

Validating the Stages of Change for Physical Activity

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Claudio R. Nigg, Ph.D, University of Hawaii

on behalf of the BCC PA workgroup

Contact: cnigg@hawaii.edu

Rationale for Physical Activity (PA)

Exercise is correlated with a large variety of psychological and physiological health benefits (Bouchard, Shepard, & Stephens, 1993; Crews & Landers, 1987; North, McCullagh, & Tran, 1990; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991; Powell, Thompson, Caspersen, & Kendrick, 1987). Regular exercise is a component of cardiovascular disease and obesity prevention (Bouchard et al., 1993; Powell et al., 1987) and it has been shown to reduce the risk of all-cause mortality, coronary heart disease, osteoporosis, diabetes, hypertension and colorectal cancer (Bouchard et al., 1993). Exercise has been found to have a positive effect on self-esteem (Sonstroem, 1988), well being and self-perception (International Society of Sport Psychology (ISSP), 1992). Positive effects on mood, clear thinking, ability to cope and increased alertness have also been reported with exercise (ISSP, 1992). Exercise has been documented to lower state anxiety, depression, stress levels and tension (Bouchard et al., 1993; Crews & Landers, 1987; ISSP, 1992; North et al., 1990; Petruzzello et al., 1991).

Rationale for stage approach as an outcome measure

The majority of past exercise-related research has investigated the determinants of exercise to predict which individuals are active or inactive at a given time (Courneya, 1995a; 1995b). This implies only two stages of physical activity: Active and Inactive. “Active” is

usually defined as exercising three times a week for 20 minutes each time at moderate or higher intensity levels and “inactive” is usually defined as not meeting this criterion. It has been suggested, however, that physical activity behavior change is a multiple stage model, which has implications for the type of interventions corresponding to the appropriate stage of behavior change (Dishman, 1991; Sallis & Hovell, 1990; Sonstroem, 1988).

Of the stage models proposed in the physical activity domain (Dishman, 1990; Sallis & Hovell, 1990; Prochaska & DiClemente, 1983), the most popular is Prochaska and DiClemente’s (1983; 1985; DiClemente et al., 1991) stages of change aspect of the Transtheoretical Model (TTM). (For the purpose of this proposal a familiarity of the stage model is assumed – please contact author if elaboration is required).

With this conceptualization, interventions are able to detect a broader outcome of the behavior change process than would normally be apparent with other approaches. Moving someone from precontemplation to contemplation (from not intending to change to intending to change) is an important step in the behavior change process that does not involve overt behavior change. Traditional activity measures cannot detect this kind of shift and may incorrectly perceive the intervention as unsuccessful. Relatedly, the stages of change allow the researcher to identify the process of behavior change and which variables (mediators) are important at which specific stage to lead to stage progression. This will have direct implications of future intervention development.

As an outcome measure, the stages of change may be utilized in various ways. As the pre-action stages (precontemplation, contemplation, & preparation) are below a specified criterion, and the action and maintenance stage are meeting the criterion, a dichotomous outcome of % at criterion is feasible. This allows for comparison to previous research, as it is one of the

traditional outcome measures in the physical activity literature (Courneya, 1995). Further, The metric of the stages of change is common across behaviors. For example, a precontemplator is someone who is not intending to engage in the health behavior at criteria. The criteria can apply to physical activity, fruit and vegetable consumption, smoking cessation, safe sex behaviors, sun protection behaviors, seatbelt use or any other health behavior with a defined criterion. This presents the opportunity for comparing 1) if your treatment is equally effective for one behavior as it is for another and 2) if different treatments are more or less effective across health behaviors.

Using the same metric across behaviors also facilitates the identification of gateway behaviors. A gateway behavior can be visualized as a behavior, when intervened upon, which has positive effects on other behavior changes. Basically a few behaviors may be related to general health of a specific population. There is preliminary evidence that points toward this possibility as stages of change for a large number of behaviors are somewhat related (Nigg et al., 1999). Examining the effect of single behavior change interventions on other health behavior changes are needed to further develop knowledge regarding potential gateway behaviors. With using stage of change as a common metric across behaviors, the issue of similarity of criteria may need to be addressed. For example, is being physically active for 30 minutes or more on most days of the week on the same “difficulty level” as quitting smoking, or eating five servings of fruits and vegetables a day.

Validity

Numerous studies have documented the construct validity of the stages of change for physical activity behavior. Past research has indicated that the stages of physical activity behavior and level of physical activity appear to be related. In general, physical activity behavior

increases from the stages of precontemplation to maintenance (Barké & Nicholas, 1990; Marcus & Simkin, 1993). Individuals who were classified in the action/maintenance groups reported significantly more moderate to vigorous exercise behavior than those in precontemplation/contemplation in a sample of middle aged adults (Marcus & Simkin, 1993) and older adults (Gorely & Gordon, 1995; Hellman, 1997). Illustrating further consistency with theory, active groups of older adults (Barké & Nicholas, 1990) and middle aged police officers (Hausenblas, Dannecker, Connaughton, & Lovins, 1999) placed themselves farther along the stages of physical activity compared to inactive groups.

Cardinal (1995a) and Hausenblas et al. (1999) developed their own stage of exercise behavior scale and replicated these results. Cardinal (1995a) reported an increasing linear gradient across the stages of change in terms of self-reported exercise and physical activity, and VO₂ peak in middle aged females. Hausenblas et al., (1999) reported an increase in leisure-time exercise and VO₂ max with increasing stage. In addition, Emmons, Marcus, Linnan, Rossi, and Abrams (1994) investigated physical activity and other behaviors/constructs in predominantly blue collar workers and found a linear relationship between stages of exercise, minutes per week spent exercising, and with other physical activities such as blocks walked per day and flights of stairs climbed per day.

Cardinal (1997) showed both physiological and self reported validation of the stages of exercise in adults. Body mass index, cardiorespiratory fitness, exercise behavior, barriers and self-efficacy all increased from precontemplation to maintenance. Further, a relapse indicator differentiated the inactive stages from the active stages.

Wyse, Mercer, Ashford, Buxton and Gleeson, (1995) evaluated the concurrent validity of the stages of exercise behavior using self-reported exercise level based on the Godin's Leisure-

Time Exercise Questionnaire for British young adults. Significant differences were found between the stages and self reported levels of exercise behavior in a theoretically consistent manner. Cardinal (1995b) further validated the stages of change for the same age group (American undergraduate students). Leisure-time exercise, frequency of sweating, physical activity rating, and VO2 max significantly increased with stage, while having relapsed significantly decreased with increasing stage.

To summarize, numerous studies have investigated the construct validity of the stages of change applied to physical activity behavior. Studies have found that stage is associated with both self-reported physical activity behavior (Calfas, Sallis, Lovato & Campbell, 1994; Emmons, Marcus, Linnan, Rossi & Abrams, 1994; Hellman, 1997; Marcus & Simkin, 1993; Lee, Nigg, DiClemente, & Courneya, 2001; Pinto & Marcus, 1995; Wyse et al., 1995) in adolescent, college, adult and older adult samples. However, only a few investigations have associated stages with measures of fitness level (Cardinal, 1995a; 1995b; 1997). The relationships are stronger if exercise stage is related to exercise behaviors and physical activity stage is related to physical activity behaviors. In general, the more progressed an individual is in the stages of change, the greater self-reported physical activity, exercise and objective fitness level.

The current group of studies within the Behavior Change Consortium (BCC) will allow an unprecedented opportunity for definitive stage validation including the much-needed further validation of special populations and use of physiological and objective measures.

Purpose

To validate the stages of PA using multiple valid and reliable self-report, objective and physiological measures from numerous sites addressing different populations.

BCC projects which have stage of PA and at least one other indicator of PA (measures are listed)

Improving Health Behavior and Outcomes After Angioplasty — The Cornell Healthy Behaviors Trial (Charlson)

Physical Activity Assessments

- A modification of the Minnesota leisure time activity questionnaire
- Physical activity duration per week is measured as total kcal consumed per week on average.
- Aerobic activity: total minutes per week on average.
- Strength activity: total minutes per week on average.

Stage-Based Health Promotion with the Elderly (Clark)

Physical Activity Assessments

- Yale Physical Activity Survey (YPAS) – primary outcome measure
- Physical functioning – Up & Go

For subsample

- CHAMPS assessment
- VO2 max estimates
- 3-day HR monitoring

Promoting Healthy Lifestyles: Alternative Models (Elliot)

Physical Activity Assessments

- Seven day Physical Activity Recall

Health Opportunities with Physical Exercise (Garrison)

Fitness/Physical Activity Assessments

- Rockport One-Mile Walk Test (RWT).

- Kaiser Physical Activity Survey (KPAS).
- Yale Physical Activity Survey (YPAS Part 1 and Part 2).
- self-report monthly log data (frequency, duration, intensity during past 7 days)
- computerized scan data of facility attendance and activity type engaged in at facility.

Exercise Advice by Human or Computer: Testing 2 Theories (King)

Physical Activity Assessments

- The Stanford 7-Day Physical Activity Recall
- CHAMPS physical activity questionnaire for seniors;
- Yale (P1 and P2)
- Measured functional capacity/fitness changes via submaximal and maximal treadmill exercise testing;
- Ambulatory heart rate and movement monitors, pedometers.

Reducing Disease Risk in Low-Income, Postpartum Women (Peterson)

Physical Activity Assessments

- Stanford 7-day Physical Activity recall (7DPAR)
- CSA Monitors
- 24-hour PA recalls (24PAR)
- 7 day PA Diary
- Digi walker step counters

Testing the Exercise Plus Program Following Hip Fracture (Resnick)

Physical Activity Assessments

- Subjective report of time spent in exercise activities

- Yale survey
- Champs
- Step Activity Monitor (SAM)

Church-based Health Promotion Project: EAT FOR LIFE II (Resnicow)

Physical Activity Assessments

- Questions from CHAMPS
- Questions from Paffenbarger (pg.85) – walking questions
- Questions from YALE (pg. 133-135 q 1-7)
- PAQ - subjective report of time spent in exercise activities
- 1 mile walk
- Treadmill tests for VO2 max using Balke and Modified Balke

A Couples Intervention for Cardiac Risk Reduction (Sher)

Physical Activity Assessments

- Exercise records
- resting HR/BP,
- exercise HR/BP,
- duration of exercise
- Self-report exercise log (METS and RPE)
- Yale
- Polar HR monitor data (intensity, duration, frequency)

Tailored Interventions for Multiple Risk Behaviors (Strecher)

Physical Activity Assessments

- # of exercise sessions per week

Enhancing support for Women at Risk for Heart Disease (Toobert)

Physical Activity Assessments

- Physical Activity Scale for the Elderly (PASE)
- National Health Interview Survey and College Alumni Study Walking Questions
- Harvard Alumni walking questions

Self-Determination, Smoking, Diet and Health (Williams)

Physical Activity Assessments

- Self-reported exercise behavior from 3-item assessment [*ref.*, Washburn, R. A., Adams, L. L., & Haile, G. T. (1987)].

Analyses

MANCOVA/ANCOVA

Sensitivity/specificity

SEM (where appropriate)

Publication plan

To present findings as symposium. To publish the validation article (two or three if appropriate) in one of the top exercise science/public health/health promotion journals as appropriate.

Timeline

This proposed project will last for one year from the award of the grant. The start date is targeted for January 2002.