

# Atlas of Instruments to Measure Team-based Primary Care

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## Jumpstart Guide

Follow these steps to identify instruments that can be used to measure team-based primary care and that meet your specific needs.

**Step 1:** Review the Conceptual Framework of Team-based Primary Care. We organized all the instruments in the Atlas according to the constructs comprising the Conceptual Framework. A graphic depiction of the Framework and definitions of its constructs are found in Section 2.

**Step 2:** Review the Instrument Selection Guide. Section 6 describes a number of issues to consider when selecting instruments to use in your work.

**Step 3:** Examine Tables 3 and 4 in Section 4, which provide an overview of the instruments in the survey and how they relate to the Conceptual Framework. These tables will enable you to identify instruments of potential relevance to your measurement needs.

**Step 4:** Review the Instrument Profiles for the instruments you identified in Tables 3 or 4. These provide more detail about the instruments, which will enable you to narrow your choices, and discover source documents for the instruments.

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# 1. Introduction

## 1.1 Background

The increasing complexity of health care services, and the recognition of inadequate patient safety and quality of care, has led to the need for high-functioning teams of health care professionals and other staff to deliver safer, higher quality, and more efficient health care services to patients. Originally drawing on techniques developed in aviation, some of the earliest health care training in team-based approaches occurred in anesthesiology.<sup>1</sup> After publication of “To Err Is Human” in 2000,<sup>2</sup> momentum built for expansion of team training and implementation of team-based approaches in additional specialties, especially those involving frequent management of “crisis” events, such as emergency medicine, obstetrics, and intensive care.<sup>3</sup> Beginning in 2003, in collaboration with the Department of Defense, the Agency for Healthcare Research and Quality (AHRQ) has supported development and dissemination of the TeamSTEPPS program, (a patient safety improvement program), which is being implemented in inpatient and ambulatory settings.<sup>4</sup> In 2013, the TeamSTEPPS program released new materials focusing on teams in primary care, reflecting the increasing interest in applying team concepts to the primary care setting.<sup>5</sup> Eidus and co-authors recently argued that measurement of primary care should focus on “high-leverage” opportunities for improvement, including implementation of team-based primary care.<sup>6</sup> This Atlas contributes to building a foundation for measuring team-based care by identifying, selecting, and classifying existing measures of teams that may be usefully applied in the primary care setting.

## 1.2 Purpose of the Atlas

The Atlas of Instruments to Measure Team-based Primary Care (the Atlas) supports the advancement of team-based primary care by:

- 1) Presenting a Conceptual Framework of Team-Based Primary Care that identifies areas that are important to effective functioning of primary care teams;

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<sup>1</sup> Gaba DM, DeAnda A. A comprehensive anesthesia simulation environment: re-creating the operating room for research and training. *Anesthesiology*. 1988;69:387-394.

<sup>2</sup> *To Err Is Human: Building a Safer Health System*. Washington, DC: The National Academies Press; 2000.

<sup>3</sup> Meier AH. Team training in surgical education: The successful surgeon of the future needs to be a team player. *Am Coll Surg* 2011. <http://www.facs.org/education/rap/maier1211.html>. Accessed 3/6/13.

<sup>4</sup> King HB, Battles J, Baker DP, et al. TeamSTEPPS™: Team Strategies and Tools to Enhance Performance and Patient Safety. In: Henriksen K, Battles JB, Keyes MA, et al., editors. *Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 3: Performance and Tools)*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Aug. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK43686/>. Accessed 3/27/13.

<sup>5</sup> TeamSTEPPS Primary Care Version. <http://www.ahrq.gov/professionals/education/curriculum-tools/teamstepps/primarycare/>. Accessed 11/7/13.

<sup>6</sup> Eidus R, Pace WD, et al. "Managing patient populations in primary care: points of leverage." *J Am Board Fam Med* 2012;25(2): 238-244.

- 2) Providing an inventory of instruments that can be used to measure team-based primary care for purposes of quality improvement, evaluation, and research; and
- 3) Organizing the instruments in a web-based searchable format to facilitate selection of instruments on key characteristics.

### 1.3 Intended Audience

The Atlas is intended to assist with evaluation, research, and quality improvement efforts relating to team-based primary care. It is designed with the following audiences in mind:

- **Quality improvement (QI) practitioners** with responsibility for QI initiatives for primary care teams. Measurement of team functioning can help identify areas that may benefit from QI interventions. While QI practitioners come from various professional backgrounds, it is possible that assistance from measurement experts or researchers may help them use instruments in this Atlas, particularly those instruments requiring some adaptation for use in the primary care setting.
- **Evaluators** of interventions or initiatives intended to improve the functioning of primary care teams. Instruments could be used to assess team functioning both before and after an intervention.
- **Researchers** studying team-based primary care. Most of the instruments included in the Atlas were developed by research on teams, whether in health care settings or other industries.

### 1.4 Scope of the Atlas

The Atlas includes instruments that address the internal team processes and functioning of teams, as opposed to the outcomes of team-based primary care, such as improved patient outcomes or efficiency of care. We excluded instruments which focused primarily on the attitudes or opinions of individual team members towards teams. Because development of team-related theory, training, and measurement originated in non-health care fields, including the military, aviation, and business, we cast a wide net in our search for instruments and looked beyond the health care literature. We excluded instruments not available in English. We included instruments developed or used in other countries if they were available in English.

See Appendix II for the reference list of included instruments and Appendix III for the reference list of excluded instruments.

### 1.5 Approach to Developing the Atlas

Our first step in developing the Atlas was creation of a Conceptual Framework of Team-based Primary Care. The Framework summarizes the core characteristics of a well-functioning primary care team. Steps to developing the Framework included a literature review of teams and teamwork, creation of a draft framework based on that review, presentation to the expert panel, and revision in response to their comments and suggestions.



The revised Framework was then further reviewed both by the expert panel and by investigators and site visitors from the Robert Wood Johnson Foundation-funded project, “Primary Care Teams: Learning from Effective Ambulatory Practices,” and then final revisions were made. The Framework provides an organizing framework for classifying the instruments in the Atlas.

After creating the Framework, we conducted an environmental scan to identify existing instruments that could be used to measure team-based primary care, drawing on research in health care as well as other fields in which much work on teams has been done (e.g., business, aviation, military). Additional sources were suggested by expert panel members, and others were found through reviews of the grey literature. Abstracts were reviewed to identify articles that should be read in full text. From those sources, instruments that could be retrieved in full text and were determined to be of potential relevance to the primary care setting were mapped at the item (i.e., survey question or checklist item) level to the Conceptual Framework.

Full details of our methods are contained in Appendix I.

## 2. What Is Team-based Primary Care?

### 2.1 Defining Team-based Primary Care

There is growing recognition that successful primary care redesign efforts such as the Patient-Centered Medical Home will require a “high-functioning” primary care team that delivers team-based primary care.<sup>7,8</sup> The Institute of Medicine (IOM) defines team-based care as:

“...the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively with patients and their caregivers--to the extent preferred by each patient--to accomplish shared goals within and across settings to achieve coordinated, high-quality care.”<sup>9</sup>

The IOM definition describes the services delivered by a team but does not define what a team is or how it works, nor does it describe the core properties or defining characteristics of a “high-functioning” primary care team. Although several definitions exist, one of the most frequently referenced definitions in the organizational literature on teams is:

A team is a collection of individuals who are inter-dependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or the corporation) and who manage their relationships across organizational boundaries.”<sup>10</sup>

In addition, another commonly used definition of teamwork found in the organizational literature is:

Cooperation and coordination of tasks among a group of people who are inter-dependent and share the responsibility and a sense of accountability for outcomes or agreed upon goals.<sup>11</sup>

### 2.2 Conceptual Framework

The Conceptual Framework was developed and refined through a review of the literature and presentation of a draft version to our expert panel. Based on expert panel feedback, the

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<sup>7</sup> Grumbach K, Bodenheimer T. Can health care teams improve primary care practice? *J Am Med Assoc* 2004;291(10):1246–1251.

<sup>8</sup> Wagner EH. Effective teamwork and quality of care. *Med Care*. 2004;42(11):1037–1039.

<sup>9</sup> Mitchell PM, Wynia R, Golden B, et al. 2012. *Core principles & values of effective team-based health care*. Discussion Paper, Institute of Medicine, Washington, DC. [www.iom.edu/tbc](http://www.iom.edu/tbc).

<sup>10</sup> Cohen SG, Bailey DE. What makes teams work: Effectiveness research from the shop floor to the executive suite. *J Manage* 1997;23:239-290.

<sup>11</sup> Holland S, Gaston K, Gomes J. Critical success factors for cross-functional teams in new product development. *Int J Manage Rev* 2000;2:231-259.

Framework was reconstructed around an “Input-Mediator-Output-Input” configuration that is iterative and dynamic in nature.<sup>12</sup>

Inputs are “precursors” or “pre-conditions” that make it possible for teams to exist. “Mediators” are processes that occur within the team and are categorized into Cognitive, Affective/Relational, and Behavioral Domains.<sup>13</sup> Leadership is an additional construct that is placed in a separate Domain of its own. Outputs are the results of effective teamwork in the primary care setting and are derived from current descriptions of the delivery of “team-based care.”

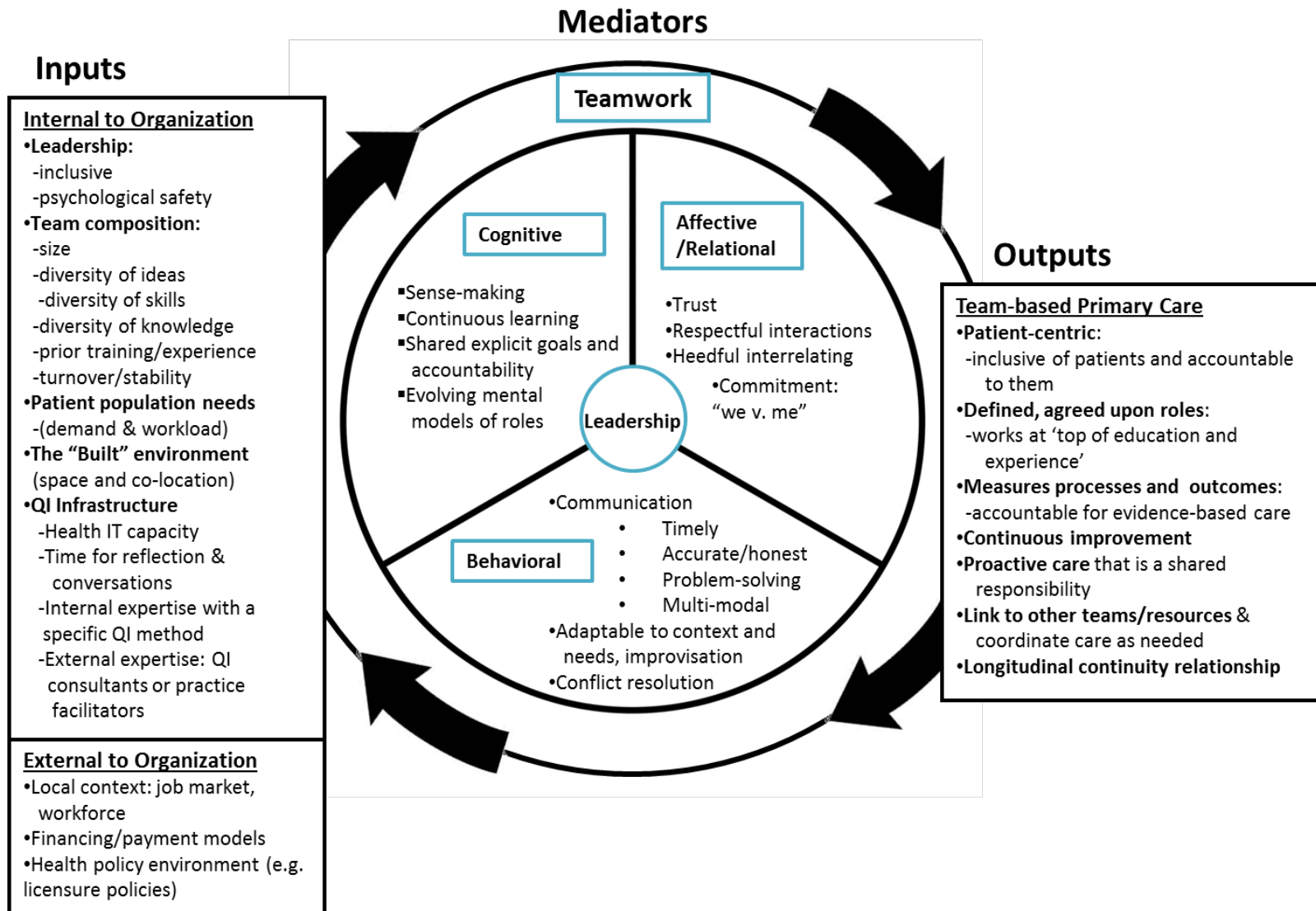
Based on feedback from the expert panel and consultation with members of the team from AHRQ, it was agreed that much of the focus of our work on identifying and evaluating measurement instruments should center on mediators of team-based care. The final Framework is depicted in Figure 1.

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<sup>12</sup> Ilgen DR, Hollenbeck JR, Johnson M, Jundt D. Teams in organizations: From input-process-output models to IMOI models. *Annu Rev Psychol* 2005;56:517-543.

<sup>13</sup> Valentine MA, Nembhard IM, Edmondson AC. Measuring Teamwork in Health Care Settings: A Review of Survey Instruments. Working Paper 11-116. Dec 2012. Harvard Business School, Cambridge, MA. <http://www.rrsstq.com/stock/fra/publications/P217.pdf>.

**Figure 1. Conceptual Framework of Team-based Primary Care**



## 2.3 Definition of Mediator Constructs in the Conceptual Framework

Below we provide definitions of the constructs under each of the mediator Domains: Cognitive, Affective/Relational, Behavioral, and Leadership. These definitions and descriptions were used by the team to guide the “mapping” of existing instruments onto the Conceptual Framework. Examples of the behaviors that exhibit these constructs can be viewed in the [TeamSTEPPS primary care videos](#).

**Table 1. Definition of Conceptual Framework Constructs**

Concept	Definition	References	TeamSTEPPS Video
<b>Cognitive Domain</b>			
<b>Sense-making</b>	Effective teams actively consider tasks, interactions and the environment within which they take place to help all team members gain a deeper understanding of how these factors relate to each other, for the purpose of both problem-solving and improving shared goals and vision.	Weick KE (1995) <sup>14</sup> McDaniel RR (2007) <sup>15</sup> Jordan ME, et al (2009) <sup>16</sup>	<b>Leadership:</b> Note how the change in environment, the absence of the triage nurse on a busy day, forces the team to look for a new workflow to assure that the problem is addressed and patients get good care.
<b>Continuous Learning</b>	Effective teams engage in continuous learning by regularly (and in the moment) collaborating to incorporate new understandings, information, data, and skills to optimize care delivery.	Jordan ME, et al (2009) <sup>16</sup> Leykum LK, et al. (2011) <sup>17</sup>	<b>Leadership:</b> Note how the huddle at the start of the day generated a collaborative experiment and how the experience of the new workflow created an agreed upon alternative model for triage.
<b>Shared Explicit Goals and Accountability</b>	Effective teams actively adopt and agree upon a set of goals and objectives with clearly articulated criteria for achievement, which motivates them as a team and measures their progress.	Xyrichis A, et al. (2008) <sup>18</sup> Mitchell P, et al. (2012) <sup>19</sup>	<b>Leadership:</b> Identify how the clearly articulated change in tasking enabled the team to meet patients’ need for same day care.

<sup>14</sup> Weick KE. Sensemaking in organizations. Thousand Oaks, CA: Sage Publications 1995.

<sup>15</sup> McDaniel RR. Management strategies for complex adaptive systems: Sensemaking, learning, and improvisation. *Perform Improv Q* 2007;20:21-42.

<sup>16</sup> Jordan ME, et al. The role of conversations in health care interventions: enabling sense-making and learning. *Implement Sci* 2009;4:15.

<sup>17</sup> Leykum LK, et al. Reciprocal learning and chronic care model implementation in primary care: results from a new scale of learning. *BMC Health Serv Res* 2011;11:44.

<sup>18</sup> Xyrichis A, Lowton K. What fosters or prevents interprofessional teamwork in primary and community care? *Int J Nurs Stud* 2008;140-53.

<sup>19</sup> Mitchell P, Wynia M, Golden R, et al. Core principles & values of effective team-based health care. Discussion Paper, 2012. Institute of Medicine, Washington, DC. [www.iom.edu/tbc](http://www.iom.edu/tbc).

Concept	Definition	References	TeamSTEPPS Video
<b><i>Evolving Mental Models of Roles</i></b>	Effective teams maintain an open mind to new ideas and perspectives that they apply to their role and understanding of others roles and relationships, allowing roles to change over time.	Bodenheimer T. (2007) <sup>20</sup>	
<b>Affective/Relational Domain</b>			
<b><i>Trust</i></b>	Effective teams are able to act in a manner that reflects confidence in the ability and reliability of other team members, are able to be vulnerable by bringing problems to the group for resolution, and believe that each team member will strive toward the goals of the group	Ilgen DR, et al. (2005) <sup>21</sup>	<a href="#">Mutual Support</a> : Notice that although the new doctor had not developed trust in the team, the nurse's confidence in her role allowed her to be vulnerable and strive for a better outcome.
<b><i>Respectful Interactions</i></b>	Effective practice teams exhibit honest, self-confident and appreciative interaction, actively seek out and value the roles and opinions of others, freely share opinions that may be unpopular and willingly change their minds in response to new meaning created within the practice	Lanham HJ, et al. (2009) <sup>22</sup> Weick KE, et al. (1993) <sup>23</sup>	<a href="#">Mutual Support</a> : Identify the change in tone and in result when the honest interactions were appreciative in tone and valued the roles of others.
<b><i>Heedful Interrelating</i></b>	In effective primary care teams, individuals pay attention to the task at hand, the way their roles and actions affect the roles and actions of others, and coordinate their actions to complement those of other team members.	Weick KE, et al. (1993) <sup>23</sup> Lanham HJ, et al. (2009) <sup>22</sup>	<a href="#">Situation Monitoring &amp; Leadership</a> : Note how busy environments in both videos created extra need for attention and coordination of action to accomplish team goals.
<b><i>Commitment</i></b>	In effective primary care teams, individuals and the group as a whole feel connected to and exhibit a sense of belonging to the team, are dedicated to group goals and values, and exhibit this loyalty to the group by consistently performing their role even in difficult situations.	Ilgen DR, et al. (2005) <sup>21</sup> Hoegl M, et al. (2001) <sup>24</sup>	<a href="#">Leadership</a> : Notice how the nurses continued to support the front desk in triage even when communication was poor, and how the team valued their performance during the end of day huddle.

<sup>20</sup> Bodenheimer T. Building teams in primary care. California Health Care Foundation; 2007.

<sup>21</sup> Ilgen DR, Hollenbeck JR, Johnson M, et al. Teams in organizations: From input-process-output models to IMOI models. *Annu Rev Psychol* 2005;56:517-543.

<sup>22</sup> Lanham HJ, et al. How improving practice relationships among clinicians and non-clinicians can improve quality in primary care. *Jt Comm J Qual Patient Saf* 2009;35:457.

<sup>23</sup> Weick KE, Roberts, KA. Collective mind in organizations: Heedful interrelating on flight decks. *Adm Sci Q* 1993;38:357.

<sup>24</sup> Hoegl M, Gemuenden HG. Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organ Sci* 2001;12:435-449

Concept	Definition	References	TeamSTEPPS Video
<b>Behavioral Domain</b>			
<b>Communication</b>	Effective practice teams keep each other informed with timely and accurate information, using multiple and appropriate modes of information transfer that facilitate problem solving.	Gittell JH, et al. (2010) <sup>25</sup> Hoegl M, et al. (2001) <sup>24</sup>	<b>Communication:</b> Note the efficiency gained by appropriate communication, and how the MA was able to perform his role more effectively when communication went well.
<b>Adaptable to Context and Needs, Improvisation</b>	Effective practice teams adapt established routines to provide for unforeseen or unusual circumstances by flexible improvisation.	Weick K. (1998) <sup>26</sup> Arrow H, et al. (2000) <sup>27</sup> McDaniel RR Jr (2007) <sup>15</sup>	<b>Leadership:</b> Note not only the adaptation of providers covering triage, but the changes in timing of tasks and the adoption of an alternate model for future use.
<b>Conflict Resolution</b>	Effective practice teams develop a relational capacity to address conflict by openly discussing disagreements or tension among team members using an effective resolution process	Lanham HJ, et al. (2009) <sup>22</sup> Jordan ME et al. (2009) <sup>15</sup>	<b>Mutual Support:</b> Note how the nurse openly approached a difficult interaction and used the group norm of debrief to resolve the problem.
<b>Leadership Domain</b>			
<b>Leadership</b>	In effective practice teams leadership promotes high quality care by encouraging each team member to develop and express new ideas, encouraging their engagement in testing them, and guiding the team towards improvement.	Edmondson A. (2003) <sup>28</sup> Nembhard IM, et al. 2006) <sup>29</sup>	<b>Leadership:</b> Notice that by calling a huddle, the leader engaged the entire team and then debriefed, valuing each person's input about the test of an alternative model.

## 2.4 Example Scenarios of Teamwork or Team-based Care

The scenarios below were created to provide supporting information on the mediator concepts in the Conceptual Framework, particularly those that are unfamiliar terms, or for which there is not a well-recognized definition. The Framework is also the organizing structure for the Atlas, so the scenarios help assure that the constructs are recognizable to the

<sup>25</sup> Gittell JH, Seidner R, Wimbush J. A relational model of how high-performance work systems work. *Organ Sci* 2010;21:490-506.

<sup>26</sup> Weick K. Improvisation as a mindset for organizational analysis. *Organization Science* 1998;9:543-545.

<sup>27</sup> Arrow H, McGrath JE, Berdahl JL. Small groups as complex systems: formation, coordination, development and adaptation. Thousand Oaks, CA: Sage; 2000.

<sup>28</sup> Edmondson, A. Speaking up in the Operating Room: How Team Leaders Promote Learning in Interdisciplinary Action Teams. *J Manage Studies* 2003; 6: 1419–1452.

<sup>29</sup> Nembhard IM, Edmondson AC. Making it safe: the effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *J Organiz Behav.* 2006;27:941-966.

user. To bring the constructs to life, the four examples below, two of which portray team behaviors in the delivery of care and two that focus on team building and quality improvement, describe typical scenarios in the delivery of team-based care. The explanatory paragraphs that follow highlight in italics the mediator constructs portrayed in the vignette.

**Scenario 1:** Esperanza felt like something was different about Mrs. Suarez when she checked into her appointment at Grandview Health Clinic today. She didn't greet Esperanza with her usual cheer. In fact, she had scarcely made eye contact. When she asked about her family, Mrs. Suarez had answered so softly, Esperanza didn't hear her reply. Dr. Cardenas, the primary care physician was running a little late, but Esperanza caught him as he came out of an exam room. "Mrs. Suarez doesn't seem herself today. She seems sad or troubled. I'm concerned about her. I think we should ask Roseanne, our behavioral health provider, to be available during your visit. I'll send her an instant message about seeing Mrs. Suarez either with you or immediately after your visit." Dr. Cardenas thanked Esperanza. He had learned from prior experience to trust Esperanza's observations, and if the behavioral health specialist were alerted right now she could intervene with Mrs. Suarez today during the primary care visit.

**Explanation for Scenario 1:** In this brief vignette, one can see several aspects of effective team structure and functioning. The receptionist is using *heedful interrelating* and *timely communication* when she expresses her concerns right away. This enables the team to efficiently take action, *adapting to the context and needs of the patient*. The interaction shows that on this team the contributions of front desk staff are *trusted* and valued. This is evidenced by the empowered action of the receptionist to immediately communicate to the physician her observation, following through with scheduling, and the physician taking action on the basis of that communication. There is a recognition of each team member's role, and an agreed upon workflow with the option of a behavioral health visit following the provider visit. This allows the team to call in the behavioral specialist in response to patient needs. With shared, *explicit team goals*, established *trust* in team members, a *working mental model of the team roles* and tasks, and efficient *multimodal communication* options, the team is able to *adapt flexibly to changing situations*.



**Scenario 2:** Morning huddle, 7:45. Consuela, the team medical assistant, and Dr. Cardenas have reviewed the day's schedule and have noted any alerts from the EMR for necessary screenings, immunizations or preventive services. They check for patients with special circumstances that may need extra time or attention during their visit today. Dr. Cardenas notes, "Looks like Mr. Sanchez is in for his follow up appointment after being in the ER last week. I see they have added new medications for him. Would you call and remind him to bring in all his medications when he comes? He was struggling with taking his medications even before he went to the ER." "I called him yesterday afternoon," replies Consuela. "I wonder if he wouldn't be a good candidate for the new pharmacy consultation service at Value Mart. That's where he gets his prescriptions filled, and he is now taking nine medications." "Great idea," Dr. Cardenas replied, "Would you set that up with the pharmacy, please? Consuela, are you comfortable having this conversation with him when you bring him back to the exam room?" Consuela nods, "I am familiar with the pharmacy consult program now. And I'll ask him if he is interested in the walking club at the recreation center, too. They have a session called 'senior strolls' that might work for him. He's on his own a lot, and might enjoy the company."

**Explanation for Scenario 2:** *Timely and honest communication* among team members and *heedful interrelating* about patient visits are two important team functions, particularly for patients with multiple or complex chronic conditions. Huddles, brief focused meetings of core practice team members, offer a routine and reliable opportunity to communicate about patient needs, prepare for visits and improve efficiency. They also provide an opportunity for brief, focused training on skills, for check-ins to assure that team members are prepared for their role in the visit, or even to practice new conversations. They refresh the team's *commitment to their shared goals and accountability* for those goals.

**Scenario 3:** This was the fourth full team meeting since the Red Team, one of three practice teams in the Grandview clinic, had begun revamping their workflow. Pizza had been delivered and as the team gathered across the hall, Molly, a nurse practitioner (NP) on the team, was describing to Juanita, the office manager, the increased tension she'd been feeling in the practice. "Consuela and Lupe are both terrific medical assistants (MAs), and they seem to be handling the new double MA model well enough. There have been a couple of mix-ups, but the workflow is settling in well, and they both have mentioned the improvement in efficiency. What I don't understand is the grumbling. Something is going on between them that is not helping the atmosphere in the back office at all." Juanita nodded. She had noticed the tension, too. "We are due for a debrief of the new workflow during today's practice meeting. Everyone is stressed to some degree in this transition, and the MAs are experiencing the biggest changes in their role. They may be experiencing a conflict that they don't feel they can talk with the team about, and can't seem to solve themselves. Why don't we talk about that today, ask everyone how they are feeling about the changes and see what comes up?" Molly agreed, and said "I think it might be helpful to get some training for the whole team to manage these changes better, to be able to talk about what isn't working and problem solve. The important thing is that everyone develop the skills to talk about difficult issues, and begin to solve problems themselves."

**Explanation for Scenario 3:** Developing effective teams requires change, which is often stressful. Effective teams take time to meet together to discuss changes, and practice *accurate and honest communication* skills to enable the *respectful interactions* good teamwork requires. Team-focused *leadership* assures there are opportunities for staff to engage in *sense-making* conversations that underscore the *shared goals of the team* and provide a context within which people can *learn together* and build skills. Especially during times of change, it is important to assure that the team sustains a sense of psychological safety to speak openly and honestly. These conversations develop the team's shared identity and *commitment*, engendering a strong sense of "we, the team". Training in communication skills and conflict resolution is provided team-wide, building a culture of *shared values and accountability*. With improved skills and confidence, each team member can take responsibility for *leadership* in those areas affecting their own work, and use *problem-solving* skills.

**Scenario 4:** It is early Thursday afternoon and an interprofessional team from High Point Clinic is site visiting here at Grandview to share best practices and provide opportunities to brainstorm and problem solve. Red, Blue and Green Teams have reassembled with High Point clinicians and staff in the lunchroom, reviewing the site visitors' observations from the morning. The clinic is closed for the afternoon, but "patient partners" sit with all three teams. Although it had felt awkward at first, engaging patient partners to provide their perspective during team meetings had really changed the conversation when troubleshooting problems in the practices. Molly, the Red Team nurse practitioner, explained, "We have been tracking patient experience measures for some time now, and the run chart graph plummeted when we first instituted the double MA model. Some patients had spoken openly about the negative effects of stressed staff on the quality of their visits in the clinic, so we invited them to be part of the solution. They really helped us identify what to focus on." One patient partner said, "Lupe is the one who helps me figure out how I can make the changes I need to manage my diabetes. When she is pulled away for other things and can't meet with me before I leave, I don't feel like I'm sure what to do when I get home". After hearing the patients' perspective, the team assured that MAs have time for "closing the loop" with patients before they leave, to make sure they understand their care plan and know what to do. The patient experience scores were now improving again.

High Point, the visiting team, wanted to learn how Grandview Clinic had invited and included patient partners into their QI meetings. In return, High Point's practice coach would provide training on "difficult conversations" and problem solving strategies. These site visit exchanges were proving to be very beneficial to both clinics. They could dive into the nuts and bolts of implementing specific changes, and it was easier to believe the changes were possible when you saw first hand how other teams had accomplished them.

**Explanation for Scenario 4:** *Continuous learning* takes place when teams have an identified quality improvement strategy that they use regularly, and the tools used, like tracking measures of targeted QI initiatives on run charts over time, are understood and discussed by the whole team. *Continuous learning* requires time for regular meetings, the opportunity for training for all staff, and benefits from shared learning from other sites working on the same issues. This can happen through virtual or in-person learning communities or site visits. Data for *sensemaking* conversations on improvement initiatives comes from regular measurement of factors affecting priority change areas. Increasingly, teams recognize the transformative potential in including patients' feedback as they work to implement change, both through experience surveys and directly from patient involvement as team members in improving quality. In this scenario, the tracking of patient experience measures and getting direct feedback from patients and family members helped staff understand how crucial the role of the MA was in supporting patient self-management, and underscored their importance on the team, creating an *evolving mental model* of their role.

### 3. Overview of Instruments in the Atlas

In this section we provide summary descriptions of the instruments included in the Atlas. The reference list for instruments included in the Atlas is provided in Appendix II.

#### 3.1 Instrument Characteristics

Table 2 summarizes the characteristics of the 48 instruments included in the Atlas. The majority of instruments are surveys with some checklists developed for simulation and field use. Thirty of the instruments were designed for health care settings, although only nine targeted family practice or other primary care settings specifically. Therefore, it is important to note that many of the instruments included in the Atlas may need some adaptation to be used in primary care settings, for example, rewording questions that refer to settings other than primary care. We categorized instruments as needing no adaptation, minor adaptation (less than 10% of items require deletion or rewording), or major adaptation (10% or more of items require deletion or rewording). Twenty instruments do not require adaptation, fifteen require minor adaptation and the remaining thirteen require major adaptation for use in primary care. Instruments vary widely in terms of how many items they include, from 6 to 94, with a median of 28.5.

Instruments, and sometimes even individual items, can map to more than one construct in the Conceptual Framework of Team-based Primary Care; in fact, no instrument included in the Atlas focuses on only a single construct. The average instrument includes items that map to about seven different constructs, although some include as few as three, and in three instruments, all twelve constructs are addressed. The individual instrument profile tables in Section 6 note the specific items in each instrument that map to each of the 12 constructs in the Framework. It should also be noted that some items in the instruments do not address any of the Conceptual Framework mediator constructs. On the other hand, some items measure two different constructs.

**Table 2. Characteristics of Instruments to Measure Team-based Primary Care (n=48)**

Characteristic	# of Instruments
<b>Instrument Type</b>	
Survey	44
Observational Checklists (total)	4
• Field use	1
• Simulation	2
• Both field and simulation	1
<b>Sample / Respondents</b>	
Physicians (including psychiatrists and surgeons)	14
Registered nurses	12
Health care administrators	9

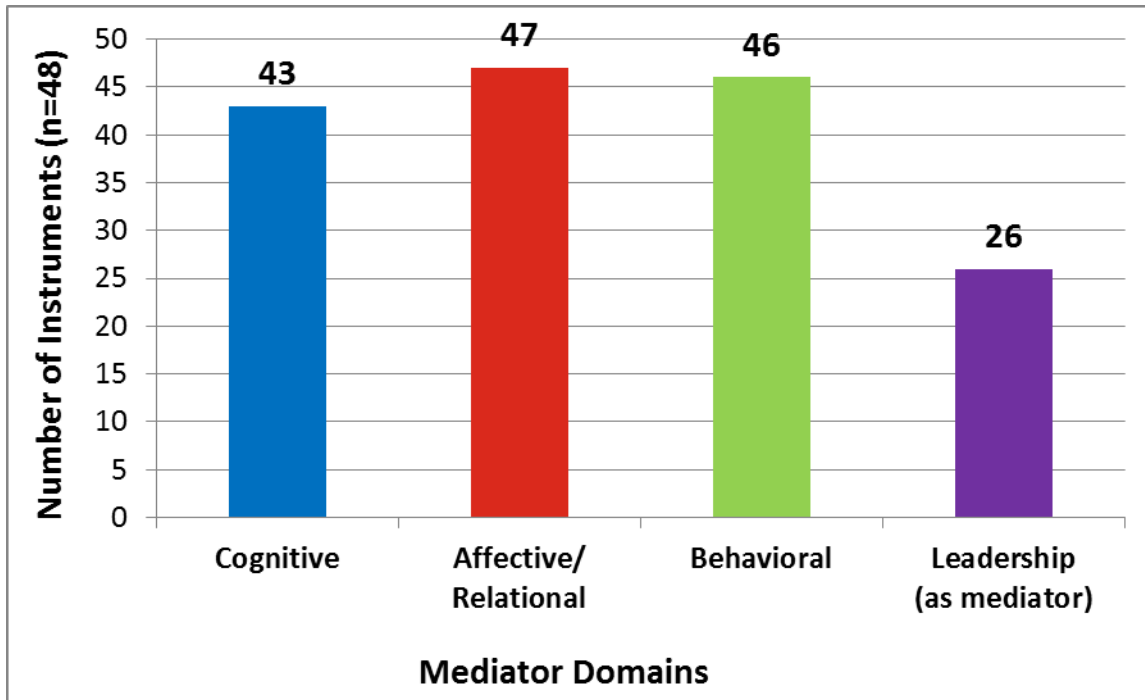
Characteristic	# of Instruments
Nurse practitioners (NPs) or advanced practice registered nurses (APRNs)	8
Allied health professionals	7
Licensed practical nurses (LPNs)	4
Pharmacists	3
Health care trainees/students	4
Other health care providers	14
Social service providers	5
Patients	1
Non-health care	17
<b>Settings</b>	
Health care (total)	30
<ul style="list-style-type: none"> <li>• Outpatient – Primary Care</li> <li>• Outpatient – Other</li> <li>• Inpatient – Acute</li> <li>• Health care – Unspecified</li> </ul>	<p>8</p> <p>3</p> <p>15</p> <p>4</p>
Non-Health Care or Unspecified	18
<b>Degree of Adaptation Needed for Use in Primary Care</b>	
No adaptation required	20
Minor	15
Major	13
<b>Number of Items</b>	
Range	6 to 94
Mean (SD)	35.5 (± 23.3)
Median	28.5
<b>Number of Constructs per Instrument</b>	
Range	3 to 12
Mean (SD)	7.2 (± 2.56)
Median	7

### 3.2 Mediator Constructs Measured

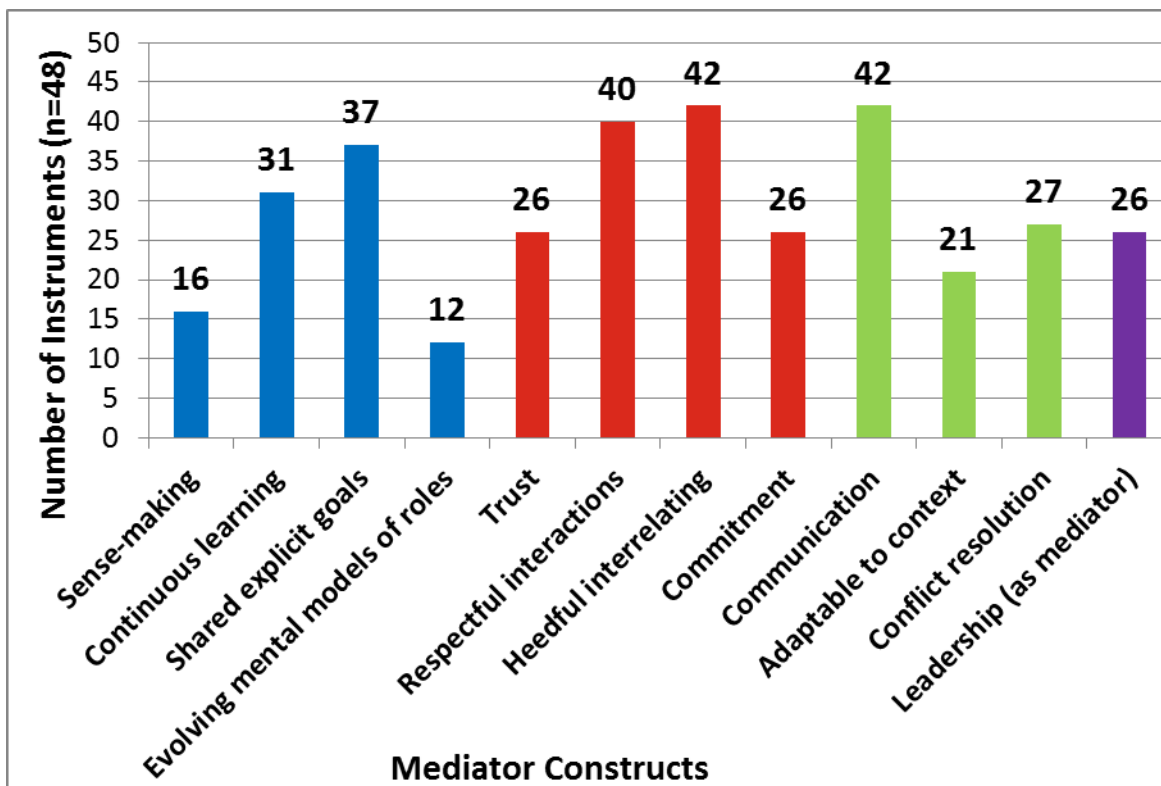
Figure 2 indicates the number of instruments that include at least one item that addresses any of the constructs in each of the four mediator domains of the conceptual framework. The majority of instruments ( $\geq 43$  instruments) have at least one item addressing each of the cognitive ( $n=43$ ), affective/relational ( $n=47$ ), and behavioral ( $n=46$ ) domains. Whereas leadership as a mediator is only reflected in about half of the instruments. Figure 3 is similar but counts instruments with at least one item that maps to each individual construct. It is obvious from this graph that some constructs, such as *communication*, *heedful interrelating*,

*respectful interactions*, and *shared explicit goals*, are much more frequently addressed in the instruments than are constructs such as *evolving mental models of roles* or *sense-making*.

**Figure 2. Number of Instruments That Measure Each Domain**

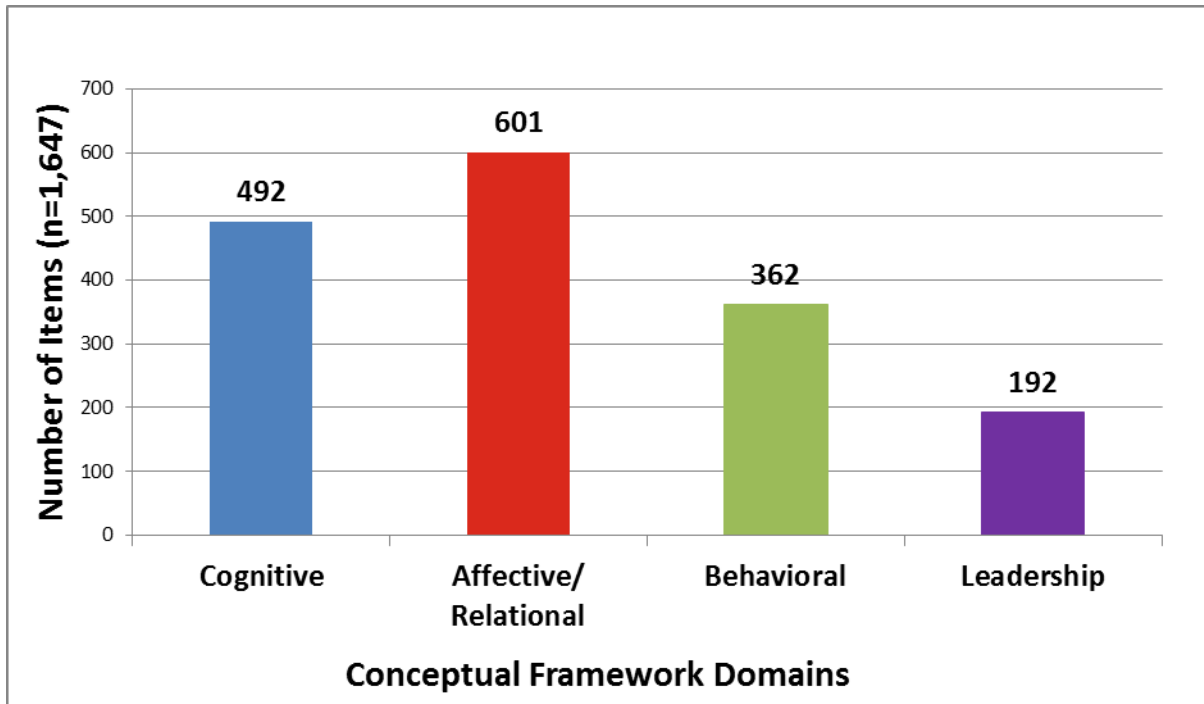


**Figure 3. Number of Instruments That Measure Each Construct**



Figures 4 and 5 are similar to Figures 2 and 3, but pertain to the mapping of individual items. Figure 4 shows that over one-third of items address constructs in the affective/relational domain (n=601), followed by the cognitive (n=492), behavioral (n=362), and leadership (n=192) domains.

**Figure 4. Number of Individual Items That Map to Each Domain (n=1,647 items)**



**Figure 5. Number of Individual Items That Map to Each Construct (n=1,647)**

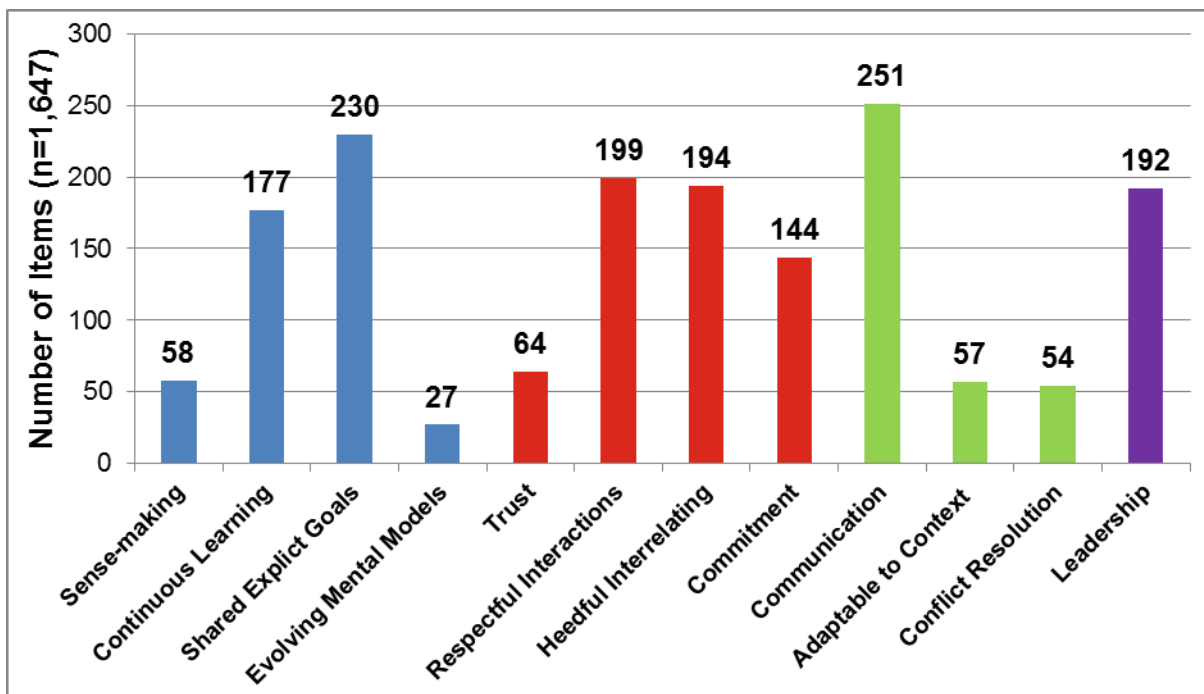
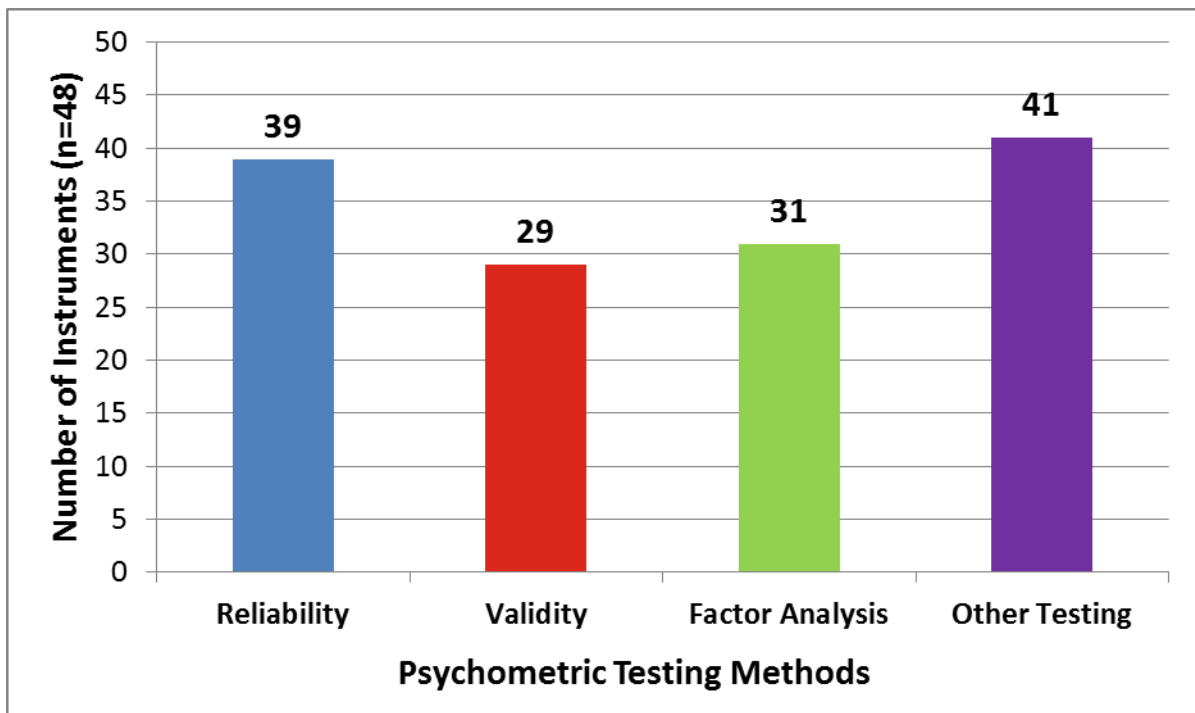


Figure 5 shows the number of individual items across the 48 instruments that maps to each of the 12 mediator constructs. The high number of items addressing the constructs *respectful interactions*, *heedful interrelating*, and *commitment* drive the relatively high number of items found to address the affective/relational domain in the conceptual framework. In contrast, there are fewer items for *trust*, *conflict resolution*, *adaptable to context* and *sense-making* and even fewer items measuring *evolving mental models of roles*. The *communication* construct accounts for 15% of all items (n=251) followed by *shared explicit goals* with 14% of all items (n=230).

### 3.3 Psychometric Testing

The instruments included in the Atlas had at least some psychometric testing in their development, whether it was reliability, validity, factor analysis or pilot testing, or a combination thereof. We provide the reported results for the psychometric testing of each instrument in the Atlas. We do not however establish a minimum threshold for inclusion or to indicate sufficient psychometric properties. The majority of instruments had at least some reliability testing (n=39), and over half included validity testing (n=29) and factor analysis (n=31) in the development of the instruments (see Figure 6).

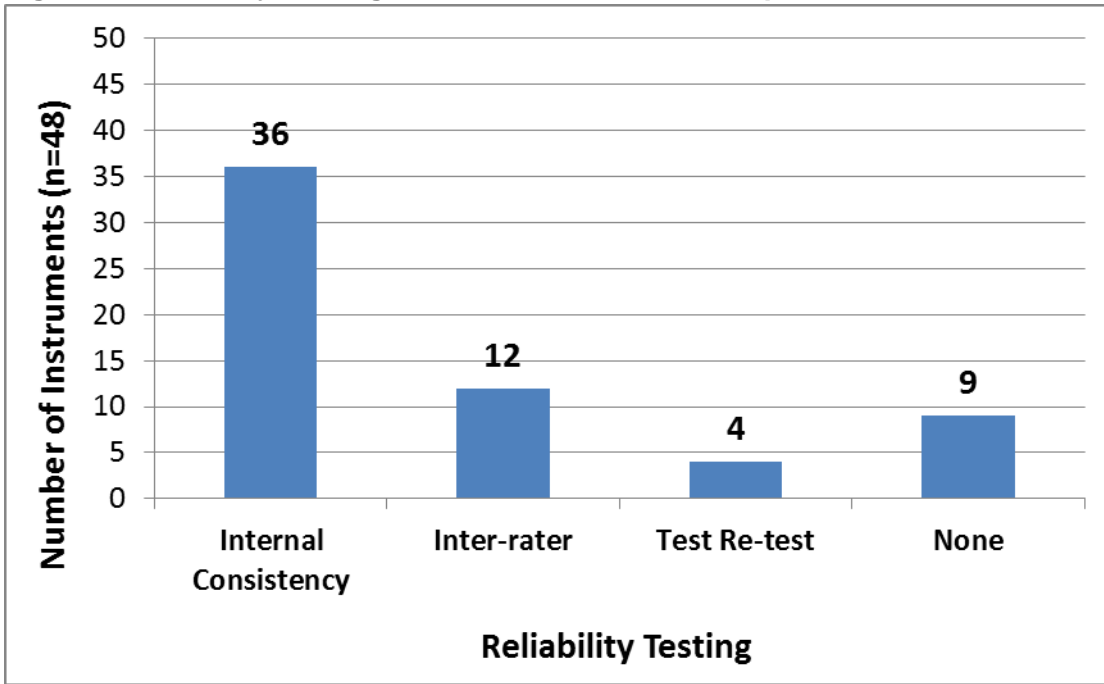
**Figure 6. Psychometric Testing Used in Instrument Development**



As shown in Figure 7, the majority of instruments (n=39) were assessed on some measure of reliability. Internal consistency was the most common reliability test used (n=36), usually measured using Cronbach’s  $\alpha$ . Just under a third of instruments (n=12) were assessed on inter-rater reliability and only four instruments were assessed for test-retest reliability.

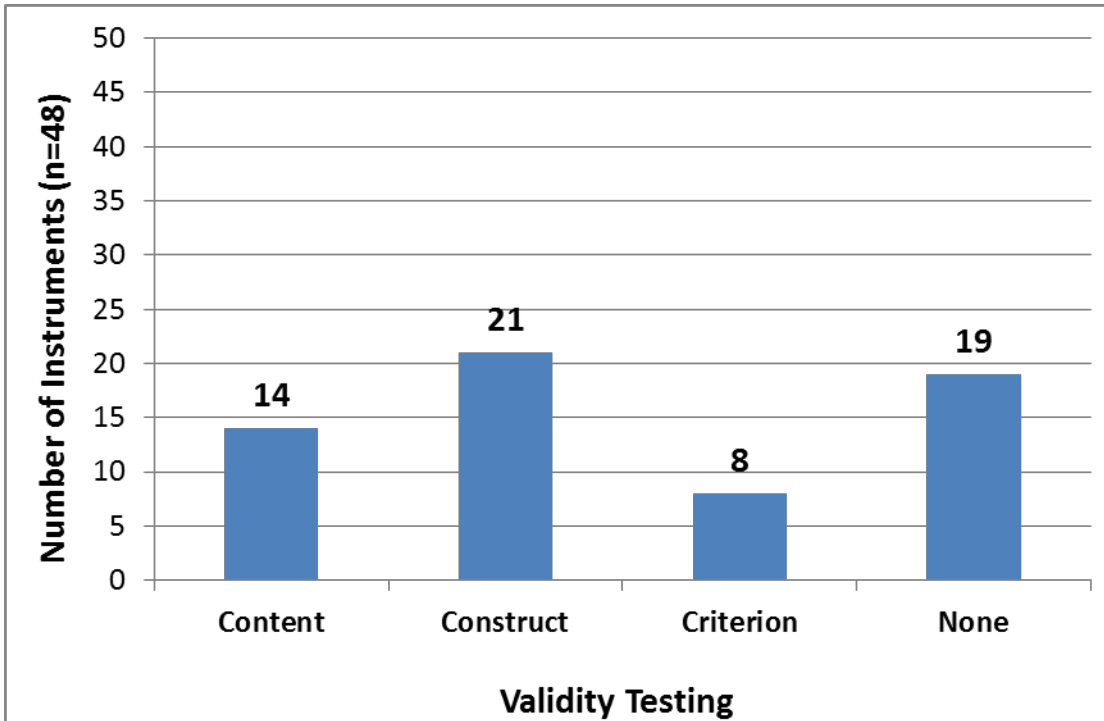


**Figure 7. Reliability Testing Used in Instrument Development**



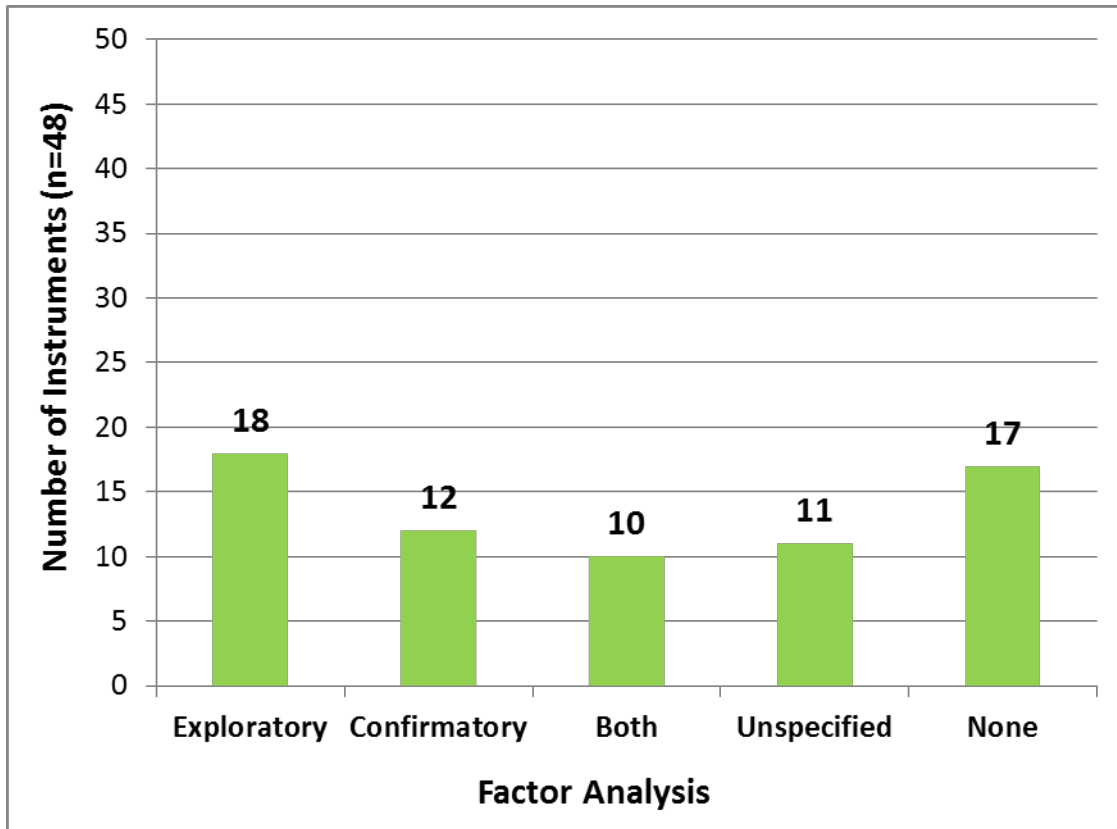
Most instruments (n=30) were assessed on some measure of validity (see Figure 8). Content validity was assessed for 14 instruments, usually with input from experts. Construct validity was assessed in just under half of the instruments (n=21). Fewer instruments were assessed on criterion (n=8).

**Figure 8. Validity Testing Used in Instrument Development**



Most instruments (n=31) used some form of factor analysis in the development of their instrument (see Figure 9). Exploratory factor analysis was used in the development of 18 instruments versus 12 in which confirmatory factor analysis was used. Several instruments also used both exploratory and confirmatory factor analysis, or did not specify.

**Figure 9. Factor Analysis Used in Instrument Development**



## 4. Gaps in the Measurement of Team-based Primary Care

The science of measuring teamwork in primary care is in its infancy. Teamwork has been studied in industries like aviation and the military, as well as in hospital settings or in health care teams involved in acute events like trauma teams. However, despite the priority put on primary care redesign efforts like the patient-centered medical home, there is not one commonly accepted model of team-based primary care. Correspondingly, we lack a common understanding of how to measure effective teamwork in primary care. Thus, as a first step in this project we developed a conceptual framework based on existing models and literature and with input from key experts in the field. The framework then helped to guide the identification and selection of instruments relevant for measuring teamwork in primary care for inclusion in the Atlas. Finally, we identified gaps in the measurement of team-based primary care by i) examining the extent to which the identified instruments mapped to the conceptual framework, ii) soliciting structured input from individual expert panel members and stakeholders, and iii) then discussing with the expert panel as a whole the input received. There are many gaps and future research needs to move the field forward, but the following are a few key gaps in the measurement of team-based primary care that we identified.

### 4.1 Potential Gaps to Fill in Team-based Primary Care Measurement

#### 4.1.1 Determine Which Mediator Constructs Achieve the Intended Outcomes of Effective Teamwork

The 48 instruments in the Atlas do not evenly measure the mediators of effective teamwork captured in our conceptual framework. Some constructs are incorporated in many more instruments and items (e.g., *communication*, *heedful interrelating*, *shared explicit goals*, and *respectful interactions*) than others (e.g., *trust*, *conflict resolution*, *sense-making*). This may reflect the fact that some mediators are conceptually clearer and easier to measure than others (for example, *communication* versus *sense-making*). However, regardless of the number of instruments measuring each construct, it is more important to determine which mediator constructs achieve the intended outcomes of effective teamwork – even if they are distal outcomes. While the conceptual framework was based on the extant literature and input from individuals working to improve primary care as well as other experts, the framework was not tested and rigorously validated. Thus, an important gap to fill is to conduct research or synthesize existing research on which mediators or enablers drive the intended outcomes of effective teamwork in primary care. Future measurement efforts should focus on those constructs.

#### 4.1.2 Test Existing Instruments in Primary Care Settings, Establish Their Psychometric Properties, and Reduce Burden on Respondents

All of the instruments included in the Atlas underwent at least some reliability testing (i.e., inter-rater, test-retest, internal consistency) or validity testing (i.e., face, content, construct, criterion). Some instruments demonstrated strong psychometric properties while others were quite weak. Additionally, some instruments were developed for different purposes or

different settings, including non-health care settings, therefore not all items were relevant to measures of team-based primary care. The reported psychometric properties for each instrument will not necessarily remain consistent if only certain items within an instrument or even a subscale are used to measure the relevant constructs in our model of team-based primary care. Some of the experts and stakeholders whom we consulted thought it advisable to further test and validate existing instruments rather than create new instruments. Valentine et al. (2013), based on their review of surveys to measure teamwork in health care, stated that using “existing, psychometrically valid measures” was advisable to “facilitate the development of cumulative knowledge about teamwork.” Therefore, an important need is to test existing instruments that appear to measure relevant mediators of effective teamwork in primary care settings and further establish their psychometric validity, particularly if only a subset of items from the original instrument was applicable. Additionally, given the burden of some instruments on respondents (e.g., a survey with 94 items), conducting additional psychometric testing of existing instruments can help create more parsimonious or shorter versions of valid and reliable instruments.

#### **4.1.3 Incorporate the Patient’s Perspective**

All experts and stakeholders who provided input agreed that the patient’s perspective was a critical gap in the measurement of team-based primary care. However, several pointed out that substantial conceptual work (e.g., exploratory or qualitative research) would be a necessary precursor to instrument development. For example, research is needed to understand fundamental questions about the patient’s role on a primary care team or to what extent patients are able to report on the effectiveness of their primary care team.

#### **4.1.4 Address Challenges in Measuring the Team**

Several experts in the measurement of team-based care raised the importance of further examining the measurement challenges associated with aggregating at the unit-level (the team) versus at the level of individual clinicians, especially when there are few clinicians in a practice. Research that tackles this critical measurement challenge will be valuable to advancing measurement of team-based primary care.

#### **4.1.5 Support Non-researchers in the Use of Instruments**

While not explicitly a gap in the *measurement* of primary care teams, most of the instruments were published as peer-reviewed manuscripts and did not provide guidance on how to analyze, interpret and use the results. Only two instruments provided guidance to the users (Frankel, 2007; Mahoney & Turkovich, 2010). All experts and stakeholders who provided input to the project agreed that more training on the effective use of team-based care instruments is needed to advance the field, particularly for individuals involved in practice improvement and other non-researchers. Support could include how to administer the instrument, collect and analyze data, and interpret the results. In addition to providing guidance on using instruments, experts thought it was equally important to provide ideas and resources regarding what action steps could be taken to improve teamwork based on the results.

#### **4.1.6 Test the Sensitivity of Existing Instruments, Including to Measure Changes Over Time**

Instruments to measure team-based primary care can be used to measure whether improvements in teamwork have occurred after an intervention or a practice improvement effort was implemented. Similarly, these instruments might be used to measure changes over time, such as when a primary care practice is transforming into a medical home and taking a team-based care approach. An instrument needs to be sufficiently sensitive to measure the expected changes in each mediator and at the interval that is meaningful to what is being measured. A key research need is to test the sensitivity of existing instruments to determine the extent to which they can measure changes reflective of important changes in team functioning and/or over time.

## 5. Instrument Mapping

As described in Appendix I, instruments were mapped to the Conceptual Framework at the individual item level and each item was individually mapped to no more than two constructs, as appropriate. Table 3 and Table 4 summarize the results of this mapping exercise. For each individual instrument, Table 3 reports the total number of items included in the instrument and the number of items judged to address each construct. This shows not only how long the instrument is overall, but also how the items are distributed among the various constructs. It should be noted that the sum of the items mapped to individual constructs do not necessarily sum to the total number of items in an instrument, because of items that may be double-mapped or which do not map to any construct at all. Table 4 is similar but reports the percent of items that are mapped to each construct.

These tables provide an overview of the instruments and how they relate to the Conceptual Framework to help users identify instruments that are relevant to their objectives. The user may then consult the more detailed individual profile of the instruments to further refine the selection of instruments.

**Table 3. Number of Items by Individual Instrument and Construct**

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adapt to Context & Needs Improvisation	Conflict Resolution	
AHRQ (2008)	58	0	6	0	0	2	6	1	0	8	0	0	0
Anderson & West (1998)	61	3	5	16	0	5	13	3	2	9	8	1	0
Aubé & Rousseau (2005)	15	0	0	3	0	0	5	3	1	0	1	1	0
Batorowicz & Shepherd (2008)	19	0	1	1	0	0	0	0	0	1	0	0	0
Bendaly (1996)	25	0	0	7	1	2	5	1	5	3	0	0	0
Campion et al (1993)	54	0	3	11	3	1	4	12	8	3	2	0	2
Chesluk et al (2012)	31	0	4	0	0	0	10	5	0	7	0	0	0
Copnell et al (2004)	29	0	0	0	0	2	1	5	0	3	0	0	0
Curran et al (2011)	31	3	3	6	0	0	5	2	1	13	0	1	1
De Wet et al (2010)	30	1	4	4	0	4	6	1	0	2	0	1	7
Denison et al (1996)	67	1	2	8	0	0	0	3	2	1	1	1	0

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs Improvisation	Conflict Resolution	
Doolen et al (2003)	78	3	6	15	2	1	1	13	12	8	0	0	12
Edmondson (1999)	54	0	17	10	2	0	5	6	3	2	2	1	5
Fernandez et al (2009)	25	0	1	3	0	0	0	4	4	1	0	3	0
Finley et al (2013, unpublished)	15	2	6	1	0	1	4	1	0	4	1	2	1
Frankel et al (2007)	21	0	0	0	0	0	0	1	0	8	1	0	0
Friesen et al (2008)	17	0	1	2	0	0	7	2	6	0	0	0	1
Gittell et al (2010)	7	0	0	2	0	1	2	2	0	4	0	0	0
Grant et al (2012)	12	2	0	0	0	0	2	1	0	3	1	0	7
Henry et al (2013)	21	0	0	2	0	0	7	4	0	8	0	2	0
Hoegl & Gemuenden (2004)	40	0	1	3	0	0	1	7	10	6	1	2	1
Jaén et al (2010) Instrument 1	81	2	19	7	2	7	5	5	1	7	5	2	6
Jaén et al (2010) Instrument 2	14	2	7	0	0	0	2	1	1	1	0	0	3
Kalisch & Lee (2011)	33	0	3	2	0	2	5	11	0	3	0	3	4
Loughry et al (2007)	93	10	15	8	0	0	12	25	29	19	0	0	5
Mahoney & Turkovich (2010)	31	0	0	5	1	3	6	1	3	5	2	2	0
Malec et al (2007)	16	0	0	2	0	0	0	7	0	4	1	1	2
Millward & Jeffries (2001)	47	0	3	8	4	1	5	11	7	7	2	0	0
Mishra et al (2009)	16	5	3	1	0	0	2	7	0	0	0	1	1
Ohman-Strickland et al (2007)	21	0	6	1	0	0	1	1	1	0	0	2	3
Orchard et al (2012)	37	0	2	4	0	2	5	4	2	6	0	2	3
Pearce & Sims (2002)	94	2	10	24	2	1	12	2	13	8	12	3	64
Peterson (2012)	22	0	0	7	0	0	10	0	0	1	0	3	0

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs Improvisation	Conflict Resolution	
Quinlan & Robinson (2010)	12	0	0	0	0	2	2	0	0	8	0	0	0
Rebollar et al (2010)	6	0	1	1	1	0	0	2	0	0	0	0	0
Reid et al (2012)	26	0	0	0	0	0	2	2	0	4	1	1	16
Savelsbergh et al (2009)	28	11	20	0	0	0	3	0	0	3	3	0	0
Schippers et al (2007)	33	8	11	7	0	1	0	1	0	5	2	1	0
Senior & Swailes (2007)	49	0	0	9	3	1	12	4	4	2	0	1	13
Sexton et al (2006)	27	0	2	2	0	4	2	4	1	8	0	1	4
Temkin-Greener et al (2004)	49	0	2	10	0	5	3	5	5	11	1	6	11
Tseng & Ku (2011) Instrument 1	9	0	0	0	0	5	2	0	0	0	0	0	1
Tseng & Ku (2011) Instrument 2	24	0	0	8	1	1	3	1	2	3	0	4	0
Upenieks et al (2009)	10	0	1	0	0	2	3	0	0	4	0	0	0
Ushiro (2009)	25	0	0	4	0	0	5	5	0	11	0	2	0
Van Beuzekom et al (2007)	48	0	0	4	0	1	0	5	1	8	1	0	5
Wageman et al (2005)	82	2	8	16	5	1	5	7	12	6	6	4	6
Wauben et al (2011)	62	1	4	6	0	6	8	6	8	23	3	0	8



**Table 4. Percent of Items by Individual Instrument and Construct**

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs, Improvisation	Conflict Resolution	
AHRQ (2008)	58	0%	10%	0%	0%	3%	10%	2%	0%	14%	0%	0%	0%
Anderson & West (1998)	61	5%	8%	26%	0%	8%	21%	5%	3%	15%	13%	2%	0%
Aubé & Rousseau (2005)	15	0%	0%	20%	0%	0%	33%	20%	7%	0%	7%	7%	0%
Batorowicz & Shepherd (2008)	19	0%	5%	5%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Bendaly (1996)	25	0%	0%	28%	4%	8%	20%	4%	20%	12%	0%	0%	0%
Campion et al (1993)	54	0%	6%	20%	6%	2%	7%	22%	15%	6%	4%	0%	4%
Chesluk et al (2012)	31	0%	13%	0%	0%	0%	32%	16%	0%	23%	0%	0%	0%
Copnell et al (2004)	29	0%	0%	0%	0%	7%	3%	17%	0%	10%	0%	0%	0%
Curran et al (2011)	31	10%	10%	19%	0%	0%	16%	6%	3%	42%	0%	3%	3%
De Wet et al (2010)	30	3%	13%	13%	0%	13%	20%	3%	0%	7%	0%	3%	23%
Denison et al (1996)	67	1%	3%	12%	0%	0%	0%	4%	3%	1%	1%	1%	0%
Doolen et al (2003)	78	4%	8%	19%	3%	1%	1%	17%	15%	10%	0%	0%	15%
Edmondson (1999)	54	0%	31%	19%	4%	0%	9%	11%	6%	4%	4%	2%	9%
Fernandez et al (2009)	25	0%	4%	12%	0%	0%	0%	16%	16%	4%	0%	12%	0%
Finley et al (2013, unpublished)	15	13%	40%	7%	0%	7%	27%	7%	0%	27%	7%	13%	7%
Frankel et al (2007)	21	0%	0%	0%	0%	0%	0%	5%	0%	38%	5%	0%	0%

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs, Improvisation	Conflict Resolution	
Friesen et al (2008)	17	0%	6%	12%	0%	0%	41%	12%	35%	0%	0%	0%	6%
Gittell et al (2010)	7	0%	0%	29%	0%	14%	29%	29%	0%	57%	0%	0%	0%
Grant et al (2012)	12	17%	0%	0%	0%	0%	17%	8%	0%	25%	8%	0%	58%
Henry et al (2013)	21	0%	0%	10%	0%	0%	33%	19%	0%	38%	0%	10%	0%
Hoegl & Gemuenden (2004)	40	0%	3%	8%	0%	0%	3%	18%	25%	15%	3%	5%	3%
Jaén et al (2010) Instrument 1	81	2%	23%	9%	2%	9%	6%	6%	1%	9%	6%	2%	7%
Jaén et al (2010) Instrument 2	14	14%	50%	0%	0%	0%	14%	7%	7%	7%	0%	0%	21%
Kalisch & Lee (2011)	33	0%	9%	6%	0%	6%	15%	33%	0%	9%	0%	9%	12%
Loughry et al (2007)	93	11%	16%	9%	0%	0%	13%	27%	31%	20%	0%	0%	5%
Mahoney & Turkovich (2010)	31	0%	0%	16%	3%	10%	19%	3%	10%	16%	6%	6%	0%
Malec et al (2007)	16	0%	0%	13%	0%	0%	0%	44%	0%	25%	6%	6%	13%
Millward & Jeffries (2001)	47	0%	6%	17%	9%	2%	11%	23%	15%	15%	4%	0%	0%
Mishra et al (2009)	16	31%	19%	6%	0%	0%	13%	44%	0%	0%	0%	6%	6%
Ohman-Strickland et al (2007)	21	0%	29%	5%	0%	0%	5%	5%	5%	0%	0%	10%	14%
Orchard et al (2012)	37	0%	5%	11%	0%	5%	14%	11%	5%	16%	0%	5%	8%
Pearce & Sims (2002)	94	2%	11%	26%	2%	1%	13%	2%	14%	9%	13%	3%	68%

Instrument ID	Total Items	Cognitive				Affective/ Relational				Behavioral			Leadership
		Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs, Improvisation	Conflict Resolution	
Peterson (2012)	22	0%	0%	32%	0%	0%	45%	0%	0%	5%	0%	14%	0%
Quinlan & Robinson (2010)	12	0%	0%	0%	0%	17%	17%	0%	0%	67%	0%	0%	0%
Rebollar et al (2010)	6	0%	17%	17%	17%	0%	0%	33%	0%	0%	0%	0%	0%
Reid et al (2012)	26	0%	0%	0%	0%	0%	8%	8%	0%	15%	4%	4%	62%
Savelsbergh et al (2009)	28	39%	71%	0%	0%	0%	11%	0%	0%	11%	11%	0%	0%
Schippers et al (2007)	33	24%	33%	21%	0%	3%	0%	3%	0%	15%	6%	3%	0%
Senior & Swailes (2007)	49	0%	0%	18%	6%	2%	24%	8%	8%	4%	0%	2%	27%
Sexton et al (2006)	27	0%	7%	7%	0%	15%	7%	15%	4%	30%	0%	4%	15%
Temkin-Greener et al (2004)	49	0%	4%	20%	0%	10%	6%	10%	10%	22%	2%	12%	22%
Tseng & Ku (2011) Instrument 1	9	0%	0%	0%	0%	56%	22%	0%	0%	0%	0%	0%	11%
Tseng & Ku (2011) Instrument 2	24	0%	0%	33%	4%	4%	13%	4%	8%	13%	0%	17%	0%
Upenieks et al (2009)	10	0%	10%	0%	0%	20%	30%	0%	0%	40%	0%	0%	0%
Ushiro (2009)	25	0%	0%	16%	0%	0%	20%	20%	0%	44%	0%	8%	0%
Van Beuzekom et al (2007)	48	0%	0%	8%	0%	2%	0%	10%	2%	17%	2%	0%	10%
Wageman et al (2005)	82	2%	10%	20%	6%	1%	6%	9%	15%	7%	7%	5%	7%
Wauben et al (2011)	62	2%	6%	10%	0%	10%	13%	10%	13%	37%	5%	0%	13%

## 6. Instrument Selection Guide

This chapter is intended to help users identify existing instruments that will meet their specific goals related to measurement of team-based primary care.

### 6.1 Selection Considerations and Criteria

#### 6.1.1 Identify Your Aim for Measuring Team-based Primary Care

The objective of the Atlas is to identify and describe instruments that can be used to measure team-based primary care for purposes of quality improvement, evaluation, and research. Individual users of the Atlas may wish to use the instruments for one or more of those purposes. According to Salas and Rosen,<sup>30</sup> the purposes of team measurement should guide the selection of measures used. The Atlas will be useful for a number of different purposes. For example, 1) identification of specific problems with team processes, as a step in a quality improvement project, could require multiple instruments addressing different aspects of team functioning. 2) Using multiple instruments to measure a given mediator construct (e.g., *respectful interactions*) may permit the user to “triangulate” results to get a fuller picture of the team’s functioning. 3) Surveys of team members who play different roles may provide complementary perceptions about how well team members are interacting, and 4) systematic observation by a trained observer could provide yet another perspective.

Alternatively, the user may wish to use one of the three instruments (see Table 5) that address all twelve constructs in the Framework as a way of capturing an overall picture of functioning of his or her team(s). However, it should be noted that all three of these instruments are rather lengthy surveys.

**Table 5. Instruments and Number of Items That Measure All Conceptual Framework Constructs**

Instrument ID	Total Items	Sense-making	Continuous Learning	Shared Explicit Goals & Accountability	Evolving Mental Models of Roles	Trust	Respectful Interactions	Heedful Interrelating	Commitment	Communication	Adaptable to Context & Needs, Improvisation	Conflict Resolution	Leadership
Jaén et al (2010) Instrument 1	81	2	19	7	2	7	5	5	1	7	5	2	6
Pearce & Sims (2002)	94	2	10	24	2	1	12	2	13	8	12	3	64
Wageman et al (2005)	82	2	8	16	5	1	5	7	12	6	6	4	6

<sup>30</sup> Salas E, Rosen M. Performance assessment: section perspective. In *The PSI Handbook of Virtual Environments for Training and Education: Developments for the Military and Beyond*. Westport, CT: Praeger Security International; 2009:227-235.

### 6.1.2 Determine Your Target Respondent Group

Users may wish to give preference to instruments that were developed for specific respondent groups, e.g., registered nurses or physicians, if they intend to measure only that group; the wording of the instrument may be particularly well suited to the target population. On the other hand, many instruments are worded generically enough so that they can be used with little or no adaptation to any relevant subgroup in team-based primary care settings, and others can be easily adapted.

### 6.1.3 Determine What You Are Interested in Measuring (Mediator Constructs)

The Conceptual Framework provides a guide to the types of team processes thought to be important to effective team functioning. Combined with the user's knowledge of the specific teams that will be measured, the Framework can help identify which processes are of interest, and then the user can refer to the Master Instrument Tables in Section 4 to select specific instruments that may be of interest.

### 6.1.4 Determine the Type of Instrument You Want to Use

The majority of instruments identified to measure team-based primary care are surveys, however, those listed in Table 6 are observational checklists.

**Table 6. Observational Checklists**

Author (date)	Intended Use
Frankel et al (2007)	Field or Simulation
Grant et al (2012)	Simulation
Mishra et al (2009)	Field
Reid et al (2012)	Simulation

Specific instruments are appropriate for different purposes. For example, surveys of clinicians may be well-suited for measuring the similarity of team members' goals or attitudes such as *commitment* and *trust*, but the results may be biased, so that team members inflate their self-ratings.<sup>31</sup> Observations of behavior patterns by trained observers using validated instruments may be more objective, but can be expensive and necessarily confined to a small portion of the overall interaction among team members. Observations in simulation settings permit more structured evaluation of specific skills and behaviors of interest to trained observers, but are even more expensive and may not closely resemble the day-to-day work of the team. While simulations have been used fruitfully in training and evaluation of teams to handle acute crises, such exercises may not be suited to the work of primary care teams.

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<sup>31</sup> Rosen, M et al. How can team performance be measured, assessed, and diagnosed? In Eduardo Salas and Karen Frush (eds.), *Improving Patient Safety Through Teamwork and Team Training*. Oxford University Press, 2012.

### 6.1.5 Other Considerations

Other considerations in selecting measures include whether one wants to measure an individual member of the team or the team as a whole; frequently this is a matter of the level of analysis, since the same instrument could be used for both purposes. All the survey instruments are designed to be administered to individuals, but the user may wish to aggregate results to get an overall assessment of team functioning. While the observational tools likewise are used by individual observers, they vary in that some assess teamwork skills of individual team members, while others focus on the functioning of the team as a whole.

The timing of measurement needs to be determined as well. Timing will be driven by the purpose of measurement, but repeated measurements may be indicated during a quality improvement project to monitor success or to re-evaluate the team after a significant change in personnel, resources, or tools (such as EHRs) may require an adaptation on the team's part.

### 6.1.6 Notes on Using the Instruments

Some users may choose to use only parts of instruments to measure their teams, e.g., only those items that pertain to certain constructs of interest. Or researchers may wish to combine items from multiple instruments to create a new instrument. However, it must be cautioned that any psychometric testing is generally done on the instrument as a whole, and evidence of an instrument's validity or reliability may not apply to use of only portions of it.

## 6.2 How to Use the Instrument Atlas

This section provides detailed, step-by-step instructions for using the Instrument Atlas.

### Step 1. Identify Mediator Constructs of Interest

First, the user should review the description and graphic of the Conceptual Framework in Section 2 to determine which mediator constructs are of interest. The Atlas of instruments is organized by mediator constructs, therefore choosing specific constructs of interest will help to narrow the field of relevant instruments. For example, the user may wish to examine whether team members are communicating in a way that will optimize their collective performance; in this case, the *communication* construct can be used to identify relevant instruments.

### Step 2. Review Lists of Atlas Instrument(s)

The second step is to review Table 3 and/or Table 4 in Section 4 to find the relevant instruments. The tables indicate how many (or what percent of) items in each instrument map to each construct. The instruments with a substantial portion of items in the constructs of interest are potential candidates for use. Users should start by filtering for instruments that measure the construct of highest priority to them, and then further filter their selection to identify instruments that will address all constructs that interest them, if they have more than one. Alternatively, if the user wishes to conduct an overall assessment of team functioning across all mediator constructs, consider the three instruments which address all 12 constructs

(see Table 5). Aim to narrow your selection of constructs or instruments to a manageable number, perhaps five to ten. Depending on the constructs of interest, the volume of instruments varies.

For example, the *communication* construct, is addressed by many instruments and thus filtering by *communication* will not eliminate many instruments. Further filtering by additional constructs will narrow the selection.

### **Step 3. Review Instrument Profiles**

Review the individual Instrument Profiles, (found in Section 6.2), on the list you produced in Step 2. The Profiles provide detailed information about the instruments that may help to further refine your selection. Instrument Profiles describe the type of instrument; the length of the instrument; the industry of origin and, in the case of health care, the specific setting for which the instrument was developed; the population for which the instrument was originally developed; when it was published; and information on psychometric testing results when available, i.e., information on the validity and reliability of the instrument. As described in Section 5.1, this information can help to match individual instruments to your needs. While instruments without extensive psychometric testing may be suitable, the user may give preference to instruments with good validity and reliability results when other characteristics are equal. Similarly users may prefer to use instruments that require no or minor adaptation for use in the primary care setting over those that require major adaptation, again assuming that other characteristics are equal.

### **Step 4. Retrieve the Selected Instrument(s)**

The citation for the source article for the instrument that is found in the Instrument Profile can be used to retrieve it. In most cases the full text of the instrument is contained in the article itself; in a few cases, the user may need to contact the corresponding author to retrieve the instrument. The instrument can then be reviewed item by item, using the Instrument Profile to identify specific items that map to specific constructs of interest. When the user administers the instrument and analyzes the results, information from those specific items can be used to assess the team's functioning in specific areas of interest, i.e., the specific mediator constructs of interest.

## 7. Instrument Profiles

### 7.1 Instrument Profiles: A Guide

Each instrument is described in detail in individual Instrument Profile tables in Appendix IV. Table 7 below explains each of the fields in the Instrument Profiles.

**Table 7. Key to Instrument Profile Table Fields**

ELEMENT	DESCRIPTION
<b>Instrument Title</b>	The title of the instrument, as provided by the author(s). Not all instruments are named by their developers.
<b>Authors (date)</b>	Author(s) of the instrument. (The year the source article was published.)
<b>INSTRUMENT CHARACTERISTICS</b>	
<b>Purpose</b>	A brief description of the purpose of the instrument, put forth by the author(s).
<b>Type</b>	The instrument types include the following: <ul style="list-style-type: none"> <li>• Survey</li> <li>• Observational Checklist (Field)</li> <li>• Observational Checklist (Simulation)</li> <li>• Observational Checklist (Field or Simulation)</li> </ul>
<b>Total number of items</b>	The total number of survey questions or items on an observational checklist.
<b>Setting</b>	The industry or specific health care delivery setting for which the instrument was originally developed.
<b>Target respondent</b>	The respondent group for which the instrument was originally developed and/or tested.
<b>Degree of adaptation needed for primary care</b>	Some instruments may need adaptation to apply them in the primary care setting, e.g., wording changes in instruments originally designed for use in acute care settings. Instruments are classified as needing the following degrees of adaptation: <ul style="list-style-type: none"> <li>• None</li> <li>• Minor (less than 10% of items need rewording or should be deleted)</li> <li>• Major (10% or more of items need rewording or should be deleted)</li> </ul>
<b>MEDIATOR CONSTRUCTS</b>	
<b>Mediator Constructs</b>	There are twelve rows in each table, one for each construct. We provide both the number of items and the specific relevant items in the instrument for each construct.
<b>PSCYHOMETRICS, DEVELOPMENT AND TESTING</b>	
<b>Reliability</b>	Reliability refers to consistency or repeatability of a set of measurements. The primary types of reliability used in the development of instruments include: <ul style="list-style-type: none"> <li>• <b>Internal consistency:</b> assesses the consistency of results across items within an instrument or scale.</li> <li>• <b>Test-retest:</b> assesses the degree to which an instrument or scale scores are consistent from one administration of the instrument to another.</li> <li>• <b>Inter-rater:</b> assesses the degree of agreement between two or more raters or coders using an instrument.</li> </ul>



ELEMENT	DESCRIPTION
Validity	<p>Validity refers to the degree to which an instrument measures what it is intended to measure. The primary types of validity testing used in the development of instruments include:</p> <ul style="list-style-type: none"> <li>• <b>Face and Content:</b> Face validity is the extent to which an instrument seems to measure what it is intended to measure. Content validity is the extent to which an instrument represents all facets of the construct trying to be measured.</li> <li>• <b>Construct:</b> the degree to which an instrument measures what it purports to measure. Two subtypes are: <ul style="list-style-type: none"> <li>○ <i>Convergent:</i> the degree to which two measures of constructs that theoretically should be related are in fact related.</li> <li>○ <i>Discriminant:</i> the degree to which two measures of constructs that are supposed to be unrelated are in fact unrelated.</li> </ul> </li> <li>• <b>Criterion:</b> the extent to which an instrument is demonstrably related to concrete criteria in the 'real' world. Two subtypes are: <ul style="list-style-type: none"> <li>○ <i>Concurrent:</i> degree to which the scores from a new instrument correlate with an existing instrument.</li> <li>○ <i>Predictive:</i> degree to which the scores from an instrument predict scores or results on criterion measures.</li> </ul> </li> </ul>
Factor analysis	Factor analysis is a statistical method for deriving from a number of variables a smaller number of the most important factors to measure the construct of interest or to verify the factor structure of a set of observed variables. There is both exploratory and confirmatory factor analysis.
Other development and testing methods	This describes any other methods used in the development or testing of the instrument.
ABSTRACTS AND CITATION	
Instrument citation	The article citation or other source for the instrument is provided.
PubMed abstract or instrument link	A hyperlink to the PubMed abstract for the source article is provided or a link to the instrument.
Link to articles citing the instrument	A hyperlink to the Google Scholar listing for the source article is provided, which allows the user to determine how many and which articles have cited the instrument.

Table 8 provides additional detail about the meaning of the various categories used in the “Target Respondent” field in the Instrument Profiles. See Appendix IV for the individual instrument profiles.

**Table 8. Key for Target Respondent Categories**

CATEGORY	INCLUDED RESPONDENTS
Allied health professionals (AHPs)	AHPs, aides, communicative disorders assistants (CDAs), dieticians, health visitors, medical technicians (e.g., lab, radiology, EKG), midwives, occupational therapists (OTs), patient care assistants/aides/care partners, phlebotomists, physical therapists, physiotherapists, respiratory therapists, speech language pathologists (SLPs)
Doctors	General practitioners, physicians
Employees and supervisors	Employees, employees (government), supervisors (business)

<b>CATEGORY</b>	<b>INCLUDED RESPONDENTS</b>
<b>Engineers and engineering team leaders</b>	Engineering students, engineering team leaders, engineers
<b>Emergency Room (ER) staff, unspecified</b>	ER staff members
<b>Health Care Administrators</b>	General medicine managers, system administrators
<b>Health Care Providers (Unspecified)</b>	Unspecified health care providers
<b>Health Care Students</b>	Medical students, pharmacy students, social service students
<b>Intensive Care Unit (ICU) staff, unspecified</b>	ICU staff, unspecified
<b>Licensed practical nurses (LPNs)</b>	LPNs, licensed vocational nurses (LVNs)
<b>Medical residents and interns</b>	Medical interns, residents, trainee doctors
<b>Military personnel</b>	AAW teams, flight crew members, pilots (helicopter), soldiers, submarine crew members
<b>Not applicable or unspecified</b>	N/A, unknown, unspecified
<b>Nurse Practitioners (NPs)</b>	NPs or advanced practice registered nurses (APRNs)
<b>Nurses (RNs)</b>	Nurses, RNs
<b>Nursing Assistants (NAs)</b>	NAs
<b>Patients</b>	Patients, patients' family members
<b>Pharmacists</b>	Pharmacists
<b>Psychiatrists</b>	Psychiatrists
<b>Social service providers</b>	Counselors, psychologists, social service providers, social workers
<b>Surgeons and other surgical staff</b>	Anesthesiologists, OR teams, surgeons, surgical staff, trauma teams
<b>Teachers and educational administrators</b>	Academic administrators, teachers