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Jon J. Rizzo

Alexandra Bell

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Recommended Citation

Rizzo, Jon J. and Bell, Alexandra (2014). "Patients' Mental Models and Adherence to Outpatient Physical Therapy Home Exercise Programs," *Adult Education Research Conference*. <https://newprairiepress.org/aerc/2014/papers/73>

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Patients' Mental Models and Adherence to Outpatient Physical Therapy Home Exercise Programs

Jon J. Rizzo
Alexandra Bell
University of Connecticut

Keywords: Mental Models, Analogical Reasoning, Patient Adherence

Abstract: This qualitative study identified aspects of patients' mental models that relate to adherence to physical therapy home exercise programs. The findings may guide clinicians in designing interventions that effectively promote adherence to home exercise programs, improving patient outcomes and reducing personal and societal costs of musculoskeletal disease.

Background and Purpose

Adherence refers to both the adoption and maintenance of a specific behavior. For individuals with health issues, adherence to self-care recommendations from medical professionals can promote healing and return to normal function, whereas non-adherence can lead to progressive declines in health, lost time from work, and rises in health care costs.

Within a physical therapy context, adherence usually relates to patients attending appointments, following advice, or undertaking prescribed exercise. For patients with musculoskeletal disorders, long-term physical therapy adherence often involves adherence to a home exercise program during formal therapy and after it concludes. Similar to findings for general medical adherence, researchers have found that long-term adherence to physical therapy interventions is poor (Dean et al., 2010), sometimes being as low as 35% (Sluljs, Kok, & van der Zee, 1993).

In studies across a variety of medical services, including physical therapy, researchers have identified over 200 factors related to non-adherence to medical advice. In their meta-analysis of medical adherence intervention literature, Van Dulman et al. (2007) concluded that although both behavioral and educational interventions can promote adherence, the effect diminishes over time. However, the authors recognized that interventions based on "cognitive models [that] emphasize patients' perceptions and beliefs" (p. 64) may play an important role in educational efforts to enhance adherence behaviors. In systematic reviews of adherence research, other researchers have concluded also that patients' perspectives (e.g., attitudes, beliefs, values, barriers) may be paramount to the study of adherence (Jack et al., 2009; Vermiere, 1991)

In the social sciences, a collection of an individual's beliefs and assumptions about their world around them is referred to as the their *mental model* (Byrne & Johnson-Laird, 2009; Gentner & Smith, 2012; Johnson-Laird, 2006). Through experience, individuals develop mental models about all aspects of their lives (Gentner & Smith, 2012), such as family, learning, health, and exercise. At a non-conscious level, mental models represent an individual's thoughts about how the world works, including perceptions and consequences of their own actions. Mental models enable individuals to make meaning of current circumstances, form assumptions about new experiences based on similarities with prior experiences, and create mental images of the future that guide their actions (Johnson-Laird, 1994).

The purpose of this study was to identify aspects of patients' mental models that relate to adherence to physical therapy home exercise programs. A better understanding of mental models related to adherence may guide clinicians in designing interventions that more effectively promote adherence to home exercise programs, improving patient outcomes and reducing the personal and societal costs of non-adherence.

Conceptual Framework

The conceptual framework for this study included theoretical and empirical research that guides understanding about how adults learn from prior experience and how learning relates to behavioral change. Specifically, research on analogical reasoning (Gentner & Smith, 2012) indicates that adults make meaning of current experiences by comparing and contrasting salient features of new experiences to features of past experiences. Analogical reasoning results in the formation of mental models by virtue of an accumulation of beliefs, values, expectations, and assumptions based on previous domain-specific experiences.

Researchers have demonstrated links between prior experience, mental models, and decision-making in both non-medical and medical contexts. In a qualitative study ($N = 10$), Eckert and Bell (2005) demonstrated that with experience, farmers developed tacit mental models of farming unique to each farmer. The authors showed that individual mental models actually trumped expert advice when making farming decisions. In a quantitative study by McNeil, Pauker, Sox, and Tversky (1982), participants ($N = 1153$) relied more on pre-existing beliefs (a component of their mental models) rather than present day statistical information when faced with a hypothetical medical decision.

In physical therapy adherence research, several authors have demonstrated that previous adherence to physical therapy interventions promotes future adherence (Medina-Mirapeix et al. 2009; Rejeski et al., 1997; Schoo et al., 2005). Although these authors did not study adherence with regards to mental models, the fact that past experience influenced adherence suggests a link to mental models. This link is based on the concept that mental models are borne out of past experiences and influence future decision-making.

Research Design

The specific research question addressed by this study was: *What aspects of individuals' mental models relate to adherence to physical therapy home exercise programs?* We used a basic qualitative approach (Creswell, 2012) with interviews, which allowed participants to voice their experiences related to adherence and the meanings they attributed to those experiences. The setting for the study was an outpatient physical therapy clinic associated with a large research university in the Northeast. Participants included 10 patients referred to the clinic for an acute orthopedic condition. Participants included 7 women and 3 men, with a mean age of 50.3 years (range = 20-80, $SD = 18.67$). Data collection occurred over the course of two face-to-face interviews. Interview One, which took place prior to participants' first physical therapy session, focused on prior experiences in which they engaged in some form of adherence to a behavioral regime via repeated attention and change in lifestyle. Interview Two occurred after at least five physical therapy sessions and focused on participants' current experiences related to adherence to their physical therapy home exercise program, including their perceptions of how the experiences compare to prior experiences, outcome expectations, and self-reported adherence behaviors. We used a constant comparative method (Merriam, 2009) to analyze interview data and identify aspects of participants' mental models that related to their adherence. The

methodology was phenomenological. Analysis of data was carried out according to Hycner (1985). Hycner (1985) outlined a systematic and repeatable method of phenomenological data analysis that draws attention to the critical caveats of this methodology.

Findings and Conclusions

Data analysis uncovered several findings that shed light on why individuals adhere to general, self-selected regimens (Interview One), and physical therapy-specific regimens (Interview Two). Analysis of Interview One data revealed seven themes. Specifically, individuals adhered to activities that were *convenient* (i.e., require minimal equipment, environmental change, time, and planning), were physically and/or cognitively *uncomplicated*, and tended to be *enjoyable* (intrinsically or socially). Additionally, individuals tended to take part in a variety of regimens when prior experiences inform of the regimen's benefits. Benefits took the form of those *realized* and those *anticipated*. This distinction demonstrates the power of past experiences to both inform individuals of results already realized and provide the expectation that results will occur in the future.

For example, when speaking about how he had began nightly studying at the library instead of returning to his dorm, Jonah highlighted how his experience with improved efficiency in his schoolwork informed him of anticipated benefits of this routine:

"I mean it was clear. I could see the...the difference in my work ethic. Where...where I was. So, I knew I'd get better results."

Finally, Interview One data analysis demonstrated a strong social component of adherence, occurring in what could be conceptualized as *social cause* and *social effect*. When there was *social cause*, individuals tended to be inspired to adhere because family members, friends, or experts either endorsed the specific regimen, engaged in the regimen themselves, or shared similar experiences that lead to the regimen. Social effect occurred when individuals made decisions about adherence based on the effects of the regimen on others.

A social effect was demonstrated when Ann discussed why she discontinued literacy training at a prison because of the stress it placed on her husband:

"When he found out, he never said I couldn't go...but...I just didn't feel I was being honest with him and it wasn't...it was effecting him physically so I mean...I...I couldn't do that to him."

Analysis of Interview Two data indicated agreement between four of the seven themes identified in Interview One. Similar to Interview One, *convenience* in the form of minimal equipment, space, and time required was important to individuals attempting to adhere to a physical therapy home exercise program, but *difficulty* and *enjoyment* of the exercises did not play a role. Also in agreement with findings from Interview One, both *realized* and *anticipated benefits* influenced adherence behaviors.

For example, Frank's remarks about his confidence in his physical therapist and his treatment informed him of realized results, promoting his adherence:

“But I’d say this time I feel much more confident in what we’re doing is helping just because I...maybe this is the communication again with [my therapist] ...but it’s understanding how I feel, why I feel, when I feel, those types of things.”

Finally, social components played a role in participants’ adherence to their physical therapy home exercise program. However, in contrast to Interview One, data indicated that only *social cause* (i.e., others’ influence on individual adherence) relate to adherence, while no data implicated *social effect* (i.e., individual adherence because of benefits adherence has on others). Specifically, social cause was embodied by loved ones or valued others who influenced the individual’s adherence because they also participated in exercise, noticed improvement in disabilities, or remind the individual to perform his or her exercises.

One participant, Ivan, discussed how consistent monitoring of adherence by the physical therapist kept him on task:

Well, that’s...I mean just having the therapist expect you to do it that’s why I do the therapy. [laughs] As opposed to reading a book, you know?

Findings from Interviews One and Two uncovered aspects of patients’ mental models that influence adherence to both general activities and a physical therapy home exercise program. The themes have implications for the methods used by physical therapists and other healthcare providers when encouraging patients to adhere to self care routines.

Implications for Adult Education

In their work with patients, physical therapists engage in informal adult education on a daily basis. They have a unique opportunity to provide information and support to patients who may be teetering between adherence and non-adherence. This study has direct implications for physical therapists and other health care providers who seek to understand factors that influence patient adherence to home exercise programs. A better understanding of these factors will enable providers to intervene in ways that promote patient adherence and ultimately improved patient health.

One method used in this study to reveal mental models of adherence was to inquire about adherence to activities unrelated to physical therapy (Interview One). To our knowledge, this method has not been used in medical adherence research to date. Physical therapists and other healthcare providers may want to inquire about patients’ adherence to activities unrelated to medical therapies as these experiences may contribute to their mental model of adherence. Adherence to other regimens may give clues as to why individuals consistently perform activities in the long-term. It also may reveal strategies that the patient uses to adhere to other activities that could be successfully applied to medical adherence.

Specific to our findings regarding adherence to physical therapy home exercise programs (Interview Two), four factors should be considered by physical therapists and other healthcare providers, aiming to promote adherence. First is the convenience of the exercise program. Physical therapists may want to inquire how the exercise program could be made more convenient for the patient based on equipment and space they possess. In addition, both realized and anticipated results were important for promotion of adherence in our study. Therefore, physical therapists should be continually helping their patients appreciate the “real-time”

physical improvements made during the program as well as the future improvements that can be achieved if adherence is maintained. Related to this finding and representing the fourth factor, physical therapists need to show support to the patient who attempts to adhere as well as establish other lines of support via family and friends. Physical therapists can help establish support from loved ones by having them attend appointments so that they understand technical aspects of treatment and projected goals. Further, physical therapist should spend some time educating loved ones regarding the physical signs of improvement so loved ones can offer feedback and encouragement to the patient.

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