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Innovation Adoption: A Review of Theories and Constructs

Jennifer P. Wisdom,

George Washington University, 2121 Eye Street Suite 601, Washington, DC 20052, USA

Ka Ho Brian Chor,

New York University Child Study Center, New York University Langone Medical Center, 1 Park Avenue, 8th Floor, New York, NY 10016, USA

Kimberly E. Hoagwood, and

New York University Child Study Center, New York University Langone Medical Center, 1 Park Avenue, 8th Floor, New York, NY 10016, USA

Sarah M. Horwitz

New York University Child Study Center, New York University Langone Medical Center, 1 Park Avenue, 8th Floor, New York, NY 10016, USA

Jennifer P. Wisdom: jpwisdom@gwu.edu; Ka Ho Brian Chor: kaho.chor@nyumc.org; Kimberly E. Hoagwood: kimberly.hoagwood@nyumc.org; Sarah M. Horwitz: sarah.horwitz@nyumc.org

Abstract

Many theoretical frameworks seek to describe the dynamic process of the implementation of innovations. Little is known, however, about factors related to decisions to adopt innovations and how the likelihood of adoption of innovations can be increased. Using a narrative synthesis approach, this paper compared constructs theorized to be related to adoption of innovations proposed in existing theoretical frameworks in order to identify characteristics likely to increase adoption of innovations. The overall goal was to identify elements across adoption frameworks that are potentially modifiable and, thus, might be employed to improve the adoption of evidence-based practices. The review identified 20 theoretical frameworks that could be grouped into two broad categories: theories that mainly address the adoption process ($N = 10$) and theories that address adoption within the context of implementation, diffusion, dissemination, and/or sustainability ($N = 10$). Constructs of leadership, operational size and structure, innovation fit with norms and values, and attitudes/motivation toward innovations each are mentioned in at least half of the theories, though there were no consistent definitions of measures for these constructs. A lack of precise definitions and measurement of constructs suggests further work is needed to increase our understanding of adoption of innovations.

Keywords

Adoption; Evidence-based treatments and practices; Organization; Innovation; Implementation

Introduction

Aarons et al. (2011) point out that there are a number of models to “summarize factors at multiple levels of the social and organizational context that potentially influence the process of translating research into effective improvements in practice” (p. 5). These authors go on to say that many models divide the process of implementation of evidence-based practices (EBPs) into phases and that while there are many common elements in these models they often emphasize different factors. Further, they assert that the implementation and diffusion literature has focused most heavily on the implementation phase of the process with less emphasis on the exploration/adoption phases (also known as pre-implementation) or the maintenance/sustainability phase (also known as post-implementation). The implementation of an EBP or treatment (called EBP in this review) is predicated on the organization’s decision to adopt that EBP (Panzano and Roth 2006). Adoption, the decision to proceed with a full or partial implementation of an EBP, is a complex process and understanding this process may provide insights for the development of strategies to increase the uptake of EBPs (Fixsen et al. 2005).

Adoption usually starts with the recognition that a need exists and moves to searching for solutions, then to the initial decision to attempt the adoption of a solution and finally to the actual decision to attempt to proceed with the implementation of the solution (Damanpour and Schneider 2006; Gallivan 2001; Mendel et al. 2008). Greenhalgh et al. (2004) characterized in the adoption process: pre-adoption (e.g., awareness of innovation), peri-adoption (e.g., continuous access to innovation information), and established adoption (e.g., adopters’ commitment to the adoption decision). Alternatively, Frambach and Schillewaert (2002) discussed two stages associated with adoption: the organization’s decision to pursue adoption and the staff’s acceptance and initiation of their individual processes of accepting the innovation. Adoption will either move to initial implementation activities or revert to de-adoption. There is little information about de-adoption (Frambach and Schillewaert 2002; Gallivan 2001). Finally, just as the decision to adopt is a process, how the adoption proceeds is better characterized in terms of level, rate, or degree of adoption (Mendel et al. 2008). The better the process of adoption can be understood, the more likely adoption challenges can be addressed thus leading to initial implementation.

On an organizational or system level, the adoption process is complex. It is particularly challenging to promote change in routine practice when decision-makers within organizations do not perceive changes as necessary (Garland et al. 2010). Despite the similarity to individual-level adoption, Aarons et al. (2011) suggest that individuals in organizations may have difficulty knowing, weighing, or selecting appropriate innovations to solve particular problems, or their decision to adopt is often complicated by organizational factors (e.g., hierarchy, culture, values) that are not necessarily experienced in individual problem-solving.

Further, organizations, like individuals, can be classified as low-, medium-, or high-adopters, regardless of the innovation of interest (Rogers 2003). These classifications of adopters, while meaningful for planning and descriptive purposes, need further empirical

inquiry into whether there are strategies that can change organizations from medium or low adopters to high adopters (Greenhalgh et al. 2004; Oldenburg and Glanz 2008).

Current State of Research

There is limited research on the adoption phase of the implementation process (Panzano and Roth 2006) in human service organizations (Horwitz et al. 2010), even though prior to actually implementing an EBP there has to be a decision to proceed with the adoption of the EBP either fully or partially. Although Tabak et al. (2012a) synthesized a collection of 61 theoretical frameworks that are necessary for quality dissemination and implementation research, their review did not identify the active ingredients of adoption. Thus, there is a need to identify modifiable factors with the ultimate goal of crafting interventions to improve adoption. Although understanding adoption in regard to its endpoint—implementation—is important, it may overlook the complexity in the adoption process itself and the impact of the adoption process on implementation and eventually sustainability. If successful adoption precedes successful implementation (Panzano and Roth 2006), then there needs to be a focused exploration of adoption theories and constructs. Therefore, the purpose of this review is to: (1) identify key theoretical frameworks that address adoption; and (2) synthesize constructs that are hypothesized to be related to adoption of EBPs into a unifying, overarching theory of adoption of innovations.

Methods

This paper applies a narrative synthesis approach (Popay et al. 2006) that incorporates aspects of realist review methods (Pawson et al. 2005) to summarize theories and constructs associated with innovation adoption. Narrative synthesis is a way of systematically reviewing and synthesizing findings from multiple studies relying primarily on the use of words and text to summarize and explain findings (Popay et al. 2006). The product of a narrative synthesis is a summary of the current state of knowledge in relation to a particular review question.

This study's phenomenon of interest—adoption of innovations—is best described by theories rather than by a prescribed program or protocol, given the long causal chain linking an innovation to its eventual adoption. Improving innovation adoption is therefore a form of complex quality improvement intervention. Specifically, this review's scope maps appropriately to Wong et al. (2010) definition of “complex interventions” as those with a significant number of (a) interacting components within experimental and control settings (e.g., interacting adoption constructs that lead to adoption), (b) difficulty of behaviors required by those delivering or receiving the intervention (e.g., complexity and difficulty of enhancing adoption), (c) groups or organizational levels targeted by the intervention (e.g., client-level, clinician-level, and organization-level adoption), (d) variability of outcomes (e.g., successful innovation-specific adoption has different connotations—adoption of improved psychotropic prescribing is vastly different from adoption of a psychosocial intervention), (e) degree of flexibility of the intervention permitted (e.g., the same innovation can be adopted differently by different organizations), and (f) degree of

dependence on context in which interventions take place. We define context as details of the setting, organization, political climate, etc. that may influence innovation adoption.

In this study, we integrate existing adoption theories to generate a “middle-range theory,” defined as a theory that is at the correct level of abstraction to be useful (Wong et al. 2010), such as one that draws broad conclusions and implications based on adoption constructs to enhance innovation adoption across adoption contexts and innovation types. A middle-range theory stresses that an underlying mechanism helps explain an outcome across contexts. We define mechanisms as any processes or techniques for achieving a result. Broadly, this review seeks to understand what it is about innovation adoption that works in organizations, as well as when adoption works, under what circumstances, how and why the identified mechanisms promote adoption. Specifically, this review aims to integrate existing adoption theories by examining specific adoption mechanisms championed by the theories to guide the development of measurements and interventions for adoption; and to improve the transferability, generalizability, and external validity of adoption theories.

Analysis and review of literature followed narrative synthesis methodology as described by Popay et al. (2006): (1) Develop a theory of how the intervention works, why and for whom; (2) Develop a preliminary synthesis of findings of included studies; (3) Explore relationships in the data; and (4) Assess the robustness of the synthesis.

Develop a Theory of How Innovation Adoption Works, Why and for Whom

The purpose of this step is to inform decisions about the review question and what types of studies to review and to assess how widely applicable findings from the review may be (Popay et al. 2006). For this review, our initial theory of how innovation adoption works was: Innovation adoption is effective in the presence of specific adoption constructs (and the absence of others) that either facilitate or impede adoption; these specific constructs operate differently across levels (i.e., external-, organization-, innovation-, or individual-level) and contexts. This specification, while somewhat vague, provided the following guidance for conducting the review: (1) we were interested in studies that include innovation adoption solely or as part of a broader schema, (2) we are specifically interested in constructs that are identified as facilitating or impeding adoption, and (3) we were searching broadly for innovation adoption across disciplines.

To identify innovation adoption theories, we used iterative purposive sampling of background materials, and “snowball” sampling of references of references, themes, and empirical studies to explore hypotheses (Jagosh et al. 2011). The decision to stop “searching” for new literature was guided by the law of diminishing returns: whether any additional literature would add anything new to our understanding of the phenomena (Pawson et al. 2005). For instance, if Diffusion Theory occurred in multiple theories, redundancy was implied as judged by three independent reviewers; but if Diffusion Theory occurred in a modified form within other theories, these theories were included. See Appendix 1 for detailed inclusion and exclusion search criteria. We defined the “data” for the review as the constructs in theories related to innovation adoption that were hypothesized to be related to successful innovation adoption.

Details of the database and search strategy are presented in Appendix 1. Database searches and references of references yielded 322 journal articles, from which the titles, abstracts, and body texts were screened and rescreened for inclusion as the primary “data” for the candidate theories by three independent reviewers. To obtain appropriate theories, articles were included if they represented unique theoretical contributions (e.g., individual vs. organizational adoption factors) or if they integrated existing adoption theories or generated new adoption theories. In addition, brainstorming with the review team and consultation with field experts (Wong et al. 2010) helped us arrive at the 20 candidate theories that for analysis to explain adoption across multiple contexts.

Develop a Preliminary Synthesis of Findings of Included Studies

Once the review was conducted and no new findings were identified, we then extracted and organized data from included papers in order to identify and list facilitators and barriers to adoption and to identify how the facilitators and barriers may interact. Due to the variety of literature admitted to the review, we did not use a standard form of extracting information (e.g., preferred reporting items for systematic reviews and meta-analyses [PRISMA]). Three independent reviewers studied the adoption theories carefully to: (a) extract and identify specific adoption constructs; (b) map the constructs to the appropriate level (i.e., external-, organization-, innovation-, or individual-level); and (c) identify the directionality of the association between the adoption constructs and adoption. We created an initial, simple version of Fig. 1 and began to populate it with information from included studies. In addition, we began preliminary tables to cross reference concepts with each other.

Explore Relationships in the Data

This is the key analytic step in the narrative synthesis process; it is designed to consider factors that may explain differences in facilitators and barriers to successful adoption and to understand why adoption is important (Popay et al. 2006). We reviewed and analyzed data from our preliminary figure and tables to create an understanding of how data were related to each other. This step also resulted in our overarching theoretical model, as presented in Fig. 1. The synthesis entails theory refinement and presenting the contextuality of conclusions drawn. Specifically, the synthesis clarifies, compares, and contrasts constructs and their associations with adoption championed by the theories, as the foundation to improve measures and interventions for adoption. The operationalization and refinement of eventual adoption constructs expand upon previous reviews of the adoption literature (e.g., Aarons et al. 2011; Greenhalgh et al. 2004).

Assess the Robustness of the Synthesis

This step provides an assessment of the strength of the evidence for making conclusions about the synthesis results and identifies the appropriate population to which the synthesis findings can be generalized. We assessed the robustness of the synthesis on criteria by examining each article’s relevance (fitness for purpose) and rigor (appropriate theoretical complexity for a multi-level synthesis), as well as by identifying the consistency of data across theories and the conclusions drawn from the synthesis.

Results

Following specification of our initial model (Narrative Synthesis Step 1), the iterative search processes led to two groups of theoretical frameworks: theories that directly address the adoption process ($N = 10$) and theories that address adoption within the context of implementation, diffusion, dissemination, and/or sustainability ($N = 10$), both summarized in Appendix 2. We then present our synthesis of the theories to explicate specific constructs (e.g., readiness for change) within contexts (e.g., political environment) that are associated with pre-adoption or adoption across theories (Step 2) and exploration of relationships in the data (Step 3). Finally, we present our assessment of the robustness of the synthesis (Step 4).

Synthesizing Theories of Adoption and Exploring Relationships in Data

We analyzed the 20 key adoption theoretical frameworks and identified several integrative themes. First, whether adoption is considered a standalone entity or a component of implementation the literature suggests that an interactive, multi-level understanding of adoption is needed. Second, adoption is a process through which change occurs in phases or stages in terms of pre-adoption and actual adoption. Third, although there are some constructs that appear in only one framework, there is considerable overlap of constructs across frameworks that pertain specifically to adoption and which are separate from other phases of implementation. Appendix 3 summarizes key adoption constructs across the 20 theoretical frameworks by levels of adoption (i.e., sociopolitical influence, organizational, individual) and Table 1 identifies the associations between key adoption constructs and stages of pre-adoption and adoption. Our preliminary synthesis and overarching theory is illustrated in Fig. 1 and important constructs by level of adoption syntheses appear in Table 2.

Socio-political and External Influence

As adopting organizations operate within their contexts and outside environments, adoption theoretical frameworks have identified socio-political and external factors that can influence adoption.

External Environment—Two theoretical frameworks assert that extra-organizational environment is associated with adoption, though the direction of association varies and there is no theory on pre-adoption. For instance, urbanization and development around an adopting organization have a positive association (Damanpour and Schneider 2006, 2009; Meyer and Goes 1988), though a competitive environment to succeed has mixed theoretical underpinnings (Frambach and Schillewaert 2002).

Government Policy and Regulation—In the pre-adoption stage, two theoretical frameworks indicate that external policy and regulation are positively associated with adoption, including specific enactment of policies, legislation, or regulations on innovation adoption (Aarons et al. 2011; Oldenburg and Glanz 2008; Rogers 2003). Similarly, during the adoption phase, legislation and regulatory agencies and accreditation standards are associated with increased adoption (Aarons et al. 2011; Berta et al. 2005; Feldstein and

Glasgow 2008; Mitchell et al. 2010), as are the fit of political and cultural climate (Glasgow 2003; Glasgow et al. 2003).

Reinforcing Regulation with Financial Incentives to Improve Quality Service

Delivery—Mendel et al. (2008) identifies financial incentives and reward systems for adoption to be positively associated with the pre-adoption stage.

Social Network (Inter-Systems)—Social networks and linkages between systems outside an organization are theorized to be positively associated with pre-adoption (Mendel et al. 2008; Oldenburg and Glanz 2008; Rogers 2003; Valente 1996), and with adoption (Berta et al. 2005; Frambach and Schillewaert 2002; Valente 1996). For example, social networks and linkages among organizations within the same system promote the uptake of the behavior of those organizations located in central positions within a network, especially in the field of medical innovation adoption (Mendel et al. 2008). Alternatively, the lack of external support such as advisory boards and regulatory agencies, or the lack of coordination between systems such as governance and administrator-managed task systems, are negatively associated with adoption (Backer et al. 1986).

Organization Characteristics

Absorptive Capacity—An organization's absorptive capacity, the capacity to utilize innovative and existing knowledge, is associated with pre-adoption and adoption (Aarons et al. 2011; Cohen and Levinthal 1990; Frambach and Schillewaert 2002; Greenhalgh et al. 2004). For example, organizations with pre-existing good knowledge and skills, have the capacity and mechanisms in place to incorporate new knowledge or innovations, are more likely to first explore followed by eventual adoption (Aarons et al. 2011).

Leadership and Champion of Innovation (e.g., Styles, Attributes, Management)—Organizational leadership, particularly in championing innovations, is important to pre-adoption and adoption. Four theoretical frameworks identify leadership in the form of CEO's influence, opinion leader, top management support, and leadership promotion, as positively associated with the pre-adoption stage (Aarons et al. 2011; Feldstein and Glasgow 2008; Gallivan 2001; Meyer and Goes 1988; Solomons and Spross 2011; Valente 1996). There is greater variability in the proposed direction of association during the adoption stage. The same leadership variables (i.e., CEO's influence, champions, opinion leaders etc.), managerial and organizational support for innovation, and prior experience in adoption, are positively associated with adoption according to nine theoretical frameworks (Aarons et al. 2011; Backer et al. 1986; Berta et al. 2005; Feldstein and Glasgow 2008; Gallivan 2001; Graham and Logan 2004; Greenhalgh et al. 2004; Meyer and Goes 1988; Simpson 2002; Solomons and Spross 2011). Top-down leadership, however, is negatively associated with adoption (Backer et al. 1986).

Network with Innovation Developers and Consultants—Six theoretical frameworks find that organizational networks and collaboration with innovation developers, consultants, professional associations, and potential users are positively associated with pre-adoption (Aarons et al. 2011; Backer et al. 1986; Feldstein and Glasgow 2008; Greenhalgh et al.

2004; Mendel et al. 2008; Mitchell et al. 2010). Both direct and indirect networking are positively associated with adoption (Feldstein and Glasgow 2008).

Norms, Values, and Cultures—Organizational norms, values, and cultures are critical to pre-adoption and adoption. Three theoretical frameworks champion the following aspects that are positively associated with pre-adoption, including shared professional values and patient-centeredness (Aarons et al. 2011; Gallivan 2001; Mendel et al. 2008; Solomons and Spross 2011). During the adoption stage, similar organizational culture variables have a positive association with adoption in two theoretical frameworks (Aarons et al. 2011; Gallivan 2001; Solomons and Spross 2011), and an additional framework identifies a culture of problem-solving as positively associated with adoption (Oldenburg and Glanz 2008; Rogers 2003).

Operational Size and Structure—Six theoretical frameworks identify organizational operation resources and size, a formalized, centralized, and differentiated structure as positively associated with pre-adoption (Frambach and Schillewaert 2002; Gallivan 2001; Godin et al. 2008; Graham and Logan 2004; Mendel et al. 2008; Simpson 2002). Alternatively, a lack of formal research infrastructure is negatively associated with pre-adoption (Solomons and Spross 2011). During the adoption stage, organizational resources and size play a substantial role as indicated by seven theoretical frameworks. Organizational resources and technical resources committed to innovation, a formalized, centralized, and differentiated structure, administrative intensity, and the fit between scope of practice and organizational size are positively associated with adoption (Aarons et al. 2011; Berta et al. 2005; Damanpour and Schneider 2006, 2009; Frambach and Schillewaert 2002; Gallivan 2001; Greenhalgh et al. 2004; Simpson 2002). A formalized, centralized organizational structure, however, according to Greenhalgh et al. (2004) and Frambach and Schillewaert (2002) are also negatively associated with adoption, as are a lack of formal research infrastructure (Solomons and Spross 2011), and slack resources after accounting for what is needed to maintain operations (Greenhalgh et al. 2004). Further, inconsistent adoption may result from heavy organizational coordination requirements or strong interdependencies across multiple adopters (Gallivan 2001). There is no evidence to suggest that unionization is related to adoption (Damanpour and Schneider 2006, 2009).

Social Climate—The social climate and social influence with an organization are related to pre-adoption and adoption. Positive social climate, social learning, and increased social pressure to adopt, are associated with pre-adoption according to three theoretical frameworks (Aarons et al. 2011; Frambach and Schillewaert 2002; Mendel et al. 2008). Similarly, social factors and adoption decision at an individual or a group level are positively associated with adoption (Frambach and Schillewaert 2002; Simpson 2002). For example, social persuasion and communication from peers within an organization help identify with and achieve adoption (Frambach and Schillewaert 2002).

Social Network (Inter-Organizations)—Social networks on the organizational level are important to pre-adoption and adoption. Multiple inter-organizational networks foster pre-adoption (Valente 1996). During the adoption phase, three theoretical frameworks identify

multiple, informal inter-organizational networks, and general interconnectedness among organizations to be positively associated with adoption (Frambach and Schillewaert 2002; Greenhalgh et al. 2004; Valente 1996).

Training Readiness and Efforts—Innovation adoption entails training and performance efforts, which are both associated with pre-adoption and adoption. Two theoretical frameworks propose that organizational and management support for training, fewer years since completion of relevant training, and built-in methods for maintaining staff competence and performance positively associated with pre-adoption (Backer et al. 1986; Frambach and Schillewaert 2002; Meyer and Goes 1988). Two theoretical frameworks identify continuation of training, provision of resources, incorporation of innovations into curricula, and communication about innovations positively associated with the adoption phase (Frambach and Schillewaert 2002; Greenhalgh et al. 2004; Mitchell et al. 2010).

Traits and Readiness for Change—An organization can be characterized in terms of traits and readiness for change. Two theoretical frameworks identify receptiveness and readiness for change to be positively associated with pre-adoption (Aarons et al. 2011; Greenhalgh et al. 2004). Two theoretical frameworks suggest that the same readiness for change, innovativeness of an organization, and propensity towards risk reduction are positively associated with adoption (Aarons et al. 2011; Frambach and Schillewaert 2002).

Innovation Characteristics

Complexity, Relative Advantage, and Observability—These characteristics become particularly important during the adoption stage. Seven theoretical frameworks characterize adoptable innovations as clear in purpose, simple to use, unambiguously more advantageous than current or prior practice, minimal expertise needed to implement them, observable, and transferrable (Backer et al. 1986; Glasgow 2003; Glasgow et al. 2003; Graham and Logan 2004; Greenhalgh et al. 2004; Oldenburg and Glanz 2008; Rogers 2003; Simpson 2002). Tacitness or implicitness of an innovation, however, is negatively associated with adoption (Berta et al. 2005). Two theoretical frameworks find the following characteristics have no association with adoption: observability, workability of an innovation, and visibility of benefits associated with adoption (Frambach and Schillewaert 2002; Greenhalgh et al. 2004).

Cost-efficacy and Feasibility—Four theoretical frameworks indicate that cost efficacy, feasibility, evaluation of cost efficacy and feasibility, and perceived benefits exceeding expected costs to adopt are positively associated with pre-adoption (Feldstein and Glasgow 2008; Mendel et al. 2008; Mitchell et al. 2010; Stetler 2001). Three theoretical frameworks indicate that innovations with an unambiguous advantage in cost-effectiveness compared to existing practice are more likely to be adopted (Damanpour and Schneider 2006, 2009; Frambach and Schillewaert 2002; Graham and Logan 2004).

Evidence and Compatibility—Three theoretical frameworks indicate that innovations with clear research evidence and practice efficacy, coupled with compatibility with existing practice are more likely to be considered during pre-adoption (Feldstein and Glasgow 2008;

Meyer and Goes 1988; Mitchell et al. 2010; Stetler 2001). During the adoption stage, six theoretical frameworks identify the following characteristics as positively associated with adoption: adaptability to suit organizational needs, compatibility with practice norms, and evidence of practice efficacy (Backer et al. 1986; Feldstein and Glasgow 2008; Glasgow 2003; Glasgow et al. 2003; Graham and Logan 2004; Greenhalgh et al. 2004; Meyer and Goes 1988; Oldenburg and Glanz 2008; Rogers 2003)

Facilitators and Barriers—Two theoretical frameworks find assessment of barriers and facilitators, and training, empowerment, and interest in practice as facilitators, associated with the pre-adoption stage (Graham and Logan 2004; Solomons and Spross 2011). One theoretical framework identifies the following barriers as negatively associated with pre-adoption: lack of awareness, familiarity, time, autonomy, and ability to access research (Feldstein and Glasgow 2008; Solomons and Spross 2011). During the adoption stage, two theoretical frameworks find that continuous assessment and management of barriers and facilitators, training, empowerment, and interest in practice as facilitators, are positively associated with adoption (Feldstein and Glasgow 2008; Solomons and Spross 2011). The same barriers identified in the pre-adoption stage by two theoretical frameworks—lack of awareness, familiarity, time, autonomy, and ability to access research—also apply to the adoption stage (Feldstein and Glasgow 2008; Solomons and Spross 2011).

Innovation Fit with Users' Norms and Values—The goodness-of-fit between an innovation and its intended user is critical to pre-adoption and adoption. During pre-adoption, five theoretical frameworks identify assessment of this fit, and the specific fit with existing practice, users' value, goal, and skills as positively associated with pre-adoption (Graham and Logan 2004; Greenhalgh et al. 2004; Oldenburg and Glanz 2008; Stetler 2001; Weinstein et al. 2008). During the adoption phase, nine theoretical frameworks indicate that innovation fit—with accepted scheme, organizational culture, abilities, values, knowledge, current practice, task performance—is positively associated with adoption (Aarons et al. 2011; Feldstein and Glasgow 2008; Frambach and Schillewaert 2002; Greenhalgh et al. 2004; Mendel et al. 2008; Oldenburg and Glanz 2008; Rogers 2003; Simpson 2002; Solomons and Spross 2011; Weinstein et al. 2008). When an intended user experiences psychological resistance to adoption, this poor fit is negatively associated with adoption (Backer et al. 1986).

Risk—Considering or adopting an innovation may incur risk-taking. During pre-adoption, two theoretical frameworks find that an innovation with low risk is associated with pre-adoption (Greenhalgh et al. 2004; Mitchell et al. 2010). During the adoption stage, when an innovation elicits perceived uncertainty of adopting, this type of risk-taking is negatively associated with adoption according to one theoretical framework (Frambach and Schillewaert 2002).

Trialability, Relevance, and Ease—Whether an innovation can be experimented, related, and easy to use contribute to pre-adoption and adoption. Three theoretical frameworks find that ease and meaning of use, and partial trial are positively associated with the pre-adoption stage (Aarons et al. 2011; Greenhalgh et al. 2004; Oldenburg and Glanz

2008; Rogers 2003). During the adoption phase, continuing ease of use and installation, partial trial, and relevant innovation impact (e.g., problem-solving, outcome, and impact on other adopters) are associated with adoption according to eight theoretical frameworks (Aarons et al. 2011; Backer et al. 1986; Berta et al. 2005; Damanpour and Schneider 2006, 2009; Frambach and Schillewaert 2002; Graham and Logan 2004; Greenhalgh et al. 2004; Oldenburg and Glanz 2008).

Staff/Individual Characteristics

Affiliation with Organizational Culture—Two theoretical frameworks identify that the fit between a staff member with an organizational culture is positively associated with pre-adoption (Aarons et al. 2011; Solomons and Spross 2011). No theoretical frameworks particularly highlight this affiliation during the adoption phase.

Attitudes, Motivation, Readiness Towards Quality Improvement and Reward—Seven theoretical frameworks indicate that individual readiness and motivation for change, assessment of attitudes toward change, endorsing a holistic approach towards quality improvement, and utilizing a reward system are associated with the pre-adoption stage (Backer et al. 1986; Godin et al. 2008; Graham and Logan 2004; Greenhalgh et al. 2004; Simpson 2002; Solomons and Spross 2011; Weinstein et al. 2008). During the adoption stage, five theoretical frameworks indicate that continuing endorsement of a holistic approach towards quality improvement, adopting pro-innovation attitudes and individual positive attitude, and individual- and organization-level motivational readiness and perceived needs for change are positively associated with adoption (Aarons et al. 2011; Damanpour and Schneider 2006, 2009; Frambach and Schillewaert 2002; Godin et al. 2008; Greenhalgh et al. 2004; Simpson 2002; Solomons and Spross 2011).

Feedback on Execution and Fidelity—This kind of feedback is more important during the adoption stage than the pre-adoption stage. Five theoretical frameworks note that feedback might entail assessment of adoption rate, frequent monitoring of adoption progress, and feedback to practitioners about alignment with or deviation from best practice (Feldstein and Glasgow 2008; Glasgow 2003; Glasgow et al. 2003; Graham and Logan 2004; Greenhalgh et al. 2004; Mitchell et al. 2010; Stetler 2001).

Individual Characteristics (e.g., Awareness, Knowledge/Skill, Competence, Current Practice, Demographic Factors)—Five theoretical frameworks identify key individual characteristics that are positively associated with pre-adoption, including assessment of awareness of innovations, innovativeness, skills and experience, knowledge of applying an innovation, and general fit with adopter characteristics such as learning style, tolerance of ambiguity, and concerns in pre-adoption stage (Aarons et al. 2011; Frambach and Schillewaert 2002; Graham and Logan 2004; Greenhalgh et al. 2004; Oldenburg and Glanz 2008; Rogers 2003; Solomons and Spross 2011). Alternatively, individual lack of skills and appreciation of research are negatively associated with pre-adoption (Solomons and Spross 2011). During the adoption phase, according to four theoretical frameworks, a continuing general fit with adopter characteristics, innovativeness, tolerance of ambiguity, and training carried over from pre-adoption, individual knowledge base, and exposure to

mass media and propensity towards risk-taking are positively associated with adoption (Aarons et al. 2011; Gallivan 2001; Greenhalgh et al. 2004; Oldenburg and Glanz 2008; Rogers 2003). One theoretical framework identifies individual characteristics such as longer job tenure and lack of skills and appreciation of research that are negatively associated with adoption (Gallivan 2001; Solomons and Spross 2011).

Managerial Characteristics—Although managerial characteristics are not highlighted during the pre-adoption phase, one theoretical framework finds that managers have a direct influence on workers' motivation, morale, and rewarding innovation and change (Damanpour and Schneider 2006, 2009).

Social Network (Individual's Personal Network)—Social networks on the individual level are important to pre-adoption and adoption. One theoretical framework emphasizes the positive association between extensiveness of staff social networks and pre-adoption (Valente 1996). During the adoption stage, social networks become more critical. Three theoretical frameworks indicate social ties within and outside an organization, extensiveness, quality, diversity, and organicity of such networks are positively associated with adoption (Greenhalgh et al. 2004; Mendel et al. 2008; Valente 1996).

Synthesis of Staff/Individual Characteristics—Individuals' attitudes and motivation for adoption, particularly positive attitudes toward change, the need for change, and quality improvement are important for successful adoption. Feedback on the adoption process is useful in increasing adoption, and individual characteristics such as skills and experience, innovativeness, tolerance of ambiguity, propensity towards risk taking are associated with increased adoption. Job tenure and lack of skills are negatively associated with adoption for staff, but education and tenure are positively associated with adoption for managers. As seen in external and organizational characteristics, extensive social networks of individuals are associated with adoption.

Client Characteristics

Readiness for Change and Capacity to Adopt—One theoretical framework notes that, in addition to networking with innovation developer and researcher, early involvement of potential users (staff or client) is positively associated with pre-adoption (Backer et al. 1986). During the adoption stage, four theoretical frameworks suggest that client attitudes, beliefs, and readiness towards change, and willingness to adopt and adapt innovations as needed are positively associated with adoption (Feldstein and Glasgow 2008; Frambach and Schillewaert 2002; Glasgow 2003; Glasgow et al. 2003; Weinstein et al. 2008). For example, clients' competing demands for their attention and pre-existing conditions may facilitate or impede their participation in adoption (Feldstein and Glasgow 2008).

Discussion

Several mechanisms for change can be consolidated across contexts: Leadership, innovation fit with norms and values, and attitudes/motivation toward innovations each are mentioned in at least half of the theories and across organization, innovation, individual, and client contexts. Although some of these constructs (e.g., attitudes) may be frequently studied

because of ease of measurement, and not all of them have consistent directionality of findings, these factors are clearly important to understanding adoption. They provide a suggested direction for researchers to focus future investigations on the drivers of adoption and may serve as the basis for developing interventions to promote adoption of EBPs. This consistency, however, is limited by a lack of precise definition and measurement of mechanisms that can lead to confusion for policymakers and organizations attempting to adopt innovations. For example, when leadership is conceptualized as CEO influence or the presence of champions or opinion leaders, it has a positive effect on adoption. Other conceptualizations of leadership, such as centralized or overly formal, top-down leadership, are not conducive to adoption, and leadership metrics such as tenure, education, and recency of education are not associated with adoption.

The 20 cited theoretical frameworks hypothesize about relationships between constructs and innovation adoption but only five include empirical data to test hypotheses. Four adoption-specific theories (Cohen and Levinthal 1990; Damanpour and Schneider 2009; Gallivan 2001; Valente 1996) and one theory of adoption within the context of implementation (Greenhalgh et al. 2004; Meyer and Goes 1988) provide either quantitative or qualitative data to support the constructs in their models. From a practical standpoint, however, empirical data can most effectively illuminate next steps for practitioners, researchers, and policymakers. These studies present an important first start to a compilation of studies that can support a meta-analysis. They also suggest challenges regarding obtaining sufficient numbers of organizations that can be studied efficiently.

When we consider how adoption-specific theories and theories that described adoption in the context of implementation are different, we found that theories that described adoption in the context of implementation were more likely to include characteristics of the innovation as central to adoption. Damanpour and Schneider (2009) clarified the key role of innovation characteristics as most important in whether an organization adopts the innovation, whereas Klein and Sorra (1996) suggested it is rather the fit of the innovation with organization's values that is most important. Characteristics of innovations, however, are likely to have varying salience depending on the type of innovation since well defined interventions such as hand-washing have more concrete and observable stages of adoption compared to the implementation of complex psychosocial interventions (Weinstein et al. 2008). Adoption-specific theories were also more likely to focus on early markers of feasibility, such as leadership, attitudes toward adoption, and organizational size and structure, whereas theories in the context of implementation were likelier to address issues related to long term implementation and sustainability, such as cost-efficacy, relative advantage, and government policy and regulation. These findings suggest adoption should be considered a separate construct from the other stages of implementation.

As suggested above, these findings suggest opportunities for clarification of innovation adoption theory. Although this synthesis focuses on theories, review of included studies suggested measurement of mechanisms varied considerably and also contributed to a lack of clarity. For example, the two studies that measured leadership each measured it in a different way: Gallivan (2001) conducted interviews with 53 individuals over 2 years in a single organization and determined qualitatively that the nature of leadership (top-down,

bureaucratic) was associated with adoption, and Valente (1996) assessed opinion leaders using social network nomination procedures in multiple case studies. To facilitate decision-making by policymakers and organizational leaders, researchers should reconcile these specific construct-measure combinations in a way that will provide standardized measurement to increase validity and replicability of the findings here. Similarly, measurement of the dependent variable, adoption, also was measured in different ways. Systematization through a single, widely accepted outcome measure would be useful. Future studies should identify measures that are feasible within evaluation or research contexts and that have demonstrated validity in predicting adoption.

Although this review provides thorough information on external, organizational, staff, and innovation characteristics, perspectives from the beneficiaries of innovations (e.g., clients, patients, customers, or other stakeholders) are not well represented and suggest research is conducted primarily from the organizational perspective, not from a consumer perspective. Only five studies included any information on these beneficiaries. Given the importance of stakeholders to service delivery (Aarons et al. 2009), and increasing importance of patient perspectives in health care (Sox 2010), consideration of these perspectives when generalizing findings could strengthen the theories of adoption.

Conclusions

This review identified 20 theoretical frameworks with multiple major constructs associated with theories of innovation adoption. These theories range from extremely specific models with a single identifiable construct (Cohen and Levinthal 1990) to comprehensive models that incorporate as many as 17 constructs (Greenhalgh et al. 2004). Theories incorporated mechanisms within the contexts of sociopolitical and external influence, organizational characteristics, innovation characteristics, staff/individual characteristics, and client characteristics. Theories also confirm that adoption is a process that moves from pre-adoption where staff within an organization become aware of an innovation and access information with which to make a decision, to established adoption, where the organization decides whether to proceed with and commit to the innovation (Frambach and Schillewaert 2002; Greenhalgh et al. 2004). Figure 1 presents our overarching theory of the adoption of innovations process based on the information suggested by this review.

This review has several limitations that affect its generalizability. First, as a narrative synthesis review, it explored the complex social intervention of innovation adoption by clearly examining the literature on this topic. It does not, however, demonstrate the rigor of a meta-analysis of multiple randomized trials and provides only preliminary evidence to inform future directions of research. Although it necessarily does not include every paper published on the topic, it provides a reasonable synthesis of what mechanisms within which contexts are likely to lead to adoption. Improvements in standardizing the measurement of constructs and including consumer perspectives when formulating innovation adoption theories would be useful in improving the application of these theories. The latter aspect has particular implications when organizations tailor their services to specific client populations, each with unique characteristics that may influence the adoption process when innovations are introduced.

This review, like others, offers methodological reflections on this complex area of research (Tabak et al. 2012b). First, reviews of constructs must contend with the inevitable lexical disagreement and inconsistency of definitions in the literature (e.g., “formalized” vs. “centralized” organizational structure, “organizational culture” vs. “organizational climate” etc.). More importantly, when contradictory findings are associated with such constructs, conclusions, as this review has shown, must be drawn with necessary cautions. Complex adoption constructs by nature should not and cannot be over-simplified or universally agreed upon. However, overly detailed differentiation of similar if not identical constructs will hinder the advancement of generalizable and usable theoretical frameworks. In this review, a preliminary cross-referencing of adoption concepts helped eliminate redundancies and clarify constructs. The exhaustiveness of literature research varies depending on the pre-specified search strategies (e.g., narrative synthesis review vs. realist review vs. Cochrane review), which also sets the boundary for the point to “stop searching.” Similarly, the criteria for study relevance and rigor inevitably carry at least some subjectivity, which is not necessarily a limitation if reviews on a similar topic (e.g., theories of adoption and implementation) can be critically compared to one another to elucidate both discrepancies and consistencies stemming from different methodological approaches. Future research on innovation adoption is likely to yield advances that can directly improve the quality of health service delivery. Policymakers could choose to focus limited resources on external environments, organizations, and staff that measurably demonstrate these positive qualities that are likely to lead to successful adoption. Organization leaders can conduct self-assessments and seek to improve the culture and attitudes in their organization prior to innovation adoption. Researchers can continue to clarify, standardize, systematize, and confirm relationships between contexts, mechanisms, and outcomes. This review provides one step toward understanding adoption of innovations by delineating constructs that affect adoption and offering suggestions for future research. The ultimate goal is to improve both our understanding of the complex process of adoption and of interventions that may encourage organizations to more quickly adopt evidence-based treatments and practices.

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Appendix 1

Databases and Search Strategy

Ovid Medline, PsycInfo, and Web of Science were the major electronic databases used for Medical Subject Heading (MeSH) and article keyword searches.

1. Ovid Medline provided the first and primary source of literature. First, exploratory searches were conducted using these individual MeSH terms:
 - Diffusion of innovation (13,774 hits);
 - Evidence-based practice (51,940 hits);

- Evidence-based medicine (47,305 hits) a subset of evidence-based practice;
- Models, theoretical (1,120,350 hits).

Next, guided by the goal of this review, the following MeSH terms were combined with the and Boolean operator:

- Diffusion of innovation and evidence-based practice (1,781 hits); diffusion of innovation and models, theoretical (1,299 hits);
- Diffusion of innovation and evidence-based practice (1,397 hits).

Considering theoretical frameworks are the focus of this review, further combinations of the following MeSH terms were conducted using the and Boolean operator:

- Diffusion of innovation and evidence-based practice and models, theoretical (320 hits);
- Diffusion of innovation and evidence-based medicine and models, theoretical (237 hits).

Since evidence-based medicine is a subset of evidence-based practice in the MeSH grouping, the search narrowed down to diffusion of innovation and evidence-based practice and models, theoretical.

- 2 We used PsycInfo to supplement the original pool of literature using a similar search logic of MeSH:

- Adoption (15,535 hits);
- Evidence based practice (8,940 hits);
- Innovation (3,995 hits);
- Models (65,923 hits);
- Theories (91,148 hits).

Since adoption as a MeSH in PsycInfo is quite broad and often refers to the child welfare taxonomy, we used the and Boolean operator for the following combinations:

- Adoption and evidence based practice (291 hits);
- Adoption and innovation (339 hits).

Next, to add a theoretical focus to this pool, we used the and Boolean operator for the following combinations:

- Adoption and evidence based practice and innovation (10 hits);
- Adoption and evidence based practice and models (11 hits);
- Adoption and evidence based practice and theories (9 hits);
- Adoption and innovation and models (18 hits);
- Adoption and innovation and theories (6 hits).

All articles from these last searches in PsycInfo were screened for overlaps.

- 3 To gain a broader perspective on other fields, we used Web of Science to expand the pool of literature obtained from Ovid Medline and PsycInfo, using the following topic searches:

- Adoption (45,440 hits);
- Diffusion (425,401 hits);
- Evidence-base (47,294 hits);
- Innovation (76,818 hits);
- Model (3,894,846 hits);
- Theory (1,172,347).

Given these large yields, we used the and Boolean operator to combine the following topic searches:

- Adoption and evidence-base (899 hits);
- Adoption and innovation (4,209 hits);
- Adoption and diffusion (3,059 hits);
- Adoption and evidence-base and innovation (135 hits).

To narrow the focus on theoretical models, further search combinations were produced using the and Boolean operator:

- Adoption and innovation and model (48 hits);
- Adoption and innovation and theory (194 hits);
- Adoption and evidence-base and model (23 hits);
- Adoption and evidence-base and theory (80 hits);
- Adoption and innovation and model and theory (439 hits);
- Adoption and evidence-base and model and theory (42 hits);

The last step searches from these three databases formed the preliminary pool of literature. All articles were searched for overlaps within and between databases, which yielded 332 unique hits. To systematically zero into specific adoption theories, we screened article keywords so at least one of the following keywords were included:

- Adoption;
- Adoption of innovation;
- Conceptual model;
- Diffusion;
- Evidence-based interventions;
- Evidence-based practice;

- Framework;
- Innovation;
- Theory.

In addition, article titles were screened so that at least one of the following words were included:

- Adoption;
- Diffusion;
- Diffusion of innovation;
- Diffusion of innovations;
- Evidence-based interventions;
- Evidence-based mental health treatments;
- Evidence-based practice;
- Framework;
- Innovation;
- Innovation adoption;
- Model;
- Multilevel;
- Research-based practice;
- Theoretical models.

Finally, we screened the actual titles of the adoption theories within the texts of the articles so that at least one the following words were included:

- Adoption;
- Diffusion;
- Evidence-based;
- Evidence-based practice;
- Framework;
- Innovation;
- Model.

Appendix 2

See Table 3.

Table 3

Theoretical frameworks of innovation adoption and adoption within the context of implementation

Framework	Summary of theoretical framework	Field(s)	Country
I. Adoption (<i>N</i> = 10)			
1. Factors related to adoption effort (Backer et al. 1986)	Factors related to adoption effort are: 1. Early involvement of influential potential users; 2. Use of outside consultant to advise on adoption strategy; 3. Personal contact between developer of innovation and potential users; linkage between innovators and adopters to maintain flexibility; 4. Building methods for rewarding adoption. Factors related to the adopting organization are: 1. Chief administrator implementing change; 2. Psychological resistance to change; 2. Contextual influence (e.g., legislature, community boards). Factors related to innovation characteristics are: 1. Similarity with current practice; 2. Cost; 3. Observability; 4. Trialability; 5. Relevance; 6. Relative advantage; 7. Ease of understanding and use.	Psychosocial interventions	United States
2. Model of firm investment in research and development (Cohen and Levinthal 1990)	A model of organizational and individual absorptive capacity (i.e., ability to recognize new information, assimilate it, and invest on it) that is critical to innovative capabilities.	Commercial science	United States
3. Social network models in diffusion of innovations (Valente 1996)	Adoption of innovation as a function of opinion leadership and external influences (personal network and within the social system). Threshold for adoption and critical mass for early adopters, early majority, late majority, and laggards.	Cross-disciplines	United States
4. Two-stage (multi-stage) adoption theoretical framework (Gallivan 2001)	Distinguishes primary authority adoption decision (management decision) from secondary adoption and organizational assimilation process (managerial intervention, subjective norms, facilitating conditions, individual adoption process, and assimilation stages).	Information technology	United States
5. Multi-level framework (Frambach and Schillewaert 2002)	Bi-directional relationship between individual and organizational level across stages of innovation adoption.	Marketing and management	United States
6. Full contingency model of innovation adoption (Berta et al. 2005)	Factors that affect innovation adoption on three levels: 1. Individual; 2. Organization; 3. Environment.	Healthcare	Canada
7. Manager, innovation characteristics, and innovation adoption and phases of the adoption of innovation (Damanpour and Schneider 2006, 2009)	Organizational manager characteristics and innovation characteristics as influential on innovation adoption.	Local government	United States

Framework	Summary of theoretical framework	Field(s)	Country
8. Theory of reasoned actions (TRA) and theory of planned behavior (TPB) (Godin et al. 2008)	Sociocognitive theories to explain personal-level attributes (e.g., intention, motivation) and behavior change related to decision-making and innovation adoption.	Healthcare	Canada
9. Precaution adoption process model (PAPM) (Weinstein et al. 2008)	Individual-level explanation of how a person comes to decisions to take action, and how to translate decision into action in stages: 1. Unaware of issue; 2. Unengaged by issue; 3. Undecided about acting/decided; 4. Not to act/decided to act; 5. Acting; 6. Maintenance.	Health behavior	United States
10. Evidence-based practice barriers and facilitators from a continuous quality improvement perspective (Solomons and Spross 2011)	Individual-level and organization-level barriers and facilitators of adoption in nursing on four dimensions: 1. Strategic (e.g., time constraints, recruitment, resources); 2. Cultural (e.g., staff resistance to change, lack of authority); 3. Technical (e.g., difficulty accessing resource materials, lack of confidence in own ability); 4. Structural (e.g., lack of awareness of research, difficulties with information formats).	Nursing	United States
II. Adoption within the context of implementation ($N = 10$)			
1. Stetler model of research utilization to facilitate evidence-based practice (Stetler 2001)	Five phases of transferring research to practice: 1. Preparation; 2. Validation; 3. Comparative evaluation and decision-making; 4. Translation and application; 5. Evaluation.	Nursing	United States
2. Process model of program change (Simpson 2002)	A heuristic framework drawn from technology transfer and organizational behavior in related fields involving four stages of change: 1. Exposure; 2. Adoption; 3. Implementation; 4. Practice. Each stage is influenced by personal (e.g., motivation, perceived needs) and organizational (e.g., institutional support, resources) factors.	Substance abuse	United States
3. Reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) (Glasgow 2003; Glasgow et al. 2003)	A design for dissemination along five dimensions: 1. Reach (to target population); 2. Effectiveness (of innovations/ interventions); 3. Adoption (of innovations represented by absolute number of staff/personnel); 4. Implementation (of consistent and accurate delivery); 5. Maintenance (of innovations/interventions as routine organizational practice).	Healthcare	United States
4. Family of diffusion of innovations models (Rogers 2003; Oldenburg and Glanz 2008)	Innovation diffusion as a multi-step process: 1. Development; 2. Dissemination; 3. Adoption; 4. Implementation; 5. Maintenance; 6. Sustainability; 7. Institutionalization. Core attributes of innovation affecting speed and extent of adoption and diffusion: 1. Relative advantage; 2. Compatibility; 3. Complexity; 4. Trialability; 5. Observability; 6. Reversibility.	Cross-disciplines	United States
5. Ottawa Model of Research Use (Graham and Logan 2004)	Guides implementation of continuity-of-care innovations in practice settings without assuming linearity or unidirectionality of process: 1. Assess (Evidence-based innovations, potential	Nursing	Canada

Framework	Summary of theoretical framework	Field(s)	Country
	adopters, and practice Environment); 2. Select and monitor implementation interventions and adoption; 3. Evaluate outcomes.		
6. Evidence-Based Model for Diffusion of Innovations in Health Service Organizations (Greenhalgh et al. 2004)	A distilled, detailed model of innovation diffusion spanning the impetus of innovation, individual adoption, system readiness, dissemination, and implementation. Adopters characterized as active seekers of knowledge rather than passive recipients of innovation. Seven aspects of adopters and adoption process: 1. General psychological antecedents; 2. Context-specific psychological antecedents; 3. Meaning; 4. Adoption decision; 5. Concerns in pre-adoption stage; 6. Concerns during early use; 7. Concerns in established users.	Health service delivery	United Kingdom
7. Framework of dissemination in healthcare intervention research (Mendel et al. 2008)	Integrates diffusion process (i.e., context, stages, outcomes) with evaluation process (i.e., need-based assessment, implementation/ process evaluation, impact evaluation).	Health service delivery	United States
8. Practical, robust implementation and sustainability model (PRISM) (Feldstein and Glasgow 2008)	Synthesizes four existing models of implementation and diffusion research: 1. Diffusion of Innovations; 2. Chronic Care Model; 3. Model for Improvement; 4. RE-AIM. Considers how innovation/ intervention design, the external environment, the implementation and sustainability infrastructure, and the recipients influence adoption, implementation, and maintenance.	Health interventions	United States
9. Thematic analysis of theoretical models for translational science (Mitchell et al. 2010)	A summative theoretical model that informs knowledge development, transfer and utilization. Four thematic areas: 1. Evidence-based practice and knowledge transformation process; 2. Strategic change to promote adoption of new knowledge; 3. Knowledge exchange and synthesis for application; 4. Designing and interpreting dissemination research.	Nursing	United States
10. Conceptual model of evidence-based practice implementation in public service sectors (Aarons et al. 2011)	Advances existing conceptual model of factors (inner and outer contexts) most influential on implementation of innovations in public mental health services for children and families. Multi-level, four-phase model of implementation process: 1. Exploration; 2. Adoption/Preparation; 3. Implementation; 4. Sustainment.	Child welfare, public sector, social service	United States

Appendix 3

See Table 4.

Table 4

Adoption constructs based on theories of adoption and adoption within the context of implementation

Adoption constructs	Adoption-only theoretical frameworks (N = 10)										
	Factors related to adoption effort ^a	Full contingency model of innovation adoption ^b	Model of firm investment in research and development ^c	Manager, innovation characteristics, and innovation adoption and phases of innovation adoption ^d	Multi-level framework ^e	Two-stage (multi-stage) adoption theoretical framework ^f	Theory of reasoned actions (tra) and theory of planned behavior (tpb) ^g	Evidence-based practice barriers and facilitators from a continuous quality improvement perspective ^h	Precaution adoption process model (papm) ⁱ	Social network models in diffusion of innovation ^j	
Sociopolitical and external influence											
External environment				X							
Government policy and regulation		X									
Reinforcing regulation with financial incentives to improve quality service delivery											
Social network (inter-systems)	X	X			X					X	
Organizational characteristics											
Absorptive capacity			X		X						
Leadership and champion of innovation (e.g., styles, attributes, management)	X	X				X		X			
Network with innovation developers and consultants	X										
Norms, values, and cultures								X			
Operational size and structure		X		X	X	X	X	X			
Social climate					X						
Social network (inter-organizations)					X					X	
Training readiness and efforts	X				X						
Traits and readiness for change					X						
Innovation characteristics											
Complexity, relative advantage, and observability	X	X									
Cost-efficacy and feasibility				X	X						
Evidence and compatibility	X										
Facilitators and barriers								X			
Innovation fit with users' norms and values	X				X			X	X		
Risk					X						
Trialability, relevance, and ease	X	X		X	X						
Staff/individual characteristics											
Affiliation with organizational culture								X			
Attitudes, motivation, readiness towards quality improvement and reward	X	X			X		X	X	X		
Feedback on execution and fidelity											
Individual characteristics (e.g., awareness, knowledge/skill, competence, current practice, demographic factors)					X			X			
Managerial characteristics				X							
Social network (individual's personal network)										X	
Client characteristics											
Readiness for change and capacity to adopt	X				X				X		
Adoption constructs											
Adoption within context of implementation frameworks (N = 10)											
	Conceptual model of evidence-based practice implementation in public service sector ^k	Practical, robust implementation and sustainability model (PRISM) ^l	Reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) ^m	Ottawa model of research use ⁿ	Evidence-based model for diffusion of innovations in health service organizations ^o	Framework of dissemination in healthcare intervention research ^p	Thematic analysis of theoretical models for translational science ^q	Family of diffusion of innovations models ^r	Process model of program change ^s	Stetler model of research utilization to facilitate evidence-based practice ^t	Total
Sociopolitical and external influence											
External environment											1
Government policy and regulation	X	X	X				X	X			6

Reinforcing regulation with financial incentives to improve quality service delivery						X				1
Social network (inter-systems)						X		X		6
Organizational characteristics										
Absorptive capacity	X					X				4
Leadership and champion of innovation (e.g., styles, attributes, management)	X	X		X	X			X		9
Network with innovation developers and consultants	X	X			X	X	X			6
Norms, values, and cultures	X					X		X		4
Operational size and structure	X			X	X	X			X	11
Social climate	X					X			X	4
Social network (inter-organizations)					X					3
Training readiness and efforts					X		X			4
Traits and readiness for change	X				X					3
Innovation characteristics										
Complexity, relative advantage, and observability			X	X	X			X	X	7
Cost-efficacy and feasibility		X		X		X	X		X	7
Evidence and compatibility		X		X	X			X		5
Facilitators and barriers		X		X						3
Innovation fit with users' norms and values	X	X			X	X		X	X	11
Risk					X		X			3
Triability, relevance, and ease	X			X	X			X		8
Staff/individual characteristics										
Affiliation with organizational culture	X									2
Attitudes, motivation, readiness towards quality improvement and reward	X		X	X	X			X		11
Feedback on execution and fidelity		X	X	X			X		X	5
Individual characteristics (e.g., awareness, knowledge/skill, competence, current practice, demographic factors)	X			X	X	X		X		7
Managerial characteristics										1
Social network (individual's personal network)					X	X				3
Client characteristics										
Readiness for change and capacity to adopt		X	X							5

^a Backer et al. (1986),

^b Berta et al. (2005),

^c Cohen and Levinthal (1990),

^d Damanpour and Schneider (2006, 2009),

^e Frambach and Schillewaert (2002),

^f Gallivan (2001),

^g Godin et al. (2008),

^h Solomons and Spross (2011),

ⁱ Weinstein et al. (2008),

^j Valente (1996),

^k Aarons et al. (2011),

^l Feldstein and Glasgow (2008),

^m (Glasgow 2003, Glasgow et al. 2003),

ⁿ Graham and Logan (2004),

^o Greenhalgh et al. (2004),

^p Mendel et al. (2008),

^q Mitchell et al. (2010),

^r (Oldenburg and Glanz 2008, Rogers 2003),

^sSimpson (2002),^tStetler (2001)

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Fig. 1.
Context-mechanism-outcome configurations for this review

Table 1

Key adoption constructs associated with adoption process

Constructs	Pre-adoption	Adoption
Sociopolitical and external influence		
External environment [*]		Urbanization ^a Competitive environment ^b
Government policy and regulation	Enactment and implementation of policies, legislation, or regulations ^{c,d}	Legislations and policies of regulatory agencies, accreditation standards include innovation ^{e,c,f,g} Political and cultural fit ^h
Reinforcing regulation with financial incentives	Policies and incentives ⁱ	
Social network (inter-systems)	Social networks, linkages, and cultural groups ^{j,i,d}	Social networks and network externalities ^b Similar communities have adopted ^e Lack of external support (e.g., advisory boards, legislatures, regulatory agencies, citizen groups, advocacy groups)(negative association) ^k Lack of coordination/agreement between administrator-managed task system, professional identity, and governance system (negative association) ^k
Organizational characteristics		
Absorptive capacity	Organizations' absorptive capacity ^{l,c} Organizations' usage of existing knowledge and skills base ^{l,b}	Organization's ability to identify, capture, interpret, share, reframe, and recodify new knowledge to link it with existing knowledge base and to put it to appropriate use ^m
Leadership and champion of innovation (e.g., styles, attributes, management)	Top management support ⁿ Leadership promotion ^{o,c,f}	CEO's influence, champions, opinion leaders (expert and peer), local leaders, self-efficacy of leadership, and leadership agreement ^{e,p,m} Leadership promotion ^{n,o,c,f,q} Organizational support for innovation ^k Prior experience in innovation adoption, skills and years since completion of training/education ^f Top-down leadership (negative association) ^k
Network with innovation developers and consultants	Bi-directional collaboration, networking, and personal contacts with outside consultants, innovation developers, credible professional associations, and potential users ^{k,c,f,m,i,g}	Direct and indirect networking ^f
Norms, values, and cultures	Shared health professionals values and patient-centeredness ^{o,c,i}	Shared health professionals values ^{o,c} Problem-solving norms ^d
Operational size and structure	Availability and mobilization of organizational resources committed to innovation ^{r,p,i,q} Formalized and centralized structure ^{b,n} Larger size and greater differentiation in personnel and structure ⁱ	Availability of organizational resources committed to innovation ^q Large, mature, observable, differentiated, specialized organizations with foci of professional knowledge ^e Size and size-practice fits ^{a,b,c,m}

Constructs	Pre-adoption	Adoption
	Lack of agency formal research infrastructure (negative association) ^o	Structures in place to support adoption (e.g., training, communication) ^e Formalized and centralized decision-making structure (negative association) ^b Lack of agency formal research infrastructure (negative association) ^o
Social climate	Positive social climate and social learning ^{c,i}	Adoption decision at individual- or group-level ^q
	Social pressure ^b	Social factors ^b
Social network (inter-organizations)	Inter-organizational networks ^j	Interconnectedness and multiple inter-organizational networks ^{b,j,m}
Training readiness and efforts *	Organizational and management support ^b	Innovations that are incorporated into training/ education curricula ^{b,g}
	Building in methods for maintaining staff competence and performance over time ^k	Targeting/communication about innovation ^b
Traits and readiness for change	Receptive context and readiness for change ^{c,m}	Innovativeness ^b Readiness for change ^c Risk reduction ^b
Innovation characteristics		Innovations are clarified as to what they are and what their implementation might entail ^{p,q} Innovations that are perceived as simple to use ^{k,p,m,d,q} Innovations that have a clear, unambiguous advantage in effectiveness over preceding idea, product, or program ^{p,m,d} Innovations that require less expertise ^h Innovations with benefits that are visible to intended adopters ^{p,m} Knowledge required to use the innovations is transferrable ^{p,m} Low complexity ^{p,m} Relative advantage of new program over existing practices ^k Staff can observe a demonstration ^k Tacitness of instruction (negative association) ^e
Complexity, relative advantage, and observability		Innovations that have a clear, unambiguous advantage in cost-effectiveness ^{a,b,p}
Cost-efficacy and feasibility	Cost efficacy and evaluation ^{f,g} Feasibility and evaluation ^{g,s} Perceived benefits exceeding expected costs ⁱ	
Evidence and compatibility	Research evidence and practice efficacy ^{f,g,s}	Adaptability of innovation ^k Compatibility with existing practices, intended users' values, norms, beliefs, and perceived needs ^{h,p,m,d} Evidence of practice efficacy ^f

Constructs	Pre-adoption	Adoption
		Innovations that can be “reinvented” to suit organizational needs ^p
Facilitators and barriers	Assessment of barriers and facilitators ^p	Assessment of barriers and facilitators ^p
	Training, empowerment, and interest in practice ^o	Management of organizational or system level barriers ^p
	Lack of awareness, familiarity, time, autonomy, and ability to access research (negative association) ^{o,f}	Training, empowerment, and interest in practice ^o
		Lack of awareness, familiarity, time, autonomy, and ability to access research (negative association) ^{o,f}
Innovation fit with users’ norms and values [*]	Assessment of potential adopters’ perceptions of the characteristics of the innovation ^p	Fit with accepted therapeutic scheme, users’ abilities, values, formed opinion, and knowledge, job description, current users of innovation, and existing procedures ^{b,t,c,f,i,d,q}
	Fit of setting with current practice, users’ values, norms, strategies, goals, skills, technologies, and ways of working ^{t,m,d,s}	EBT match with organizational culture ^{o,f}
		Psychological resistance to adoption (negative association) ^k
Risk	Low risk ^{m,g}	Perceived uncertainty (negative association) ^b
Trialability, relevance, and ease	Ease and meaning of use ^{c,m}	Ease of use ^c
	Partial trial of innovation ^d	Innovation impact ^a
		Partial trial of innovation ^{b,p,m,d}
		Link with positive health outcomes ^{k,e}
		Number of others using innovation ^b
		Relevance to solving a clearly identified problem ^k
		Degree to which innovation can be installed one step at a time with evidence of incremental success ^k
Staff/individual characteristics		
Affiliation with organizational culture	Fit with organizational culture ^{o,c}	
Attitudes, motivation, readiness towards quality improvement and reward	Adequate readiness and motivation for change ^{r,t,m,q}	Attitude toward change and pro-innovation attitude ^b
	Assessment of attitudes towards change ^p	Holistic approach to quality improvement ^o
	Holistic approach to quality improvement ^o	Positive attitude ^{r,c}
	Building in methods for rewarding adoption and innovation ^k	Motivational readiness and perceived needs influences adoption decision at individual or group level ^q
Feedback on execution and fidelity		Assessment of participation/adoption rate of expected participants ^h
		Decisions made about what constitutes adoption, how adoption is to be measured, and who will be responsible for monitoring ^p
		Feedback to practitioners about variation from best practice ^{f,p,g}
		Frequent evaluation of innovation use as part of routine practice ^s

Constructs	Pre-adoption	Adoption
Individual characteristics (e.g., awareness, knowledge/skill, competence, current practice, demographic factors)*	Assessment of awareness of innovation, skills and experiences required, and current practices ^{p,m}	Awareness knowledge, procedural knowledge, and principles knowledge ^{m,d}
	Fit with individual adopter characteristics ^c	Early adopters have higher degrees of mass media exposure and higher propensities for risk-taking ⁱ
	Innovativeness ^b	
	Intra-individual factors such as learning style, tolerance of ambiguity, meaning, and concerns in pre-adoption stage ^d	Fit with individual adopter characteristics ^c
	Experience with intervention ^b	Lack of skills and appreciation of research (negative association) ^o
	Lack of skills and appreciation of research (negative association) ^o	
Managerial characteristics		Managers' influence on workers' motivation, morale, and rewarding innovation and change ^a
Social network (individual's personal network)	Extensiveness of social networks ^j	Extensive social network, and strong, diverse, and organic intra-organizational networks ^{m,i}
Client characteristics		
Readiness for change and capacity to adopt	Early involvement of influential potential users in the planning, research, and development of the innovation ^k	Attitudes/Beliefs toward change ^b
		Patient/User readiness ^{t,f}
		Willingness of stakeholders to adopt and adapt innovations ^h

^aDamanpour and Schneider (2006, 2009),

^bFrambach and Schillewaert (2002),

^cAarons et al. (2011),

^d(Rogers 2003, Oldenburg and Glanz 2008),

^e(Berta et al. 2005),

^fFeldstein and Glasgow (2008),

^gMitchell et al. (2010),

^h(Glasgow 2003, Glasgow et al. 2003),

ⁱMendel et al. (2008),

^jValente (1996),

^kBacker et al. (1986),

^lCohen and Levinthal (1990),

^mGreenhalgh et al. (2004),

ⁿGallivan (2001),

^oSolomons and Spross (2011),

^pGraham and Logan (2004),

^qSimpson (2002),

^r Godin et al. (2008),

^s Stetler (2001),

^t Weinstein et al. (2008)

* There were several theories that indicated a construct could have both positive and negative associations with successful adoption. These are: External environment (adoption): Competitive environment (Frambach and Schillewaert 2002); Training readiness and efforts (pre-adoption): Information technology and training support^b; Innovation fit with users' norms and values (pre-adoption): Social norms (Frambach and Schillewaert 2002); Innovation fit with users' norms and values (adoption): Product independence (Frambach and Schillewaert 2002); Individual characteristics (adoption): Users' gender and age (Frambach and Schillewaert 2002)

Table 2

Synthesis of findings of the five levels of adoption constructs

Construct level	Findings
Socio-political and external influence	<ul style="list-style-type: none"> • Positive external influences, such as a physical environment of development and growth; policies, regulations, and accreditation standards supportive of innovation; financial incentives, and social environment supportive of adoption are proposed to promote adoption. • There are few negative theorized associations that demonstrate that lack of these external influences hamper adoption, suggesting that evidence is consistent for the role of external influences on adoption.
Organizational characteristics	<ul style="list-style-type: none"> • Organization characteristics present the intersection of the environment and the workers, and accordingly is an area of contradictory findings. • Leadership support for and experience with adoption leads to better adoption, but a hierarchy of top-down leadership may hinder adoption. Organizations with a research infrastructure, and additional resources facilitate adoption, but if the organizational structure is too formal and centralized or requires too much from individuals, adoption is less likely to be successful. • Similar to the external environment, positive social climate and interactions with innovation developers are useful, but if the organization's culture focuses responsibility of learning on the organization, it is less effective than if individuals are responsible for learning.
Innovation characteristics	<ul style="list-style-type: none"> • Findings at this level were generally consistent. • Innovations that are easy to use, better than current practice, observable, cost-effective, adaptable to the organization, evidence-based, compatible with the organization's and users' norms and values, relevant, and low risk are more likely to be adopted. Few studies indicate that the absence of these innovation characteristics were more likely to lead to adoption failure. • Innovations that engender resistance or those that staff are unaware of, not familiar with, and for which evidence cannot be obtained are less likely to be adopted. Organizations that assess these characteristics, monitor fit, and address barriers are likely to be more successful.
Staff/individual characteristics	<ul style="list-style-type: none"> • Individuals' attitudes and motivation for adoption, particularly positive attitudes toward change, the need for change, and quality improvement are important for successful adoption. Feedback on the adoption process is useful in increasing adoption, and individual characteristics such as skills and experience, innovativeness, tolerance of ambiguity, propensity towards risk taking are associated with increased adoption. As seen in external and organizational characteristics, extensive social networks of individuals are associated with adoption. • Job tenure and lack of skills are negatively associated with adoption for staff, but education and tenure are positively associated with adoption for managers.
Client characteristics	<ul style="list-style-type: none"> • Fewer researchers addressed this topic than many of the others. In general, similar to staff and manager characteristics, client attitudes, beliefs, and readiness toward change are all associated with better adoption. Additional work is needed in this area.