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Perspective

The Case for Developing a Movement System Framework for Older Adults

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Abstract

Leaders and scholars from multiple academies of the American Physical Therapy Association are developing and defining movement system diagnoses to guide practice. However, there is no consensus on the need for or content of such frameworks. This Perspective describes current thought about movement system diagnoses in physical therapy and summarizes the work of the Academy of Geriatrics (APTA Geriatrics) Movement System Diagnosis Task Force (GMS-TF) as it contributes to the movement system diagnosis discussion within the profession. Initially convened to define movement system diagnostic labels unique to older adults, the GMS-TF's developmental process identified the need for a clearer diagnostic framework onto which specific diagnoses will later be added. Although The World Health Organization International Classification of Functioning, Disability and Health model is a strong foundation for the patient–client management model, the GMS-TF proposes formal incorporation of the Geriatric 5Ms (mobility, medications, memory, multi-complexity, and "what matters most") into a movement system framework for older adults. The GMS-TF concurs with the APTA Academy of Neurology Movement System Task Force proposal that observation and analysis of key functional tasks are the foundation of any examination of older adults. The GMS-TF suggests adding several additional movement tasks that are important for older adults. The GMS-TF believes that this strategy highlights the health care needs of older adults and prioritizes physical therapist care for older adults with complex needs. This Perspective is the foundation for a future movement system diagnosis model for older adults that will complement and facilitate the development of models of care to be applied across the lifespan.

Keywords: Geriatric 5Ms, Movement Analysis, Movement System, Older Adults, Physical Therapy

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Introduction: Why Focus on Function–Based Diagnostic Labels

The conversation about "diagnostic labels" in physical therapy is vibrant and ongoing; such debate is essential for continued development of the profession and refinement of our foundational knowledge base. Leaders and scholars involved in Academy of Geriatric Physical Therapy (APTA Geriatrics) are closely following discussions about the development of Movement System Diagnoses (MSD). Although clinicians are beginning to apply MSD models addressing knee pain[1] and stroke,[2] the impact of other conditions seen primarily in later life (frailty/sarcopenia, falls, cognitive dysfunction, multimorbidity, polypharmacy, etc.) on movement efficacy has not yet been addressed. In July 2021, The APTA-Geriatrics Board of Directors convened a Geriatrics Movement Systems Task Force (GMS-TF) to explore the necessity of MSD for older adults. The GMS-TF is charged to review existing models of MSD, identify if these effectively address movement problems experienced by older adults, and recommend how APTA Geriatrics might contribute to the evolution of MSDs.

Older adults are the most function and health diverse groups across the lifespan. The cumulative combination of life-style factors (nutrition/obesity, habitual physical activity),[3] prevalence of chronic disease,[4] susceptibility to infection and other acute disease,[5] and the aging process itself contribute to increased use of health care resources, especially by the very old. There are currently 52 million older adults living in the United States, making up nearly 18% of the US population, with a life expectancy of 19.1 years at age 65.[6] Their health status ranges from very fit and healthy to very frail and compromised, from being functionally independent to requiring total care. Older adults have been subgrouped as the relatively healthy "young old" (65–74 years), the "old" (75–84 years) likely coping with mild-to-moderate chronic disease, and "very old" (85+ years) at risk for dependence and requiring significant assistance.[7] This strategy arose from the need to better understand health needs and functional status over the 30+ year period that makes up later life.

Data from APTA's 2021 practice profile survey indicate the mean percentage of patient care time spent per week by physical therapists with patients 65 years and older ranges from 32.5% in outpatient private practice to 81.7% in skilled nursing facilities, with a weighted mean among the 6 most common clinical practice settings of 41.2% (Internal Surveys and Focus Groups Department, American Physical Therapy Association; S. Miller, email communication, July 2, 2022). Changing demographics caused the mean percentage to increase overall and in every setting since the previous APTA practice survey (Tab. 1). This increase supports the need for physical therapists who practice and specialize in the management of older adults need to contribute to the Movement System Diagnosis discussion. This perspective summarizes deliberations of the GMS-TF and presents evidence supporting the need for a movement system framework for older adults as the "first step" toward functional MSD for older adults.

The 7 member Geriatric Movement System Task Force (GMS-TF) includes academics, researchers, and clinicians from across the United States, with expertise and experience in geriatrics/gerontology and in neurologic and orthopedic physical therapy. Team members had a range of practice experience from 27 to 46 years (mean [SD] = 32.3 [6.5] years), in care settings including private practice, home care, acute care, rehabilitation, long-term care, and education/research. The team met every 3 or 4 weeks remotely and in person to deliberate and develop a geriatrics perspective on MSD. The first task was to search across practice areas for MSD information in order to trace its history in physical therapy and determine whether any practices met the needs of older adults. Although not a formal systematic or scoping review, our goal was to find all salient peer-reviewed work from the 1980s onward. The team used reference lists to ensure no relevant materials were overlooked. After reading retrieved articles, the team summarized key points/findings and discussed how well each addressed what physical therapists encountered in the care of older adults.

Foundational Classification Systems: Comparing the ICD and ICF

The World Health Organization's International Classification of Diseases (ICD) is a pathoanatomical system of diagnostic and procedural codes developed to provide common language for health care documentation and standardize collection of health information.[8] In the United States, ICD-10 coding is required for processing of all health care claims. Physicians use these diagnostic labels to describe the patient's current disease state, determine appropriate medical/surgical intervention, and ensure payment for their services.[9]

Physical therapists focus on improving physical performance and daily function at activity and participation levels; this may involve addressing impairments at the body structure and function level, modifying the task and environment to improve safety and efficacy, and optimizing movement strategies. The ICD classification system provides a medical diagnosis but fails to capture the impact of disease and its consequences on movement and quality of life. Physical therapists instead use the WHO International Classification of Functioning, Disability and Health (ICF) for a detailed look at each patient's functional status, activity limitations, and participation restrictions, while also considering contextual factors that impact function.[10] The ICF moves away from a classification system solely based on disease and death toward classification focused on function and contextual factors but does not necessarily include what matters most to the patient.

The Movement System Perspective: Pathokinesiologic or Biopsychosocial?

In her 1998 McMillan Lecture, Shirley Sahrmann introduced her vision for a physical therapy–related classification system based on the theoretical construct of normal versus abnormal movement of body segments.[11] Over the next 2 decades, Sahrmann and colleagues built a pathokinesiologic diagnostic model, presenting their work at professional conferences and creating a widely adopted textbook.[12]

The 2015 APTA House of Delegates endorsed development of a diagnostic classification system to reflect and contribute to the physical therapists' ability to manage disorders of the movement system. The 2016 APTA Movement System Summit developed criteria for classification labels, approved by the 2017 APTA House of Delegates.[13] Sahrmann 2020 publication called on all APTA Academies to continue the work the House of Delegates motion set in motion[14] with emphasis on 2 points: that "we must develop a diagnostic

Table 1. Mean Percentage of Patient Care Time Spent per Week (by Physical Therapists) With Patients 65 Years and Older[a]

Setting	2017 Mean % (*n*)	2021 Mean % (*n*)
Acute care hospital	50.8 (712)	52.6 (405)
Hospital–based outpatient facility or clinic	32.8 (1456)	37.0 (919)
Private outpatient office or group practice	30.1 (2116)	32.5 (1274)
Skilled Nursing Facility (SNF)/long-term care	79.9 (271)	81.7 (109)
Patient's home/home care	61.1 (406)	62.0 (207)
Inpatient rehab facility (IRF)	51.4 (229)	53.4 (124)
Weighted mean (all listed settings combined)	**39.7 (5190)**	**41.2 (3038)**

[a]Internal Surveys and Focus Groups Department, American Physical Therapy Association (S. Miller, email communication, July 2, 2022; from the APTA PT Practice Profile Survey, 2017 & 2021 [unpublished raw data]).

process that results in a label that is meaningful for directing treatment." and that "development of the label requires expertise in movement analysis."

APTA Academy of Neurologic Physical Therapy Movement System Task Force's 2018 White Paper notes "the profession lacks a consistent approach to movement analysis and, importantly, lacks the terminology to describe movement dysfunction in a standardized manner."[14] They identify 6 core tasks for movement analysis: (1) unsupported sitting, (2) sit to stand/stand to sit transition, (3) quiet standing, (4) ability to walk, turn, and change speed, (5) capability to step up/step down, and (6) upper extremity reach, grasp, and manipulation. They acknowledge variability within the same task even in patients with the same neurological health condition. Quinn et al proposed a systemic framework for movement analysis using Hedman et al's continuum of movement, applying contemporary theories of motor control.[14,15] This perspective holds that movement emerges from a complex interaction between the task, the person, and their environment (Fig. 1). Alteration of task and/or environment can be used to promote success or to further challenge the system. Gill-Body et al propose a diagnostic framework specific for balance dysfunction using those 6 core functional tasks observed while assessing balance/postural control and describing qualifiers of movement for diagnostic documentation.[16] ANPT's model shifts away from a pathokinesiologic orientation toward a biopsychosocial perspective.

McClure and colleagues offer another perspective by distilling movement into a parsimonious 4-element movement system model focusing on motion, force, energy, and control as the primary elements.[17] They propose that observation of functional movement is essential but did not define core functional tasks to be observed. Their 4-element model is a tool for physical therapist education to facilitate students' understanding of how these elements interact and can be systematically evaluated using existing tests and measures. This model focuses on underlying elements of movement, rather than the physiological systems of the current APTA movement system model. The 4-element model also incorporates environmental context and individual characteristics/resources. This is consistent with the models of motor learning and the ICF model. It uses the acronym CASSS (control, amount, symmetry, speed, and symptoms) as key descriptors for movement analysis.[18]

One of the criteria adopted in the 2017 House of Delegates consideration of movement system frameworks and diagnoses is "striving for movement system diagnoses that span all populations, health conditions, and the lifespan."[13] Both McClure et al[18] and APTA Neurology Movement System Task Force members[15–17] expect their movement system models to be ultimately applicable to most patient populations. The major difference between these models is the ability to systematically manipulate the task and/or the environment as part of the movement analysis process as proposed by APTA Neurology.

Guccione and colleagues[19] also understand human movement as an emergent behavior with interdependencies between task, performer, and environment. They suggest that pathokinesiologic diagnostic labels are static and ineffective in directing treatment. They argue that strategies to determine prognosis would be more useful in the long run than a pathokinesiologic diagnostic classification system. Biopsychosocial models are more dynamic, considering a patient's resources along with impairments, the tasks they must perform, and the physical and psychosocial circumstances in which movement occurs.

Brismee et al[20] concur that pathokinesiological/pathoanatomical models do not recognize the nebulous relationships between symptoms and pathology (or the lack thereof). Instead, they challenge the profession to use "expertise in screening, differentially diagnosis pathologies/impairments while taking into account movement impairment, the patient' biopsychosocial features, and personal preferences" thus investing in evidence-informed reasoning as a priority for individual patients. Jette concurs and further points out, using Dr David Nicholls provocative book, *The End of Physiotherapy*, " . . . the adoption of 'the movement system' as a fundamental principle in physical therapy practice is really a restatement of the profession's long historical association with a biomechanical approach to posture and movement."[21,22]

The profession's understanding of pain is also changing with advancements in neuroscience research: Pain during movement is understood to be an emergent and plastic phenomenon, and the association between symptoms and pathology less precise.[23] In many cases, pain cannot be explained successfully via the pathokinesiologic model. Stewart et al contend that psychological factors are more effective predictors of pain and disability levels than pathoanatomical factors.[24] Brismee et al caution that "what might be considered to be pathokinesiologic or kinesiopathologic might be natural variations in movement and perhaps clinically irrelevant."[20] McClure notes that the relationship between pain and movement is complex; pain is included in the 4-Element model by considering symptoms during task analysis.[18] In the 21st John H.P. Maley Lecture, George, using lively language, noted that "As we transform ourselves, we must realize that acquiring expertise in the human movement system without improving our ability to effectively manage pain is another example of professional masturbation. We must clearly and directly

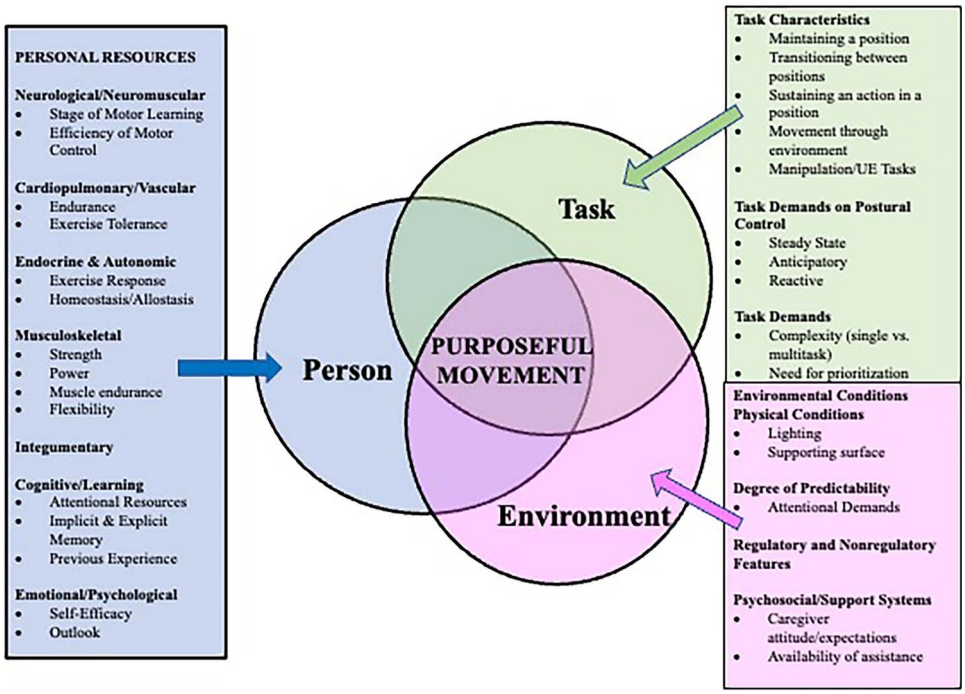

Figure 1. Movement emerges from a complex interaction among the task, the person, and their environment.[15,16]

indicate how we will use our expertise in the movement system to provide relief from pain and suffering."[25]

Criticisms of movement system diagnosis include concerns about the "fit" of MSD in the established documentation system, and the ability to distill language about movement across the specialty areas of physical therapist practice.[26] Sahrmann believes that physical therapist movement system diagnostic labels are essential because they communicate our understanding and expertise in examining factors and/or mechanisms contributing to an individual's functional problem[14] and enhance communication about the role and scope of physical therapy to colleagues in other disciplines. Jette[21] argues that profession-specific labels create barriers to communication among health professionals, hindering interdisciplinary care and collaboration. He supports the ICF framework as an optimal means to share common language and perspective across disciplines.

Each version of a movement system model or diagnostic strategy moves the profession toward a clearer description of our focus in providing care. The work by Deutsch et al,[27] "Updated Integrated Framework for Making Clinical Decisions Across the Lifespan and Health Conditions," builds on earlier work of Schenkman and colleagues[28] addressing clinical decision making within the context of an ICF biopsychosocial framework by focusing on patient relevant movement tasks for analysis. Schenkman et al contend that focus on the individual's movement ability and identification of potential plasticity across systems during examination and evaluation enhances clinical care and treatment interventions to better achieve structural change within physiologic systems and enhance efficacy of movement.[28]

Whether a single model can be applied across all dimensions of physical therapist practice is yet to be determined, as ideal as such a model would be.[29] The dialog so far has been rich and creative. The independent work of each of the groups ensures that all relevant perspectives will be considered. Evolution of similar concepts across workgroups provides evidence of content validity as the profession adopts the movement system as our underlying framework, movement analysis as our mechanism to evaluate, and eventually, development of a functionally oriented classification system to better direct intervention.

The GMS-TF's review of existing physical therapist diagnostic models identifies many aspects applicable to older adults. Ideally, future work of the GMS-TF will integrate key aspects of published models into a paradigm to be applied in care of older adults regardless of medical diagnoses, across practice settings, incorporating a biopsychosocial paradigm of health, and effectively addressing conditions unique to later life. The GMS-TF applauds the incredible conceptual effort that has led the profession to this point. We seek to add to the discussion/evolution of the concept that will guide examination, evaluation, intervention, and outcomes assessment for the profession's future. Acknowledging that any framework proposed will continue to evolve, an integrated model is the initial step in defining MSD for conditions unique to older adults.

Why Consider the Geriatric 5Ms Perspective?

Geriatricians have long struggled to sort through and prioritize care for complex older patients. The Geriatric 5Ms incorporates shared decision making, with the cornerstone being "What Matters Most" to the older adult and their family.[30,31] The framework explicitly and succinctly describes what Geriatricians must consider for effective care of older adults, using 5 key words: Medications, Mentation/Mind, Multi-Complexity, Mobility, and What Matters Most (Fig. 2).This model is just as applicable to guide physical therapists' focus on function because of the complexity of health needs of many older adults

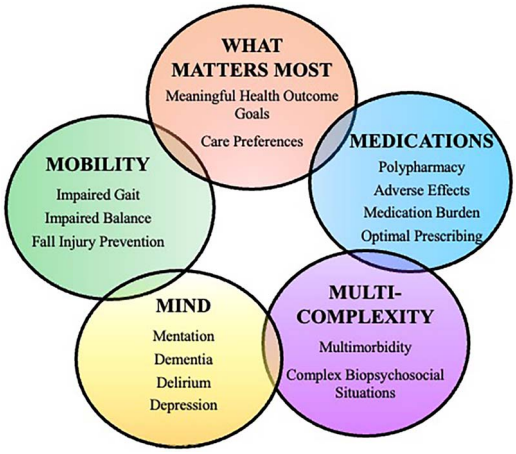

Figure 2. The Geriatric 5Ms[31,32] incorporates shared decision making, with the cornerstone being "What Matters Most" to the older adult and their family. Adapted with permission from Table 1 of: Molnar F, Frank CC. Optimizing geriatric care with the GERIATRIC 5Ms. *Can Fam Physician.* 2019;65(1):39.

receiving physical therapist care. The GMS-TF believes incorporation of the Geriatric 5Ms inside the ICF'S biopsychosocial model is essential. This patient-centered/shared decision-making model provides a foundation for prioritized physical therapist care across an array of potential problems and medical diagnoses.[30,31] Movement analysis of key functional tasks/activities offers optimal insight to guide physical therapist management of older adults.[32] Although charged to focus on MSD specific to older adults, reflecting on the literature has prompted GMS-TF members to begin development of a diagnostic process or framework as a foundation prior to developing definitive diagnoses.

Because older adults present with multiple, interacting, health conditions, this multi-complexity often leads to an extensive problem list that challenges health professionals managing their care. Additionally, care is often fragmented as specialists focus on diseases within their area of expertise, increasing risk of polypharmacy and adverse outcomes. Tinetti, a leading geriatrician, writes, "The medications, health care visits, testing, procedures, and self-management tasks entailed in treating multiple chronic conditions require investments of time and effort that may be burdensome and conflict with what patients are willing and able to do."[33] The Geriatric 5Ms model, endorsed by the American, Canadian, and British Geriatrics Societies, is an evidence–based, patient-centered guide for geriatricians and other health professionals caring for older adults.[34–36] The 5Ms approach actively involves older adults and/or their caregivers in determining priority; this makes caring for older adults efficacious by targeting the older patient's goals.[30,31] The GMS-TF believes that the Geriatric 5Ms perspective will be an essential component in the evolving MSD Framework for older adults, who often present with pain fatigue, lack of energy or poor sleep, unsteadiness and slow walking, and shortness of breath and dizziness.[33] Their physical therapist care is frequently complicated by polypharmacy and drug interaction, frailty, cognitive issues, and interaction of multiple morbidities.[37]

Developing a functionally oriented movement system framework, incorporating the 5Ms as well as descriptors of severity, will better inform decisions about prognosis, focus physical therapist intervention (prevention, recovery/rehabilitation, compensation for deficits, or accommodation/adaptation), clarify need for assistance, and better consider optimal living arrangements for older adults. MSD that evolve from such a framework have the potential to not only mitigate the ICD classification/physical therapist care mismatch but also add useful specifics to the traditional ICF information.

Rationale for a Movement System Framework for Older Adults

Functional movement is a set of complex behaviors performed within a specific context to achieve a particular movement goal. Interaction of multiple underlying physiological, cognitive, and emotional "support" systems allows the individual to adapt performance based on changes in task demand and environmental conditions. Fluctuation of physiologic activity within the human movement system contributes to an individual's ability to adapt motor behavior to meet goals.[38] Because there are many ways to approach any given movement task, observed movement may represent the most efficacious given an individual's resources and constraints. The underlying goal of physical therapist intervention is to facilitate development of movement options that are efficient, stable, and adaptable to the often-unpredictable environments in which function occurs.[39]

When interacting with older adults, the most frequently expressed concern is fear about loss of independence and ability to care for themselves, regardless of what prompted entry into a health care encounter.[40] Many functional tasks (eg, ability to rise from sitting without using arm support,[41] usual walking speed,[42] and grip strength)[43] quantify functional decline over time, and assess risk of morbidity and mortality. Vulnerability around loss of independence and self-direction requires greater attention to the activity and participation components of the ICF model, as well as incorporation of social support/caregiver into physical therapist management of older adults. This is where profession-specific, movement-focused, diagnostic labels would better define the contributions made by physical therapists in the care of older adults.

Physical therapists traditionally document the ability to perform functional tasks and the level of assistance required for safe performance. This does not address underlying contributors to movement dysfunction; "how" and "how well" a task is being performed (e.g., effectiveness of movement strategy, level of effort/difficulty, consistency of performance etc.). Physical therapists also consider whether task performance is likely to be "recovered" after illness or injury, requires adaptation, may lead to secondary dysfunction over time, or must be compensated for in the presence of a deficit unlikely to change.

Several papers on movement analysis of core tasks provide salient models development of an evidence–based movement system framework and classification. Gill-Body and colleagues[17] operationally defined components/characteristics of balance and underlying systems that influence/control balance function, characterized 3 dimensions of balance encountered clinically (steady state, anticipatory, and reactive postural control), defined deficits likely in each of the 3 dimensions of balance, and identified key functional tasks during which balance deficits are observed. Evaluation includes observation of the individual's ability to plan and organize, initiate,

sustain, adapt, and complete movement, much like McClure et al's 4-Element model's motor control dimension.[18] These 2 frameworks (Movement Analysis of Tasks and the 4-Element model) are especially appropriate for older adults.

The 6 core movement tasks recommended by the ANPT Movement Systems Task Force are appropriate for all older adults; however, we recommend 3 additional salient tasks be considered as well: their ability to (1) get into/out of bed (supine to/from sitting transition); (2) transfer bed to/from chair; and (3) rise from the floor. Difficulty getting out of bed is a powerful predictor of functional decline, hospitalization, and mortality.[44] The ability to transfer bed to chair is an important determinant of discharge destination after hospitalization for injury or acute illness.[45] The ability to rise from the floor reduces the risk of a "long lie" after a fall, providing a measure of safety for populations at risk for falls.[46,47] Analysis of any task/s salient to the patient must also be considered (Tab. 2).

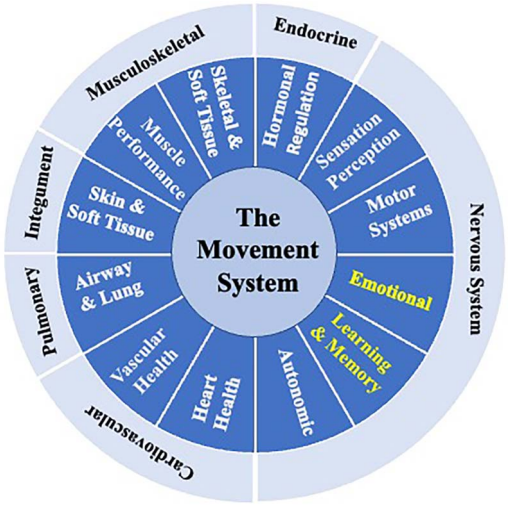

Figure 3. Movement System Model. Adapted with permission of the American Physical Therapy Association.

Preliminary Thoughts on the Geriatric Movement System Framework

The GMS-TF understands movement from a dynamic systems perspective as well as from current motor learning models.[48] Purposeful (functional) movement is goal directed and emerges from the interaction of the individual (considering resources and limitations across multiple physiological systems as well as emotional and cognitive systems); the nature of the task itself (stability, transition between positions, mobility, manipulation/UE use), and the physical and psychological/emotional environment (predictable vs unpredictable) in which the individual lives and functions.[49] Observation of functional movement, then, can identify the efficacy of the individual's resources to accomplish a task and where improvement might be possible[39]; determine whether the movement task is too complex, thus requiring adaptation or remediation/rehabilitation of the person's resources, and how their lived environment might facilitate or inhibit safe and effective task accomplishment, necessitating modification. Such information is necessary for selection of additional further tests/measures to document baseline, development of an appropriate evidence–based plan of care, and assessment of change/efficacy of intervention.

Early MSD models identify the underlying physiological systems that influence the movement quality/effectiveness of an individual's movement performance; however, they do not explicitly identify the role of cognitive/learning/memory and emotional/behavioral/psychological systems as contributors to the quality of movement. Both systems are powerful influences on function in older adults. One of the challenges reported by older adults is the efficacy of learning and memory systems, in healthy, high functioning individuals as well as those impacted by depression, mild cognitive decline, and various types of dementia.[50] An older individual's ability to learn and remember must be considered in determining prognosis to change motor behavior. How this aspect of a person's individual resources be integrated into development of MSD needs to be determined.

The GMS-TF strongly suggest 2 additional dimensions especially salient for older adults be added to the current APTA Movement System Model: (Fig. 3)

1. **A cognitive/learning/memory dimension:** understanding of a movement task, ability to problem solve, alternative ways to approach a task across environments, patient relevant education regarding pain with movement experiences.
2. **An emotional/behavioral/psychological dimension:** "motivators" or influencers on engagement in movement and activity (including fear of injury, pain, or failure; and self-efficacy about being able to perform the task safely, comfortably, and effectively)

We are recommending 2 familiar models, APTA's patient–client management model and the WHO's ICF as the foundation for a geriatric-focused movement system framework. Including the Geriatric 5 Ms as well will ensure a patient-centered, biopsychosocial perspective. In addition to clearly explaining the model, we will need to evaluate its validity and plan for the dissemination of the model to physical therapists caring for older adults across care settings will then need to be put into place. Feedback from patients, practitioners, and caregivers will further shape the framework. Strategies to determine "what matters most" to the individual, as it relates to physical therapist care, need to be developed and tested. Because of the prevalence of cognitive impairment among older adults, especially of the very old, a great deal of effort will be needed to incorporate indicators of learning and memory into any assessment framework. Only then will the work of developing movement system diagnostic labels become feasible.

Conclusion

In this Perspective, we have outlined the evolution of the movement system as foundation for physical therapist practice, identified commonalities and differences across movement system frameworks, and considered how the complex health care needs of older adults are addressed by frameworks to date. We concur that movement analysis of key meaningful daily activities is essential and applaud that the definition of characteristics of effective movement and movement dysfunction has begun. We believe that consideration of the interaction of the individual, the task, and the environment during

Table 2. Suggested Core Tasks for Movement Analysis for Older Adults[a]

Movement Task	Description	Task Characteristic	Dimensions to Consider
Unsupported Sitting[b]	Ability to maintain upright posture (30 s) while sitting on a firm surface with feet on the floor and hands resting in the lap	Maintaining a position	Stability/sway Verticality Alignment Symmetry
Sit to stand[b]	Ability to transition from unsupported sitting on a firm surface to standing position	Transitioning between positions	Preparation, initiation, control, and termination Speed and amplitude Smoothness and sequencing Timing and accuracy Level of effort/need for assistance
Unsupported standing[b]	Ability to maintain upright posture for 30 s standing on a firm surface	Maintaining a position	Stability/sway Verticality Alignment Symmetry
Ability to walk[b]	Ability to walk at "comfortable" speed for 10 m, turn around, and return to starting position	Movement through the environment	Preparation, initiation, execution, and termination Speed and amplitude Smoothness and sequencing Timing and accuracy Level of effort/need for assistance
Ability to step up[b]	Ability to step up and then backwards down onto 7-in stool or step, first with R limb, then with L limb	Transitioning between positions	Initiation, execution, and termination Speed, amplitude, smoothness, sequencing, timing, and accuracy Strength and power of LE Level of effort/need for assistance
Reach, grasp, manipulation[b]	While in unsupported sitting, reaching for a cup filled with foam pieces, lifting the cup, and emptying into a different cup	Manipulation, sustaining an action while in a position	Initiation, execution, and termination Anticipatory/reactionary postural control Speed, amplitude, smoothness, sequencing, timing, and accuracy Strength and power of LEs
Getting in and out of bed[c]	Ability to safely transfer from a sitting position on the edge of a bed to a supine position, and then return to a sitting position again	Transitioning between positions	Initiation, execution, and termination Anticipatory/reactionary postural control Speed, amplitude, smoothness, sequencing, timing, and accuracy
Bed to chair transfer[c]	Ability to safely and efficiently move from unsupported sitting on a soft surface (bed) to a chair placed at a 45° angle next to the bed	Transitioning between positions	Initiation, execution, and termination Anticipatory/reactionary postural control Speed, amplitude, smoothness, sequencing, timing, and accuracy Strength and power of LEs
Descend to the floor from standing, and return to standing[c]	Ability to move from a standing position safely and efficiently to sitting/lying on the floor, and return to standing	Transitioning between positions	Initiation, execution, and termination Anticipatory/reactionary postural control Speed, amplitude, smoothness, sequencing, timing, and accuracy
Patient-specific movement task(s)[c]	Movement analysis of a task specific to an individual's interests/needs	Determined by task chosen by patient	As appropriate to patient-specific task

[a]If an older person has difficulty performing the task, the therapist repeats the core activity at least once, manipulating (regressing/simplifying) the task (eg, increasing base of support, slower speed of movement), the environment (surface height, verbal cues/instructions, providing assistance or support, and/or simplifying distraction), or both. If the individual performs the task easily, the therapist "progresses" (increases difficulty of) the task (narrowing based of support, moving more quickly, adding perturbation, or introducing dual task conditions for more cognitive demand) and/or increasing environmental complexity (altering step height, lowering seat height, altering surface/adding foam or other less stable surface, adding visual/auditory distraction). L = left; LE = lower extremity; R = right. [b]Identified by the Neurology Movement System Task Force. [c]Additional tasks added by the Geriatric Movement System Task Force.

functional activity is a foundational component of movement analysis. We recommend that the cognitive/learning/memory systems and the emotional/ behavioral/ psychological systems be incorporated into the professions concept of the movement system to better address the needs of older adults. We recommend that the Geriatric 5Ms, a developed and tested model used by medical geriatricians to improve care and communication, are equally applicable in physical therapy, and will assist prioritization and efficacy of physical therapist examination, evaluation, and intervention. We believe that, even though there are medical conditions almost exclusively encountered in older adults, we first need a working movement system model that integrates multiple contributors to movement efficacy before we can define movement diagnoses.

As each movement system model included in this review is the product of independent work groups; commonalities across groups support content validity of the movement systems concept. We anticipate that conversations across workgroups will eventually lead to consensus. In the meantime, there is much conceptual and practical collaborative work to be done. The ongoing work of developing movement system framework and, eventually, MSD, is a crucial developmental

step for the profession. The GMS-TF is grateful to join the debate and discussion and looks forward to further work of making a consistent systematic movement analysis model the cornerstone of our profession.

Author Contributions

Concept/idea/research design: M.M. Lusardi, G.W. Hartley, S.J. Leach, L.Z. Gras, M. Larkin, K.L. Miller, M. Quiben
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Project management: M.M. Lusardi

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Disclosures and Presentations

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

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