Open Journal of Social Sciences, 2025, 13(6), 315-347
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

The Biopsychosocial Model in Rehabilitation Medicine and the Contribution of Cultural Historical Activity Theory

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How to cite this paper: Hiragami, F., & Macdonald, C. A. (2025). The Biopsychosocial Model in Rehabilitation Medicine and the Contribution of Cultural Historical Activity Theory. *Open Journal of Social Sciences, 13,* 315-347.
https://doi.org/10.4236/jss.2025.136022

Received: April 29, 2025
Accepted: June 24, 2025
Published: June 27, 2025

Abstract

This article critically examines the integration of the biopsychosocial (BPS) model of rehabilitation medicine with Cultural-Historical Activity Theory (CHAT) to propose a hybrid framework for culturally sensitive, contextually grounded rehabilitation practice. Building on Wade and Halligan's expansion of the BPS model and Engeström's Activity System model, the authors argue that health, disability, and recovery are best understood as dynamic, multidimensional processes embedded in social, cultural, and historical contexts. The paper contrasts the biomedical and biopsychosocial models, explores the application of CHAT to rehabilitation, and highlights cross-cultural differences, particularly between Western and Japanese rehabilitation paradigms. It shows that constructs like "independence" and "role restoration" are culturally mediated and that models of patient autonomy differ widely across systems. The integration of Wade's structural insights with Engeström's systemic analysis enables a more comprehensive account of rehabilitation as an evolving, socially mediated activity. The hybrid model is proposed not only as a conceptual scaffold for practice but also as a foundation for future research into the dynamic, culturally specific pathways of rehabilitation, patient engagement, and system transformation. Directions for future research are outlined, emphasizing the need for cross-cultural validation, systemic analysis of contradictions, and adaptive innovation in rehabilitation settings.

Keywords

Rehabilitation Medicine, Biomedical Model, Biopsychosocial Model, Cultural Historical Activity Theory

1. Introduction

In 2023, Fukumi Hiragami and Carol Macdonald began a relationship as an author and editor, respectively, as Fukumi wrote three papers (Hiragami, 2023a, 2023b, 2024) on rehabilitation medicine (RM) which Carol edited for a journal. This relationship continued into a book that they co-authored, together with Clare-Anne Kilroe and which is now in production (Hiragami, Macdonald and Kilroe, 2025). In Chapter Two of this book, they talk about models and theories in rehabilitation medicine: the two models are the biomedical (BM) and biopsychosocial (BPS) model; in Chapter Three, they talk about the role of psychology in RM and wrote about Cultural Historical Activity Theory. In this paper, they attempt an integration.

2. The Biomedical Model

The biomedical model (BM) remains the prevailing framework in Western medicine and rehabilitation, grounded in scientific reductionism and the view that health and illness are best understood through biological mechanisms. Originating in the early 20th century and formalized by Engel (1977), it attributes disease to identifiable physiological dysfunctions—such as infections, genetic anomalies, or trauma—and seeks to correct these through targeted medical interventions, including pharmacology, surgery, and diagnostics (Engel, 1977).

This model is underpinned by three core principles: biological causation – illness arises from discernible physical abnormalities (Porter, 1999); objectivity in health assessment—mental, social, and environmental influences are secondary to somatic dysfunction (Wade and Halligan, 2004); and, mechanistic treatment – diagnosis relies on empirical tools like imaging and lab tests, while treatment aims to reverse biological problems (Ghaemi, 2010).

These principles have led to remarkable advancements in acute care, life expectancy (Lichtenberg, 2022), and medical technology. In rehabilitation medicine, the BM model emphasises: tissue repair after trauma or disease (Gatchel et al., 2007); pharmacological aids such as analgesics and neuroprotectants (Cifu and Lew, 2020); and procedural interventions like surgery, physiotherapy, and assistive devices (Wade, 2020). Functional recovery is chiefly assessed through metrics like muscle strength or neurological improvements.

Yet, despite its successes, the BM model is increasingly critiqued for its reductive and mechanistic lens, especially in managing chronic and complex conditions. Critics argue it overlooks the psychosocial and environmental determinants of health, which are central to effective long-term care (Borrell-Carrió et al., 2004; Ghaemi, 2010). For example, in chronic pain management, psychosocial factors—such as trauma history, stress, or depression—significantly influence pain perception, but the BM model often defaults to medication or surgery (Gatchel et al., 2007). In mental health, conditions like depression and schizophrenia are commonly framed as neurochemical disorders, leading to an overreliance on pharmacological solutions at the expense of therapy or social support (Kinderman, 2014).

In rehabilitation, this model may neglect emotional and societal dimensions of recovery. A stroke survivor may regain mobility yet struggle with identity loss or social reintegration—areas that lie beyond the scope of the BM model (Wade, 2020).

Concerns over over-medicalization have also emerged. Decreasing diagnostic thresholds for disorders such as ADHD or generalized anxiety disorder (GAD) have led to increased prescription rates, sometimes replacing non-pharmacological strategies (Moynihan et al., 2002). In rehabilitation, overuse of surgeries or drugs can overshadow effective alternatives like exercise therapy, behavioral rehabilitation, or psychosocial interventions (Cifu and Lew, 2020).

This situation has catalyzed a shift toward biopsychosocial (BPS) and patient-centered models, which highlight the interconnectedness of biological, psychological, and social factors. Engel (1977) argued that healthcare must integrate behavioral and social dimensions, warning against treating disease as independent of human experience; Kleinman et al. (1978) similarly highlighted the gap between clinical disease and lived illness, noting that medicine often ignores patients' lived experience of suffering.

Although embraced in fields like rehabilitation and mental health, the BPS model remains underutilized in dominant areas like acute medicine and surgery. Nonetheless, it forms the basis of global frameworks such as the World Health Organization's International Classification of Functioning, Disability and Health (WHO ICF), highlighting its growing relevance (WHO, 2001).

In contrast to the Western preference for biological essentialism, many non-Western health systems—such as in Japan—see mind, body, and social context as quite naturally inseparable. The evolution from the BM model to more integrative approaches reflects a deeper understanding of health as multifaceted, dynamic, and inherently human.

3. The Biopsychosocial Model of Medicine

3.1. Key Components

The biological factors include the anatomical, physiological, and genetic aspects of health and illness. In rehabilitation medicine, biological factors might involve the nature of the injury or disease (e.g., spinal cord injury, stroke, musculoskeletal disorders), the extent of tissue damage, and the body's healing processes.

Medical interventions such as surgery, medication, physical (physio-) therapy, and occupational therapy often address these biological factors to restore or improve physical function (Understanding the Biopsychosocial Model of Health (verywellmind.com)) These first two factors are shared with the BM model; the last two factors are not.

Psychological factors encompass the mental and emotional states of individuals, including their thoughts, behaviors, coping mechanisms, and emotional resilience. These elements significantly impact a patient's perception of illness, response to treatment, and overall prognosis. For instance, chronic stress and psychological strain are known to contribute to physiological dysregulation, suppress immune function, and they increase a susceptibility to chronic conditions such as cardiovascular disease and kidney dysfunction (Cohen, Janacki-Devert, and Miller, 2007; McEwen, 2008). Depression is also prevalent among patients with chronic illnesses, including those undergoing dialysis or cancer treatment, and is linked to lower adherence to treatment regimens and poorer overall outcomes (DiMatteo, Lepper, and Croghan, 2000). Conversely, effective coping mechanisms—such as problem-solving, the use of social support, and emotional regulation—are associated with faster recovery and improved quality of life, while maladaptive responses like avoidance and substance use may exacerbate one's symptoms (Gatchel et al., 2007).

To meet these challenges, a range of psychological interventions have been integrated into chronic illness care. Cognitive-behavioral therapy (CBT), for instance, helps patients reframe dysfunctional thoughts and behaviour, and is effective in improving outcomes in chronic pain, anxiety, and somatic illness management (Meyer and Scott, 2008). Relaxation-based approaches, including mindfulness and breathwork, have shown decreases in autonomic hyperarousal and improvements in outcomes such as migraine and hypertension (Marks, Allegrante, and Lorig, 2005). Motivational interviewing is now also been more widely used to improve the patient's self-efficacy and commitment to behavioral change, with uses in diabetes management, weight loss, and smoking cessation (Miller and Rollnick, 2013). Other psychosocial interventions, including narrative counselling (Ghavibazou et al., 2022) and psychotherapy, provide emotional scaffolding for patients undergoing major health transitions, such as palliative care or treatment for traumatic illness experiences (Kissane and Bultz, 2000).

Social factors also shape clinical outcomes. These include socioeconomic status, cultural identity, family dynamics, and access to healthcare infrastructure. Lower socioeconomic status has been consistently linked to a higher burden of disease, poorer nutrition, and a smaller engagement with preventative services (Adler and Rehkopf, 2008). Patients embedded within strong social networks—family, religious communities, peer groups—tend to experience greater resilience, improved treatment adherence, and reduced hospital readmissions (Sherman, 1999). Similarly, a mismatch between cultural or language between patients and healthcare systems often leads to a disengagement, underuse of services, and poorer outcomes for minority populations (Braveman and Gottlieb, 2014).

Healthcare systems have implemented a variety of interventions to address these multilayered social determinants. Family counselling is now commonly integrated into chronic illness care and palliative services to support relational coping and shared decision-making (Waddell and Burton, 2006). Vocational rehabilitation supports return-to-work pathways for people recovering from illness or living with long-term disability (Kleinman, 1980). Community-based public health initiatives—ranging from diabetes prevention to mental health literacy programmes—are also more widely used to promote greater proactive healthcare use

(Betancourt et al., 2003; Blessing, 2024). Finally, systems-level interventions, such as social prescribing and care coordination, attempt to connect vulnerable populations with housing, food assistance, and economic support services that assist them in recovering (Husk et al., 2019).

3.2. Application of the Biopsychosocial Model in Rehabilitation Medicine

The BPS model is particularly valuable in rehabilitation medicine because many conditions leading to the need for rehabilitation, such as chronic pain, disabilities, and long-term illnesses, are influenced by a combination of biological, psychological, and social factors. This model supports a personalized and holistic approach to patient care (Mullins, Chaney and Frank, 1996).

3.2.1. Assessment in the Biopsychosocial Model of Rehabilitation Medicine

Assessment within the Biopsychosocial (BPS) model represents a multidimensional process that transcends traditional medical evaluations. It aims to provide a holistic understanding of the individual by integrating biological, psychological, and social perspectives. This comprehensive approach enables rehabilitation professionals to formulate tailored care plans that reflect the full complexity of a patient's health status and lived experience (Bolton and Gillett, 2019; Glintborg and Hansen, 2016).

Biological assessment includes the examination of physical symptoms, physiological dysfunctions, and disease-related variables. Medical history, diagnostic imaging (e.g., MRI, X-ray), laboratory tests, and physical evaluations form the cornerstone of this domain. These assessments are critical for identifying anatomical or systemic contributors to functional limitations (Cukkemane, Hurlemann, and Sanchez, 2025). However, the BPS approach cautions against viewing biological data in isolation, emphasizing its interaction with psychological and social variables.

Psychological assessment is equally vital. It explores emotional well-being, cognitive function, behavioral tendencies, and mental health conditions such as depression or anxiety, all of which may influence rehabilitation outcomes. Instruments like the Beck Depression Inventory (BDI), Generalized Anxiety Disorder Scale (GAD-7), and clinical interviews are commonly used. Emotional resilience, motivation, self-efficacy, and coping strategies are important to this domain and they directly impact treatment engagement and patients' prognosis (Bruns and Warren, 2018; Gatchel, Jones, and Kishino, 2019).

Social assessment addresses the external context in which rehabilitation takes place. This includes family dynamics, economic conditions, cultural background, social support, and environmental accessibility. These factors may either facilitate or hinder recovery, especially when individuals face barriers such as inadequate transportation, low health literacy, or unstable housing (Appiah and Ackah-Jnr, 2025; Shakespeare and Watson, 2017). Japanese rehabilitation practices, in particular, place strong emphasis on the social domain, often involving families and community networks in recovery planning (Karvannan et al., 2020); as Japan has the highest proportion of old people and the lowest proportion of young people in employment, the focus on caring for elderly people is particularly great.

The integration of these components allows for a nuanced and person-centered approach to assessment. Rather than identifying a single root cause, the BPS model encourages clinicians to map interrelationships among domains—for instance, how economic hardship may exacerbate anxiety, or how social isolation may impact treatment adherence. This systems-based thinking furthers more adaptable and effective care pathways (Bolton and Gillett, 2019; Konráðsdóttir, 2021).

3.2.2. A Multidisciplinary Team Approach

Rehabilitation medicine is inherently interdisciplinary, requiring the coordinated input of various health professionals to address the complex, multifactorial nature of illness and recovery. A typical rehabilitation team may include physicians, physical and occupational therapists, psychologists, social workers, nurses, and speech and language therapists, among others. Each professional contributes a unique perspective and area of expertise, working collaboratively to construct and implement an individualized treatment plan that reflects the patient's biological, psychological, and social needs (Farver-Vestergaard et al., 2025).

The strength of this team-based approach lies in its capacity to synthesize fragmented clinical insights into an integrated care strategy, ensuring that interventions are not only evidence-based but also person-centered and contextually grounded. Multidisciplinary collaboration enhances communication, prevents duplication of efforts, and facilitates early identification of barriers to recovery (Halligan, 2017). Importantly, such teams must be adaptable and reflexive, responding to changes in the patient's condition and feedback from both patients and caregivers.

3.2.3. Treatment Planning

Effective treatment planning within the BPS framework involves synthesizing information from all domains of the assessment to craft an individualized intervention strategy. This plan may incorporate physical rehabilitation techniques, psychological counselling, medication management, and community or vocational reintegration efforts. The aim is to not only alleviate physical symptoms but also improve psychological resilience and address socio-environmental barriers to recovery. Such integrative care planning has shown improved outcomes in chronic conditions, particularly when care teams regularly update and personalize the plan through interprofessional collaboration (Dona et al., 2024; Kristofersson and Kaas, 2022).

3.2.4. Patient Education

Patient education is central to BPS-oriented rehabilitation as it empowers individuals to understand and manage their health conditions more effectively. Educational efforts must address biomedical explanations of illness, alongside psychosocial contributors such as stress, coping mechanisms, and environmental challenges. Educating patients on these interconnected factors helps promote adherence to rehabilitation protocols and improves self-efficacy. Moreover, by framing education within the BPS model, patients become more engaged in shared decision-making and are more likely to adopt sustainable self-management practices (Koskan et al., 2025; Hernandez and Rider, 2023).

3.2.5. Integration of Interventions

Integrated care is essential in the BPS approach, where the synergy between medical, psychological, and social interventions strengthens overall treatment efficacy. For instance, physical therapy to restore movement can be paired with psychological strategies for pain management and social support to promote reintegration into daily roles. Integrated biopsychosocial models, particularly those embedded in coordinated care settings, reduce fragmentation of services and ensure that all therapeutic components reinforce each other (Gatchel et al., 2019; Hoenders et al., 2024).

3.2.6. Monitoring and Adjustment

Regular monitoring and iterative adjustments are foundational to BPS-based rehabilitation. This process includes periodic reviews of treatment goals, progress evaluations, and timely responses to new barriers or opportunities in the patient's recovery journey. Interdisciplinary team meetings serve as checkpoints to assess both objective progress and subjective feedback from the patient and their support network. Adjustments may involve modifying therapy intensity, introducing new psychological interventions, or coordinating social services to address emerging needs (Lamson et al., 2025; Rose, 2023). This adaptive cycle supports a dynamic and responsive care environment.

3.3. Benefits of the Biopsychosocial Model

Holistic Care: The biopsychosocial model fosters a comprehensive view of health that goes beyond isolated symptoms or diagnoses. By incorporating biological, psychological, and social domains, it supports truly holistic care that treats patients as whole individuals rather than focusing solely on disease or disability (Mpofu et al., 2023; Gatchel et al., 2019).

Improved Health Outcomes: Integrating psychological and social factors into treatment planning improves patient outcomes, especially in chronic and complex conditions. Mental health plays a vital role in the experience and management of physical symptoms, and when unaddressed, it can significantly hinder recovery. Similarly, stable social support systems and environments enhance rehabilitation success by reducing stress and improving adherence to interventions (Hartley, 2015).

Patient-Centered Approach: The BPS model aligns closely with person-centered care frameworks, as it acknowledges the patient's unique experience and context. This supports individualized care planning and fosters empathy, engagement, and better therapeutic relationships (Gatchel et al., 2007).

***Enhanced Coping and Self-Management*:** By recognising the influence of psychological states and social environments, the model facilitates better coping strategies and self-regulatory behaviors. Patients are more likely to manage their own conditions effectively when interventions consider their emotional well-being and social realities (Alyafei and Easton, 2024).

***Empowerment and Engagement*:** Involving patients in both the assessment and treatment phases increases their sense of agency and responsibility. When patients understand their condition and feel respected in the treatment process, they are more engaged and likely to adhere to their rehabilitation plans (Hoenders et al., 2024).

3.4. Challenges and Considerations of the Biopsychosocial Model

The BPS model emerged as a critical response to the limitations of the traditional biomedical model, particularly as articulated by Engel (1977), who argued that medical care often neglected psychological and social aspects of illness. Although general practitioners may still consider these broader factors, the increasing specialization of modern healthcare has led many clinicians to focus narrowly on their field of expertise. This fragmentation, particularly prominent in Western healthcare systems, calls for a model that explicitly reintegrates the patient's psychosocial context into medical decision-making.

A common critique of the BPS model is that it may serve more as a descriptive framework than an explanatory theory. Scholars have questioned whether merely listing biological, psychological, and social variables suffices if these variables are not shown to interact meaningfully (Tripathi, Das, and Kar, 2019). Without theoretical cohesion, the model risks becoming additive rather than integrative—where each specialist continues to work in a silo rather than contributing to a truly collaborative, cross-disciplinary approach.

To address this, Bolton and Gillett (2019) have argued that the BPS model does indeed possess the conceptual depth of a theory when its principles are applied dynamically to clinical practice. More recently, Wainwright and Low, 2020 (cited in Rossettini et al., 2025) emphasized the model's capacity to evolve in response to patient needs, arguing for its adaptability and responsiveness rather than any rigidity.

Nevertheless, implementation of the BPS model faces substantial structural and systemic barriers. Effective application demands well-trained multidisciplinary teams and access to a wide range of medical, psychological, and social resources; these requirements often not met in under-resourced health systems (Ampiah et al., 2025; Hudson et al., 2009). As such, countries with comprehensive national health services, such as Japan, are better positioned to realize the model's full potential in rehabilitation contexts.

Training and education remain essential for embedding the BPS model into routine care. As Ataman et al. (2025) suggest, implementation science and theory-informed training strategies are needed to support professionals in applying holistic care approaches. Moreover, evaluating BPS-based interventions can be difficult: outcome measures that focus solely on physical recovery may miss important psychosocial improvements. Here, newer tools such as patient-reported outcome measures (PROMs), supported by digital platforms, are increasingly being trialed to capture more meaningful indicators of rehabilitation progress (Kearns et al., 2025).

Aagesen et al. (2024) explicitly reference the BPS model as the guiding theoretical framework for a rehabilitation program aimed at young adult cancer survivors. The BPS model is used not just conceptually, but as a structural basis for the co-designed intervention. The authors refer to the need to address psychological and social consequences of survivorship, not just medical follow-up; the model as a holistic paradigm, contrasts with narrow biomedical approaches and more specifically a BPS-informed method in designing care pathways through co-production with survivors. Mingels et al. (2024)'s narrative review examines the extent to which physiotherapy for headache aligns with the BPS model; it highlights a disconnect between theoretical endorsement of the BPS model and actual clinical implementation. They point out that the model is cited as ideal for guiding patient-centered physiotherapy, but that many interventions still lack social and psychological dimensions. They advocate for more systematic integration of psycho-social-lifestyle interventions and critique the overuse of somatic treatments within an allegedly BPS-informed approach; they criticize the partial application of the BPS model, arguing it is often nominally referenced but incompletely operationalized in physiotherapy settings.

While these challenges are real, they do not invalidate the model. Instead, they highlight the need for ongoing refinement and creative implementation of the BPS framework, especially in environments striving for person-centered, equitable care.

Below is an important model of biopsychosocial medicine, in which the three aspects are part of the system. It should be noted it is a description, not a theory. It is a model due to the work of Wade & Halligan (2017), where Wade has been a leading developer of BPS medicine per se.

This expanded BPS model offers a multidimensional framework for understanding how disability and rehabilitation are shaped not merely by observable behaviors or clinical diagnoses, but by a dynamic interplay of subjective experience, environmental context, and personal agency. It distinguishes between components that are externally visible and those that are internal, interpretive, or culturally mediated, framing rehabilitation as a complex, adaptive system rather than a linear clinical sequence.

Several elements within the model, such as pathology, impairment, personal context, and individual choice, are internal constructs that, although central to the rehabilitation experience, are not directly observable. Pathology refers not only to a medically defined diagnosis or damage within the body, but also to how this condition is

perceived by the individual and by others. Impairment, in turn, is understood as the personal experience of that pathology, encompassing its physical, cognitive, and emotional consequences. The personal context incorporates the individual's beliefs, past experiences, life goals, and available resources, all of which shape the way they interpret and manage impairment. Central to this inner constellation is the notion of choice, which reflects the agency of the individual. Although influenced by contextual and clinical factors, choice remains a personal construct—reflecting how individuals exercise autonomy within the limits of their own condition and own environment.

In contrast to these internal dimensions, the model also includes domains that are externally observable. These include both activities—defined as behaviors, adaptations, and interactions with the environment—and the physical context in which these activities occur. The physical environment encompasses personal devices, accessibility aids, local infrastructure, and the presence or absence of supportive community resources. These domains offer tangible indicators of a person's functional status and are typically the focus of clinical assessments.

Other aspects of the model—particularly those related to social meaning—require interpretation and cannot be directly observed. Social participation, for instance, involves the extent to which individuals engage in meaningful roles within family, work, or community life, while social context includes the broader cultural norms, values, and expectations that govern these roles. Social functioning and social status are not directly measurable but are inferred from patterns of interaction and positioning within society, often shaped by social attitudes and systemic structures.

Time, another essential dimension, is represented in two distinct but interacting forms: the temporal context of illness and the temporal context of life. The former refers to the stage of the illness trajectory—such as acute onset, chronic adaptation, or recovery—while the latter encompasses broader life stage considerations, including age, family commitments, employment roles, and evolving responsibilities. These time-bound elements remind us that rehabilitation is not static, and that effective practice must adapt as patients' priorities and capacities change.

Overall, this framework conceptualizes rehabilitation as a non-linear, interdependent system in which variables interact across cognitive, behavioral, social, and temporal levels. The relationships among components are often reciprocal—individual choice can shape activities, just as social context can redefine perceived impairment. Such complexity calls for a flexible, person-centered approach to rehabilitation planning that recognizes the fluid and situated nature of recovery. This model therefore resists reductionist classifications, instead it offers a scaffold for integrating individual meaning, contextual nuance, and therapeutic responsiveness into the heart of rehabilitative care.

4. Cultural Issues

4.1. The Cultural Foundations of Japan's Rehabilitation Model: A Comparative Perspective

As we have pointed out, the underlying cultural values of a healthcare system significantly shape how rehabilitation is delivered, particularly within the biopsychosocial BPS framework. In Japan, rehabilitation medicine reflects broader social values rooted in collectivism, social harmony (wa, 和), and filial obligation, in marked contrast to the individualistic ethos of Western healthcare (Hofstede, 2001; Nakane, 1970). These differences are evident in how autonomy, decision-making, doctor-patient relationships, and rehabilitation goals are interpreted and put into action.

In Western countries—particularly in systems influenced by Anglo-American medical ethics—rehabilitation is principally designed to promote individual autonomy. Patients are encouraged to become fully independent, and the therapeutic aim is often defined in terms of returning to work, engaging in self-care, and minimizing the patient's reliance on others (Wade & Halligan, 2004). Treatment plans are typically discussed openly between clinician and patient, as the patient plays an essential role in negotiating goals, therapies, and timelines. The doctor-patient relationship is somewhat egalitarian, reflecting a shared decision-making model that empowers patients to make informed choices based on comprehensible discussions about prognosis, risks, and expected outcomes (Beauchamp & Childress, 2013; Charles, Gafni, & Whelan, 1999).

In marked contrast, Japan's rehabilitation model is embedded within a collectivist cultural framework. Here, the emphasis is not on regaining independence in isolation, but on restoring the individual's role within the family and community (Kagawa-Singer & Blackhall, 2001; Sugimoto, 2010). Rehabilitation is structured around the idea of relational recovery, in which the patient is supported to resume culturally expected roles, such as those of a partner, parent, or community member. This model reflects the Confucian-rooted thinking that an individual's identity is derived from one's relationships and duties to others, rather than personal autonomy (Long, 2018; Tu, 1985).

Shared decision-making in Japan is often constrained by traditional hierarchies and culturally ingrained expectations around patient passivity, though this is changing. For example, a 2023 study by Ogawa et al. found that physiotherapy patients in Japan reported limited involvement in clinical decision-making, especially in settings where time or authority gradients restricted patient voice (Ogawa et al., 2023). This delegation is regarded not as a denial of autonomy, but as an expression of trust and interdependence—a culturally sanctioned mode of interaction that preserves social harmony and reduces one's personal burden (Zheng et al., 2021; Asai, 1995). The prioritization of consensus over confrontation is a function of long-standing cultural norms governing communication and social interaction in Japan (Lebra, 1976).

Furthermore, the doctor-patient relationship is more hierarchical, shaped by more traditional expectations that physicians act as benevolent authority figures. Patients are expected to defer to medical knowledge, and clinicians manage both clinical decisions and also the communication of sensitive information. For example, when discussing long-term prognosis or the possibility of permanent disability, Japanese physicians may withhold or soften difficult truths, prioritizing the patient's emotional stability and social dignity over full disclosure (Tanaka et al., 2021; Fujimoto, 2003); "truth-telling" (Sarafis et al., 2013) is balanced against the goal of maintaining harmony within the setting of the clinical and family life (Akabayashi, Fetters, & Elwyn, 1999).

Hence, rehabilitation goals in Japan also differ in orientation. While Western models often aim for a return to work or independent functioning, Japanese rehabilitation focuses more on reintegrating patients into social roles—particularly within the family. Success is defined not only by physical recovery but by the patient's ability to resume expected contributions to family life, community participation, and culturally delineated responsibilities (Okamoto & Komamura, 2022; Matoba, 2007). Rehabilitation centers and long-term care facilities serve not only a clinical function, but also a social and cultural one, as they offer spaces where patients can recover in line with communal norms (Campbell & Ikegami, 2003).

These cultural values—collectivism, deference to authority, and role-based identity—profoundly influence how stroke rehabilitation, for example, is conducted in Japan. They affect the pace of therapy, the structure of decision-making, and the system of measurement used to demarcate recovery (Yamamoto-Mitani et al., 2002). While they contrast with Western ideals of individual empowerment and self-determination, they offer a coherent and culturally adjusted model that puts relational integration at the heart of rehabilitation medicine.

4.2. Two Rehabilitation Contexts Signaling Cross-Cultural Differences

4.2.1. A Comparison of Western and Japanese BPS Approaches to Stroke Rehabilitation

In Western stroke rehabilitation, the initial assessment focuses on rapid stabilization and early intervention, with medical teams aiming to discharge patients as soon as they are medically stable; neurological examinations such as CT and MRI scans, as well as assessments using the NIH Stroke Scale, are performed early to determine stroke severity and prognosis (Leonardi et al., 2022). Physiotherapists and occupational therapists assess motor function, balance, and gait using tools like the Berg Balance Scale and Timed Up and Go Test, while speech and language therapists evaluate aphasia and swallowing difficulties using standard diagnostic tests. Cardiovascular risk factors are addressed early, with patients receiving education on blood pressure management, cholesterol control, and diabetes prevention as part of their rehabilitation plan (Dean, 2009).

In contrast, Japanese stroke rehabilitation follows a more prolonged and structured hospital-based model. While similar neurological and motor function assessments are conducted, the emphasis is placed on long-term inpatient rehabilitation rather than early discharge (Ilola, 1990). Patients often remain hospitalized for three to six months, allowing for extended physiotherapy, speech therapy, and social adaptation before transitioning to home care (Dean, 2009). Unlike in Western settings, where outpatient services play a major role in rehabilitation, Japan's model relies more on hospital-based recovery, ensuring that biological stabilization and physical function improvements occur before discharge (Kinoshita et al., 2017); this puts a relatively greater burden on the hospitals.

In psychological assessment Western rehabilitation systems place a strong emphasis on mental health screening and psychological adjustment after stroke. It is standard practice to screen for post-stroke depression (PSD), anxiety, and cognitive impairment using tools such as the Patient Health Questionnaire (PHQ-9), Hospital Anxiety and Depression Scale (HADS), and the Montreal Cognitive Assessment (MoCA) (Turner-Stokes, 2009). Cognitive impairments, including memory loss, attention deficits, and executive function difficulties, are addressed through structured cognitive rehabilitation programmes. Motivational interviewing and psychological resilience training are also incorporated to support emotional adjustment and recovery motivation (Na et al., 2016).

In Japan, psychological well-being is approached differently: while depression and cognitive decline are acknowledged, there is less direct discussion of psychological distress with the patient. Instead, mental health concerns are often addressed indirectly through family involvement, group therapy, and social interactions. Individual psychological therapy is less commonly used, and emotional resilience is fostered through collectivist coping mechanisms, such as encouragement from family members, structured social roles, and participation in group-based rehabilitation activities (Toyama & Fuller, 2021).

Social and Environmental Assessment: In Western rehabilitation, social and environmental factors are evaluated early, with the goal of helping patients regain independence as soon as possible. Social workers assess family support structures, socioeconomic status, and community integration options, using tools such as the Zarit Burden Interview for caregivers. Vocational rehabilitation is often introduced early, with occupational therapists helping stroke survivors return to work, to access disability services, or to transition to new careers if needed (Waddell & Burton, 2006). Home modifications, such as installing handrails, ramps, and adaptive furniture, are recommended to promote independent living.

Japanese stroke rehabilitation places a greater emphasis on family caregiving and social stability, rather than on promoting full independence. Families play a central role in caregiving decisions, often assuming long-term responsibility for patient support (Kalra et al., 2004). Returning to work is not always prioritized, especially for older adults, as rehabilitation is often more focused on reintegration into family and social roles rather than workplace reintegration. Home adaptations are used less frequently, as family members are expected to provide daily assistance for ADLs rather than modifying the physical environment to accommodate independent living.

Treatment: In terms of biological treatment and physical rehabilitation, Western stroke rehabilitation emphasises early mobility training, goal-oriented therapy, and outpatient rehabilitation. Physiotherapy and occupational therapy are introduced immediately after hospitalization, and may focus on neuroplasticity-based interventions such as constraint-induced movement therapy and robotic-assisted rehabilitation (Cifu & Lew, 2020). Patients are discharged as soon as they are medically stable, continuing therapy through outpatient clinics, home-based programmes, and tele-rehabilitation services. Speech and swallowing therapy is integrated into early rehabilitation, with individualized treatment plans based on the severity of aphasia. In Japan, physical rehabilitation follows a more standardized, hospital-driven approach. Patients receive intensive in-patient physiotherapy for several months before transitioning to home-based therapy. The use of robotics and high-tech rehabilitation devices is increasing, but therapy is generally structured and follows a slower, stepwise approach (Kinoshita et al., 2017); Speech therapy is often delayed until the patient has stabilized physically, which reflects a more cautious rehabilitation strategy.

In Western stroke rehabilitation, psychological therapy plays a prominent role in managing post-stroke depression, anxiety, and cognitive impairment. Cognitive-behavioral therapy is commonly used to help patients cope with disability-related distress, and antidepressants (such as SSRIs) are prescribed for severe post-stroke depression. Cognitive rehabilitation includes executive function training, virtual reality-based therapy, and problem-solving exercises to improve attention and memory (Bishop et al., 2004). Japan, by contrast, adopts a less individualized approach to mental health support, relying on family encouragement, group therapy, and cultural resilience (Toyama & Fuller, 2021). While cognitive rehabilitation exercises are integrated into therapy, psychological distress is less openly addressed; instead of individual counselling, emotional support is often provided through structured routines and social expectations.

Social and Environmental Interventions: In Western rehabilitation, the transition to independent living is carefully planned, with vocational rehabilitation, social reintegration programmes, and independent mobility support offered as part of the recovery process. Patients are encouraged to regain autonomy, and assistive technology is widely used to enhance independence. Japanese stroke rehabilitation, in contrast, is more family-centered, with less emphasis on returning to work and more focus on reintegration into home life and social circles. Community-based rehabilitation centers offering patients structured support for physical, emotional and social support play a major role in long-term therapy (Omu & Reynolds, 2012).

4.2.2. Mental Health Rehabilitation in Japan: A Cultural and Biopsychosocial Perspective

Mental health rehabilitation in Japan is strongly influenced by cultural values such as harmony (wa 和), stigma, and collectivism. Unlike Western countries, which emphasize individual recovery and autonomy, Japanese approaches prioritize social reintegration and family caregiving. Although Japan formally applies the biopsychosocial model to mental health rehabilitation, it is culturally adapted to reflect the persistent stigma of mental ill-health and the collective approach to caregiving. This results in long-term hospitalization and social care models that rely on indirect communication and family support rather than independent living. Schizophrenia care is a notable example of how these cultural factors manifest in treatment and recovery planning.

Mental illness in Japan is often treated within the family unit, with decisions made collectively; recovery is not seen as the sole responsibility of the individual but as a shared duty of the family and community. Stigma continues to surround mental health, making the public acknowledgment of a diagnosis uncommon. This contrasts with Western mental health care, which encourages transparency and patient empowerment. Also, while Western psychiatric systems aim for short-term hospitalization and community care, Japan continues to have one of the highest rates of long-term psychiatric hospitalization among developed nations (Okamoto et al., 2014). The doctor-patient relationship in Japan also tends to be hierarchical, with patients deferring to clinical authority rather than participating actively in care planning.

4.2.3. A Shifting Trend—From Institutionalization to Community-Based Psychiatric Care

While Japan has historically relied on long-term hospitalization, it is gradually shifting toward a more community-based mental health care model in response to global mental health reform trends and WHO guidelines. Governmental policy changes since the early 2000s have promoted deinstitutionalization, the development of group homes, and the integration of psychiatric services into primary health care (Iwatani et al., 2022). Initiatives like the "Mental Health and Welfare Law" have encouraged the establishment of psychiatric day-care programs and community centers aimed at reducing dependence on inpatient care. These programs provide structured activities, psychosocial rehabilitation, and support for both patients and families. Although the pace of change has been cautious due to cultural resistance and infrastructural limitations, the trend marks a significant move toward person-centered and rights-based mental health care in Japan (Setoya, 2012).

Wade has underscored that the biopsychosocial model should be viewed not as a theory but as a model per se—a way of organizing and integrating multiple factors affecting health and functioning, rather than a testable explanation in itself. He argues that its value lies in its holistic approach, which enables clinicians to consider biological, psychological, and social dimensions, rather than attributing outcomes to a single cause or mechanism (Wade, 2020; Borrell-Carrió et al., 2004). This distinction is crucial in clinical rehabilitation, where rigid adherence to theoretical models may limit the capacity to respond to individual complexity.

Other scholars have echoed this (e.g. Cui, 2024), noting that while models like the BPS are crucial for guiding holistic practice, their generality and flexibility mean they fall short of the predictive rigor expected of formal scientific theories. However, this flexibility can be advantageous in cross-cultural and person-centered contexts—such as in Japanese rehabilitation—where values like relational interdependence align well with the BPS model's non-reductionist orientation. The biopsychosocial model, first proposed by Engel and elaborated by Wade, calls for a systemic approach to health that goes beyond biological symptoms to include psychological states and social context. However, unless culture is explicitly recognized as a structuring force within the "social" domain, the model risks defaulting to a Western conceptual framework.

The same "social" category within the BPS model can mean radically different things across cultural settings. For instance, in Japan, "social" may emphasize collective identity, familial obligation, and social role continuity, whereas in Western contexts, it often these centers on individual autonomy, self-efficacy, and independence, are not mere variations in practice—they reflect fundamentally different assumptions about what it means to recover, engage, and thrive.

Wade's expanded framework does offer a path forward. His model includes domains such as personal context, role, expectation, and social participation—each of which can be adapted to accommodate culturally specific expressions of rehabilitation. For example: The concept of "role" can be used to compare cultural expectations concerning independence (Western) vs. reintegration into communal roles (Japanese). "Social participation" can be culturally mapped—voluntary engagement in Western contexts vs. fulfilling obligations in collectivist settings. The "choice" and "agency" domains can be adapted to reflect different interpretations of patient autonomy.

To fully realize the promise of the BPS model in global rehabilitation medicine, especially through Wade's structure, it is essential to embed culture as a dynamic, mediating layer rather than treat it as an external variable. The social is not universal—it is culturally coded, historically situated, and deeply contextual. Recognising this allows for a more genuinely person-centered and context-aware model of rehabilitation.

The framework developed by Wade and Halligan in their expanded version of the biopsychosocial model (**Figure 1**) presents a structured yet holistic account of illness that moves beyond linear cause-and-effect explanations. It introduces interconnected domains—personal, social, temporal, physical, and pathological—each contributing to the lived experience of illness through dynamic, reciprocal influences. Central to this model is the idea that choice mediates many of the interactions between these domains, reflecting the agency and interpretative role of the individual within the system.

Unlike traditional medical models which often privilege observable pathology or impairment, this framework situates impairment, activities (disability), and physical context as only the externally observable components of a much broader system. Constructs such as quality of life, social participation, and personal context are acknowledged as equally central but not readily visible—highlighting the epistemological complexity of health and illness.

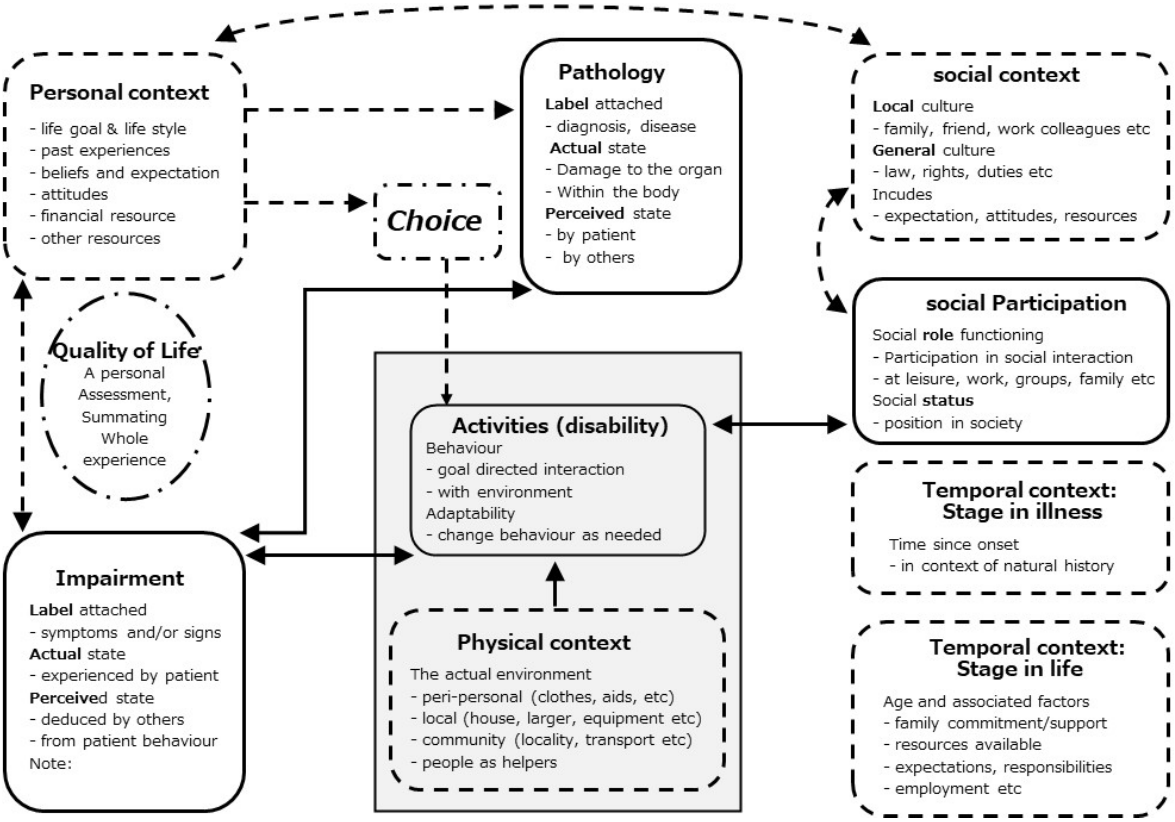

Figure 1. Holistic, biopyschsocial model of illness: components of importance (Adapted from: Wade & Halligan (2017)).

From the standpoint of theory development, this model offers a fertile starting point. The explicit recognition of constructs (e.g., perception, expectation, role, choice) enables operational definitions that could be tested empirically, especially within a BPS rehabilitation paradigm. For instance, one might theorize that the degree of perceived choice mediates the impact of social participation on activity levels among patients with chronic illness. Such a proposition could be translated into hypotheses, subjected to measurement, and refined through study, thus moving toward theory.

Furthermore, Wade's model lays out relational structures that a theory could formalize—for example: How does temporal context (e.g., stage in illness) modulate the influence of pathology on social participation? When one first has a stroke, one may feel greatly depressed, but three months later, one may be reassured that one has made progress in recovering function. Another possible question is: How do personal beliefs and expectations mediate the effects of impairment on perceived quality of life?

5. Reframing a Cultural-Historical Activity System in Rehabilitation

5.1. Introduction

Finnish cultural psychologist Yrjö Engeström has significantly advanced our understanding of human action through his work on Activity Theory and the concept of expansive learning. This framework offers a powerful lens to explore how people learn, adapt, and develop within the constraints and affordances of social and cultural environments. Originally developed in adult education, the theory has extended to work in general education, commerce and medicine (Engeström, 2018; Daniels et al., 2010). In rehabilitation medicine, they can be used to deepen our understanding of how patients engage with recovery processes and how clinicians can support learning and transformation throughout that journey.

At its core, Activity Theory posits that all human activity is embedded within specific socio-cultural systems, inherently shaped by collective practices and interactions (Engeström, 1987/2015; Sannino, 2011). In the context of rehabilitation, patients do not merely perform tasks to regain function—they participate in meaningful, socially-situated activities oriented toward autonomy, reintegration, and well-being. Engeström's activity system model invites us to analyze these processes in relation to broader systemic components, including tools, rules, community, and division of labor.

The above Engeström's triangle is based on the cultural-historical psychologists' notions of mediation as individual action (subject—tools/instruments—object) at the top of the diagram. The object refers to the "raw material" or "problem space" at which the activity is directed and which is molded and transformed into outcomes. Engeström (1987/2015: p. 67) considered "a human activity system always contains the subsystems of production, distribution, exchange, and consumption", thus, he added the bottom of the triangle to the original individual triangle in order to include other people (community), social rules (rules), and the division of labor between the subject and others.

5.2. Key Components of Engeström's Activity System in Rehabilitation

Tools refer to the instruments—both tangible (like assistive devices or rehabilitation technologies) and intangible (such as language, theoretical concepts, or digital platforms)—through which individuals interact with their environment (Engeström, 2001). In rehabilitation, tools are central to facilitating progress, but their design and implementation must ally with the user's context. A new tool is only successful if the rules adapt to accommodate it, the relevant community is prepared to use it, and responsibilities are realigned accordingly.

Rules encompass both formal policies and informal norms that regulate behaviour within an activity system (Engeström, 2015). These may include medical protocols, insurance limitations, or cultural expectations regarding recovery. In rehabilitation, understanding such constraints is crucial to anticipating sources of friction, such as between bureaucratic regulations and patient-centered care needs.

Community involves all actors directly or indirectly involved in the activity—from patients and families to therapists, administrators, and even insurers or community leaders (Engeström & Sannino, 2009). Recognising this network prevents narrow interpretations of recovery as an isolated patient journey, instead highlighting the collective responsibilities that shape rehabilitation outcomes.

Division of Labor describes how roles and tasks are distributed across members of the system (Engeström, 1987/2015). In healthcare, this includes clinical hierarchies and interdisciplinary interactions. Misalignments here—such as overlapping responsibilities or unclear expectations—often become sources of conflict or inefficiency but may also offer opportunities for realignment and improvement.

According to Engeström, contradictions within or between these system elements often trigger transformation. These internal tensions—such as between institutional rules and patient needs—can become catalysts for learning and development, leading to expansive learning: a collaborative, creative process in which actors reconceptualize the activity itself (Engeström, 2015). The fundamental internal contradiction of human activity, as Engeström (1987/2015) describes, stems from the dual nature of activity itself: immediate, here-and-now actions hold concrete meaning and value for individuals, yet simultaneously, they compose "the total societal production" (p. 66) in a way that obscures their individual specificity. This dual existence highlights that while activities are personally significant for individuals, they are, from the societal perspective, merely one element within the broader fabric of collective production. In Engeström's words, "any specific production must at the same time be independent of and subordinated to the total societal production" (p. 66). The resulting tension manifests as "the clash between individual actions and the total activity system" (p. 66), a dynamic that is recurrent and systemic. When applying Engeström's model of a collective activity system, this contradiction can be conceptualized as an ongoing tension between individual action—represented by the smaller, upper triangle of the model—and the encompassing cultural-historical activity system, multi-dimensionally mediated by social elements, as depicted in the lower portion of the model.

Applying Activity Theory in Rehabilitation Practice

Engeström's framework suggests that interventions in rehabilitation must account for the entire system, rather than focusing narrowly on discrete clinical tasks. When tools, rules, social structures, and role divisions are analysed together, a more responsive and sustainable rehabilitation process can emerge.

Expansive learning becomes particularly powerful in interdisciplinary team settings, where dialogue between professionals, patients, and families can generate new solutions to entrenched challenges (Engeström, 2001). These collaborative interactions often take the form of reflective discussions, shared problem-solving, and joint innovation, enhancing both outcomes and engagement.

Another key aspect of this theory is the notion of boundary-crossing—the idea that meaningful learning often occurs when individuals move across institutional or disciplinary boundaries to adopt new perspectives (Engeström & Sannino, 2009). In rehabilitation, this might involve connecting clinical care with vocational programmes, community resources, or peer networks, enabling smoother transitions and longer-term success for patients.

These boundary-crossing activities also help professionals integrate non-clinical dimensions—social, occupational, or educational—into the care process, extending rehabilitation beyond the clinic into everyday life. Partnerships with schools, workplaces, and community organizations become crucial in sustaining recovery and promoting social reintegration (Engeström, 2015).

5.3. Cultural Context and Theoretical Implications

This systems-based mapping of interdependent components also offers a semiotic scaffold for developing middle-range theories tailored to specific cultures. In Japanese rehabilitation contexts, for instance, culturally embedded values like familial responsibility or social role continuity may carry unique significance. Using Engeström's model, such constructs can be structurally integrated into care planning without imposing Western-centric assumptions.

Finally, while Wade and Halligan's biopsychosocial model is often used in rehabilitation as a holistic framework, it is not a formal theory but rather a conceptual structure. When paired with activity theory, which offers dynamic tools for analyzing action and transformation, a combined framework may provide a robust foundation for culturally sensitive and empirically grounded rehabilitation theory development.

Cultural-Historical Activity Theory and Cross-Cultural Rehabilitation

Engeström's activity system model (**Figure 2**) offers a powerful conceptual framework for understanding human action as embedded in socially, culturally, and historically situated systems. Unlike linear models of intervention, this framework highlights the interdependence of elements that shape purposeful activity—such as rehabilitation—through tensions, negotiations, and systemic contradictions. When applied to cross-cultural rehabilitation, Cultural-Historical Activity Theory (CHAT) allows us to examine how rehabilitation is not simply a biomedical or psychological event but a culturally mediated activity system with diverse configurations across societies.

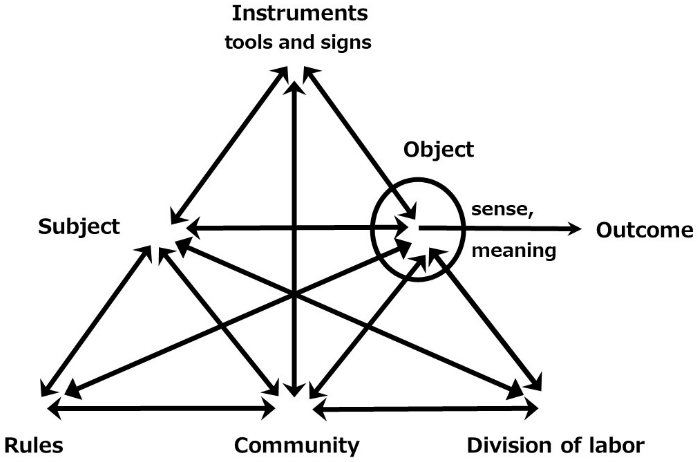

Figure 2. General model of an activity system (Adapted from: Engeström, 1987/2015: p. 78).

Each component of the activity triangle becomes a site of cultural variation:

In Western systems, the “subject” is often the autonomous individual patient, expected to engage actively in their recovery. In collectivist cultures such as Japan, the subject may be more interpersonally constructed, with family members or carers co-constituting the subject’s agency and decisions.

Rehabilitation goals—or “objects”—are culturally shaped. In Western settings, the object might be framed in terms of functional independence or return to work. In other cultural contexts, such as East Asia, the object may involve social role restoration, harmony, or fulfilling familial expectations.

Tools used in rehabilitation (e.g. therapy protocols, technologies, assessments) are themselves culturally shaped. Western models often emphasize standardized metrics and digital tools, whereas in other contexts, instruments may include informal caregiving practices, traditional therapies, or community rituals.

Rules include not only institutional guidelines but cultural expectations and taboos. For example, avoidance of negative prognosis in Japanese rehabilitation reflects a cultural “rule” that prioritizes emotional preservation over direct communication, contrasting sharply with Western norms of prognostic transparency.

The “community” encompasses everyone involved in the rehabilitation process, including family, healthcare providers, and sometimes religious or local leaders. Its structure varies widely. In collectivist settings, communal involvement is routine; in Western contexts, emphasis is placed on the individual-clinician dyad, with community roles more peripheral.

Roles (division of labor) within the rehabilitation process also diverge culturally. In Western systems, interdisciplinary teams are hierarchically structured with clear scopes of practice. In Japan, more hierarchical deference to physician authority may coexist with high involvement of family in caregiving roles, shifting the “labor” of rehabilitation beyond the clinical team.

This framework is especially powerful for unpacking contradictions within and between these elements. For instance, Western-designed rehabilitation instruments may not align with collectivist norms around decision-making or goal-setting, creating tensions between object and rules, or subject and community. CHAT thus becomes not only a descriptive model but also a diagnostic tool to identify friction points in cross-cultural rehabilitation practice.

In essence, Engeström’s model provides a systemic map for understanding how culture permeates every level of rehabilitation—not just as background context, but as a structuring force that configures relationships, values, tools, and outcomes. It complements the BPS model by making social mediation, cultural logic, and distributed agency central to the analysis of therapeutic activity.

6. Integrating Wade’s Biopsychosocial Model and Engeström’s Activity System: A Hybrid Framework for Rehabilitation Theory

The integration of Wade’s expanded biopsychosocial model with Engeström’s

Cultural-Historical Activity Theory offers a theoretically rich and pragmatically useful framework for advancing rehabilitation science. While these models emerge from distinct intellectual traditions—clinical medicine and socio-cultural psychology—they converge in their shared emphasis on systemic complexity, contextual meaning, and the dynamic nature of human development and recovery.

Wade's BPS model, as expanded in the current formulation, provides a multidimensional structure for understanding rehabilitation that transcends traditional tripartite models. It identifies distinct yet interacting layers: internal constructs such as pathology, impairment, personal context, and choice; externally observable domains such as activity and physical environment; social dimensions requiring interpretive insight; and, temporal contexts reflecting both the illness trajectory and broader life stages. Importantly, Wade presents this model as a framework, a scaffold for reasoning and planning that accommodates complexity, ambiguity, and person-centered variability.

Engeström's CHAT complements this framework by offering an activity-oriented lens through which the dynamic interactions between these BPS elements can be examined. CHAT introduces systemic components—subject, object, tools, community, rules, and division of labor—that help explain how rehabilitation unfolds within historically and culturally situated settings. Where Wade provides what matters in rehabilitation (the conceptual content), CHAT explicates how these elements operate within evolving systems of practice (what we might call the procedural logic).

The integration becomes particularly powerful when we attempt align the core components of each framework:

Subject (in CHAT) corresponds to the biopsychosocially constructed person in Wade's model, whose agency is shaped by internal pathology, cognitive meaning-making, life history, and social position.

Object (the goal or focus of the activity) maps onto the dynamic rehabilitation aims articulated in Wade's model—whether restoring motor function, achieving psychological adaptation, or enabling social reintegration. These goals evolve over time and vary across cultural contexts.

Tools, including both physical instruments and symbolic mediators, are enriched by Wade's emphasis on the patient's belief systems, therapeutic language, and conceptual models—tools that are not only instrumental but also meaning-bearing.

Rules are aligned with institutional policies, cultural values, and implicit norms—as explored in Wade's "social context" domain—which often shape what is considered possible, acceptable, or desirable in rehabilitation.

Community, as conceptualized by Engeström, includes the patient's family, peers, healthcare providers, and wider social systems, resonating with Wade's account of social roles and participatory structures that mediate recovery.

Division of labor reveals the distribution of tasks and power within the rehabilitation system, closely linked to how responsibilities are culturally defined, hierarchically organised, and emotionally negotiated—especially in collectivist or intergenerational caregiving systems.

This hybrid framework allows us to bridge content and process: it grounds rehabilitation in a richly layered biopsychosocial ontology while equipping us to analyze how that ontology is enacted, negotiated, and transformed across institutional and cultural contexts. It supports cross-cultural differentiation (e.g., independence vs. social role restoration), temporal adaptability, and systemic analysis of contradictions (e.g., between patient agency and institutional protocol). One concrete example of a systemic contradiction that the hybrid model helps to analyze and potentially resolve occurs in the mismatch between institutional rules and culturally shaped expectations of patient agency.

Consider the Japanese rehabilitation context: medical protocols often emphasize efficient discharge, standardized physical recovery goals, and functional independence—values aligned with the biomedical and administrative "rules" of the institution. However, many elderly patients and their families, shaped by a collectivist cultural ethos, may prioritize relational role restoration or social harmony over individual independence. This creates a systemic contradiction between institutional expectations (quick discharge and measurable autonomy) and patients' situated values (relational continuity, prolonged in-hospital care).

Within the hybrid BPS–CHAT model, this contradiction can be mapped structurally. On the Engeströmian triangle, it would be seen as tension between Rules, Object, and Community—where biomedical policies prioritize "independence" as the object of rehabilitation, while the community (family, patient) envisions a different goal rooted in culturally mediated social belonging.

The knots of interaction (as shown in **Figure 3** below) between the "clinical-bio" and "psychosocial" triangles offer a space for dialogical re-alignment. Through shared decision-making loops, interdisciplinary team reflection, and what Engeström calls expansive learning, professionals can collaboratively reframe the object of rehabilitation to incorporate culturally appropriate goals. This transforms the contradiction from a barrier into a site of development and innovation—in this case, perhaps creating new post-discharge community programs or family-inclusive care pathways.

This dynamic systems perspective, rooted in the hybrid model, allows clinicians not only to identify the source of friction but to navigate it systematically, ensuring that practice becomes more responsive, culturally congruent, and theoretically coherent.

Furthermore, the hybrid model offers methodological traction for researchers and clinicians seeking to evaluate not only what outcomes are achieved, but how those outcomes are co-constructed within the activity system. It also underscores the importance of reflective practice, boundary-crossing collaboration, and iterative learning cycles—where each is basic to expansive learning theory and vital to responsive rehabilitation.

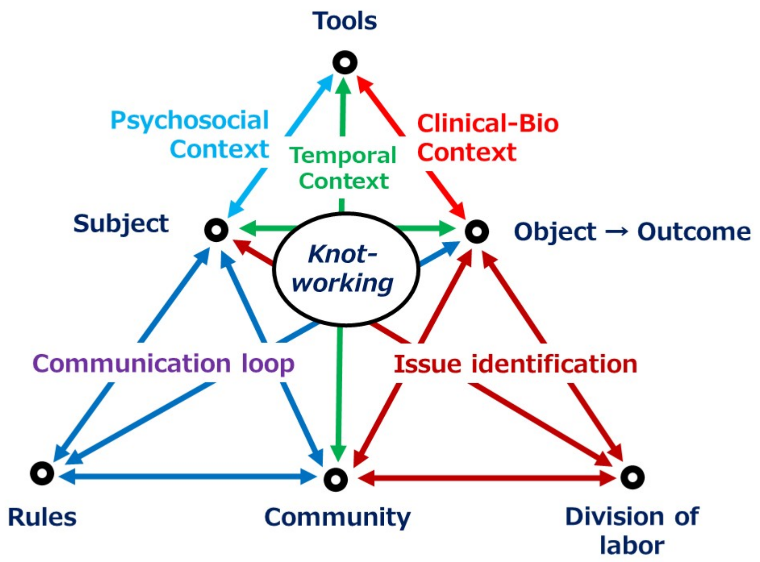

Figure 3. Hybrid rehabilitation activity model. This graphic captures how mismatched expectations between institutional practices (e.g., early discharge) and culturally situated goals (e.g., social reintegration) can either lead to system friction or, through expansive learning, to system innovation (Adapted from: Engeström, 1987/2015; Wade & Halligan, 2017; Hiragami, 2024).

In essence, by pairing the structural depth of Wade's BPS model with the systemic dynamism of CHAT, we move toward a practice-oriented, culturally attuned, and theoretically coherent model of rehabilitation—one that reflects both the complexity of health and the situated nature of human recovery.

The hybrid framework combining Wade's expanded biopsychosocial (BPS) model with Engeström's Cultural-Historical Activity Theory (CHAT) opens up new avenues for research that address the multifaceted, context-sensitive nature of rehabilitation. This model shifts the analytical focus from linear, reductionist interpretations of health and recovery toward a dynamic understanding of rehabilitation as socially mediated, culturally embedded, and historically situated. In doing so, it calls attention to the complex interplay of internal constructs, institutional rules, tools, roles, and social environments that shape patients' experience and clinical practice. Future research should explore how these elements interact across cultural, temporal, and systemic dimensions—especially in ways that generate tensions, adaptations, and innovations in rehabilitation. The following questions outline possible directions for inquiry that emerge from this integrative approach.

How do culturally shaped rehabilitation "objects"—such as independence, role restoration, or social belonging—vary across sociocultural systems, and how do these differences influence both recovery trajectories and institutional practices? (For example, compare the Western emphasis on self-management with collectivist values of role reintegration in East Asian contexts)

What types of contradictions emerge within rehabilitation activity systems—particularly between institutional rules and personal or family expectations—and how do these tensions shape patient engagement, provider decision-making, or system-level innovation? (e.g., friction between biomedical protocols and socioculturally influenced care practices; between task delegation and lived caregiver roles.)

In what ways do rehabilitation tools—ranging from language and goal-setting frameworks to therapeutic devices—reinforce or disrupt equitable participation across cultural or socioeconomic contexts? (e.g., do digital tools privilege individualistic planning models that exclude family participation or shared decision-making?)

How can shared decision-making models be designed or adapted in healthcare systems where traditional hierarchies and deference to authority still dominate clinical relationships? (e.g., explore boundary-crossing dialogue models in Japanese, Indian, or Middle Eastern rehabilitation settings.)

How might the division of labor in rehabilitation—particularly between clinicians, family caregivers, and social networks—be structured to support cultural congruence while also preventing role strain and unequal burden-sharing? (e.g., examine hybrid role negotiation strategies in intergenerational households or community-based models.)

What mechanisms best support expansive learning within interdisciplinary rehabilitation teams, especially when faced with evolving goals, conflicting protocols, or diverse stakeholder perspectives? (e.g., study how contradictions are identified, discussed, and transformed through collaborative learning cycles.)

How can Wade's and Engeström's combined framework be operationalized for evaluating context-sensitive rehabilitation outcomes, beyond functional metrics, to include psychosocial reintegration, identity reconstruction, and relational recovery?
(e.g., develop and test measurement frameworks that capture transformation across cognitive, social, and structural domains.)

How may this hybrid model be adapted to emerging rehabilitation ecosystems, including digital, telehealth, and community-based platforms that cross physical and institutional boundaries? (e.g., study the interaction of tools, community roles, and decision-making rules in virtual rehabilitation systems.)

7. Conclusion: Practical Implications of a Hybrid Framework for Rehabilitation

This paper has proposed a hybrid rehabilitation model that integrates Wade's expanded Biopsychosocial (BPS) framework with Engeström's Cultural-Historical Activity Theory (CHAT) to offer a dynamic, context-sensitive system for understanding and improving rehabilitation practice. While the BPS model helps clinicians think holistically across biological, psychological, and social dimensions, CHAT adds a procedural, systemic layer that captures how real-world practices evolve across time, roles, tools, and cultural structures.

The practical implications of this hybrid model are considerable. First, it supports clinicians in identifying and addressing the contradictions—the frictions and misalignments—between patient expectations, institutional rules, family roles, and treatment tools. These contradictions are not errors but signals of needed adaptation, and CHAT frames them as opportunities for expansive learning. This is particularly useful in rehabilitation medicine, where patient needs shift over time and where recovery is as much relational and social as it is physical.

Second, the model enhances interdisciplinary collaboration by making visible the communication loops, decision-making structures, and contextual layers within care teams. The concept of knot-working—borrowed from CHAT—describes how different actors (therapists, families, administrators, patients) can come together, temporarily and flexibly, to reconfigure care in response to complex challenges. **Figure 3** maps these dynamics in a single system, showing how bio-clinical priorities, psychosocial understanding, and cultural roles intersect around the shared object of rehabilitation.

Finally, by embedding culturally specific values—such as the prioritization of social role reintegration in Japan or the emphasis on independence in Western systems—the hybrid model enables rehabilitation practitioners to adapt care plans without importing assumptions that may not fit the patient's worldview. It also invites the development of contextualized outcome measures, which move beyond physical recovery to include social reintegration, satisfaction, and identity restoration.

In summary, this hybrid framework does more than combine two models; it opens a new direction for person-centered, culturally grounded rehabilitation science, where clinical reasoning, social participation, and system transformation are analysed together as part of a dynamic activity system.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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