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Response Shift Theory: An Application For Health-Related Quality Of Life In Rehabilitation Research And Practice

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Abstract

Evaluating change in patients over time can be challenging to any health care provider. Response shift theory is based on the change typology of alpha, beta, and gamma change and proposes that residual changes in self-response measures occur over time. These changes are the result of recal- ibration, reconceptualization, and reprioritization of internal standards and references utilized for self-appraisal. Failing to account for response shift may result in over- or under-reporting of true physiologic change. The purpose of this paper is to review the components of response shift, identify research designs used to detect it, and present a model for its practical application to rehabilitation of both acute and chronic disabilities. Awareness of response shifts throughout the rehabilitation process may be beneficial in guiding patient goal-setting, treatment, and education. Of particular emphasis is the role that the rehabilitation specialist can have in using the response shift process to result in the highest possible perceived quality of life for each individual patient.

Response Shift Theory: An Application for Health-related Quality of Life in Rehabilitation Research and Practice

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ACCURATELY AND OBJECTIVELY evaluating change in a patient's condition over time is a necessity for all rehabilitation professionals. While it is common to document changes using objective pre-test/post-test measures such as strength or range of motion, it is more difficult to quantify abstract concepts such as function or quality of life. In these situations, rehabilitation professionals often rely on patient self-evaluation of well-being, using any number of well-studied self-report instruments.

Self-report instruments may be specific to a pathology or region of the body,[1–6] or they may be more general and designed to evaluate health-related quality of life (HRQL) as a whole.[7–9] The theoretical approach of HRQL instruments is to evaluate the impact of disease on the population of interest. By focusing on activities and participation, these instruments address the components of health most relevant to patients and society.[10] One concern with any form of subjective self-evaluation is that the change that is documented using the self-report instrument may not actually be synonymous with the change researchers or clinicians are trying to measure. Identifying and categorizing treatment responses accurately is important because identification of change, or lack thereof, may be key to planning future rehabilitation or even discontinuation of treatment.

Documentation of change in patient symptoms and function is a necessity of clinical practice. Of particular interest is the ability to use self-response measures to accurately detect change in parameters that may otherwise be immeasurable, such as HRQL. The idea that more than one type of change may occur was first introduced by Golembiewski et al. in 1975 in the area of organizational development.[11] These authors presented concepts of change with respect to workplace interventions (such as flex-time) and employee evaluations. Their ideas have since been adapted to the fields of education and, more recently, healthcare to explore the effects of teaching, learning, and treatment strategies.[12–15] As change typology has evolved, the term *response shift* has been used to describe the phenomenon of residual changes in self-response measures over time.[16]

Response shifts are changes in self-evaluation that may be a direct or indirect result of the intervention being evaluated. For example, a terminally ill patient may demonstrate improved or stable HRQL scores over time, not because the patient's physical health is improving, but because the patient has mentally recalibrated his or her physical expectations and come to terms with his or her disease while adjusting to any limitations that it may impose.[15] Within this patient, a response shift has occurred. The ability to detect

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TABLE 1. Change Typology and Response Shift in Rehabilitation

Type of Change[11]	Response Shift	Rehabilitation Example
Alpha—change in state relative to a constantly calibrated instrument evaluating a stable conceptual domain	None, "true change"	Physiologic change in range of motion
Beta—change complicated by the fact that some intervals of the measurement continuum associated with a constant conceptual domain have beenrecalibrated	Recalibration	Patient's internal definition of "severe" pain changes following surgery
Gamma—redefinition or reconceptualization of some domain, a major change in the perspective or frame of reference within which phenomena are perceived and classified	Reconceptualization	Patient's definition of Independence changes to allow for use of assistive devices
N/A	Reprioritization	Patient leaves the hospital and the need to climb stairs becomes a bigger priority because of home structure

the various components of change is particularly relevant in the areas of medicine, psychology, rehabilitation, and education, where self-evaluations (formal or informal) are often employed and placebo effects and participant/patient state-of-mind may directly influence outcomes.

Therefore, the purpose of this paper is to review the types of response shift, identify research designs that may be used to detect these changes, and present models for its practical application to rehabilitation of both acute and chronic disabilities. This information will be useful to both clinicians and researchers in guiding patient goal-setting, treatment, and education and in affecting improved HRQL for each individual patient or patient population.

Change Typology and Response Shift

Conceptually, the three basic types of change are alpha, beta, and gamma (Table 1).[11]

- *Alpha change* is often considered to be "true change." Alpha change can be clearly observed and concretely measured using stable scales or instruments.
- *Beta change* is recalibration and describes a change in the scale against which the variable of interest may be measured.[14]
- *Gamma change* occurs when the dimension of interest is reconceptualized or redefined with a different meaning or interpretation by the individual.

Schwartz and Sprangers[14] later translated these change typologies as response shifts in HRQL research to explain the observed stability of HRQL in chronic and terminally ill patients with declining physical health. In this translation the terms alpha, beta, and gamma change were replaced by true change, scale recalibration, reprioritization, and reconceptualization.

Alpha change is the type of change most commonly thought of when something is considered to have "changed." These may include changes in condition or performance such as improved movement time or fracture healing that can be observed radiographically. It is a change occurring within a relatively fixed system characterized by fixed dimensions defined by consistent intervals. The easiest examples of alpha change in rehabilitation come from objective measures, such as range of motion measured in degrees. The scale of measurement in degrees is fixed and has equidistant proportions from one point to the next. Alpha change is equivalent to true physiologic change that is independent of variations in patient perspective or attitude.

Beta change is characterized by recalibration or a change in one's internal standards of measurement.[14] In rehabilitation sciences, beta change can occur in conjunction with patient education and changes in patients' expectations. For example, in the case of a patient who seeks care from a medical practitioner, the initial evaluation function may be considered good, because the patient has adapted his or her activities of daily living (ADLs) to match existing physical limitations. However, as rehabilitation progresses and function improves, expectations may change, and the patient begins to contemplate the possibility of resuming activities that may exceed his or her current physical abilities. The patient may now consider his or her function to be moderate, because although it has improved from the initial visit, it is not as good as it could possibly become on his or her newly recalibrated scale of function. This individual has experienced beta change, an interval change to a stable dimension.

Unlike beta change, where the concept being measured is constant and the standard to which it is compared changes, *gamma change* occurs when the concept of interest is redefined to have new or different meaning. Gamma change involves the reconceptualization of the domain of interest. Here, the target construct takes on new meaning to the individual undergoing evaluation. This typically happens due to a change in frame of reference. In rehabilitation, reconceptualization may occur in a patient with a newly acquired disability. The idea of independence may

initially be defined by the patient as his or her ability to function without assistance of any kind, but following rehabilitation he or she may change the definition of independence to allow for the use of assistive devices.

In HRQL response shift models, an additional change factor of *reprioritization* is included.[14] This can be the result of a change in an individual's internal values and maybe due to a change in how an individual selects the experiences that are used as references for self-evaluation.[17] Rapkin and Schwartz[17] suggest that all self-ratings result from the evaluation of selected experiences against some standard of comparison. With recalibration, the standard of comparison may change, but with reprioritization, it is the selected experience that is altered. The concept of mobility can also be used to understand reprioritization. When living in a one-story structure, a patient may not consider his or her ability to climb steps when questioned regarding his or her mobility, but should that same patient relocate to a house with stairs, the ability to climb steps may now become a high priority and factor into his or her response.

Typically, rehabilitation professionals seek to quantify change in terms of alpha change: How much has the patient's condition physically changed? However, being aware of and even achieving beta and gamma change can be meaningful in both clinical practice and research. In some cases, no amount of treatment will resolve the underlying physiologic condition; however, appropriate care and patient education can trigger a response shift in which recalibration (beta change), reconceptualization (gamma change), and reprioritization result in healthy and appropriate goals for patient progress. In such cases, improvements in HRQL can be achieved when little or no alpha—i.e., "true change"—can be achieved.

Research Designs

A greater understanding of response shift theory and its effects on measuring changes in HRQL can be gained by examining some of the research designs used by both clinicians and researchers to detect it (Table 2).

The first research design is a traditional *pre-test/post-test design* during which participants complete a baseline assessment and then complete an identical assessment after an intervention or a set period of time. While this design is simple to administer and presents low demand for the participant, it is challenging to analyze and interpret results. However, through various statistical methods, alpha, beta, and gamma changes can be estimated using this design.[18-24] Because of its ease of administration, low demand placed on participants, and ability to detect all three types of change, the pre-test/post-test design has great potential in the area of outcomes research. However, it requires large samples and complex statistical analysis for interpretation, limiting its applicability for day-to-day clinical use.

A similar research methodology is the *pre-test/then-test/post-test design*.[12,25] This design is identical to a tradi-

tional pre-test/post-test method with the exception that participants complete an additional "then-test" assessment at the same session as their post-test assessment. For the then-test, participants are instructed to answer the questions with respect to how they would have rated themselves at the time of the pre-test, prior to the intervention. The rationale of this design is that participants will provide responses from the same frame of reference and calibration standards to both the then-test and the post-test by completing them at the same time.

With this design, response shift is calculated as the difference between the then-test and the pre-test, and the true change is considered to be the difference between the post-test and the then-test. Unfortunately, this calculation is unable to differentiate between beta and gamma change. Additional weaknesses of this design are related to increased burden on the participant or patient. First, he or she is required to complete an additional assessment, and secondly, validity of the results are dependent on accurate recall by the patient to his or her condition at the time of the pre-test, leaving this method open to recall bias.[26] Importantly, this design can be easily administered in a clinical setting, and its interpretation is simple, making it useful on a patient-by-patient basis.

A final common research design is known as the *anchor* or *ideal scale method*. For this method, participants complete an additional assessment at both pre-test and post-test. On this additional assessment, participants are instructed to either mark their ideal response to the question or to give examples of what they would consider the upper and lower anchors for the domain of interest. Changes from pre-test to post-test in the ideal or anchor responses are used to determine scale recalibration. This test places additional burden on the participant by requiring the completion of additional assessments. It is also prone to ceiling effects, as ideal responses may not change but the intervals between worst and ideal may undergo recalibration, resulting in a response shift that cannot be detected.[26] Similarly, response shifts due to reconceptualization and reprioritizaton may not be accounted for when using this method.

Identification of response shift in the rehabilitation sciences has largely not been considered. Of the limited research that is available, it has been suggested that some currently accepted outcome instruments may be influenced by response shift and other methods of evaluation may need to be reconsidered.[27–30] Unfortunately, none of this research has focused on clinical applications of response shift measurement nor how the findings may be incorporated into practice.

Appraisal Process

Response shift is likely a product of the appraisal process for HRQL assessment (Fig. 1).[17] According to this process, when faced with an assessment question, a patient completes four distinct steps to arrive at a response:

TABLE 2. Research Designs to Evaluate Response Shift

Design	Response Shift Assumption	Major Strengths	Major Weaknesses
Pre-Test/Post-Test Completion of same assessment instrument pre- and post-treatment.	A response shift is detected by changes in latent variables and statistical models representing participant responses.	Low participant demand Easy implementation Has demonstrated convergent validity with other research designs[26,34]	Statistically demanding requiring multivariate analysis Requires large sample sizes for analysis Cannot be interpreted for an individual patient
Then-Test Same as pre-test/post-test, but at time of post-test an additional "then-test" is completed, where using the same instrument individuals retrospectively rate how they were prior to treatment (at the time of the pre-test).	By completing post-test and then-test at the same time point, responses are provided from the same frame of reference using the same evaluation standards. Differences between then-test and pre-test responses may represent a response shift.	Easily analyzed Can be interpreted for an individual patient Has demonstrated convergent validity with other research designs[26,34]	Requires additional time and effort from the participant Susceptible to recall bias
Anchor/Ideal Scale At both pre-test and post-test, an additional assessment is completed where individuals provide their ideal responses or provide "anchor" responses of what they consider the highest and lowest level of a domain.	Changes in ideal or "anchor" responses represent a response shift due to scale recalibration or reconceptualization.	Easily analyzed Can be interpreted for an individual patient	Requires additional time and effort from the participant Fails to detect reprioritization or changes in scales that between ideal or anchor extremes Has failed to demonstrate convergent validity with other research designs

1. The patient first establishes a frame of reference from which to consider the question.
2. Next, a sample of specific experiences relative to that frame of reference is selected.
3. These sample experiences are then judged against subjective standards of comparison, and
4. Finally, a combinatory algorithm is applied to summarize these experiences and select a response.[17]

The first three steps of this process present an area in which reconceptualization (change in initial frame of reference), reprioritization (change in which experiences are relevant to be sampled), and recalibration (change in standards for comparison) may occur resulting in a response shift.

From both a rehabilitation and a research perspective, it is important to understand that the appraisal process is unique to each individual, but it can be altered by providing the patient with objective performance indicators. While examining physical function in an elderly population, Daltroy et al.[31] demonstrated that self-report functional measures correlated better with observed functional measures when the individual had experienced an objective performance assessment prior to completing self-response measures. This prior completion of performance testing may provide patients with both a new experience to sample from and a recalibrated scale of reference.

Understanding the appraisal process demonstrates the importance of challenging patients to perform and evaluate

themselves at the highest level they are physically capable. It also demonstrates the influence a self-limiting sample of experiences can have on self-perception. In the event a patient is afraid to attempt certain tasks, either out of fear of failing or injury, the patient condenses the experiences he or she has to choose from for self-evaluation, triggering a response shift in the self-appraisal process.

Modeling Response Shift in Rehabilitation

A theoretical model of quality of life and response shift has been proposed previously (Fig. 2).[14] This model has five key components: catalyst, antecedents, mechanisms, response shift, and perceived quality of life. Catalysts are any changes in an individual's condition. Catalysts may or may not be a result of treatment. Antecedents refer to the characteristics of the individual which may be stable or dispositional. Mechanisms are the behavioral, cognitive, and affective responses to the catalysts. These factors can combine to cause a response shift, which then may alter perceived quality of life scores. Sprangers and Schwartz[14] argue that response shift is almost always a positive adaptive process, a position supported by Carver and Scheier[32] in their discussion of behavioral goal modification.

In the existing model, response shift is depicted as a single component in the HRQL appraisal process, but it is important to understand that response shift is not a single
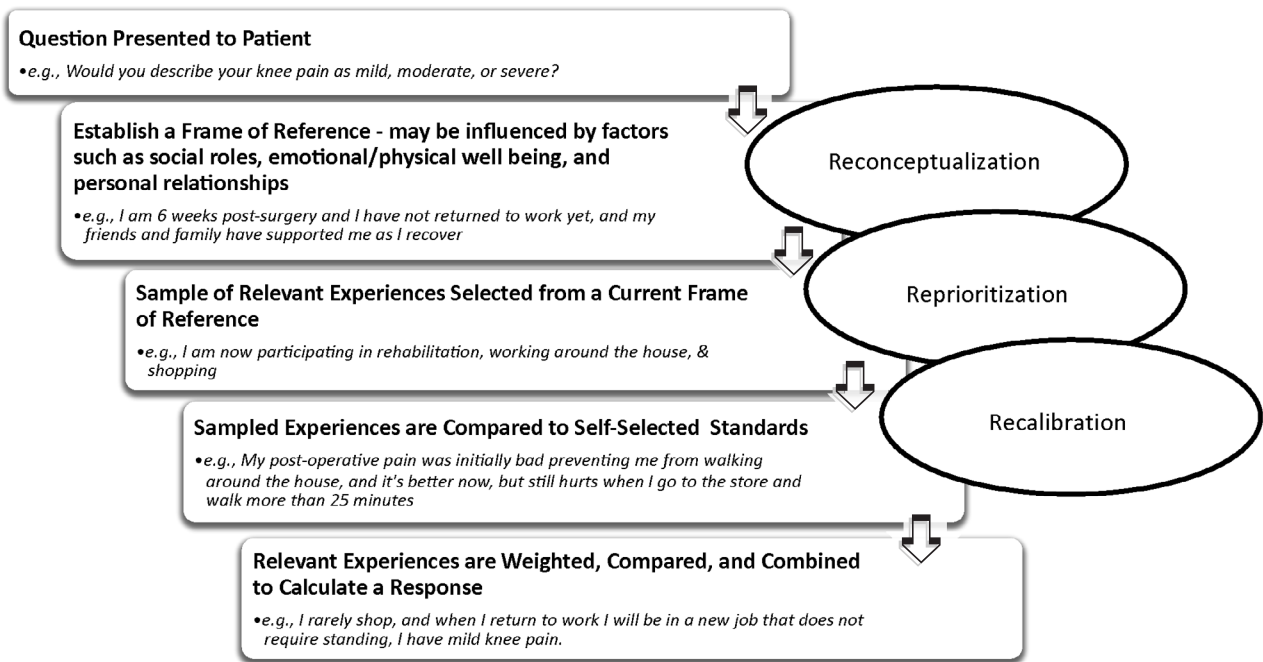
FIGURE 1. The appraisal process and response shift. For each stage of the appraisal process, the corresponding response shift concept that may influence that stage is presented. (Figure is a simplified representation of the quality of life appraisal process presented by Rapkin and Schwartz.[17])

event or automatic. Instead, it is a process that occurs over time that can be influenced by the rehabilitation process and external factors. To better understand the progression of response shift throughout the rehabilitation process we provide two scenarios. In the first, we focus on acute disability (Fig. 3). In the second, we provide a scenario where response shift is depicted relative to treatment of chronic disability (Fig. 4).

These models demonstrate the adaptive aspect of response shift as discussed by Carter and Scheier.[32] Each model represents a different starting point for a patient's internal scale of reference. The scale of reference is what is susceptible to be influenced by a response shift as the patient's scale of reference may be recalibrated, reconceptu-

alized, and/or reprioritized. In the acute disability model, following injury patients are likely to maintain a "healthy" reference scale, meaning that they reference all aspects of their well-being to their preinjury state of health. By contrast, those afflicted by chronic disability have undergone a scaling back of their response scale over time as their disability has persisted and/or increased.[32] In the chronic model, this reduction is represented by a "decreased" scale of reference. This is not representative of a response shift that occurred in the short term, but rather a gradual one that has occurred over time. These differences in reference standards help to explain variations in self-perceived health observed between acute and chronic patients who may have similar physical and functional limitations.[31]
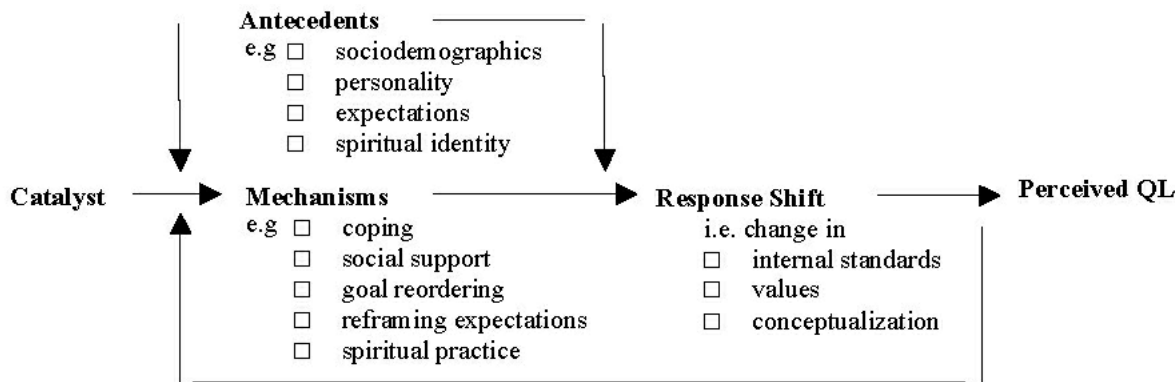

FIGURE 2. Sprangers and Schwartz's theoretical model of response shift and quality of life.[14] (Reprinted from Spranger and Schwartz, *Soc Sci Med* 1999;48(11):1507-1515, with permission of Elsevier.)
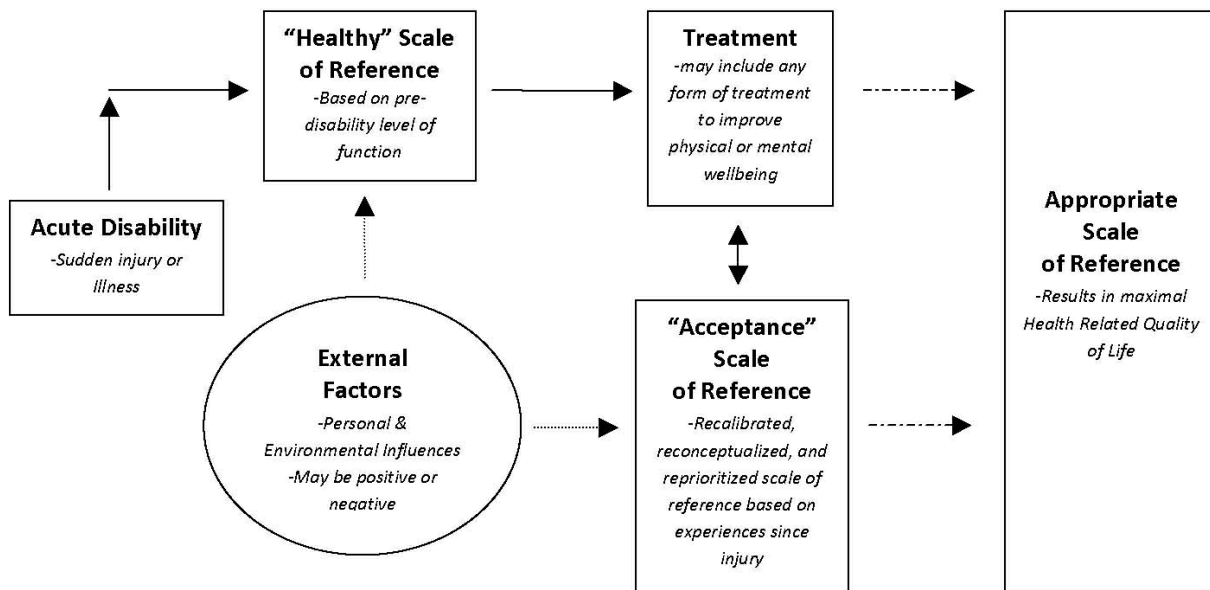
FIGURE 3. Response shift process due to acute disability.

In addition to differences in pretreatment reference standards, it may be theorized that patients experience response shift differently following treatment. Treatments may include surgery, physical rehabilitation, or other interventions. For the acute patient, the process of undergoing treatment may result in a scaling back of goals or an acceptance of some aspects of the newly acquired disability similar to what the chronic patient has previously experienced. In contrast, the chronically disabled patient may undergo a response shift toward increased expectations of health. Although his or her disability is in response to a chronic state, the initiation of treatment is a catalyst that is represented by an "expectant" scale of reference in the model. Both the pretreatment and post-treatment reference scales can be influenced by factors external to both the patient and the rehabilitation process. These factors are similar to the personal and environmental factors described in the World Health Organizations' International Classification of Function (ICF) model[33] and may include items such as socioeconomic status, access to care, physical characteristics of surrounding environments, and external support systems.

In both the chronic and acute models, ideally, individuals ultimately achieve what is considered to be their appropriate scale of reference. The final scale of reference may fall anywhere along the reference scale continuum but should optimize their perceived HRQL. In both models, the transition to the final scale of reference is represented by a dashed line from both treatment and the intermediate frames of reference (Figs. 3 and 4). This signifies that the final reference scale likely forms over a period of time and may be a result of further treatment or an adaptation of the previous frame of reference. By considering the response shift process, the rehabilitation professional can aid each individual patient in finding the scale of reference that is most appropriate for him or her. In some cases this may require a scaling back of expectations, while in other instances it may be necessary to motivate patients to advance their expectations of themselves or to provide patients with increased experiences to reference for self-appraisal.

Neither of these models is meant to express a clear path that is universally followed by all chronic or acute patients. Instead, the goal is to introduce the concept that various frames of reference may result in a response shift that has a direct influence on the perception of the effectiveness of treatment and the rehabilitation process. With continual reevaluation of goals and expectations, while taking into consideration potentially influential external factors, patient treatment and education can be individualized in a manner that provides the best HRQL across disability levels.

Conclusions

We have provided a review of response shift theory and its origins in change typology. Measurement methods for both research and clinical use in addition to models for the application of response shift to improve HRQL have been presented. Potential influences of response shift during rehabilitation for both acute and chronic disability have been considered. From this review, it is clear that continued research and the application of response shift to rehabilitation treatment and outcomes are needed. Incorporation of response shift into practice is clinically feasible and requires little additional resources beyond what is currently utilized to track patient progress. Patient evaluation and measurement methods must be used to evaluate an individual's frame of reference over the course of medical care to assess response shifts which may alter that frame of reference. Finally, the rehabilitation process can, coincidentally or by design, result
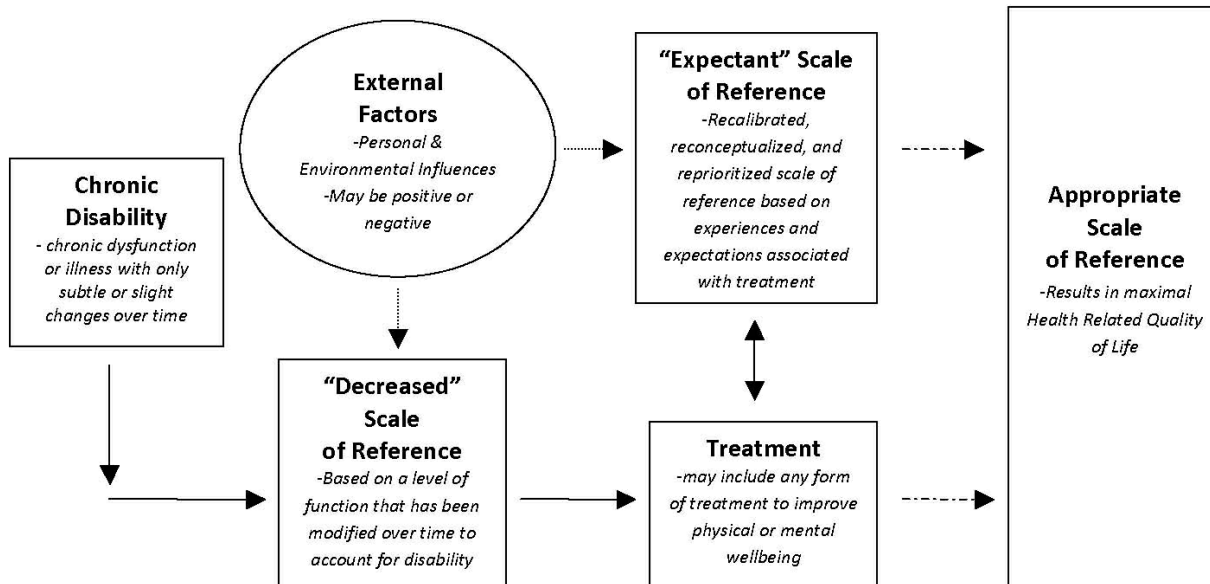
FIGURE 4. Response shift process due to chronic disability.

in response shifts that may result in a patient appropriate frame of reference and improved perceived quality of life.

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