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Employees' Change Support in the Public Sector— A Multi-Time Field Study Examining the Formation of Intentions and Behaviors

Research Article

Abstract: *Recent micro-level research on public sector reform and change highlights the importance of employees' reactions to change. Based on the assumption that intentions determine behaviors, scholars have focused on the importance of understanding how change-supportive intentions are formed. However, how change-supportive intentions translate to change-supportive behaviors over time has received less attention. Drawing on the theory of planned behavior and public administration literature, this study examines the formation of change-supportive intentions and behaviors based on data from a two-wave field study of 135 public school teachers undergoing a major top-down reform in the Kurdistan Region of Iraq. The results highlight the explanatory value of the psychological perspective for change-supportive intentions as well as for change-supportive behaviors measured nine months later. The findings of the present study are theoretically and practically relevant as they offer new insights into the psychological mechanisms involved in the formation of change support in the context of public organizations.*

Evidence for Practice

- Change-supportive intentions show a strong relationship with change-supportive behaviors measured nine months later and, hence, can serve as early indicators for proactive change management.
- Valuable insights for the design of tailored change management intervention fostering change support can be derived from knowledge about the psychological reactions of change recipients.
- To optimally promote change support, interventions should target positive change-related attitudes, as well as subjective norms in the organization and perceived behavioral control of the change recipients.

In the last few decades, there have been significant processes of change and reforms in public sector organizations (Fattore, Iacovone, and Steccolini 2018). Since the 1980s, tighter budgets, fluctuating financial markets, safety standards, as well as information technology and more turbulent environments have increasingly prompted public sector organizations to initiate and execute changes in the governance, structure, design, and quality of services delivered to citizens (Ahmad 2018; Fernandez and Rainey 2006; Pollitt and Bouckaert 2011).

Looking at changes in the public sector context reveals that while reforms and change programs are often initiated by elected or politically appointed officials and executives in a top-down manner, the implementations of actual changes and reforms in public organizations are executed by middle- and first-line managers, as well as by front-line employees (that is, change recipients) (Ahmad, Liu, and Butt 2019b; Hassan et al. 2020). Hence, the public administration literature on public sector reform and change implementation emphasizes the important role of change recipients in shaping how

reforms are translated into practice (Zarychta, Grillos, and Andersson 2019). van der Voet, Kuipers, and Groeneveld (2016, 121) argue that to have any effect, reform initiatives must “ultimately result in changes in the work processes of public organizations and in the attitudes and behavior of employees who work in these organizations.” As a result of the reform and change initiatives, organizational members are expected to go beyond their regular comfort zones (Kotter 1995) and substitute familiar behaviors with new behaviors that are aligned with the goals of the change initiative (Kuipers et al. 2014; Schneider, Gunnarson, and Niles-Jolly 1994). Such a notion is supported by various scholars who argue that “If people do not change, there is no organizational change” (Schneider et al. 1994, 7), or that “change persists over the long term only when individuals alter their on-the-job behaviors in appropriate ways” (Choi 2011, 480). Thus, the response of change recipients to changes is, inter alia, suggested to be one of the main determinants of the extent to which organizational changes succeed in public sector organizations (Ahmad and Cheng 2018; Kelman 2005; van der Voet 2016).

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Currently, a significant body of research exists that acknowledges the importance of recipients' responses during times of reform and change (Oreg and Berson 2011). However, reviewing organizational change literature from a public administration perspective shows that there are a number of notable gaps that warrant further investigation.

First, while there is a considerable amount of research pointing to the crucial role of recipients' responses in the general context of organizational changes (Oreg et al. 2018), the applicability of this knowledge to the public administration context is challenging from policy, practical, and scholarly perspectives (Fernandez and Rainey 2006) because the public sector is often recognized as a context in which the implementation of organizational changes is rather difficult (e.g., Cinite, Duxbury, and Higgins 2009; Isett et al. 2013). Indeed, research on change has been criticized for being rather "ahistorical, acontextual and aprocessual" (Kuipers et al. 2014, 2). Moreover, literature reviews on change in the public sector show that only a few studies have explicitly focused on the process of change and how it is implemented (e.g., Fernandez and Rainey 2006; Kuipers et al. 2014). However, Pettigrew (1987, 2012) has emphasized the importance of considering the process and context of change. Hence, while the content and reasons for change have received much research attention in public administration (e.g., Van de Walle and Groeneveld 2016), more research is needed that focuses on the implementation of change in the public sector context (e.g., Ahmad, Liu, and Butt 2019a; Fattore et al. 2018; van der Voet, Kuipers, and Groeneveld 2016).

Second, despite calls for "the interdisciplinary analysis of public administration from a micro-level perspective of individual behavior and attitudes" (Grimmelikhuijsen et al. 2017, 46), considerations of micro-level processes during times of reform and change in public sector organizations seem sparse (Ahmad and Cheng 2018; Kuipers et al. 2014). Moreover, it is argued that organizational changes should not be regarded as a simple technical issue, but rather are socially complex in their implementation (Fullan 2016). Taking into account that change recipients are more than "neutral implementers" van Engen, Steijn, and Tummers (2019) they are more likely to have a favorable, 2) increases the relevance of micro-level approaches to studying change in the public administration context.

Third, while some recent studies surrounding public sector reform and change (e.g., Ahmad et al. 2019a; Ahmad and Cheng 2018; Straatmann, Nolte, and Seggewiss 2018; van der Voet et al. 2016) provide insights explaining how recipients' initial psychological responses and intentions can determine the change's potential to succeed, it is not clear to what extent recipients' change-supportive intentions predict their subsequent change-supportive behaviors (Ahmad et al. 2019a; Oreg et al. 2018). Specifically, longitudinal studies explicitly testing the intention-behavior link in the domain of public sector reform and change are still rare (Holt et al. 2007; Jimmieson, Peach, and White 2008; O'Connor, Jimmieson, and White 2018). Hence, more research is needed to understand how public employees react to specific reforms (Giauque 2015) and how psychological mechanisms predict change-supportive behaviors of public employees.

Therefore, the aim of the study is to better understand employees' change support in the context of top-down reform in order to provide insights for the management of change in the public sector. Specifically, this study contributes to the existing literature, first, by responding to Grimmelikhuijsen et al.'s (2017) call for a behavioral approach to public administration as the focus lies on individuals within the public sector as the unit of analysis. It does so by integrating insights from psychology and the behavioral sciences into the study of public administration (Battaglio et al. 2019). More specifically, the study draws on the established Theory of Planned Behavior (TPB) (Ajzen 1991) and behavioral science literature as a micro-level theoretical framework for better understanding the psychological underpinnings of recipients' change-supportive intentions to engage in actions toward the successful implementation of a change effort in a public sector setting. Second, this longitudinal study applies a processual, multi-time perspective and puts the linkage between recipients' change-supportive intentions and their change-supportive behaviors to an empirical test in a top-down organizational change context. Third, as suggested by the TPB (see figure 1), the role of change-related perceived behavioral control in influencing change-supportive behaviors is examined with specific reference to the particularities of the public administration context. Hence, the study goes beyond previous organizational change research by taking advantage of

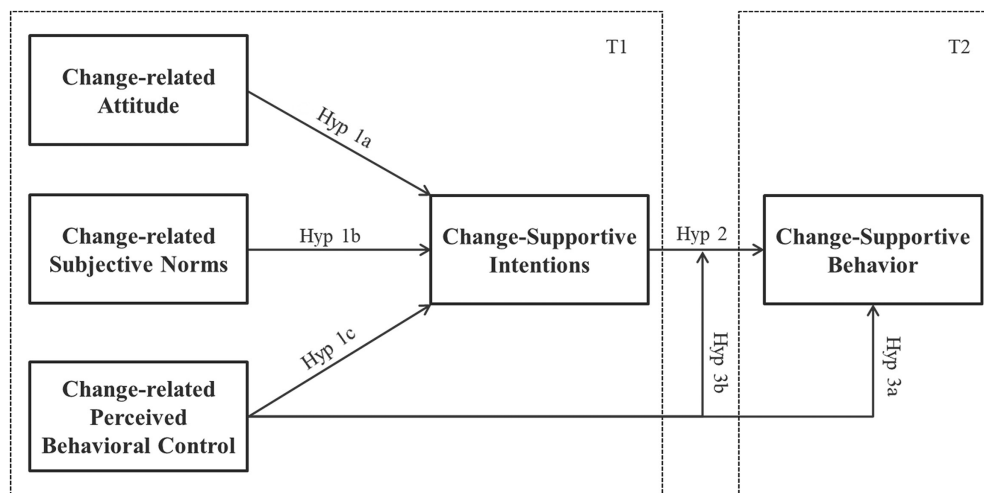


Figure 1 Research Model Based on the TPB (Ajzen 1991)

the complete framework of the TPB in order to better understand the individual psychological mechanisms involved in support of top-down change in the public sector. Fourth, regarding the contextual perspective, the study answers calls to extend the mostly Western focus by conducting research in other economic, cultural, political, and legal contexts (e.g., Ahmad and Cheng 2018; Fattore et al. 2018). Specifically, the context of the study is a unique educational reform in the Kurdistan Region of Iraq that has not received ample attention.

Taken together, based on the high-resolution and theoretical foundation of the TPB applied in the present study to a top-down reform, the results will be helpful for researchers, policymakers, and practitioners to better identify specific levers for change interventions to foster change-supportive intentions and change-supportive behaviors in the context of public organizations.

Public Sector Reform from a Change Management Perspective

Public management reform has been defined as deliberate attempts by political as well as senior administrative leaders to change structures, processes, or cultural aspects of “public sector organizations with the objective of getting them (in some sense) to run better” (Pollitt and Bouckaert 2011, 2). Literature reviews show that public management reforms are often initiated in a top-down manner (e.g., Kuipers et al. 2014), largely overlooking the view of those responsible for the implementation process (Ahmad et al. 2019a). While such top-down reforms are steadily used as an instrument to initiate change in the public sector, the initiation of reforms does not necessarily mean the achievement of the aspired goals, since scholars conclude that reforms often fail to fulfill their intended objective (e.g., Arar, Kondakci, and Taysum 2019; Christensen et al. 2007; Röbbken, Schütz, and Lehmkuhl 2019; Zayim-Kurtay and Zhu 2019).

To date, public sector reform has been studied from a number of perspectives, such as institutional perspective (Olsen 2009), principal agent perspectives (Van de Walle and Groeneveld 2016), as well as instrumental and cultural perspectives (Christensen et al. 2007). Although these different perspectives offer valuable insights into reform in the public sector, they focus on reform and change at the national or sectoral (macro- or meso-)level (Ahmad 2018). In other words, these perspectives offer limited insights into how the change process is implemented and managed in public organizations. Hence, there is a need for more research examining the implementation and the reactions of change recipients to reforms in the public sector from micro-level perspectives (e.g., Ahmad et al. 2019a; Giauque 2015; Kuipers et al. 2014).

A perspective that conceptualizes the challenges facing reforms and organizational change on a micro-level is the change management perspective (Burke 2013; van der Voet et al. 2016). The change management perspective on public sector reform focuses on what happens to the structures, processes, and culture of public sector organizations, as well as to the attitudes, intentions, and behaviors of public employees (Christensen et al. 2007). This perspective argues that recipients’ psychological and behavioral responses are among the central determinants of the success and effectiveness

of most reform and change efforts (van der Voet et al. 2016). The change management perspective fits neatly within the emerging field of behavioral public administration which emphasizes the relevance of micro-level and psychological processes within or between individuals in the public sector (Grimmelikhuijsen et al. 2017). Hence, research that focuses on the implementation of public reform and investigation of change support among front-line employees has great potential to contribute to public administration research, which has largely concentrated on reasons for and content of change (e.g., van der Voet et al. 2016).

Understanding Employee Support for Change in Public Organizations

Acknowledging the importance of the micro-level perspective on public sector reform and change, a number of recent research efforts have been devoted to understanding and predicting employee reactions to organizational changes in the public sector (Ahmad et al. 2019a; Ahmad and Cheng 2018; van der Voet et al. 2016; van der Voet, Kuipers, and Groeneveld 2015). These studies contend that employees’ change supportive behavior, defined as employees’ efforts to “actively participate in, facilitate and contribute to a planned change” (Kim, Hornung, and Rousseau 2011, 1,665), is a crucial factor for the success of organizational changes (Kim et al. 2011; Rafferty, Jimmieson, and Armenakis 2013). Research on public sector reform and change also suggests that policymakers are dependent on the willingness and support of front-line employees for the successful implementation of new change programs and policies (Ahmad et al. 2019a; van Engen et al. 2019). It is also argued that the actual behavior of these recipients during change implementation may not necessarily align with the policy-makers’ ambitions (May and Winter 2009). Hence, the implementation of public sector reforms needs to consider and foster the support of change recipients (Isett et al. 2013). This is especially true given that front-line employees have the ability to create major difficulties for top-down change programs (van Engen et al. 2019).

In an effort to provide a comprehensive theoretical perspective and enhance our knowledge about the psychological mechanisms underlying employees’ support for change, Jimmieson et al. (2008) built on the TPB (Ajzen 1991). The TPB is “designed to predict and explain human behavior in specific contexts” (Ajzen 1991, 181). In short, the TPB contends that there is a logical sequence of psychological reactions that help to explain and predict human behavior (Ajzen 1991). Specifically, the TPB suggests a person’s intention to perform a specific behavior as the most proximal determinant of subsequent behavior.

According to the TPB, behavioral intentions are largely dependent on three determinants (Ajzen 1991). The first determinant of intentions is the person’s attitude toward the behavior of interest, conceptualized as evaluative beliefs based on the potential positive or negative outcomes of enacting the behavior. When a change is initiated from above (as is usually the case in public organizations, Kuipers et al. 2014), change recipients will evaluate the impact of the change based on its projected effect on recipients (Ahmad and Cheng 2018). To the extent that recipients perceive the impact of change efforts positively, they are more likely to have a favorable change-related attitude.

A considerable amount of literature highlights the importance of change recipients' positive attitude toward the change (e.g., Ahmad et al. 2019b; Kelman 2005; Oreg and Berson 2011; Van de Walle and Groeneveld 2016). While research on attitudes in the context of organizational change often builds on a broad conceptualization (i.e., referring to affective, cognitive, and behavioral facets, e.g., Eagly and Chaiken 1993; Giauque 2015; Kelman 2005; Piderit, 2000; Vakola and Nikolaou 2005), the conceptualization of attitudes in the TPB focuses on attitudes as an overall favorable or unfavorable evaluation of the resulting outcome (Ajzen 1991). Research employing the TPB with its focused conceptualization of attitudes in public organizations finds change-related attitudes to consistently show significant relationships with recipients' responses to change (e.g., Jimmieson et al. 2008; Straatmann et al. 2018). Even though these studies did not specifically address changes initiated by large-scale top-down reforms, it can be expected that a positive change-related attitude will be related to more positive change-supportive intentions also in a top-down change process that affects employees across distributed organizations. Hence, we hypothesize that:

Hypothesis 1a: Favorable change-related attitude (T1) are positively related to employees' change-supportive intention (T1).

The second determinant of intentions is subjective norms relating to a behavior, which is conceptualized as the perceived social pressure to perform or not perform the behavior in question (Ajzen 2011). Subjective norms are based on the perceptions of social influences from important referents (e.g., colleagues, managers, and top management). The more positive these significant others are toward a certain behavior, the stronger will this social influence affect the individual's intention to perform that behavior (Tummers, Steijn, and Bekkers 2012). Such a notion is based on the idea that social influence creates pressure among change recipients to act (or not to act) in change-supportive ways (Jimmieson et al. 2008). When considering organizational change with its attendant uncertainty (Hornung and Rousseau 2007), recipients will look for sources of information and support they can trust. In such cases, when recipients perceive that the significant others are supportive of the change, this will positively contribute to their own intentions and subsequent behaviors (Jimmieson et al. 2008). The importance of social influence for the interpretation of events in organizational change processes has been strongly recognized in the public administration literature (e.g., Giauque 2015; Kelman 2005; Tummers 2019; Zayim-Kurtay and Zhu 2019). Tenkasi and Cesmore (2003), for instance, suggested that change management can, and should, capitalize on the social networks in organizations in order to create alliances and power bases that are sources for sense-making during times of change. Moreover, dependent relationships are supposed to strengthen the relevance of subjective norms (Jimmieson, White, and Zajdlewicz 2009), which is likely the case in public organizations with their hierarchical structures and command-and-control environments. In line with this notion, Tummers et al. (2012) revealed that the subjective norms of managers and colleagues were significantly related to public professionals' willingness to implement a new policy. Similarly, Jimmieson et al. (2008) and Straatmann et al. (2018) also demonstrated the significance of subjective norms in the formation of employee

reactions to change. Other behavioral science literature (e.g., John et al. 2013) experimentally showed that social norms can be used as a "nudge" to enhance a desired behavior. Thus, we hypothesize that:

Hypothesis 1b: Stronger change-related subjective norms (T1) are positively related to employees' change-supportive intentions (T1).

The third determinant of intentions is the perceived behavioral control (PBC), defined as "perceived ease or difficulty of performing the behavior of interest" (Ajzen 1991, 183). PBC is the recipients' assessment of the barriers they are likely to face and their ability to overcome those barriers (Dawkins and Frass 2005). Conner (1992) argued that being confident about one's ability to cope with the change is an essential determinant of actual behavior. The assumptions of the TPB concerning PBC are closely tied to the work on self-efficacy by Bandura (1982). Indeed, when defined at a specific level, self-efficacy and PBC are very similar concepts (Ajzen 2002). Bandura (1997) argued that individuals commonly avoid activities that they believe exceed their coping capabilities. In contrast, individuals will undertake and perform those behaviors that they judge themselves to be capable of. Employees with high levels of PBC feel that they are able to carry out a range of broad and interpersonal roles beyond the traditionally prescribed requirements of their position (Parker 1998). Because PBC raises employees' feelings of confidence and the perceived likelihood of change success, it is no surprise that PBC has been found to be associated with employee positive responses to change and change proactive behaviors of public employees (Ahmad et al. 2019a; Straatmann et al. 2018). Therefore, we expect that:

Hypothesis 1c: Higher levels of change-related perceived behavioral control (T1) are positively related to employees' change-supportive intentions (T1).

As noted above, the successful implementation of public sector reform requires change support on behalf of the change recipients who bring the reform to life (e.g., Cinite et al. 2009; Tummers 2019; van der Voet et al. 2016). According to the TPB and in line with general change research, change-supportive intentions can be seen as the most proximal variable in predicting change-supportive behaviors (e.g., Ajzen 1991; Rafferty et al. 2013). Conceptualizing change-supportive intention as a main determinant of subsequent behavior implies that the effect of other factors, such as change-related attitude, subjective norms, and PBC, on change-supportive behavior is mediated via change-supportive intentions (Ajzen 1991). From this perspective, change-supportive intentions are highly relevant for research and organizational practice as knowledge about the formation of change-supportive intentions will help to develop specific measures to foster change-supportive behaviors.

Supporting the relevance of intentions, Sheeran (2002) found a mean correlation of 0.53 between intention and behavior by integrating general research on the intention-behavior relation. More recently, McEachan et al. (2011) summarized the results of 206 studies on health-related behaviors in their meta-analysis and also showed that intentions are substantially correlated with subsequent behavior (mean correlation = 0.43). While these meta-analyses have a rather general or private scope, the intention-

behavior link has received comparatively less research attention in the context of organizational changes. From a broader perspective, Meyer et al. (2007) showed that a positive psychological state (i.e., affective commitment to change) is strongly linked to subsequent employee behavioral support. Similarly, public administration research reports a high relevance of employees' psychological states for subsequent change-supportive behavior (e.g., Kelman 2005). Hence, building on the TPB and previous results from other research domains, the following hypothesis is suggested for changes resulting from top-down reform:

Hypothesis 2: Change-supportive intention (T1) is positively related to change-supportive behaviors (T2).

Ajzen (2011) notes that the correlation between intention and behavior shows a considerable variation across studies and domains. While having positive intentions is an important step to performing the behavior of interest, additional factors have to be taken into account, as the translation of intentions to performing the behavior is not guaranteed (Ahmad et al. 2019a). For example, Sheeran (2002) found that people who intend to perform the behavior and then do not do so form a main reason for the often-observed intention–behavior inconsistency.

The TPB proposes that the degree of volitional control plays a central role in determining the actual performance of behavior (Ajzen 1991). That is, the performance of behavior is in many contexts not only dependent on the intention to perform the behavior, but at least to some degree also on non-motivational factors such as personal or situational constraints (Ajzen 1991; Armitage and Conner 2001). By providing information about such perceived constraints for the behavior, PBC is suggested to increase the precision of predicting behavior (Armitage and Conner 2001). Hence, a double role of PBC with effects on intentions and behaviors is assumed in the TPB (Ajzen 1991). While in situations with high volitional control intentions are sufficient for predicting behavior, the importance of PBC increases when volitional control declines (Ajzen 1991). Specifically, under conditions where there are constraints to performing the behavior, PBC should directly influence the performance of behavior and interactively strengthen the relationship between intentions and behavior (Ajzen 1991; Armitage and Conner 2001).

Turning to top-down initiated reforms and distributed change implementation, the relevance of PBC is given as supporting organizational changes dependent on time, skills, or cooperation of and with others, which are critical resources for the performance of behavior (Ajzen 1991). Thus, the context of public sector reform is likely to lead to a reduction in volitional control compared with more private activities. As volitional control reduces, the importance of considering PBC in the formation of change-supportive behaviors increases (Ajzen 1991). Analyzing PBC as a potential moderator of the intention–behavior link follows Kelman's (2005) notion that the investigation of interactions helps to gain a better appreciation for the formation of change behavior of public employees. Hence, it is hypothesized that:

Hypothesis 3: Change-related perceived behavioral control (T1) is (1) positively related to change-supportive behaviors

(T2) and (2) moderates the relationship between change-supportive intentions (T1) and change-supportive behaviors (T2) such that the relationship is stronger for change recipients with a high change-related perceived behavioral control.

Method

Research Context

The study was conducted in Kurdistan, a semi-autonomous region in the north of Iraq. With a population of nearly six million, the Iraqi Constitution defines Kurdistan as a federal entity in Iraq with its own government that enjoys the right to exercise legislative, executive, and judicial powers. In recent years, the Kurdistan Regional Government (KRG) has initiated and implemented several reforms and change initiatives in its public organizations in an effort to raise the quality of education and the higher education system in the region, and as a response to the severe economic crisis that the region has faced since 2014 (Ahmad and Cheng 2018).

In early 2016, inspired by various educational reforms in different countries (Arar et al. 2019), the Ministry of Education of the KRG initiated a top-down reform to change the language of instruction for Math and Science subjects to English in primary schools, from grade 1 (age 6). The reform aims to increase proficiency in English starting from an early age and to allow for a more egalitarian education. The policy was designed in consultation with many educational experts, academics, and other stakeholders. The change requires Math and Science teachers (MSTs) to teach their classes in English.

Following a series of workshops and meetings with education supervisors and teachers' representatives, the ministry began piloting the new policy in a number of primary schools. The training of MSTs was seen as crucial to the success of the reform; therefore, MSTs from the participating schools attended a 10-week-long English training program to enable them to teach their subjects in English. Based on the enthusiasm of MSTs and school principals, the Ministry concluded that the pilot was a success.

In summer 2017, the ministry gradually expanded the new policy in different cities and included more schools with the goal of officially approving the policy in all primary schools in the Kurdistan Region. Specifically, the schools that participated in the current study were selected from the Educational Directorate and were all located in the same city. Like in the pilot phase, an English training program was provided for all MSTs of the selected schools. MSTs participating in the 10-week-long English training program were consulted about issues related to successful planning and implementation of the change initiative, such as identifying important ways to deal with the new task, evaluating new work practices, and becoming more familiar with the objectives and significance of the change initiative. It was at this anticipatory stage of the change process that T1 data collection started.

Investigating changes in public schools has a number of research advantages. First, public schools in Kurdistan are highly homogeneous in their structure, funding, practices, and policies. All schools across Kurdistan follow the same centralized employment and promotion system; teachers with similar qualifications and experience receive the same salary. This homogeneity facilitates

comparisons across organizations. Second, the comparability in multi-organization studies of organizational changes is often reduced by different changes in the organizations (Oreg and Berson 2011). However, the present study investigates a system-wide primary school reform, to be applied homogeneously across different organizations, which allows for a better investigation of the effects under study. Third, by investigating primary schools, this study answers calls for the pursuit of research in public organizations, and in particular, schools, which are of great importance to society and yet are largely underrepresented in the public management as well as generic management literature (Ouchi, Ouchi, Lingle, and Porter 2005).

Survey Timing and Administration

A multi-time research design was employed in which change-related attitude, change-related subjective norms, change-related perceived behavioral control (PBC), and change-supportive intention were measured at time 1 (T1). In order to examine the extent to which change-supportive intention and PBC had any effects on subsequent change-supportive behavior, the latter variable was assessed at time 2 (T2), approximately 9 months after the collection of T1 data.

The timing of measurements was determined in consultation with the director of the English language training program based on the progress of the change and teachers' understanding of what was required from them to cope with the changes. By the time of the initial wave (which was conducted during the last two weeks of the training program), all MSTs were assumed to have had an opportunity to develop beliefs about the change's consequences, their intentions regarding whether or not to support the change, and ultimately engage in change-supportive behavior upon their return to schools. At the time of T2 data collection, which was about 9 months later, MSTs had had the opportunity to teach their classes in English for around two semesters.

At T1, a paper-pencil survey was distributed to all 150 participants in the English training workshop in August/September 2017 via a trained research assistant and with the help of the director of the English language training program. Before distributing the questionnaires, MSTs were informed that (1) participation in the survey was voluntary; (2) their responses were completely confidential in that their principals, colleagues, the MoE, nor any other party besides the (international) research team would have access to individual responses; (3) the research assistant (who collected the data) was not otherwise involved in the study; (4) the results of the study would only be reported in an aggregated way; (5) their ID and school names were needed for a follow-up survey; and (6) the instruments were not achievement tests and there was no right or wrong answer to the instrument. The MSTs were permitted to complete the survey during work hours or at home and return the questionnaires the next working days.

In accordance with the low turnover rate among public servants in Kurdistan Region's public organizations in general and school teachers in particular (Ahmad 2018), all MSTs who participated in T1 data collection were still working in their respective schools. For T2 data collection, the trained research assistant who collected T1 data had to carry out repeat visits to schools of participants, if the initial attempted contact had been unsuccessful. The MSTs were

asked to complete the questionnaire during their class breaks or take it home and return the completed copy the following day(s). To ensure that teachers' individual responses remained confidential, they were also asked to put the completed questionnaire in a sealed envelope provided by the research assistant. T2 data were collected within five working days.

Sample

After two callbacks, 149 MSTs completed the survey, providing a response rate of 99.3% at T1. At T2, responses from 144 MSTs were retrieved and could be matched with T1 responses. Screening for data quality, two respondents were deleted because of conflicting responses to demographic variables (age, experience) and seven respondents were removed for providing more than 70% consecutive identical answers. Hence, the final sample consisted of 135 respondents, representing a medium-sized sample (Ullman 2006). Of the participants in the final sample, 61.5% were female. The median age at T1 was 36 years with a range from 21 years up to 55 years. The years of teaching experience ranged from 1 year to 35 years with a median of 14 years. Regarding their professional education, 91.9% indicate vocational education, 7.4% bachelor education, and one respondent did not answer to this variable.

Measures

A full list of the items used in the present study is given in the appendix. Unless stated otherwise, all measures were based on a seven-point Likert-type scale (1 = strongly disagree; 7 = strongly agree). Previously established scales were adapted from Straatmann et al. (2016) to measure change-related attitude, change-related subjective norms, change-related PBC, and change-supportive intention at T1. Measurement items for change-supportive behavior were adapted from scales previously developed and validated by Ahmad et al. (2019b). This variable tapped on the sort of activities that were considered as supportive of the change and utilized self-assessments of change-supportive behavior, similar to much research in the context of organizational changes (e.g. Alfes et al. 2019; Oreg and Berson 2011). Following Ajzen's (2006) recommendations, items were adapted to target the behavior of interest in a specific context. The wording of the items was discussed with five teachers and two doctoral candidates in the field of organizational behavior to ensure that items matched the specific organizational context under investigation.

Questionnaires were administered in the respondents' native language (Kurdish). In line with Brislin's (1980) recommendations, questionnaires were first translated to Kurdish by the first author and two doctoral candidates, followed by back-translation by an independent researcher. To minimize social desirability, employees were instructed, both orally and in writing, to "rate how you actually behave in response to the change effort and not how you think you should behave."

Results

Preliminary Analyses

To evaluate and ensure the distinctiveness of the main study variables, confirmatory and exploratory factor analyses in AMOS and SPSS were conducted. As the initial model fit of the measurement model was unsatisfactory ($\chi^2 = 751.019$, $df = 160$,

CFI = 0.763, IFI = 0.768, RMSEA = 0.166), some variables were excluded from the analysis due to low loadings on their expected factor (see appendix). Table 1 shows that the refined five-factor model has a good fit to the data ($\chi^2 = 194.934$; $df = 67$; IFI = 0.932; CFI = 0.931; RMSEA = 0.119), with competing models providing inferior fits. While the RMSEA was slightly above usual conventions for adequate model fit, Hu and Bentler (1999) conclude that in samples with fewer than 150 participants the RMSEA tends to over-reject the true model. Given these results, and the Cronbach's alpha scores across all measurement scales (reported in parentheses in table 2), the measures seem to be distinct and consistent enough to confidently proceed with the analyses.

Descriptive Results

Descriptive statistics and correlations of the variables are presented in table 2. As can be seen, all but one correlation among the variables of the TPB were statistically significant and in the anticipated direction, except for the insignificant correlation between change-related PBC at T1 and change-supportive behavior

at T2. In line with the TPB, change-supportive intention showed the highest correlation with change-supportive behavior ($r = 0.513$; $p < 0.01$). Of the control variables, only experience showed a significant negative correlation with change-supportive behavior. Moreover, all correlation coefficients among the main variables are below 0.70, which can be seen as an indication that problems associated with multicollinearity are less of a concern (Hair et al. 2010).

Hypotheses Testing

The hypotheses were tested by a series of path models calculated in AMOS 24 (see table 3). Path modeling was chosen instead of structural equation modeling with latent factors in order to avoid low parameter-to-respondent ratios (Hair et al. 2010) due to the complexity of the hypothesized models and the medium sample size ($N = 135$).

In the first step, change-supportive intention was regressed on change-related attitude, subjective norms, and PBC. Change-related

Table 1 Measurement Model Comparisons

Model	χ^2	df	CFI	IFI	RMSEA	$\Delta\chi^2$	Δdf	ΔCFI
Refined five-factor model	194.934	67	0.931	0.932	0.119			
Test 1: Competing four-factor model (change-related attitude–change-supportive intention combined)	513.325	71	0.761	0.765	0.216	318.391 ^a	4	0.170
Test 2: Competing one-factor model	1,240.008	77	0.372	0.381	0.336	1,045.074 ^a	10	0.559

^a $\Delta\chi^2$ significant at $p < 0.01$ level.

Table 2 Observed Scale Means, Standard Deviations, and Correlations

Variable	Mean (SD)	1	2	3	4	5	6	7	8
1. Change-related attitude (T1)	5.25 (1.60)	(0.884)							
2. Change-related subjective norms (T1)	5.61 (1.39)	0.391**	(0.893)						
3. Change-related PBC (T1)	4.48 (1.75)	0.291**	0.220*	(0.820)					
4. Change-supportive intention (T1)	5.58 (1.36)	0.687**	0.423**	0.380**	(0.879)				
5. Change-supportive behavior (T2)	5.29 (1.40)	0.487**	0.355**	<i>n.s.</i>	0.513**	(0.786)			
6. Gender (T1) ^a	0.39 (0.49)	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>			
7. Education (T1) ^b	1.07 (2.64)	0.204*	<i>n.s.</i>	0.233**	<i>n.s.</i>	<i>n.s.</i>	-0.226**		
8. Age (T1)	37.31 (7.47)	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	0.557**	-0.506**	
9. Experience (T1)	13.99 (6.26)	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>	-0.237**	0.315**	-0.424**	0.859**

Note: **Correlation significant at 0.01 level (two-tailed). * Correlation significant at 0.05 level (two-tailed).

^aGender was coded 0 = female, 1 = male.

^bEducation was coded 1 = vocational education, 2 = bachelor education.

Table 3 Results of Path Models Explaining Change-Supportive Intention (T1) and Change-Supportive Behavior (T2)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Explaining change-supportive intention (T1)</i>						
Change-related attitude (T1)	0.488**	0.488**	0.488**	0.489**	0.489**	0.489**
Change-related subjective norms (T1)	0.157*	0.157*	0.157*	0.157*	0.157*	0.157*
Change-related PBC (T1)	0.137**	0.137**	0.137**	0.138**	0.138**	0.138**
<i>Explaining change-supportive behavior (T2)</i>						
Change-supportive intention (T1)		0.527**	0.505**	0.541**	0.655**	0.400**
Experience (T1)			-0.040*	-0.038*	<i>n.s.</i>	<i>n.s.</i>
Change-related PBC (T1)				<i>n.s.</i>	<i>n.s.</i>	<i>n.s.</i>
CSI * Change-related PBC (T1)					0.111**	0.148**
Change-related attitude (T1)						0.216**
Change-related subjective norms (T1)						0.181*
CSI * Change-related attitude (T1)						<i>n.s.</i>
CSI * Change-related subjective norms (T1)						<i>n.s.</i>
<i>Variance explained</i>						
Change-supportive intention (T1)	0.529	0.529	0.529	0.529	0.529	0.529
Change-supportive behavior (T2)		0.263	0.288/ Δ 0.025	0.295/ Δ 0.007	0.329/ Δ 0.034	0.401/ Δ 0.072

Notes: **Significant at $p < 0.01$ level. *Significant at $p < 0.05$ level. Unstandardized regression coefficients are reported. $N = 135$.

attitude was significantly related to change-supportive intention ($b = 0.488, p < 0.01$), as were change-related subjective norms ($b = 0.157, p < 0.05$) and change-related PBC ($b = 0.137, p < 0.01$). Together the determinants explained more than 50% of the variance in change-supportive intention. Thus, hypotheses 1a, 1b, and 1c, received support from the results at T1.

Hypothesis 2 expected that change-supportive intention will be positively related to change-supportive behavior. Our results show a statistically significant relationship between change-supportive intention and change-supportive behavior ($b = 0.527, p < 0.01$), explaining more than 25% of the variance in change-supportive behavior measured 9 months later. When the control variable experience was entered, it showed a significant negative effect on change-supportive behavior and increased the explained variance by 2.5%. The direct effect of change-supportive intention was only marginally reduced by entering the control variable. Hence, the results provide support for hypothesis 2. Given the significant effect of change-supportive intention on subsequent change-supportive behavior, the indirect effects of change-related attitude, subjective norms, and PBC on behavior mediated via intention were tested. Specifically, Sobel test values and 95% confidence intervals of the mediated effect were calculated (Preacher and Leonardelli 2001; Tofighi and MacKinnon 2011). The results revealed significant mediating effects for change-related attitude ($B = 0.265, SE = 0.05$; 95% CI 0.173 to 0.369; Sobel value = 5.305, $p < 0.01$), subjective norms ($B = 0.085, SE = 0.037$; 95% CI 0.016 to 0.163; Sobel value = 2.303, $p < 0.05$), and PBC ($B = 0.075, SE = 0.029$; 95% CI 0.022 to 0.136; Sobel value = 2.595, $p < 0.01$).

Hypothesis 3a looked at the influence of change-related PBC on change-supportive behavior. Contrary to our expectations, this hypothesis was not supported, as no significant direct effect of change-related PBC was found on change-supportive behavior. Hypothesis 3b concerns the interaction effects of change-related PBC on the relationship between change-supportive intention and change-supportive behavior. To test this hypothesis, mean-centered variables were calculated and multiplied to create an interaction term following the procedures recommended by Aiken and West (1991). When the interaction term was entered into the path model, the explained variance in change-supportive behavior was increased by 3.4% and summed up to 33%. The results indicate that change-related PBC indeed moderates the relationship between change-supportive intention and change-supportive behavior. While the direct effect of PBC remained insignificant and the effect of experience became insignificant, the direct effect of change-supportive intention on change-supportive behavior increased in this step. The interaction of change-supportive intention and change-related PBC is plotted in figure 2. As can be seen, stronger change-supportive intention led to more change-supportive behavior, an effect that was strongest when change-related PBC was high. Interestingly, high PBC in combination with low change-supportive intention led to least change-supportive behavior.

Although not directly suggested in the TPB, we tested the direct and moderating effects of change-related attitude and change-related subjective norms on change-supportive behavior in an exploratory and extended step. Specifically, this explorative step was inspired by previous research reporting direct relationships between

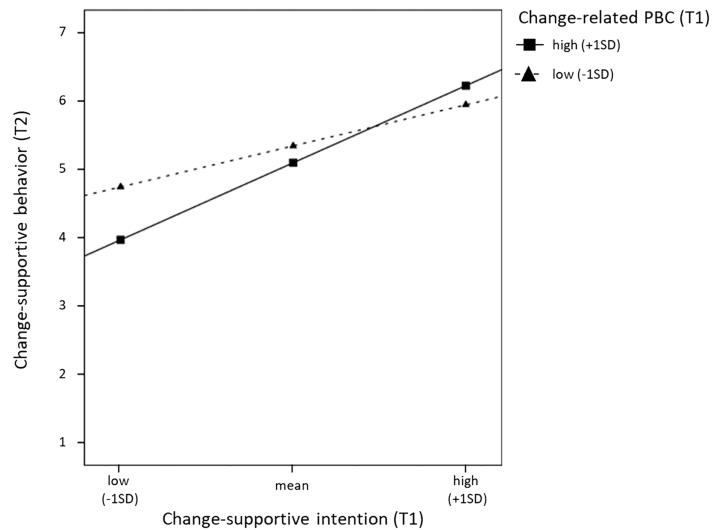


Figure 2 Moderation of Effect of Change-Supportive Intention (T1) on Change-Supportive Behavior (T2) at Values of Moderator Change-Related PBC (T1)

psychological determinants (attitude, subjective norms, and PBC), yet more as a side note (see, for example, the seminal meta-analysis conducted by McEachan et al. 2011). Our analyses show that both change-related attitude and subjective norms are significantly related to change-supportive behavior, respectively, but do not moderate the relationship between change-supportive intention and change-supportive behavior. While the direct effect of change-supportive intention was reduced, it still represents the strongest effect on change-supportive behavior. This is followed by the interaction effect of PBC and change-supportive intention, which slightly increased in this step. Taking the explorative effects into account increased the explained variance in change-supportive behavior to 40% ($\Delta R^2 = 0.072$).

Discussion

The public sector is often considered rather inconducive to change (e.g., Cinite et al. 2009; Isett et al. 2013), and reforms often fail to fulfill their intended objectives (e.g., Arar et al. 2019; Christensen et al. 2007; Röbbken et al. 2019; Zayim-Kurtay and Zhu 2019). As public sector reforms are often initiated in a top-down manner (Kuipers et al. 2014), it is argued that the actual implementation of public sector reforms largely depends on the support of change recipients (Ahmad et al. 2019a, Isett et al. 2013). Responding to calls to study public administration phenomena from a micro-level perspective of individual attitudes and behaviors (Battaglio et al. 2019; Grimmelhuijsen et al. 2017), the present study capitalizes on the TPB (Ajzen 1991) as an established theoretical foundation to examine the formation of change support in the context of public school teachers implementing a top-down reform.

Specifically, the present study aims to contribute to the existing research by analyzing the formation of change-supportive intention at T1 and how these are related to change-supportive behavior at T2 with specific reference to the public administration context and the top-down nature of public sector reform. Knowledge about the psychological processes involved in the formation of change support is of high value to policymakers and change management in the

public sector, as it allows the design of specific interventions and optimizing change processes in a proactive way.

Overall, the results of the present study support the utility of the TPB as a framework for understanding the formation of change support of public Math and Science teachers (MSTs) in the context of a top-down reform. Specifically, at T1, change-related attitudes, subjective norms, and PBC were all related significantly to change-supportive intention of the MSTs and accounted for a large proportion of the variance in change-supportive intention at T1 ($R^2 = 53\%$) as suggested by the TPB.

These results are in line with findings from previous change research (Jimmieson et al. 2008; Straatmann et al. 2016; Straatmann et al. 2018) and highlight that top-down reforms should pay special attention to these central psychological processes involved in the formation of change-supportive intention. Considering that the reform in the present study had a major impact on the work processes of the employees and that the reform was implemented across various institutions, it is important to acknowledge that intentions are not solely related to an individuals' change-related attitude, but also to subjective norms and PBC.

The present results lend additional support to the assumption that subjective norms are of significant importance in the context of top-down reforms to change employees' behavior. Specifically, research on behavioral public administration argues that individuals' rationality is bounded in their ability to process information (Battaglio et al. 2019). Then, in dynamic environments (i.e., during change processes) when recipients are confronted with an ambiguous situation, they are likely to look for decision-making heuristics on how to behave. In such cases, subjective norms can be used as nudges to move individuals toward desirable behavior (Shafir 2013). Such a notion is in line with findings that suggest subjective norm activation to change individual behavior (Shafir 2013). Particularly as public organizations with their hierarchies, work roles, and job descriptions are set up in a way which creates dependent relationships (Jimmieson et al. 2009), the relevance of subjective norms in the formation of behavioral intentions seems to be increased as compared with more general or personal contexts (e.g., Armitage and Conner 2001).

Testing the common assumption that change-supportive intention precedes the degree to which they will engage in change-supportive behavior (Kim et al. 2011; Straatmann et al. 2016), the present results show that change-supportive intention measured at T1 was significantly related to change-supportive behavior measured at T2, 9 months later. Only considering change-supportive intention, 26% of the variance in change-supportive behavior can be explained. Moreover, the present results reveal that change-supportive intention significantly mediated the influences from change-related attitude, subjective norms, and PBC on change-supportive behavior. Hence, change-supportive intention is an important antecedent of change-supportive behavior, also in the context of a top-down public reform that required substantial efforts on behalf of the change recipients.

Despite the comparatively long time lag of 9 months, the correlation between change-supportive intention and behavior

lies in a similar range as reported in general meta-analyses (e.g., McEachan et al. 2011; Sheeran 2002). Hence, the significant relationship between change-supportive intention and change-supportive behavior found in the present study highlights the importance of creating favorable change-supportive intention to promote subsequent change-supportive behavior in the context of change in the public sector.

While the link between change-supportive intention and behavior received support in the present study, Ajzen notes that acting on a formed intention requires "considerable work" (Ajzen 2002, 118). In correspondence, the TPB assumes that PBC is an important condition that also influences the behavior carried out. Specifically, direct effects of PBC on the behavior, as well as moderating effects with high PBC strengthening the link between intention and behavior, are discussed in the literature (Ajzen 1991; Armitage and Conner 2001). As the context of top-down reform likely leads to a reduction in volitional control, the relevance of considering PBC for understanding change-supportive behavior is increased compared with more private activities. Contrary to common expectations, change-related PBC at T1 was not directly related to change-supportive behavior at T2. As such, the finding is in contrast with previous research reporting links between change recipients' perception of their ability to exercise control over the environment and effect change in general (Chen and Wang 2007; Devos, Buelens, and Bouckennooghe 2007) and public servants' change proactive behaviors in particular (Ahmad 2018). Yet, by employing the full framework of the TPB, the results of the present study reveal that PBC was indirectly (via change-supportive intention) related to change-supportive behavior and also showed a significant moderation of the relationship between change-supportive intention and behavior in the expected direction. Specifically, employees with higher change-related PBC are more able to transit from change-supportive intention to change-supportive behavior. Hence, the highest level of change-supportive behavior was found for strong change-supportive intention in combination with high change-related PBC. Interestingly, high change-related PBC also led to the lowest levels of change-supportive behavior when change-supportive intention was low. Taken together, these findings show the relevance of creating high change-supportive intention and fostering change-related PBC among change recipients to provide them equal opportunities to act on their change-supportive intention.

In an explorative step, the present study went beyond the classical assumptions of the TPB by also testing direct and moderating effects of change-related attitude and subjective norms on change-supportive behavior. Entering these additional paths increased the explained variance of change-supportive behavior by 7%, so that altogether 40% of the variance of change-supportive behaviors at T2 was explained. Specifically, significant direct effects of change-related attitude and subjective norms were revealed. However, intention remained the strongest predictor of change-supportive behavior, while the interaction between intention and change-related PBC also remained significant. Thus, the results indicate that the assumptions of the TPB provide a valuable framework for understanding and explaining employees' change-supportive behavior. At the same time, the explorative results hint at additional mechanisms which are not completely covered by the mediation via change-supportive intention. For example, the role of emotions

or the role of habits and previous behaviors in the formation of intention and behavior have been discussed (e.g., Gardner, de Bruijn, and Lally 2011; Oreg et al. 2018; Rafferty et al. 2013) and may constitute such additional mechanisms that should receive more attention in public sector change research.

From a practical perspective, the results inform policymakers and change management in the public sector about the high relevance of the psychological mechanisms predicting change-supportive behavior. Applying a micro-level perspective founded on the established TPB (Ajzen 1991) and behavioral public administration literature, the findings provide valuable insights for interventions designed to encourage desired change-supportive behavior in the context of top-down reforms. Specifically, the positive relationship between change-supportive intention at T1 and change-supportive behavior at T2 (9 months later) highlights that change-supportive intention can serve as an important early indicator for more successful implementation of public sector reform and change. Hence, the results encourage organizational practice to take an interest in and assess the psychological reactions of the change recipients. Besides early assessments, insights on the reactions of change recipients may help policymakers and senior officials to nudge recipients into change-supportive behavior by designing change interventions which recognize that recipients are boundedly rational decision-makers (John et al. 2013) and by leveraging change recipients' attitudes, subjective norm, and PBC to create higher change-supportive intention.

As high PBC strengthens the relationship of change-supportive intention and subsequent behavior and is also directly related to change-supportive intention, fostering change-related PBC can have a double benefit for the formation of change support. Hence, leveraging on PBC is especially relevant for top-down public sector reform and can be achieved by training the change recipients (as done in this study), allowing for participation, and providing the required resources. Indeed, the training of the MSTs was seen as an important factor for the success of the reform studied. Moreover, change-supportive intention can be influenced by interventions that target change-related attitude and subjective norms (e.g., Armenakis and Harris 2002; Straatmann et al. 2016). As public organizations often operate in a less competitive environment, change communication needs to transport the reasons and benefits of the change in an authentic and respectful way in order to affect and instill positive change-related attitudes among the change recipients (Ahmad and Cheng 2018). Based on the finding that change-related subjective norms seem to be especially relevant in public organizations, signaling principal support of the change and winning over opinion leaders are important strategies that should be employed to promote the strong perceptions of a change-supporting norm in the organization.

Limitations and Research Implications

Like all studies, this study has some limitations that should be acknowledged. Clearly, a limitation of the present study is its reliance on self-report data due to its focus on a particular public sector reform from the change recipients' perspective. In such cases, it is argued that employees have persistent access to, and thus more instances of, their own performance and can possibly perceive differences among their behaviors to a greater extent than

can peers or supervisors (Lance, Teachout, and Donnelly 1992). One shortcoming of self-reports is that the data may be subject to common method variance (CMV) (Podsakoff et al. 2003). The debate regarding the likelihood and impact of CMV continues, and recent research by Spector (2019) argues that claims about CMV's influence might be exaggerated and that whether or not CMV "is a universal inflator of correlations in self-reported variables seems to be pointing toward a negative answer—it is not" (George and Pandey 2017: 245). Despite these claims, proactive steps were taken to mitigate CMV by following design procedures such as the employment of two measurement times, protection of anonymity, and reducing evaluation apprehension (Podsakoff et al. 2003). These approaches help to minimize the effects of CMV that can emanate from the influence of priming, social desirability bias, consistency effects, and unstable occasion factors, such as mood states (Podsakoff et al. 2003). Furthermore, the study made use of several tests on the measurement model to ensure the distinctiveness of the variables and to address issues of CMV. It is important to note that although multi-time research design goes some way to reducing the effects of CMV, it is still limited regarding inferences of causality. Thus, future research employing more complex research designs with three or more points in time (Menard 2002) and active manipulation of the conditions may help to shed more light on the temporal and causal relationships involved (e.g., Spector 2019).

Another limitation of the study is the sample size, which in combination with the complexity of the research model limited the tests of the hypotheses to analyses based on path models. Moreover, RMSEA values are affected by sample size and overly reject acceptable models in smaller samples ($N < 150$; Hu and Bentler 1999). Hence, the focus was on the CFI and IFI to determine the acceptability of the models. To put the sample size in the context of the research field, it should be noted that the medium sample size is higher than in some previous longitudinal studies in the change context (e.g., Jones, Jimmieson, and Griffiths 2005; Kim et al. 2011).

Moreover, the generalizability of our findings to other social contexts is limited by our focus on schools in Kurdistan. The TPB has gained empirical support globally and was also supported in the present study, pointing to a certain generalizability of this general framework. Yet, the specific political, organizational, and cultural context should be taken into account when interpreting the results. For example, people in Kurdistan prefer to work for the public sector over the private sector due to the higher job security and possibilities of internal staff mobility provided. This is in contrast to Linos (2017, 67), who noted for Western countries that "there is a human capital crisis looming in the public sector as fewer and fewer people show interest in government jobs." Hence, while the results of the present study are in line with previous research, contextual and cultural influences should receive more research attention to better understand their relevance in the formation of change-supportive intention and behavior.

Conclusion

By employing the full framework of the TPB in the public administration context and by exploring the formation of change-supportive intention and subsequent change-supportive behavior

during a top-down reform, the present study contributes to the organizational change literature in general and that on public administration management in particular. Applying a micro-level perspective, the study revealed important insights into the formation of change support and provides guidance for interventions to enhance change-supportive intention and change-supportive behavior in the context of top-down reforms. As often assumed in the literature, change-supportive intention predicted change-supportive behavior 9 months later, which supports the idea of proactive change management based on change-supportive intention. Going beyond this direct effect, the present study also revealed that in the context of public top-down reform, facilitating conditions for acting out on formed change-supportive intention needs to be considered. Taken together, the study enriches our understanding of change support in top-down reform contexts and puts valuable insights into the hands of policymakers and change managers aspiring to foster change support in public organizations for more successful reform implementation.

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Appendix

1. Change-related attitude

- *It will be beneficial to teach mathematics/science in English.*^a
- I look forward to teaching mathematics/science in English.
- Teaching mathematics/science in English is an important step for offering better quality education.
- Overall, I have a positive attitude toward teaching mathematics/science in English.

2. Change-related subjective norms

- *My colleagues think that it is important to teach mathematics/science in English.*^a
- My manager promotes teaching mathematics/science in English.
- My manager expects me to teach mathematics/science in English.
- Overall, it is recommended to teach mathematics/science in English.

3. Change-related perceived behavioral control

- *I am confident that I will be able to teach mathematics/science in English.*^a
- *I will have the knowledge and skills to teach mathematics/science in English.*^a
- I will have enough time and opportunities to teach mathematics/science in English.

- Overall, I have the impression that I can teach mathematics/science in English.

4. Intention to engage in the change process

- *I am willing to teach mathematics/science in English.*^a
- I intend to promote teaching mathematics/science in English.
- I am willing to take an active role to turn this change (teaching mathematics/science in English) into a success.
- Overall, I intend to integrate the changes resulting from teaching mathematics/science in English in my classes.

5. Change-supportive behavior

- I put in a lot of time and energy to ensure successful implementation of this change.
- *I make constructive suggestions for improving how to effectively teach mathematics/science in English.*^a
- I try to bring about improved procedures related to teaching mathematics/science in English.
- I actively seek out information related to teaching mathematics/science in English rather than passively waiting for it to be delivered from above.

Note. Items for 1, 2, 3, and 4 were adopted from validated scales by Straatmann et al. (2016), while items for 5 were developed by Ahmad et al. (2019b). ^a Italic items were dropped from the analyses due to low loadings on their expected factor.