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Roy's Adaptation Model To Promote Physical Activity Among Sedentary Older Adults

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The aging population is rapidly increasing in size and with that, there is a growing need for age appropriate physical activity (PA) programs to help them age successfully. Older adults face many challenges in adaptation to aging and related physical function, emphasizing the importance of developing interventions to promote adaptation to aging such as increasing PA among older adults.

A primary concern for the aging individual is the decline in physical function, compounded with the increased prevalence of sedentary behavior. In 2005, 47% of the young-old (65 to 74) reported no leisure time activity, with 60% of the old-old (over 75 years old), reporting no leisure time activity.¹ These data indicate that the aging population is falling short of HP 2010 goals and the American College of Sports Medicine (ACSM) and American Heart Association (AHA) guidelines for PA for older adults.² Those guidelines recommend at least 30 minutes of moderate intensity PA at least 5 times per week, strength training and flexibility two times a week and balance training. Further, they recommend that sedentary older adults begin with balance, flexibility and strength training to build endurance prior to participating in moderate to vigorous-intensity aerobic PA.²

The interplay of mind-body theoretical concepts and PA has increased in popularity since the 1990's and makes up 30% of the exercise programs in fitness centers.³ Mind-body practices that blend physical movement or postures, a focus on the breath and mind achieve deep states of relaxation include, but are not limited to, familiar forms such as Yoga, Tai Chi (TC), Qigong, and other less familiar forms such as Sign-Chi-Do (SCD).^{4–6} SCD, grounded in the principles of traditional Chinese medicine, incorporates deep breathing and mental concentration during the movement to achieve harmony between body and brain, and is a novel form of PA that has multiple health benefits including strengthening muscles and improving balance using a mind-body approach.⁴ Both the mind-body interactions and the potential for improved functional outcomes resulting from these forms of PA make them particularly appealing for older adults.^{7, 8} SCD is particularly suitable for older adults, as it is implemented without the aerobic and

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musculoskeletal strain that is sometimes associated with higher intensity exercise, while providing a mild to moderate intensity PA. There is a growing body of research that indicates a wide range of potential health benefits from mind-body exercise.⁹ However, there has been limited research exploring mind-body PA interventions for adaptation and physical function among older adults. This discussion is focused on the description of the development of a theory-based intervention to promote successful adaptation to an active lifestyle based on Roy's Adaptation model and guided by evaluation theory to address theoretical integrity.¹⁰

Theoretical Approach

The broad nature of the Roy Adaptation Model (RAM) developed by Sister Callista Roy, allows an examination of PA and the development of a theory-based intervention from an expanded, integrated, and holistic nursing perspective. According to the RAM, nursing's biobehavioral knowledge "balances understanding of the person as both a physiologic being in a physical world and as a thinking and feeling being with human experience in a cosmic world."¹¹ Human beings and groups are perceived as holistic, adaptive systems that constantly change and interact with their environment. Health is a process of being and becoming integrated and whole and reflects environment and person mutually. According to Roy, the overall goal of nursing is to focus on promoting health of the individual and group by promoting adaptation in each of four adaptive modes: physiological-physical, self-concept, role function, and interdependence.¹¹

Adaptation is assessed and measured in physical (physiologic) and psychosocial (selfconcept, role function, and interdependence) modes: physiologic-physical, measures bodily function and specific to this study, the level of activity and function; self-concept, the composite of beliefs including spirituality and feelings one has of oneself at a given time operationalized as confidence to exercise or self-efficacy; role function, a set of expectations about how a person functions and relates with others; and interdependence, giving and receiving love via nurturing relationships.¹¹ While all of these modes are important, this intervention will focus on adaptation to aging using Roy's theoretical physiologic-physical and self-concept modes to evaluate the effect of SCD on physical function and personal beliefs.

The RAM has been used in studies of physical activity and cancer to promote adaptation and quality of life.^{12, 13} Flood used the RAM to define adaptation to successful aging.¹⁴ The optimal level of adaptation is consistent with active aging as defined by the WHO and others to include the importance of treating the person as a whole; emphasizing physical and psychological function, as well as spirituality.^{11, 14, 15} The goal of the described intervention is to promote adaptation by enhancing the physiological-physical and self concept modes through a meditative movement (SCD) intervention that enhances physical activity performance, spirituality, and self efficacy.

Problem Definition

Adaptation is the primary concept of interest in the RAM. It is the dynamic process whereby people use conscious awareness and choice to create human and environmental integration. The RAM model depicts the individual as a biopsychosocial being who is able to adapt to environmental stimuli categorized as focal, contextual, or residual. When assessing physical function, sedentary lifestyle is viewed as the focal stimulus, which leads to maladaptive responses for older adults (disuse consequences and negative beliefs). Contextual stimuli are indirectly related to the focal stimuli such as PA and personal beliefs. The residual are all other stimuli that affect the focal and contextual stimuli such as relationships with family and friends.

Adaptation includes two processes called the regulator and cognator subsystems.¹⁶ The regulator subsystem includes automatic bodily responses through neural, chemical and

endocrine adaptation channels.¹¹ The cognator subsystem responds through four cognitive-emotional channels: perceptual and information processing, learning, judgment and emotion.¹¹ The effects of the regulator and cognator interact, but cannot be measured at this level, however, they are measured in behavioral outcomes assessed in adaptation.¹¹ Adaptation occurs when the cognator and regulator subsystems are stimulated, resulting in behavior changes measured in physiologic and psychosocial modes.

The physiologic mode measures all bodily function and specific to this intervention, physical function. In the RAM, the psychosocial or mind and spirit modes are self-concept, role function, and interdependence.¹¹ Self-concept deals with personal aspects of human systems, specifically psychic and spiritual integrity.¹¹ It is a composite of beliefs one holds at a given time. In an older adult who is sedentary, self-concept is characterized by a decreased confidence in the ability to exercise and spirituality. Maladaptive responses occur when adaptive mechanisms are inadequate, resulting in activity intolerance and disuse consequences for sedentary aging adults.¹¹ The “problem”, then, used to develop the following intervention, is the ‘maladaptive’ response of older persons, sedentary behavior, that is amenable to ‘treatment’ or an intervention that promotes adaptation through Sign-Chi-Do.

Critical Inputs

Roy’s conceptualization of adaptation defines a sedentary adult as in a maladaptive state due to an inability to regulate their physiological and psychological state. An intervention needs to impact both of these modes. It is theorized that SCD will promote adaptation by enhancing the Regulator and Cognator subsystems, and influencing the focal and contextual stimuli through the mind, body, and spirit connections of deep breathing and meditation combined with purposeful movements to promote adaptation measured in the selected physiologic and self-concept modes. The Regulator subsystem will enhance adaptation through the physical movements that foster spiritual connections, which will improve balance and physical function. The cognitive function of the Cognator allows humans to obtain knowledge and promote adaptation through increased self-efficacy measured in the self-concept mode. In this intervention, a mind, body, and spiritual PA will be tested to promote adaptation to aging by improving the personal beliefs of community dwelling older adults and subsequent outcomes of improved physical function.

The dose of the intervention is the primary critical input. Increases in the regulator and cognator critical inputs will be achieved through one hour weekly sessions with groups of 15 participants each, over 12 weeks; the length was selected based on a review of previous TC programs.^{17, 18} Participants are given a copy of an instructional DVD or video to facilitate practice of movements at home, between classes. Participants are encouraged to practice at least 10 minutes, 2 times between classes the first week, increasing the time to include up to the recommended 30 minutes at least 5 days per week.

Mediating Processes

Mediating processes are conceptualized by Roy as the contextual stimuli.¹¹ For this intervention, a combination of the physical movement of the SCD and the self-concept enhancement of personal beliefs mediate the adaptation process in sedentary older adults. These activities are the regulator and cognator inputs for the intervention including: spiritual/self-reflection and physical movement; and self-efficacy enhancement strategies.

Spiritual and physical movement

The regulator critical input for this intervention includes a mind-body-spiritual exercise called Sign-Chi-Do (SCD) Exercise. SCD utilizes slow, continuous movements of the arms and legs,

similar to TC.^{4, 9} The movements incorporate balance, postural alignment, concentration, and muscle strengthening.^{4, 9} SCD movements begin with the toe first; completion of the form while experiencing the meaning of the word phrase is the goal of SCD. The meditative effect is achieved by concentrating on positive word phrases of prayer.⁴ Those word phrases are taught in a three step pattern: do the movement (engaging the body), visualize what the phrase means (engaging the mind), and feel the word phrase (engaging the spirit). Self efficacy and spirituality are enhanced through this intervention designed to ask participants to selecting their own picture of the words in their mind, and identifying how the word makes them feel during the intervention.

There is a growing body of knowledge to support the importance of spirituality among the aging population.^{14, 19, 20} Spirituality is defined as the personal quest for understanding answers to ultimate questions about life, meaning and a relationship with the sacred or transcendent, which may (or not) lead to or arise from the development of religious rituals and the formation of community.²¹ Low spirituality is reported to have a high relationship with all cause mortality.²² Spiritual feelings are emphasized during SCD.

Self-efficacy

The intervention is anticipated to enhance the cognator mode by improving personal beliefs through increasing self-efficacy with a spiritual focus to improve the way participants feel about themselves. SCD uses a three step technique to engage the mind, body and spirit in physical activity. First, the physical boundaries of word phrases are demonstrated by the instructor and practiced by the group participants, encouraging the participant to visualize and “feel” the word phrase. This three step process also helps the individual remember the movements so they can be repeated, consistent with the learning principles of the RAM.¹¹ Self efficacy is enhanced in four ways: demonstration of the SCD movement; seeing the SCD movements performed by others, repeating the SCD movements themselves, and increasing daily participation in the SCD movements.

Assessment of confidence to exercise would also evaluate personal beliefs at a given time. Levy and Meyers write that health problems are inevitable with aging and this contributes to an unwillingness to engage in PA and maladaptive adaptation.²³ This belief is reinforced by the following reported barriers to PA among older adults: feelings of inability to perform PA (low self-efficacy); fear of falling; and self-rated poor health accompanied by pain and fear of pain.^{24, 25} Self-efficacy is the confidence a person feels in performing a behavior and overcoming the associated barriers.²⁶ Several studies have reported a significant positive relationship between physical activity and self-efficacy ($r = .30 - .70$ and $b = .493$).²⁷⁻²⁹ Assessment of confidence to exercise is evaluated in this intervention.

Expected Outcomes

The overarching outcome for this intervention is adaptation. Adaptation is improved physical function and measured by the outcomes that relate to the physiologic mode including: improved BP, 6-minute walk, and Timed-Up-& Go. Mind-body exercises have been shown to improve physical function in older adults. Slow meditative movements such as TC and SCD may improve physiologic function (blood pressure, 6-minute walk distance, and Timed-Up-& Go) from a mind-body perspective which may promote adaptation on multiple levels.

Exogenous Variables

According to the RAM, residual stimuli are environmental factors that have an unclear effect on the current situation and may include family relationships or a previous fall which may be extraneous variables related to adaptation.¹¹ For example, it has been reported that situations

such as unplanned hospitalizations have contributed to declining functional status among previously active older adults.³⁰ Other extraneous factors include age in calendar years, gender (male and female), current chronic illness, level of education in years, ethnicity and race, life crisis, new diagnosis of chronic disease.

Implementation Issues

Implementation strategies are vital to the success of this theory-based intervention. SCD classes are to be taught by a trained facilitator and all course materials are available on a DVD to provide a consistent delivery of the information. The SCD classes are taught in a classroom to provide privacy to the participants who are encouraged to ask questions at any time. In recognition of the safety of participants, chairs are provided, and those who are unstable will begin the class in the seated position. Class size is a concern for safe implementation of this intervention, with no more than 15 participants per class with a co-facilitator providing teaching support.

Application to Clinical Practice

This discussion of the critical elements of Roy's Adaptation model in the application to the development of programs and interventions to guide practice in health promotion in older persons gives clinicians several ways to use a theoretical model to guide the development of a physical activity intervention in older persons. First, the elements of enhancing spirituality and self efficacy are described with an alternative form of PA to increase strength and endurance in older persons. Second, carefully detailing the significant elements of the theory increases our understanding of identification of what components 'work' in an intervention, and which components are excluded.

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REFERENCES

1. U.S. Department of Health and Human Services. Healthy people 2010. [Accessed November 30, 2006]. Available at: <http://healthypeople.gov/document/HTML>
2. Nelson ME, Rejeski WJ, Blair SN, et al. Physical activity and public health in older adults: Recommendation from the American college of sports medicine and the American heart association. *Med Sci Sports Exerc* 2007;39:1435–1445. [PubMed: 17762378]
3. La Forge R. Aligning mind and body: Exploring the disciplines of mindful exercise. *ACSMs Health & Fitness Journal* 2005;9:7.
4. Borik, A. Sign Chi do: The Power of Mind and Body Fitness. Chandler, AZ: SignChiDo Press; 2004.
5. Larkey L, Jahnke R, Etnier J, Gonzalez J. Meditative movement as a category of exercise: Implications for research. *Journal of Physical Activity & Health*. in press.
6. Steiner, R.; Wegman, I. Fundamentals of Therapy: An Extension of the Art of Healing through Spiritual Knowledge. Whitefish, MT: Kessinger Publishing; 2003.
7. Beaudreau SA. Qualitative variables associated with older adults' compliance in a tai chi group. *Clin Gerontol* 2006;30:99–107. Available from: [internal-pdf://Beaudreau-3280537102/Beaudreau.pdf](#).
8. Li F, Harmer P, Fisher KJ, Xu J, Fitzgerald K, Vongjaturapat N. Tai chi-based exercise for older adults with Parkinson's disease: A pilot-program evaluation. *Journal of Aging & Physical Activity* 2007;15:139–151. Available from: [internal-pdf://Li Harmer Fisher Xu Fitzgerald Vongjaturapt-2026309123/Li Harmer Fisher Xu Fitzgerald Vongjaturapt.pdf](#). [PubMed: 17556781]

9. Rogers CE, Larkey LK, Keller C. A review of clinical trials of tai chi and qigong in older adults. *Western Journal of Nursing Research* 2009;31:280–284.
10. Sidani, S.; Braden, CJ. *Evaluating Nursing Interventions: A Theory-Driven Approach*. Thousand Oaks, CA: Sage; 1998.
11. Roy, C.; Andrews, HA. *Roy Adaptation Model*. 2nd ed.. Stanford, CT: Appleton & Lange; 1999.
12. Headley JA, Ownby KK, John LD. The effect of seated exercise on fatigue and quality of life in women with advanced breast cancer. *Oncol Nurs Forum* 2004;31:977–983. [PubMed: 15378098]
13. Young-McCaughan S, Arzola TM, Leclerc KM, et al. Exercise tolerance 18-months following participation in an exercise program for patients treated for cancer. *Oncol Nurs Forum* 2007;34:189.
14. Flood M. A mid-range nursing theory of successful aging. *J Theory Construct Test* 2005;9:35–39.
15. Crowther MR, Parker MW, Achenbaum WA, Larimore WL, Koenig HG. Rowe and Kahn's model of successful aging revisited: Positive spirituality--the forgotten factor. *Gerontologist* 2002;42:613–620. [PubMed: 12351796]
16. Hanna DR. Using the Roy adaptation model in management of work groups. *Nurs Sci Q* 2006;19:226–227. [PubMed: 16757787]
17. Wolf SL, Barnhart HX, Kutner NG, et al. Selected as the best paper in the 1990s: Reducing frailty and falls in older persons: An investigation of tai chi and computerized balance training. *Journal of the American Geriatrics Society* 2003;51:1794–1803. [PubMed: 14687360]
18. Yeh GY, Wood MJ, Lorell BH, et al. Effects of tai chi mind-body movement therapy on functional status and exercise capacity in patients with chronic heart failure: A randomized controlled trial. *American Journal of Medicine* 2004;117:541–548. [see comment]. [PubMed: 15465501]
19. Eisenhandler SA. "Religion is the finding thing": An evolving spirituality in late life. *Journal of Gerontological Social Work* 2005;45:85–103. [PubMed: 16172064]
20. Koenig HG. Religion, spirituality and aging. *Aging & Mental Health* 2006;10:1–3. [comment]. [PubMed: 16338807]
21. Koenig, HG.; McCullough, M.; Larson, DB. *Handbook of Religion and Health: A Century of Research Reviewed*. New York: Oxford University Press; 2001.
22. McCullough ME, Hoyt WT, Larson DB, Koenig HG, Thoresen C. Religious involvement and mortality: A meta-analytic review. *Health Psychology* 2000;19:211–222. [PubMed: 10868765]
23. Levy BR, Myers LM. Preventive health behaviors influenced by self-perceptions of aging. *Preventive Medicine* 2004;39:625–629. [PubMed: 15313104]
24. Rasinaho M, Hirvensalo M, Leinoen R, Lintunen T, Rantanen T. Motives for and barriers to physical activity among older adults with mobility limitations. *Journal of Aging and Physical Activity* 2006;15:90–102. [PubMed: 17387231]
25. Resnick B. Health promotion practices of older adults: Model testing. *Public Health Nursing* 2002;20:2–12. [PubMed: 12492820]
26. Baranowski, T.; Perry, CL.; Parcel, GS. How individuals, environments, and health behavior interact: Social cognitive theory. In: Glanz, K.; Rimer, BK.; Lewis, FM., editors. *Health Behavior and Health Education: Theory, Research, and Practice*. 3rd ed.. San Francisco: John Wiley & Sons; 2002. p. 8
27. Gallagher KI, Jakicic JM, Napolitano MA, Marcus BH. Psychosocial factors related to physical activity and weight loss in overweight women. *Med Sci Sports Exerc* 2006;38:971–980. [PubMed: 16672853]
28. McAuley E, Konopack JF, Morris KS, et al. Physical activity and functional limitations in older women: Influence of self-efficacy. *Journals of Gerontology Series B-Psychological Sciences & Social Sciences* 2006;61:P270–P277.
29. Netz Y, Wu MJ, Becker BJ, Tenenbaum G. Physical activity and psychological well-being in advanced age: A meta-analysis of intervention studies. *Psychology and aging* 2005;20:272–284. [PubMed: 16029091]
30. Wu HY, Sahadevan S, Ding YY. Factors associated with functional decline of hospitalized older persons following discharge from an acute geriatric unit. *Annals of Academy of Medicine* 2006;35:17–23.

Figure 1.
Critical Inputs

Table 1

Intervention Components of Roy's Adaptation Mode

Problem	Critical Inputs	Mediating Processes	Expected Outcomes	Exogenous Factors	Implementation Issues
Maladaptation to aging due to sedentary behavior	Regulator and Cognator Subsystem enhancement Personal Belief, spirituality, self efficacy	Spiritual Enhancement Self Efficacy Enhancement Self Concept Enhancement	Increased Physical Function: 6 minute walk, Timed Up & Go test; Blood Pressure	Residual Stimuli, Chronic Illness, SES and cultural considerations	Chronic illness affecting balance Safety Room set-up Different levels of physical function