268									0.744	0.447	0.957	0.085
Indicator 5	0.755	0.430			0.877	0.231											0.954	0.090
Indicator 6	0.852	0.274															0.957	0.084
Reliability (ω)	0.923		0.874		940		0.871		0.928		0.800		0.868		0.791		0.982	

Note. [1] All factor loadings, save one, are higher than .400. The factor loading relating the competence first-order factor to the higher-order PE factor proved to be non-satisfactory at Time 1, but not at other times. Furthermore, the results from the tests of measurement invariance suggest that once the system is stabilized through invariance constraints, then the PE factor is properly defined by all four first-order factors at all time-points. λ = standardized factor loadings; δ = standardized uniquenesses; L = change legitimacy; N= change necessity; S = change support; M = meaning; A = autonomy; C = competence; I = impact; HO-PE = higher-order factor reflecting psychological empowerment (estimated from the M, A, C, and I first-order factors); ACC = affective commitment to the change. Scale score reliability was computed from the standardized parameter estimates, using McDonald's (1970) omega coefficient: $\omega = (\Sigma|\lambda i|)^2 / ([\Sigma|\lambda i|]^2 + \Sigma\delta ii)$ where λi are the factor loadings and δii, the error variances. Compared with traditional scale score reliability (e.g., alpha; see Sijtsma, 2009), ω has the advantage of taking into account the strength of association between items and constructs (λi) as well as item-specific measurement errors (δii). All parameter estimates significant at $p \leq .01$.

Table S9.

Latent Factor Correlations from the Higher-Order Confirmatory Factor Analytic Model for Participants who Completed at Least Two Time Points (N = 371)

	Time 1					Time 2					Time 3				
	L	N	S	PE	ACC	L	N	S	PE	ACC	L	N	S	PE	ACC
Time 1: L	*.912*	.683*	.552*	.387*	.814*	.727*	.527*	.522*	.388*	.713*	.784*	.587*	.591*	.328*	.785*
Time 1: N		*.865*	.337*	.207*	.585*	.569*	.611*	.342*	.214*	.510*	.600*	.594*	.338*	.137	.528*
Time 1: S			*.940*	.542*	.511*	.376*	.251*	.652*	.501*	.442*	.530*	.392*	.611*	.447*	.463*
Time 1: PE				*.690*	.466*	.376*	.157	.493*	.874*	.396*	.381*	.269*	.366*	.674*	.346*
Time 1: ACC					*.980*	.688*	.492*	.484*	.421*	.752*	.670*	.479*	.505*	.288*	.780*
Time 2: L						*.922*	.682*	.564*	.391*	.772*	.666*	.468*	.486*	.372*	.707*
Time 2: N							*.892*	.360*	.260*	.563*	.496*	.630*	.393*	.145	.499*
Time 2: S								*.949*	.554*	.578*	.432*	.245*	.578*	.510*	.539*
Time 2: PE									*.794*	.413*	.328*	.212*	.399*	.726*	.401*
Time 2: ACC										*.980*	.565*	.418*	.536*	.356*	.764*
Time 3: L											*.923*	.727*	.605*	.352*	.773*
Time 3: N												*.874*	.435*	.230*	.557*
Time 3: S													*.940*	.337*	.690*
Time 3: PE														*.791*	.409*
Time 3: ACC															*.982*

Note. L = change legitimacy; N= change necessity; S = change support; PE = psychological empowerment; ACC = affective commitment to the change. Scale score reliability reported in the diagonal (italicized) and were computed from the standardized parameter estimates, using McDonald's (1970) omega coefficient: $\omega = (\Sigma|\lambda i|)^2 / ([\Sigma|\lambda i|]^2 + \Sigma\delta ii)$ where λi are the factor loadings and δii, the error variances. * = $p \leq .01$.

Table S10.

Parameter Estimates from the Final Predictive Model (Model P5) for Participants who Completed at Least Two Time Points (N = 371)

Predictors (t)	*Outcomes (t +1)*	*Time 1 → Time 2 ß (E.S.)*	*Time 2 → Time 3 ß (S.E.)*	*Time t → Time t+1 b (S.E.)*
Autoregressive paths				
Necessity	Necessity	0.594 (0.047)**	0.619 (0.048)**	0.610 (0.048)**
Legitimacy	Legitimacy	0.809 (0.061)**	0.717 (0.049)**	0.812 (0.062)**
Support	Support	0.505 (0.056)**	0.473 (0.054)**	0.493 (0.056)**
ACC	ACC	0.378 (0.052)**	0.421 (0.054)**	0.399 (0.053)**
PE	PE	0.774 (0.054)**	0.846 (0.062)**	0.861 (0.067)**
Predictive paths				
Necessity	ACC	-0.137 (0.048)**	-0.149 (0.053)**	-0.519 (0.190)**
Legitimacy	ACC	0.558 (0.075)**	0.592 (0.084)**	1.256 (0.192)**
Support	ACC	0.019 (0.045)	0.020 (0.046)	0.031 (0.072)
Necessity	PE	-0.027 (0.069)	-0.029 (0.075)	-0.042 (0.110)
Legitimacy	PE	0.003 (0.076)	0.003 (0.084)	0.002 (0.073)
Support	PE	0.102 (0.049)*	0.117 (0.055)*	0.072 (0.030)*
ACC	Necessity	0.140 (0.052)**	0.150 (0.057)**	0.040 (0.016)*
ACC	Legitimacy	0.100 (0.061)	0.093 (0.058)	0.047 (0.030)
ACC	Support	0.245 (0.048)**	0.248 (0.049)**	0.158 (0.033)**
PE	Necessity	0.030 (0.047)	0.031 (0.049)	0.021 (0.034)
PE	Legitimacy	0.016 (0.040)	0.045 (0.036)	0.019 (0.047)
PE	Support	0.125 (0.044)**	0.122 (0.044)**	0.202 (0.073)**

Note. ACC = Affective Commitment to Change; PE = Psychological Empowerment. The final model included invariant predictive paths, which explains why the non-standardized coefficients (*b*) are invariant across time periods. Conversely, the standardized coefficients (*ß*) are a function of the variances of latent constructs on which no constraints were imposed, and thus differ slightly across time periods. ** $p < .01$; * $p < .05$