Abstract

The purpose of this study is to examine the micro-level dynamics underlying macro-level associations between organizational change and its outcomes, focusing in particular on the role of networks in shaping individual reactions to change. Drawing upon multilevel research on situational and individual antecedents of change, we first argue that the magnitude of change at the unit level has a non-linear effect on change recipients' tendency to resist change, which in turn influences their adaptive behaviors. We argue, further, that the attitudinal and structural composition of the professional networks in which change recipients are embedded account for differences in their adaptive behaviors. Finally, we argue that individual adaptivity coalesces at the collective, i.e., unit level, and predicts the attainment of desired change goals. We find general support for our arguments in a longitudinal study using multi-source data on 170 physicians in 29 units of a large hospital that experienced a major restructuring intervention. Results confirm that multilevel mechanisms involving individuals and their social context fundamentally undergird macro-level outcomes of change. We discuss the theoretical and practical implications of bringing a network perspective to bear on issues of individual and collective reactions to organizational change.

Keywords: Organizational change, reactions to change, social networks, multilevel analysis, patient-centered care

A multilevel study of social networks and collective reactions to organizational change

Recent years have seen a surge of interest in the study of organizational change and its impact on organizations. Implementing organizational change is fraught with difficulties, and frequently change initiatives fail to achieve their intended objectives (Rafferty et al., 2013). Even when organizations commit adequate resources to support change, the internal structure may respond heterogeneously. For example, during large-scale restructuring interventions involving "major reconfiguration of internal administrative structure that is associated with an intentional management change program" (McKinley & Scherer, 2000: 736), some functions or divisions may readily adjust to change to meet the top management expectations and attain desired change goals. Others may lag behind and their adaptive performance fall below expectations. What factors contribute to such variability in collective responses and outcomes of change?

Organizational change means giving up established ways of doing things (Woodman & Dewett, 2004), and typically involves heterogeneous responses from organizational members (Jimmieson et al., 2004). Recent research has suggested that an important factor behind the failure of organizational change efforts is lack of organizational members' adaptivity, defined in terms of behavioral change aligned with the change effort (Stouten et al., 2018; Bartunek et al., 2006). More formally, adaptivity refers to the degree to which organizational members cope with, respond to, and support changes that have an impact on the work environment and day-to-day work activities (Griffin et al., 2007). In this paper, we are interested in exploring the micro-level dynamics underlying macro-level associations between change and its consequences. More specifically, we investigate multilevel factors affecting individual adaptive behaviors and collective responses to change, focusing in particular on aspects of the professional networks that organizational members maintain within organizations. We seek to answer the following

question: *What (multilevel) factors contribute to individual adaptive behaviors and collective reactions to, and outcomes of change?*

In addressing this question, we acknowledge that organizational change is a complex phenomenon involving processes unfolding at various levels (Rafferty et al., 2013; Schwarz & Bouckenooghe, 2018). This view of organizational change resonates clearly with Coleman's multilevel model (Coleman, 1990) – generally known as "Coleman's boat" -, an established sociological framework that has been suggested to study the integration of micro and macro theoretical approaches in management and organization research (Cowen et al., 2022). In this study, Coleman' model will be used as a heuristic framework to structure the narrative behind the multilevel model that we develop to investigate the impact of organizational change at individual and collective levels.

Following the framework, we first focus on situational factors and examine a cross-level effect involving characteristics of the changing work environment (macro-level) and attitudes that organizational members develop toward change (micro-level). Relying on empirical studies (Caldwell & Liu, 2011; Karim & Kaul, 2015; Oreg et al., 2011; Van Dam et al., 2008), we argue that organizational members' tendency to resist change depends on the magnitude or extensiveness of change affecting their most proximate work environment (i.e., the work units they are affiliated to). More specifically, we predict that as the magnitude of change increases, resistance to change will decrease up to a point, after which it increases.

Second, we draw on recent empirical research and focus on the effect of attitudinal factors on individual adaptive behaviors (micro-level) (Vakola et al., 2021; Van den Heuvel, 2014). More specifically, we predict that organizational members who are more resistant to change (i.e., members holding negative attitudes toward it) will be less adaptive to change. We also predict

that such adaptive behavior is influenced by the composition and structure of the professional networks in which organizational members are embedded. Organizations are composite systems consisting of individuals interacting and coordinating their actions and behaviors in order jointly to manage and operate the organization systems and processes (Fedor et al., 2006). Because of such interdependence, individuals' attitudes and behaviors are likely to influence - and be influenced by - attitudes and behaviors hold by others (Visser & Mirabile, 2004; Vissa & Chacar, 2009; Sonehshein & Dholakia, 2012). This is particularly the case in uncertain and ambiguous situations, such as during periods of extensive change, when organizational members feel a heightened need to rely on others to make sense of the situation (Krackhardt & Porter, 1985; Krackhardt & Stern, 1988; Srivastava, 2015). We predict that organizational members surrounded by contacts holding heterogeneous attitudes about change will be more adaptive to change when such contacts reside outside organizational members' immediate work unit – i.e., when their professional networks are characterized by high range (Burt, 1992; Shipilov et al., 2014). Finally, we suggest that collective adaptivity emerging from individual, interdependent adaptive behaviors will influence the attainment of desired change goals at the unit level.

We test our model in a longitudinal study using multi-source data on 170 physicians in 29 units of a large hospital that recently experienced a major restructuring intervention. Organizational restructuring is a type of large-scale, planned intervention involving change in formal organizational design, processes and procedures (McKinley & Scherer, 2000). In the specific case that we examine, the episodic restructuring intervention was aimed at enacting a strategy based on a multidisciplinary approach to patient care. Key aspects of change included: (a) structural change from a departmental organization to one characterized by cross-disciplinary clinical areas; (b) shifting from organizing around disciplines to organizing around clinical

processes and integrated care services; and (c) shifting from an emphasis on accountability for individual performance, to accountability based on collective performance (including quality metrics). From a design perspective, the actual implementation of the new organizational model involved a reshuffling and recombination of exiting organizational units into newly created, larger formal structures bringing together physicians with different medical background to enhance cross-disciplinary coordination around core care processes.

In developing and testing our model, we add to the previous literature in three main ways. First, our study provides insights into when professional networks can benefit change implementation at the individual level. Studies that have examined networks in the context of change have largely focused on the effect of organizational change on employee networks, thus treating them as consequences, rather than antecedents of change implementation (Aalbers, 2020; Gray et al., 2019; Kleinbaum, 2018; Lynch & Mors, 2019; Srivastava, 2015). We build on, and contribute to a different but growing line of research suggesting that networks are important antecedents of responses to change (e.g., Battilana & Casciaro; 2012; 2013; Krackhardt & Stern, 1988; Tenkasi & Chesmore, 2003). To our knowledge, we are among the few to test the effect of networks on change recipients' behavioral responses to change. Second, we focus on a behavioral change response, namely organizational members' adaptivity[1]. Previous studies on organizational change have primarily considered attitudinal responses, making it difficult to draw conclusions on actual behavioral change and its effect on collective outcomes. Third, in keeping with recent developments in research on organizational change, we adopt a multilevel approach

[1] Henceforth, our focus will be on *behavioral* responses to change (such as adaptivity), which are distinct from *attitudinal* responses to change (such as resistance to change) that do not involve *actual* behaviors. This distinction is similar to Vakola et al.'s (2013) difference between direct, or explicit reactions to change (attitudes), and indirect, or long-term consequences of change (behaviors).

(Caldwell et al., 2009; Whelan-Barry et al., 2003), wherein different levels (e.g., individual and unit) are involved and bridged by processes that act either top-down or bottom-up. In so doing, we answer the call to improve our understanding of how individual reactions to change are interdependent, and how such interdependence relates to antecedents and consequences of change across multiple levels (Rafferty et al., 2013).

Theoretical Background

Studies of organizational change routinely advocate the adoption of a multilevel perspective in the study of organizational change (Caldwell et al., 2004; Caldwell et al., 2009; Rafferty et al., 2013; Whelan-Barry et al., 2003). A multilevel perspective is consistent with the view of formal organizations as composite entities characterized by a multilayered internal structure (Van de Ven & Poole, 1995), where the building blocks are individuals nested in teams and other aggregate units or formations. A multilevel perspective is also consistent with the view of organizations as social entities, composed of individuals interacting and coordinating their actions and behaviors to perform relevant organizational tasks and functions (Zappa & Lomi, 2015). Hence, understanding organizational change requires an integrated theory bridging micro and macro levels, and taking into account individual action and social interaction.

A general framework for analyzing organizational change through a multilevel lens is Coleman's conceptual micro-macro model (Coleman, 1990) – frequently and informally referred to as "Coleman's boat" (Cowen et al., 2022). This framework is particularly congenial for representing organizational change as a dynamic process involving mechanisms which are both top-down – concerning how change at the *macro-level* cascades through the organization, and affects attitudes and behaviors of individual members (Caldwell et al., 2004), as well as bottom-up – concerning how individual attitudes and behaviors at the *micro-level* combine and give rise

to emerging change reactions and outcomes at the collective level (Molina-Azorin et al., 2020; Schwarz & Bouckenooghe, 2018). Coleman's model is not the only one that could be adopted to frame change as a multilevel process. In particular, Oreg et al.'s (2011) model of change recipient reactions to organizational change, and Rafferty et al.'s (2013) model of change readiness both provide examples of well-established theoretical frameworks that have been used extensively in the organizational change literature with a focus, respectively, on individual and collective reactions to change. We adopt Coleman's framework for two main reasons. The first is more general, and has to do with our attempt to link the study of organizational change to broader sociological theories of organizations aimed at explaining the emergence, persistence and change of large-scale processes (such as organizational change), and their relationship with smaller scale processes (such as individual behavior, or social interaction) (Hedström & Ylikoski, 2014). Coleman's framework offers a systematic, yet intuitive way of thinking about micro-macro relationships in terms of causal pathways (Ylikoski, 2012). The second reason for adopting Coleman's framework is more specific, and has to do with the greater emphasis we want to put on cross-level and macro-level relationships in the analysis of organizational change. The framework provides a mechanisms-based explanation of how a change intervention at the macro level brings about a change in individuals' attitudes and beliefs; how these changes, in turn, bring about changes in individuals' behavior and, finally, how these behavioral changes cumulate into the macro change to be explained (Ylikoski, 2021). In other words, the focus on mechanisms that is central in Coleman's framework allows us to make theoretically grounded claims about macro-level associations by specifying the underlying sociological and psychological causal micro-mechanisms (Cowen et al., 2022).

We rely on Coleman's framework to structure the theoretical narrative behind the multilevel model that we develop. In our empirical case, we observe high levels of variability in change outcomes at the macro-level (i.e., work units) following change. Some work units reacted more positively to the restructuring intervention by showing a higher attainment of change goals and objectives compared to other units. Building, broadly, on Coleman's framework, we derive testable hypotheses on the multilevel processes responsible for such differences in collective reactions and outcomes. The conceptual model summarized in Figure 1 provides an overview of the main constructs and relationships studied in this paper.. The arrows in the Figure reflect multilevel dependencies linking the following questions (Ylikoski, 2021): (i) How does the macro change affect individual agents?; (ii) How does the behavior of individual agents change?, and (iii) How do changes in behavior bring about macro consequences? The explanatory relationships underlying these *how*-questions are discussed next.

Figure 1 about here

Magnitude of change and resistance to change

Research on organizational change has examined the interplay between characteristics of change and change reactions by focusing on how change cascades through the organization and is ultimately experienced by individual members (Caldwell et al., 2004; Hersocovitch & Meyer, 2002; Lau & Woodman, 1995; Rafferty & Griffin, 2006). A recurring theoretical prediction and empirical finding is that organizational members' attitudinal and behavioral responses to change vary. This is partly because a change at the organization level will often have different implications for the various work groups or units throughout the organization and, ultimately,

different implications for individuals within them (Mohrman et al., 1989). A related insight from research on organizational change is that individual members will be affected more directly by changes involving their immediate work environment (Burke & Litwin, 1992; Caldwell et al., 2004). Previous studies that have explored aspects of change such as its content and process (e.g., Caldwell et al., 2004; Fedor et al., 2006; Herold et al., 2007), postulated that the magnitude of a particular change at both the job and work-unit levels is an important correlate of change recipients' attitudes and behaviors. That is, individual differences in attitudes and behaviors were hypothesized and found to be a function, at least in part, of the degree to which change affects individuals' job, or their immediate work unit's routines and procedures. The results of these studies, however, showed that magnitude of change (as well as other change-related variables, such as procedural fairness), has no significant main effect. Rather, its effect is best understood in terms of its interaction with other change-related or individual-level variables - a result consistently found in subsequent empirical studies (e.g., Caldwell & Liu, 2011; Caldwell et al., 2009; Herold et al., 2007).

Interestingly, previous studies have also produced contradictory findings regarding the relationship between magnitude of change and change recipients' attitude. The majority of available evidence suggests that increasing amounts of change are associated with increasingly negative attitudes, and ascribes such results to factors such as uncertainty and stress (Ashford, 1988), limited control (Lazarus & Folkman, 1984), fear of failure (Rafferty & Griffin, 2006), and changing job demands (Caldwell et al., 2004) typically associated with phase-shifting events (Soenen et al., 2017). Fewer studies have produced evidence suggesting a positive relationship between magnitude of change and attitudinal and behavioral reactions (e.g., Axtell et al., 2002; Caldwell et al., 2004), and justified such results on the account that change recipients are

expected to react less negatively to high levels of change as they tend to consider it inevitable or positive for the organization (Caldwell et al., 2004; Laurin et al., 2012). This, in turns, will lead to a greater acceptance of change, regardless of individual views and predispositions toward it (Yang et al., 2018). These empirical results are consistent with situational strength theory according to which the strength of implicit or explicit cues regarding the desirability of particular behaviors exert pressure on individuals to engage in such behaviors (Meyer et al., 2010).

Together, these partially inconsistent findings remain in need of reconciliation. In consequence, this study attempts to investigate the plausible curvilinear relationship between magnitude of change and individuals' change-related attitudes. Because of the dominant assumption about the linear effect of magnitude of change, little has been done to discriminate the amount of change that change recipients actually experience, that is, differentiating minor changes requiring small adjustments from major ones bringing about significant disruption (Fedor et al., 2006). Studies of organizational change typically distinguish between incremental and fundamental (or radical) change (e.g., Bartunek & Moch, 1987; Tushman et al., 1986). *Incremental* change is compatible with the existing organizational structure, systems and processes, and is relatively easy to implement. The response is frequently high conformity and commitment to change requirements. *Fundamental* change, on the other hand, disrupts established activity patterns and routines, and involves modifications of core aspects of an organization, including traditional ways of working (Levy, 1986). Novelty and change are likely to impose harder challenges to organizational members (Lazarus & Folkman, 1984). Resistance to change is frequently the modal response in such circumstances.

Under the assumption that incremental and fundamental change can be represented on the same scale – i.e., their differences can be expressed in quantitative terms – our argument

suggests a curvilinear effect of the magnitude of change on individual resistance to change. One way to think about magnitude of change is in terms of its impact on workflows, procedures and routines in one's immediate work and task environment (Caldwell & Liu, 2011). When the magnitude of change is low – i.e., when change is incremental - organizational members' resistance to change will tend to decrease. This happens because in the context of incremental change, modifications of current work practices and routines will be minimal. Change is likely to be seen as a positive phenomenon, contributing to organizational flexibility and employee development (Laurin et al., 2012; Van Dam, 2005). Almost regardless of heterogeneity in individual traits and predispositions, in situations of incremental change the distance between the present state and the desired future state is smaller, because change happens in the neighborhood of individuals' current experience. Hence, the effort to fill the gap will be lower, and making sense of change is likely to be facilitated by proximity of change expectations with experience (Parker, 1998). The specific content of change is also likely to influence individual attitudes (Bartunek et al., 2006). Individuals perceiving that change brings about positive, incremental changes in work design will be more likely to develop change-supportive attitudes and behaviors (Axtell et al., 2002). In the current study, for example, the new organizational model offered physicians greater control and responsibility over clinical processes, as well as an opportunity to improve patient outcomes through an increased inter-disciplinary collaboration (Wensing et al., 2006). Such aspects of job enrichment or improvement are likely to reduce attitudinal resistance to change (Caldwell et al., 2004) especially when the actual impact of change on work design is low.

As the magnitude of change further increases, resistance to change will also increase. This happens because more extensive changes in one's immediate work unit represent more difficult

situations that impose harder adaptation requirements and is typically associated with high levels of ambiguity felt by individual members (Caldwell et al., 2004; Oreg, 2003; Rafferty & Griffin, 2006; Srivastava, 2015; Stouten et al., 2018). The gap between current and expected future states becomes larger, imposing greater efforts on organizational members to fill that gap as change is no longer in the neighborhood of their accumulated experience. Moreover, extensive change – like, for example, change produced by alterations of the organizational structure – typically involve changes in internal resource allocation processes, coordination requirements, and bases for accountability. In such cases, change is more likely to be perceived as a threat to established power structures (Brass, 2017; Krackhardt & Stern, 1988) and be resisted more by organizational members. Finally, extensive change in organizational structure and processes disrupts established routines and relationships within which organizational knowledge resides (Karim & Kaul, 2015; Kogut & Zander, 1992). Increased change requirements compounded by feelings of uncertainty and risk associated with fundamental change will be likely to increase individual resistance to change. We therefore propose the following:

HP1: There is a U-shaped relationship between magnitude of change at the unit level and individuals' resistance to change, such that resistance to change will first decrease and then increase as the magnitude of change increases.

Resistance to change and individual adaptivity

Successful organizational change depends on the extent to which individuals involved in – or affected by change adjust their behavior to meet the demand posed by the new situation (Woodman & Dewett, 2004). In this study, we focus on adaptivity, defined as the degree to

which organizational members cope with, respond to, and support changes that affect their work activity (Griffin et al., 2007). Adaptivity is considered an emergent form of change-oriented behavior initiated by individuals rather than directed or imposed by others (Griffin et al., 2010). Also, it is based on actual behaviors aimed at adapting to new circumstances, therefore differing from attitudes involving non-observable cognitions, emotions, and intentions to behave (Ghitulescu, 2013; Vakola et al., 2021). Because of its relevance for successful organizational change, adaptivity is attracting increasing interest in contemporary studies of organizational change (e.g., Jimmieson et al., 2004; Nikolova et al., 2022; Petrou et al., 2018; Strauss et al., 2015; Van den Heuvel et al., 2014; Van den Heuvel et al., 2013). Restructuring is an example of an organizational change for which individual adjustment is fundamental (Griffin et al., 2007; Pulakos et al., 2000; Strauss et al., 2015). For example, healthcare professionals working in a hospital undergoing changes to its internal organizational structure will have to adapt to, and support the change attempt by modifying their actual behaviors and work practices. Adaptivity captures this kind of explicit behaviors (Ghitulescu, 2013).

Drawing on core results produced by studies inspired by social psychological and sociological research in organizations (Mischel & Shoda, 1995; Burt, 1982), we examine how individual and context-specific factors predict the emergence of adaptive behaviors. First, we consider the effect of individual attitudes toward change on adaptive behaviors. While there is considerable variability in the degree to which attitudes predict behaviors (Ajzen, 2000), social psychological research suggests that attitudes more strongly predict future behaviors when individuals form their attitudes based on behavior-relevant information (Glasman & Albarracin, 2006). Specifically, the attitude-behavior correspondence increases when individuals have direct experience with the attitude object, and when they construct their attitudes based on information

that is relevant to performing the behavior (Ajzen, 1996). In such cases, positive (negative) attitudes are likely to predict positive (negative) behaviors – i.e., individuals display a greater attitude-behavior correspondence (Ajzen & Sexton, 1999). In the specific context of change, the attitude-behavior relationship is based on the fundamental premise that attitudes reflect how individuals interpret change-related cues in the work environment and, subsequently, how they respond to such cues (Vakola et al., 2021). A number of studies offer evidence in support of the existence of a systematic link between attitudes and behavior in the context of change (Caldwell et al., 2004; Oreg et al., 2011; Rafferty & Griffin, 2006; Vakola et al., 2013).

One of the most examined attitudes in the organizational change research is resistance to change (Rafferty, 2013). Resistance to change has been conceptualized as a complex attitude comprising cognitive, affective and behavioral components (for a detailed description, see Vakola et al., 2013; Oreg, 2006; Piderit, 2000). Following prior research (Van Dam et al., 2008) we embrace a multidimensional view of resistance to change, and consider its impact on change recipients' adaptive behaviors. We argue that change recipients holding negative attitudes toward change (i.e., individuals who are more resistant to it), will be less likely to support, and actively adapt to change. On the contrary, when change recipients develop positive attitudes toward a particular change, they will be more likely to engage in change supportive behaviors (Griffin et al., 2010). This argument is summarized in the following hypothesis:

HP2: Individual resistance to change will be negatively associated with individual adaptivity.

The effect of social context on individual adaptivity

Over and above the effect of individual attitudes toward change, we also consider the influence of context-specific factors on organizational members' adaptive behaviors. We focus, in particular, on features of the social context describing the set of interpersonal relations that affect – and are affected by individuals' work roles and activities (Cross et al., 2002). Organizations can be conceived as social systems of coordinated action and interaction, offering multiple *foci* to individuals and groups for developing relations (March & Simon, 1993). While organizational members may relate to one another in a number of ways (Ahuja et al., 2012; Gibbons, 2004), professional relations are primarily established to exchange information and knowledge needed to perform organizational tasks (Borgatti & Cross, 2003). Our choice to focus on the social context in which organizational members are situated is informed by social psychological research examining the influence of a workplace social environment on employees' attitudes and behaviors (Bandura, 1986; Chiaburu & Harrison, 2008). Our choice is also informed by research examining context-specific antecedents of organizational change (see Cunningham et al., 2002; Oreg et al., 2011; and Stouten et al., 2018, for a review), and suggesting that interactions with colleagues are important as they provide the social support and access to information needed to facilitate change-oriented behaviors (Fuller et al., 2006; Ghitulescu, 2013).

Although the importance of interpersonal relations for effective change implementation has been recognized in theoretical research (e.g., Cross et al., 2002; Stouten et al., 2018), there is scant empirical evidence of what specific features of change recipients' professional networks affect their adaptivity, and how (Mohrman et al., 2003; Stouten et al., 2018). Battilana and Casciaro (2012), for example, found that structural closure in an individual's network diminishes

the likelihood of adoption of organizational changes diverging from the status quo. The authors analyze, however, change agents' – not change recipients – professional networks. Ghitulescu (2013) found that the strength of social ties with co-workers increases individuals' adaptive responses to change. The author focuses, however, on a qualitative feature of work relationships, rather than structural characteristics of the wider professional networks.

We build on, and contribute to this line of research by exploring two distinct features of the professional networks in which change recipients are situated, and tracing their implications for change recipients' adaptive responses to change. The first feature captures the attitudinal composition of networks. According to Visser & Mirabile (2004), a network can be defined as *attitudinally heterogeneous* (*congruent*) when network members hold *different* (*similar*) attitudes and views about a particular issue. In this paper, we examine the impact of the difference between change recipients' attitude toward change and the attitude of their networks' members, on change recipients' adaptive behavior.

Social comparison theory offers hints about the mechanism determining such impact. The theory predicts that individuals assess the accuracy of their attitudes and views by comparing them with those of individuals around them (Festinger, 1954). The mechanism of social comparison is especially salient in periods of ambiguity and change, when objective information may be lacking and individuals struggle to make sense of their environment (Krackhardt & Stern, 1988; Srivastava, 2015). Because "an opinion, a belief, an attitude is 'correct,' 'valid,' and 'proper' to the extent that it is anchored in a group of people with similar beliefs, opinions, and attitudes" (Festinger, 1950, p. 272), the strength of an individual's attitude decreases when it differs from the attitude held by others (Bienenstock et al., 1990; Erickson, 1988; Visser and Mirabile, 2004). Available research provides evidence that supports this claim in the context of

organizational change. For example, Soenen et al. (2017) found that colleagues' views about a change situation might lead to a shift in individual perception and original judgement of change. More specifically, the authors found that lack of social support to change in an employee's proximal environment makes them more likely to revisit their own evaluations of the change situation, as lack of support signals that something is wrong or inconsistent, and that change must be reconsidered. In a similar vein, Sonenshein and Dholakia (2012) found that communication with peers during change negatively affects individual attitudes and views of the change, as collegial communication typically diffuses negative rumors and decreases the general level of understanding of the benefits of change.

Taken together, the two examples offer evidence that attitudinal heterogeneity (i.e., difference in attitudes in a proximal environment) triggers organizational members to reconsider their own attitudes and perceptions, which, as predicted by the theory, affects their change behaviors (Bandura, 1986). On one hand, the larger the difference in attitudes, the higher the feeling of uncertainty perceived by a focal member due to existing competing interpretations of the same situation (Weick, 1995). Such ambiguity about change is likely to increase individual resistance, and make organizational members less likely to adapt to change. On the other hand, differences in attitudes may increase a focal member's understanding of change, due to existing multiple interpretations of the same situation. Such enlarged vision of change is likely to decrease individual resistance, and make organizational members more likely to adapt to change. Based on the above, we do not posit a main effect for attitudinal heterogeneity on individual adaptivity. We predict that the advantages of attitudinal heterogeneity are contingent on the structure of the professional networks in which attitudes emerge.

We focus, in particular, on *network range*, a structural feature capturing the extent to which ties in an individual's social network cross formal organizational boundaries (Burt, 1992; Oh et al., 2004; Reagans & McEvily, 2003). Employees with numerous inter-unit, as opposed to intra-unit ties will have networks characterized by high range (Shipilov et al., 2014). In the context of organizational change, Krackhardt and Stern (1988) suggested that organizations are more effective at dealing with change when informal relationships cut across formal organizational boundaries (e.g., departments, units). When an organizational change is oriented toward modifying work-related practices and behaviors, professional relations influencing the dissemination and sharing of task-oriented knowledge (Gibbons, 2004; Morrison, 2002) are likely to be more relevant than other types of relations in predicting change supportive behaviors.

Professional networks composed by contacts outside a tightly knit local professional group benefit organizational members by providing them access to a larger set of experiences with change (Reagans et al., 2004; Tortoriello & Krackhardt, 2010). Such benefit should be reflected in higher-quality decision-making, a finding that has been consistently found in both intra- and inter-organizational research (Beckman & Haunschild, 2002; Eagle et al., 2010). When knowledge-sharing relations spanning unit boundaries also provide individuals with different views about a change situation, this is likely to make organizational members more lenient and willing to endorse change (Battilana & Casciaro, 2012). Also, adaptivity involves acquiring new information that facilitates employees' adjustment to changes in the organization (Strauss et al., 2015). In consequence, organizational members collecting information from various parts of the organization will likely develop an organizational view that increases their level of commitment to change (Krackhardt & Stern, 1988; McGrath & Krackhardt, 2003). On the contrary, highly clustered, or insular, relations in professional networks limit organizational members' access to

change experiences from outside their immediate unit, thus reducing awareness of alternative possibilities. Following this logic, we predict that:

HP3: The more a professional network is characterized by boundary spanning relations, the more attitudinal heterogeneity in a change recipient's professional network increases individual adaptivity.

Collective adaptivity and outcomes of change

Our last hypothesis builds on the assumption that individual adaptivity provides the conditions for the emergence of collective adaptivity (Kozlowski and Klein, 2000). Collective adaptivity relates, in turn, to the attainment of desired change outcomes at the macro level.

The interplay between two factors likely contributes to the emergence of collective (i.e., unit) adaptivity. The first factor is similarity in change exposure. In general, unit members are exposed to a similar range of organizational processes and stimuli (Rafferty et al., 2013). Similarity in exposure is likely to make unit members develop a convergent view about organizational phenomena through processes of social influence and social comparison (Herold et al., 2008; Lindsley et al., 1995; Nikolova et el., 2022). In the specific context of organizational change, structurally bounded proximity will increase unit members' communication and exchange of opinions about their experience with change, which is likely to lead to an understanding of change along the same set of dimensions (Kozlowski & Klein, 2000). The strength of group vision and sense making will, in turn, facilitate the emergence of a collective response to change following a bottom-up process (Stouten et al., 2018).

The second factor is group interdependence. Individual and collective adaptivity are distinct, yet interrelated constructs. Interdependence in tasks and activities within units is the mechanism transforming an individual behavioral adaptivity into a collective one. The group is not just, and simply, the sum of its parts (i.e., the group members). Rather, for a group to act as such, unit members need to combine their individual contribution through interaction and reciprocal interdependence, especially in knowledge-intensive settings like healthcare (Leggat et al., 2011). Individual adaptation to new tasks and procedures envisioned by the change is a necessary condition for collective adaptivity to emerge. Its full emergence, however, requires that individual members integrate and work as a group to meet the objectives and reach the expected outcomes of change.

Extant research offers evidence of a positive relationship between collective change adaptivity and collective outcomes. For example, Rafferty and Jimmieson (2010) provided evidence of a positive association between aggregated change participation and a number of collective outcomes. Nohe et al. (2013) showed that individual commitment to change increases individual performance, which aggregated at the team level enhances team performance. In the empirical context that we describe next, the development of new clinical guidelines (i.e., integrated care pathways) was not only the intended objective of the planned organizational change. It was also, and most importantly, the result of a group effort, requiring individual contribution and the integration of different specialized knowledge within and between hospital units, usually over extended periods of time. We suggest that a higher change adaptivity at the unit level implies a collective uptake of new processes and operating procedures (Stouten et al., 2018). This, in turn, will result in the joint development of new group practices as envisioned by the change initiative. Hence, our last hypothesis states that:

HP4: Collective adaptivity will be positively associated with the development of new group practices following organizational change.

Methods

Research context

This study was conducted in one of the largest hospitals in the Italian National Health Service. About a year before the first data collection, the hospital underwent a major change involving the adoption of a new organizational model aimed at aligning internal structure, processes and procedure with a multidisciplinary, patient-centered approach to care. From a structural perspective, the organizational change involved a reshuffling and reorganization of the existing hospital units (Karim & Kaul, 2015). Hospital units (or hospital wards), represent the building blocks of a hospital's organizational structure and are formed by groups of specialized physicians with high levels of autonomy and responsibility in the use of clinical and organizational resources (e.g., hospital beds, technologies). Prior to the change, the hospital units were grouped into functional departments, each organized around a single clinical specialty. The rationale behind such single-specialty departments was to promote resource management, control, and accountability. The departmental model, however, had led to poor coordination at the organizational level, and high levels of fragmentation of medical knowledge and practices. Most importantly, functional departments had proved to be inadequate to meet the growing demand for a multidisciplinary approach to patient care, which requires integration, rather than separation, of medical and clinical knowledge. The change in the organizational structure was designed with the intended objective to place patients' needs at the center of care delivery by bringing different knowledge resources that were previously separated closer together – an

approach that has proven to be successful in improving patient care (Wensing et al., 2006). Hospital units were rearranged into a number of clinical areas functioning as large disease- and organ-based units where physicians with different medical disciplines are brought together to coordinate and integrate their knowledge around core care processes. The implementation of the new structure required actual changes in physicians' work-related behaviors, in terms of increased cross-disciplinary collaboration, joint development of new clinical guidelines, and provision of integrated care services.

Data collection and participants

We collected multi-source data in two waves. The first data collection took place one year into the implementation of the new organizational model, consistently with prior studies on structural change in organizations (e.g., Bordia et al., 2004; Caldwell et al., 2009). Relative to the stage model developed by Seo and Hill (2005), this first wave relates to the "*operational combination stage*" of a change process, i.e., the phase where "budgets, space, work assignments, and reporting responsibilities are realigned", and where "employees are pushed to learn new ways of doing things" (Seo & Hill, 2005: 433). Because this phase typically affects important aspects of the organization (in our case, procedural and operational), and it may take years to produce its outcomes, the original plan was to collect a second wave of data in 2020. Due to the Covid-19 pandemic, the follow-up survey took place in 2022[2]. Relative to the stage model developed by Seo and Hill (2005), this second wave relates to the "stabilization stage" of

[2] To account for the potential impact of Covid-19 on the change process, in the follow-up study we asked physicians to report on the extent to which they believed the pandemic affected the adoption and implementation of a multidisciplinary approach to patient care. Responses ranged from "*very much slowed down*" to "*very much accelerated*". We obtained consistent results relative to the main study variables when we included this variable as control in our empirical models (Becker et al., 2016).

a change process, i.e., the phase where the operational change is completed, and organizational routines are stabilized.

Before starting the first data collection, the research team conducted semi-structured interviews with four members of the top management team of the hospital (CEO, CFO, Medical Director and HR Director) better to understand objectives, timing and scope of the reorganization initiative. The interviews were also aimed at identifying the sample of hospital units. Physicians within these units were later invited to participate in the survey. Based on the interviews, we selected hospital units that were differentially affected by the change. Changes at the organization level (such as a structural recombination) usually have different implications for different work groups or units, and ultimately for individuals within these units (Caldwell et al., 2004; Mohrman et al., 1989). For some hospital units the recombination implied a more extensive (i.e., fundamental) change. This happened, for example, when a focal unit was combined in a clinical area with other units previously affiliated to different functional departments in the former organizational model. For the focal unit's members the change had a greater impact on their work practices and routines, as under the new model new task interdependencies had to be established, and new interactions developed within clinical areas. For other units, on the other hand, the extent of change was smaller when, for example, a focal unit was combined in a clinical area with other units that were previously affiliated to the same functional department. In such cases, the impact on unit members' work was more limited. Overall, the selected hospital units accounted for 25% of the hospital clinical personnel, 46% of the total number of staffed beds and 43% of the total number of hospital admissions.

To mitigate potential common method bias (Podsakoff et al., 2003), we collected individual-level (i.e., physicians) and unit-level (i.e., hospital units) data using self-reported and archival

data. In the first data collection wave, we obtained access to administrative data on the organization structure of the hospital, namely physicians' affiliations to units before and after the change. A questionnaire was administered to all 242 physicians in the selected clinical areas to collect a number of information, including individual (e.g., attitudes toward change) and network-related data. In the follow-up study, a second questionnaire was administered to the same sample to collect data on individual and collective behavioral reactions to change using validated scales from the literature. Finally, in the follow-up study, we also relied on administrative sources to reconstruct our collective change outcome measure.

The two questionnaires were administered both in a paper-and-pencil format and electronically. In the introduction section, respondents were informed that the topic of the survey was multidisciplinary collaboration and patient-centered care supported by a formal organizational structure based on clinical areas. Respondents were instructed to think about changes in the "organizational structure, processes and procedures" every time they read the word "change(s)." Participation of physicians was voluntary. A section of the questionnaire in the first survey was designed to collect social network data on knowledge sharing relations using the roster method. Respondents were asked to reconstruct their professional networks by placing a check next to the names of colleagues they ask for work-related advice in the same clinical area. Respondents were free to nominate as many network contacts as they deemed appropriate. While the use of a roster method is common in studies of organizational networks (e.g., Mehra et al., 2001; Tasselli, 2015), we also gave respondents the possibility to nominate colleagues not included in the rosters using the free recall option (Burt, 1992). Another section of the questionnaire was used to collect information on attitudes and perceptions toward change. The follow-up survey included validated scales for individual and collective adaptivity. A total of 175

physicians in 34 hospital units responded to the questionnaire in the first data collection wave (72% response rate). Following prior studies (Balkundi et al., 2019; Kossinets, 2006), we excluded 5 units in which physicians' participation was less than 50% leading to a final sample of 170 physicians in 29 hospital units. The response rate in the follow-up survey was 95%, with 161 out of the 170 physicians returning a completed and usable questionnaire. Eight physicians retired before the follow-up study started. One physician was lost due to Covid-19.

Measures

Individual-level measures

Individual adaptivity

We measured physicians' adaptivity using Griffin et al.'s (2007) 3-item individual adaptivity scale. Based on prior research (Caldwell & Liu, 2011), the questionnaire items were explicitly indicative of an ex-post evaluation of behaviors. An example item was "Following change, I adapted well to changes in core tasks". Items were rated on a 5-point Likert-type answering scale ranging from 1 (*not at all*) to 5 (*a great deal*). The scale reliability coefficient (Cronbach's alpha) was 0.95.

Resistance to change

Physicians' attitude toward change was measured using the widely adopted construct of resistance to change (Piderit, 2000; Oreg, 2011). The change attitude scale (Oreg, 2006) is composed of items capturing affective, behavioral and cognitive dimensions of resistance to change. Sample items include "I was afraid of the change", "I looked for ways to prevent the change from taking place", and "I thought that it's a negative thing that we were going through this change". The response options ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), with greater scores indicating higher resistance. Because we were interested in an overall measure of

attitudinal resistance to change, consistently with previous studies (Van Dam, 2008) we used a composite resistance to change score. The scale's reliability coefficient (Cronbach's alpha) for this measure was 0.94.

Network attitudinal heterogeneity

We measured attitudinal heterogeneity in each physician's professional network by following the approach adopted by Visser and Mirabile (2004). First, we averaged resistance to change scores for each physician's network members. Second, we subtracted average scores from focal physicians' scores to obtain a measure of difference in attitudes in professional networks. Absolute difference values were used in the analysis, with larger values indicating a higher network attitudinal heterogeneity.

Network range

Network range in our context refers to professional relations crossing formal hospital unit boundaries (Oh et al., 2004; Shipilov et al., 2014). Consistently with prior studies on the effect of network range in the context of organizational change, we operationalized network range by using the E-I index (Krackhardt & Stern, 1998; McGrath & Krackhardt, 2003). The E-I index measures the extent to which an individual's network ties form a bridge across some organizational or social divide (Tortoriello & Krackhardt, 2010). In our case, for each sampled physician we considered the distribution of professional ties within and across hospital units. The index was calculated as the difference between the number of professional ties that cut across unit boundaries (external ties) and the number of ties connecting members of the same unit (internal ties), divided by the total number of ties (Krackhardt & Stern, 1988). More formally, the E-I index for physician *i* is defined as:

$$EI\ Index_i = \frac{E_i - I_i}{E_i + I_i}$$

where E_i is the number of ties with physicians in other hospital units (i.e., "external" ties), and I_i is the number of ties with physicians in the same unit (i.e., "internal" ties). The E-I index ranges from -1 (when all ties to/from *i* are internal ties), to +1 (when all ties are external, or bridging ties).

Control variables at the individual level

We controlled for *gender* (1 = male; 2 = female), *managerial role* in the hospital (1 = managerial role; 0 = no managerial role) and *tenure*. We also controlled for *perceived job impact*, a variable that has been found to affect individual responses to change (Caldwell & Liu, 2011). Perceived job impact was measured using Caldwell et al.'s (2004) 5-item scale. Sample items included "I am experiencing more pressure at work because of this change", and "I find greater demands placed on me at work because of this change". The scale's reliability coefficient (Cronbach's alpha) was 0.89. One last set of control variables were used to take into account features of physicians' professional networks, namely the *size* of their networks (measured as number of knowledge sharing ties), and the network members' (i.e., alters) *average resistance to change*.

Unit-level measures

Collective adaptivity

Collective adaptivity is a group-level construct emerging from the aggregation of individual adaptive behaviors. Although unit members may differ in their adaptive behaviors, they are likely to develop common views and beliefs due to physical proximity in hospital units, as well as the highly interdependent nature of professional work. In such circumstances, a referent-shift model is considered the most appropriate to represent the aggregation of behavioral change responses at the unit level (Chan, 1998; Kozlowski & Klein, 2000; Molina-Azorín et al., 2020;

Rafferty et al., 2013). Consistently with the model, we asked physicians to assess adaptivity adopting a unit perspective (Chan, 1998). We used the Griffin et al.'s (2007) 3-item individual adaptivity scale. The three items were slightly modified to represent a shift in the referent (i.e., from individual to unit). Sample items included "Following change, my work unit adapted well to changes in core tasks". A unit-level score was calculated by averaging individual members' scores. The mean score reflects a shared perspective of individuals experiencing the same unit-level phenomenon (Caldwell et al., 2004). The median Rwg score was 0.85, indicating high levels of within-group consensus. The intraclass correlation coefficient for this scale was 0.46 (ICC1), suggesting that a considerable amount of variance is due to unit membership resulting in a reliability score of 0.82 (ICC2). This provides evidence that unit membership accounts for members' rating in a reliable way (Bliese, 2000; LeBreton & Senter, 2008).

Magnitude of change

While prior research has mostly measured magnitude of change based on employees' perceptions, in this study we used an objective measure of change at the unit level (Rafferty & Griffin, 2006). More specifically, we used a global construct to represent magnitude of change, that is, a group-level attribute that does not depend on individual perceptions (Molina-Azorín, 2020), and captures the impact of change at the unit level. The shift from functional departments to clinical areas implied a reshuffling and structural recombination of existing hospital units. Based on Karim & Kaul's (2015) measure of structural recombination, the variable magnitude of change is a count, for each hospital unit, of the total number of change events in the unit-to-unit affiliation matrix (i.e., new affiliations and affiliations lost) in the shift from an organizational model based on departments to an organizational model based on clinical areas. This variable

was reconstructed comparing the hospital's organizational charts before and after the change that were provided by the Human Resource department.

Development of new guidelines

A typical change outcome examined in empirical studies on organizational change is the uptake and use of new organizational practices and, relatedly, the attainment of desired change goals (Stouten et al., 2018). In this study, we considered the development of new clinical guidelines as a measure of the uptake of new group practices and attainment of desired change goals at the unit level. More specifically, for each hospital unit we counted the number of new integrated care pathways developed after the organizational change. Integrated care pathways are organized systems for care delivery to patients with specific diseases and receiving care according to a protocol covering the whole spectrum of care activities (Wensing et al., 2006). Integrated care pathways normally involve multidisciplinary collaboration and care service coordination among physicians, who jointly define: i) new processes of care; ii) categories of enrolled patients, and iii) "who does what" in clinical processes. This variable was reconstructed based on archival data provided by the top management team of the hospital.

Control variables at the unit level

We controlled for *collective efficacy* as perceived by unit members after change. Collective efficacy refers to the beliefs that individuals hold concerning the ability of their group to successfully perform its work tasks. We used the Riggs and Knight's (1994) scale and asked physicians to assess the efficacy of their unit adopting a unit perspective, then averaging their responses (Chan, 1998). A sample item was "My unit is not able to perform as well as it should" (reverse coded)". The Cronbach's alpha for this scale was 0.86. We also controlled for the *procedural fairness* of the change process as perceived by physicians using Caldwell et al.'s

(2004) 3-item scale. Individual scores were averaged to compute a collective measure of procedural fairness (Caldwell & Liu, 2011). The scale's reliability coefficient (Cronbach's alpha) was 0.97. We controlled for *unit size* by including a variable counting the number of physicians affiliated to each hospital unit. Finally, we used the variable *unit network centrality* to control for interdependence among hospital units. This variable was measured using group degree centrality, defined as the number of non-group members (i.e., physicians external to a focal unit) connected to group members (i.e., physicians internal to the unit) via information sharing ties. Multiple ties to the same node are counted only once (Everett & Borgatti, 1999).

Results

Table 1 shows the mean, standard deviation, and correlation coefficients for the variables included in our models. We computed correlations for all variables within their respective level of analysis to determine zero-order relationships within each level (i.e., individual and unit). At the individual level, adaptivity is negatively and significantly correlated with resistance to change (r = -0.42) and average alters' resistance to change (r = -0.52), and positively correlated with E-I index (r = 0.33). Individual resistance to change is positively and significantly correlated with average alters' resistance to change (r = 0.48) and network attitudinal heterogeneity (r = 0.29). At the unit level, development of new guidelines is positively and significantly correlated with collective adaptivity (r = 0.37), magnitude of change (r = 0.41) and unit size (r = 0.52). There is also a positive and significant correlation between collective adaptivity and magnitude of change (r = 0.52), collective efficacy (r = 0.54) and procedural fairness (r = 0.86).

Table 1 about here

Because of the nature of the dependent and independent variables measured at the individual and unit level, we used hierarchical linear modeling (HLM) to analyze the data (Raudenbush & Bryk, 2002). We adopted a stepwise approach in model building, following the sequence suggested by Aguinis et al. (2013). First, we tested an unconditional model (null model) assessing the extent of the total variance of the dependent variable attributable to characteristics of organizational units. Then, we included the control variables at the individual (e.g., gender, tenure) and, where appropriate, unit level (e.g., unit size). Finally, we included the main predictors and moderators at the individual and unit level. In all models, we centered individual-level variables around the group (unit) mean, and unit-level variables around the grand mean (Hofmann & Gavin, 1998). Table 2 shows the results of the HLM regression predicting individual resistance to change.

Table 2 about here

We first estimated a null model in which no predictors were specified for either level in order to test the significance of the level-2 residual variance of the dependent variable. The null model (Model 1) indicates that ICC(1) was 0.14, suggesting that 14 percent of the variance in individual resistance to change resides between units, and 86 percent of the variance resides within units. Model 2 reports the results of a model including the control variables only. The results show that individual resistance to change is negatively and significantly related to procedural fairness.

Model 3 was estimated to test for hypothesis 1 predicting a U-shaped relationship between magnitude of change and resistance to change. Results indicate that resistance to change is negatively related to magnitude of change (B = -0.02, SE = 0.01, p = 0.01) and positively related to magnitude of change squared (B = 0.15, SE = 0.07, p = 0.03), providing support to the hypothesis. Figure 2 shows the plot of the U-shape relationship between the magnitude of change and individual resistance to change.

Figure 2 about here

Table 3 shows the results of the HLM regression predicting individual adaptivity. First, we estimated a null model (Model 1) to verify the extent of the total variance in the dependent variable attributable to unit-level characteristics. The unconditional model indicates that ICC(1) is 0.43, suggesting that 43 percent of the variance in individual adaptivity resides between units, and 57 percent within units. Hypothesis 2 predicted a negative relationship between resistance to change and individual adaptivity. Model 3 shows a significantly negative parameter estimate for resistance to change (B = -0.31, SE = 0.09, p < .001), thus providing support to the hypothesis. Hypothesis 3 predicted a moderation effect of network range on the relationship between network attitudinal heterogeneity and individual adaptivity, such that the relationship is positive and stronger when network range is higher. Results reported in Model 5 show a significantly positive interaction effect (B = 2.70, SE = 1.10, p = 0.01).

Table 3 about here

Figure 3 graphically shows the nature of the significant interaction. We performed a simple slope analysis using the approach described in Preacher et al. (2006). The simple slopes were as follows: high E-I index (B = 1.85, SE = 0.68, p = 0.01), low E-I index (B = -0.31, SE = 0.28, p = 0.27). The results provide support for the hypothesis that the relationship between network attitudinal heterogeneity and individual adaptivity is positive and stronger for organizational members whose professional network is characterized by high range. Parameter estimates in Model 5 also suggest that individual adaptivity is positively and significantly related to perceived job impact, but negatively and significantly related to the average level of resistance to change in an individual's professional network.

Figure 3 about here

Finally, hypothesis 4 predicted a positive association between collective adaptivity and the development of new integrated care pathways at the unit level. As the dependent variable takes the form of a count – i.e., number of integrated care pathways following the change – we used negative binomial regression for hypothesis testing. We specified two models. Model 1 includes control variables only. Model 2 includes the main variable of theoretical interest, namely collective adaptivity. Regression results reported in Table 4 show that collective adaptivity is positively and significantly related to the number of new integrated care pathways (Model 2; B = 0.54, SE = 0.26, p = 0.02), and that adding this variable produces a statistically significant improvement over Model 1 (Log-likelihood ratio test Model 2 vs Model 1, LR $\chi 2$ = 4.06, p = 0.04). Hence, hypothesis 4 is supported.

Table 4 about here

Discussion

The purpose of this study was to examine the micro-level dynamics underlying macro-level associations between organizational change and its outcomes. We focused on the role of networks in shaping individual behavioral reactions to change. Broadly inspired by Coleman's multilevel framework (Coleman, 1990), we found that, in the macro-to-micro transition, the extent of formal change at the unit level predicts varying levels of attitudinal resistance to change at the individual level. In the attitude-to-behavior transition (micro-to-micro), we found that both attitudes toward change, as well as structural and compositional characteristics of professional networks come to explain individuals' adaptive behaviors during change. Finally, in the micro-to-macro transition, we found that individual adaptive behaviors contribute, in a composite way, to the attainment of change goals at the unit level. Considered together, these results track closely the multilevel process of organizational change which starts from the intention of changing elements of the global organizational structure, induces change in the local world of individual organizational members, and, finally, produces effective macro-level change which combines original intentions and actual behaviors.

Theoretical implications

Our study contributes to research on organizational change, social networks and adaptive behaviors in several ways. Four deserve mention in this concluding section. First, we contribute to harness the growing interest in how and when networks shape individual reactions to change. In the context of organizational change, professional and other types of intra-organizational

networks have recurrently been examined as consequences of change (e.g., Aalbers, 2020; Barley, 1990; Kleinbaum & Stuart, 2014; Lynch & Mors, 2019; Srivastava, 2015; Tenkasi & Chesmore, 2003), or as mediators of some change-related attitudes or behaviors (e.g., Krackhardt & Porter, 1985; Woehler et al., 2021). In the present study, we identified social context as a relevant change antecedent that has not been consistently considered - and explicitly examined - in research on change recipients' reactions to change (Mohrman et al., 2003; Oreg et al., 2011; Stouten et al., 2018). Few notable exceptions have studied the effect of networks for change *agents* (e.g., Battilana & Casciaro, 2012), or have examined networks at a higher, i.e., group level (e.g., Krackhardt & Stern, 1988). We focused on change recipients and their professional networks because prior research has suggested that change recipients' behavioral response is critical for successful change implementation (DeCelles et al., 2013; Rafferty et al, 2013). A novel contribution of our study is our finding that professional networks may in some cases strengthen, and in other cases dampen, change recipients' adaptive behaviors, depending on the joint effect of structural and compositional features of professional networks. Our analysis revealed that when organizational members are embedded in attitudinally heterogeneous networks characterized by high range, the combined benefits afforded by access to different viewpoints and different knowledge pools residing in different organizational silos, will increase change recipients' adaptive behaviors. These findings have important theoretical implications because they suggest that networks may play a role in eliciting or suppressing the behavioral manifestation of individual attitudes. Stated differently, networks may play a key role in the transition from change initiation – which requires positive attitudes and views of change - to change adoption – which requires actual behaviors (Battilana and Casciaro, 2012). Our finding also suggests that networks can be viewed as a linking mechanism that relate to unit-level change

outcomes via individual-level behaviors. From this multilevel perspective, networks influence individual-level behaviors that contribute in an additive fashion to unit-level outcomes.

Second, the results of this study align with a multilevel perspective in contemporary organizational change research, grounded in the premise that collective outcomes should be viewed and examined as the joint result of top-down and bottom-up processes linking macro-level characteristics to individual-level attitudes and behaviors (Cowen et al., 2022; Rafferty et al., 2013). Specifically, we found evidence of a cross-level effect linking characteristics of change at the unit level and individual attitudes. We also found evidence of a bottom-up process linking individual behaviors to unit-level change outcomes. Work units are the most proximate context of change for organizational members. Hence, an increasing number of studies have focused on work units' characteristics to understand individual and collective reactions to change (e.g., Caldwell & Liu, 2011; Fedor et al., 2006; Herold et al., 2008; Turgut et al., 2016). We considered magnitude of change as a unit-level characteristic, and found that it has a non-linear effect on attitudinal resistance to change, such that individual resistance to change first decreases and then increases as magnitude of change increases further. This finding is important as it suggests that a group level phenomenon – magnitude of change, in our case – crosses levels and may reinforce or constrain micro-level processes. This may be useful in explaining partially inconsistent prior findings, and shed light on contingency factors that may provide organizational practice with more concrete and relevant guidance. This finding is also important as we use an objective measure of formal change at the unit level – i.e., actual changes in internal recombination of unit boundaries – which allows us directly to test the effect of organizational change on individual reactions to change. In so doing, we respond to a call for additional research integrating change features in theoretical and empirical accounts (Stouten et al., 2018).

Third, the study extends research on organizational change by examining attitudinal and relational antecedents of change recipients' adaptive behaviors. Our focus on a behavioral, rather than attitudinal outcome allowed us to fill a gap in the literature where more careful attention is needed on actual behaviors in the studies on organizational change (Ghitulescu, 2013; Strauss et al., 2015). We acknowledge that for organizational change initiatives to reach their intended objectives, it is not enough for organizational members to hold positive attitudes toward change. Rather, they have to adapt their actual behavior to the specific change that is being implemented (Shoss et al., 2012; Van den Heuvel et al., 2014). We consider both attitudes and actual behaviors in our account of individual and collective responses to organizational change. To our knowledge, this is the first study examining the effect of networks on individual adaptivity.

Fourth, and finally, Coleman's model provided the theoretical backbone of our empirical study, and allowed us to connect different levels of action, by explicitly framing organizational change as a multilevel process connecting micro and macro organizational levels. As we clarified, other theoretical models are available that could be adopted for this purpose such as, for example, the models proposed by Oreg et al. (2011), and Rafferty et al. (2013). Our study invites future research to integrate available models to provide a more complete theoretical account of how organizational change happens across levels of agency. More specifically, we believe that future research should allocate a greater share of attention to theoretically inspired multilevel mechanisms to complement the current emphasis on context-dependent variables of empirical interest (Amati et al., 2021). The promise of such integrative efforts would be to facilitate comparison of change processes across different and apparently idiosyncratic organizational settings. For example, future studies may explore *how* organizational change may affect differently members occupying different strategic network positions (Burt, 1992), and *how*

this, in turn, might explain individual and collective reactions to change. We believe this might represent a valuable direction that future studies could follow to consolidate mechanism-based explanations of how effective responses to change attempts emerge from a complex interaction between change contexts and characteristics of change recipients or, in other words, between "the person" and "the situation" (Ross & Nisbett, 2011). To our knowledge, our study is the first to adopt Coleman's mechanisms-based model as an empirical guide to making sense of processes of organizational change.

Managerial implications

We believe that our study may have important practical implications for the management of healthcare organizations undergoing major changes. Current healthcare organizations are increasingly involved in restructuring interventions aimed at improving the quality of care through the adoption of multidisciplinary, team-based approaches to care (Rosen et al., 2018). Such changes, however, are particularly challenging as they are typically resisted by healthcare professionals, and especially by physicians (Ramanujam & Rousseau, 2006). Our findings have implication for management practice as they suggest the need to complement extant approaches to planned change with an increased understanding of the role of professional networks within healthcare communities. Our results reveal the importance of considering not only the scope of an organizational change initiative, but also patterns of informal interactions in order to identify pockets of potential acceptance or resistance, and design the most appropriate change strategy. We have found that physicians are less likely to participate in organizational change initiatives when they are embedded in attitudinally homogenous networks with few external ties to members of other organizational units. This finding suggests that the presence of densely connected, and inward-looking subgroups may undermine organizational change efforts as it

makes organizational members less open and responsive to novel stimuli. This further suggests a need to adopt "unfreezing" interventions (Stouten et al., 2018) targeting tightly connected groups of professionals. Examples of such interventions may include the organization of collaborative initiatives bringing together physicians in different medical specializations, such as joint training programs, or interdisciplinary teams for the development of clinical standards and guidelines. Understanding the conditions under which employees' professional networks drive change implementation is critical for understanding how organizations can influence the structure of informal organizational networks in intended ways through planned interventions (Gray et al., 2019; Kleinbaum & Stuart, 2014).

Limitations and future research

Two main limitations deserve comment in this concluding commentary. First, we have examined the interplay between organizational change and social networks within a potentially idiosyncratic organizational setting, which may limit the generalizability of our results to different settings. Hospitals are professional organizations (Tasselli, 2014) characterized by distributed leadership, power and status dynamics among clinical and administrative staff that are highly specific to these types of organizations and may have affected our results. Systematic replication of our results in different settings is therefore needed to establish the empirical extension of our study. This is facilitated by the fact that while our setting is idiosyncratic, our research design is not and may be adopted and adapted to different organizational settings.

Second, our study focuses only on physicians and their professional networks, hence overlooking the importance of change reactions of other professional roles which may be equally important for the quality of health care delivery services, particularly during major change events (Barley, 1990). This may limit the generalizability of our results to other categories of healthcare

professionals, such as nurses, technicians and allied health professionals, who may reveal different dynamics in the way they react to organizational change. Furthermore, we focused on professional networks that physicians maintain with peers. The adoption of a multidisciplinary approach in patient care, however, typically requires collaboration and coordination across professional boundaries in the hospital community. We invite future research to adopt a more holistic view that takes into account the complexity of the relationships that organizational members develop across professional and role boundaries, including relationships with managers and administrators.

Conclusion

This study examined the micro-level dynamics underlying macro-level associations between organizational change and its outcomes, by focusing in particular on the role of social networks in the context of organizational change. The study adds to existing empirical research adopting a multilevel approach, but focusing predominantly on the analysis of change agents' professional networks. The study also adds to existing empirical research focusing on change recipients' professional networks, but overlooking the importance of examining them in a multilevel fashion. We believe our study offers new insights on when change recipients' professional networks affect change implementation at the individual level, and how this, in turn, affects collective outcomes of change. Overall, our findings open new avenues for future research investigating the role of organizational networks in predicting individual reactions and collective outcomes of planned organizational change.

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Table 1

Means, standard deviations, and correlations of the study variables.

	Variable	Mean (%)	SD	1	2	3	4	5	6	7	8	9
	Individual level											
1	Individual adaptivity	3.31	1.27	-								
2	Resistance to change	2.33	0.89	**-0.42**	-							
3	Gender	27.95		-0.02	-0.01	-						
4	Tenure	17.74	10.32	-0.03	0.10	**-0.18**	-					
5	Managerial responsibility	31.3		0.10	0.03	**-0.19**	**0.48**	-				
6	Perceived job impact	2.58	0.97	0.04	0.13	-0.09	0.04	**0.20**	-			
7	Network size	16.16	5.94	0.15	0.00	**-0.25**	**0.16**	0.15	0.04	-		
8	Average alters resistance to change	2.31	0.49	**-0.52**	**0.48**	0.10	0.02	-0.05	0.12	**-0.17**	-	
9	Network attitudinal heterogeneity	0.60	0.51	0.04	**0.29**	**-0.18**	**0.25**	**0.19**	0.02	**0.18**	-0.11	-
10	Network range	0.20	0.40	**0.33**	-0.11	**-0.17**	0.12	**0.23**	**0.18**	**0.41**	**-0.34**	0.12
	Unit level											
1	Development of new guidelines	1.72	2.39	-								
2	Collective adaptivity	3.42	0.93	**0.37**	-							
3	Magnitude of change	21.24	14.40	**0.41**	**0.52**	-						
4	Collective efficacy	3.64	1.01	0.00	**0.54**	0.13	-					
5	Procedural fairness	2.78	1.09	0.08	**0.86**	0.17	**0.51**	-				
6	Unit network centrality	17.17	7.23	0.14	0.13	-0.37	0.19	0.16	-			
7	Unit size	5.86	3.01	**0.52**	-0.18	0.09	-0.13	-0.21	0.17			

Note: N (individuals) = 161; n (units) = 29. Gender was coded as 1 = Male and 2 = Female; Significant coefficients ($p < .05$) are reported in bold.

Table 2

HLM regression predicting individual resistance to change.

	Model 1	Model 2	Model 3
Gender		-0.05	-0.02
		(0.15)	(0.15)
Tenure		0.01	0.00
		(0.01)	(0.01)
Managerial responsibility		0.01	0.10
		(0.17)	(0.17)
Perceived fairness		-0.54***	-0.42***
		(0.12)	(0.12)
Unit size		-0.02	-0.03
		(0.03)	(0.03)
Magnitude of change			-0.02***
			(0.01)
Magnitude of change^2 (x100)			0.15**
			(0.07)
Intercept	2.31***	2.28***	1.92***
	(0.09)	(0.25)	(0.29)
Variance components			
Within-team (L1) variance ($\sigma 2$)	0.69	0.67	0.66
Intercept (L2) variance (τ_{00})	0.11	0.02	0.00
Additional information			
ICC	0.14		
-2 log likelihood	413.84	396.42	390.02
Wald $\chi 2$	--	23.87***	35.52***
Pseudo R-squared	0	0.14	0.18
N(Individuals)	161	161	161
n(Units)	29	29	29

Note: Standard errors in parentheses. Significance levels: ***p<0.01, **p<0.05, *p<0.1

Table 3
HLM predicting individual adaptivity.

	Model 1	Model 2	Model 3	Model 4	Model 5
Gender		0.22	0.17	0.24	0.29
		(0.19)	(0.18)	(0.18)	(0.18)
Tenure		-0.01	-0.00	-0.00	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)
Management responsibility		0.20	0.19	0.15	0.13
		(0.20)	(0.20)	(0.20)	(0.20)
Perceived job impact		0.20**	0.21**	0.20**	0.21**
		(0.10)	(0.10)	(0.10)	(0.10)
Resistance to change			-0.31***	-0.30***	-0.43***
			(0.09)	(0.10)	(0.11)
Network size				0.03*	0.01
				(0.02)	(0.02)
Average alters resistance to change				-0.80***	-0.78***
				(0.24)	(0.23)
Network attitudinal heterogeneity					0.22
					(0.17)
Network range					1.01*
					(0.55)
Net. Att. Heter. × Network range					2.70**
					(1.10)
Intercept	3.40***	3.16***	3.90***	5.17***	5.59***
	(0.17)	(0.35)	(0.39)	(0.66)	(0.65)
Variance components					
Within-team (L1) variance ($\sigma 2$)	0.89	0.85	0.84	0.86	0.84
Intercept (L2) variance (τ_{00})	0.69	0.69	0.51	0.23	0.16
Additional information					
ICC	0.43				
-2 log likelihood	484.78	478.86	468.78	457.48	448.52
Wald $\chi 2$	--	6.10	17.22***	38.92***	56.14***
Pseudo R-squared	0	0.03	0.15	0.31	0.37
N(Individuals)	161	161	161	161	161
n(Units)	29	29	29	29	29

Note: Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 4

Negative binomial regression predicting development of new guidelines at unit level.

	Model 1	Model 2
Collective efficacy	0.33	0.14
	(0.34)	(0.34)
Unit network centrality	-0.00	-0.01
	(0.03)	(0.04)
Unit size	0.28***	0.31***
	(0.08)	(0.09)
Collective adaptivity		0.54**
		(0.26)
Intercept	-1.37**	-3.32***
	(0.55)	(1.05)
Regression diagnostics		
McFadden's R-squared	0.11	0.16
Log-Likelihood	-45.76	-43.73
Lr-test (Model 2 vs Model 1)	--	4.06**
n(Units)	29	29

Note: Robust standard errors in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1

Figure 1

Conceptual Model

Note: Solid lines indicate within-level relationships. The dashed line indicates the cross-level direct effect tested in the study. The dotted line indicates an emergent phenomenon, operationalized by aggregating individual-level responses at the unit level.

Figure 2

The curvilinear relationship between magnitude of change and individual resistance to change

Figure 3

The moderating role of network range on the relationship between network attitudinal heterogeneity and individual adaptivity

Note: The values used to determine the lines are one standard deviation either side of the mean.
A solid line represents low network range; a dashed line represents high network range.