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## Development and evaluation of a social cognitive theory-based instrument to assess correlations for physical activity among people with spinal cord injury

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### ABSTRACT

**Background:** People with spinal cord injury (SCI) are more susceptible to sedentary lifestyles because of the displacement of physical functioning and the copious barriers. Benefits of physical activity for people with SCI include physical fitness, functional capacity, social integration and psychological well-being.

**Objective:** The purpose of this study was to develop and test a social cognitive theory-based instrument aimed to predict physical activity among people with SCI.

**Methods:** An instrument was developed through the utilization and modification of previous items from the literature, an expert panel review, and cognitive interviewing, and tested among a sample of the SCI population using a cross-sectional design. Statistical analysis included descriptives, correlations, multiple regression, and exploratory factor analysis.

**Results:** The physical activity outcome variable was significantly and positively correlated with self-regulatory efficacy ( $r = 0.575$ ), task self-efficacy ( $r = 0.491$ ), self-regulation ( $r = 0.432$ ), social support ( $r = 0.284$ ), and outcome expectations ( $r = 0.247$ ). Internal consistency for the constructs ranged from 0.82 to 0.96. Construct reliability values for the self-regulation (0.95), self-regulatory efficacy (0.96), task self-efficacy (0.94), social support (0.84), and outcome expectations (0.92) each exceeded the 0.70 a priori criteria.

**Conclusions:** The factor analysis was conducted to seek modifications of current instrument to improve validity and reliability. The data provided support for the convergent validity of the five-factor SCT model. This study provides direction for further development of a valid and reliable instrument for predicting physical activity among people with SCI.

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### Introduction

A spinal cord injury (SCI) results in devastating life changes and people who experience an injury to the spinal cord often require significant lifestyle adaptations. Using a wheelchair and coping with the many unique health issues of living with SCI present physical, mental, emotional and social barriers.<sup>1</sup> Many people with SCI<sup>2</sup> are too overwhelmed and discouraged to adapt. They often become depressed and isolated and as a result, their health status

and quality of life decline.<sup>3-5</sup>

People with SCI are susceptible to being sedentary because of lowered muscle mass, reduced motor functioning, and health, environmental, and logistical barriers to physical activity.<sup>1,6</sup> These barriers include transportation, fatigue, managing disability, inaccessible facilities, need for assistance, and lack of knowledge on how or where to perform certain activities.<sup>1</sup> People with SCI are at risk for chronic diseases, which add further burden to their lowered physical functioning and lead to a vicious cycle of deconditioning.<sup>7-9</sup> Other complications of SCI include pain, hospitalization, depression, and overall lower quality of life.<sup>1,10-11</sup>

Being physically active offer many benefits for people with SCI. It enhances functional independence and motor gains,<sup>12-13</sup> lowers chronic disease risk, aids in pain management, and reduces other

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secondary medical conditions.<sup>9,14,15</sup> Being active also improves social integration, psychological well-being, and self-presentation.<sup>16–17</sup> These benefits facilitate higher quality of life.<sup>17–18</sup>

### *Need for theory-based instrument*

Most research regarding physical activity among people with SCI has focused on health outcomes, and less research has examined behavioral theories that are needed to plan programs that help people to become active.<sup>15,19–20,21</sup> The behavioral theory literature indicates that the social cognitive theory<sup>23</sup> appears to hold the most promise for enhancing activity among people with SCI.<sup>24–25</sup> A strength of the social cognitive theory is the provision of predictors and principles that lead to informing, enabling, guiding, and motivating people to modify their health behaviors.<sup>26</sup> Self-regulation, reaching long-term positive outcomes through managing day-to-day impediments, is crucial for coping with the many barriers to physical activity faced by people with SCI, such as transportation and accessible facilities.<sup>27</sup> The social cognitive theory was therefore selected as the behavioral framework for this study.

Past research includes questionnaire items that operationalize theoretical concepts to explain or predict physical activity in people with SCI.<sup>22,24–25</sup> However, these studies lack a comprehensive theory-based instrument tested for validity and reliability that predicts physical activity behavior among the SCI population. A strong need exists for a valid and reliable instrument to measure the impact of social cognitions on physical activity. A theory-based instrument could assess the effectiveness of physical activity programs and align health education and promotion strategies within a theoretical framework. The purpose of this study was to develop and evaluate a social cognitive theory-based instrument aimed to predict physical activity among people with SCI. Accomplishing this purpose involved two stages: (a) the identification and operationalization of scale items that conceptually reflect the social cognitive theory in relation to physical activity among people with SCI, and (b) the evaluation of the developed scale items.

## **Methods**

### *Participants*

The target population for this study was people who had experienced a SCI. The sample was comprised of participants between the ages of 18 and 65 years that were currently living with SCI. Part one of this study involved the use of an expert panel, approval by the sponsoring Institutional Review Board, and five people with SCI undergoing cognitive interviews with the instrument, for which they received \$20 gift cards for their participation.

Part two of this study utilized a non-experimental, cross-sectional design, which involved convenience sampling of online SCI support groups. Participant recruitment involved identifying and contacting multiple online spinal cord injury communities. Criteria for contacting an online SCI community for recruitment included that they provide updated information on research, events, and news about SCI and their mission statement was to improve the health of people with SCI. Participants for part two of the study had the opportunity of entering a raffle to win one of twenty-five \$20 gift cards. All participants reviewed an electronic consent form before agreeing to participate in the study.

### *Procedures*

Development and evaluation of the instrument involved five phases. The methodology is depicted in Fig. 1.

### *Literature search*

Drafting the initial instrument began with the intensive review of the literature. For the social cognitive theory subscales, the researcher gathered items from previous studies that assessed physical activity among people with SCI,<sup>22,24–25</sup> and chose items based on the following criteria: 1) operationalized SCT constructs, 2) related to physical activity, and 3) directed towards people with SCI. These items were modified for inclusion into the instrument by creating comprehensive instructions for participants and assigning appropriate scales. These items served to draft a preliminary instrument, and at least two items were included for each subscale in order to determine internal consistency.<sup>28</sup> The Flesch Reading Ease score was 60.4, which falls into the “fairly easy” range for reading ease, and the Flesch-Kincaid Grade Level was 7.5, indicating the reading level of the instrument was between a 7th and 8th grade-level.<sup>29–30</sup>

### *Expert panel review*

After drafting the instrument, a panel of experts reviewed it to assess readability, face validity, and content validity over two rounds.<sup>31</sup> Two experts in the area of health and disability research, two experts in measurement and instrument development, and two experts in health behavior theory comprised the expert panel.<sup>31</sup> The researcher emailed the instrument, along with instructions, to each member of the panel. The panel reviewed the instrument and emailed feedback within two weeks, which were used to modify the instrument. The panel of experts then received a revised copy of the instrument for a final review.<sup>30</sup> The panel of experts approved 64 items as part of the survey, which are divided into three sections: the PASIPD (13), social cognitive theory subscales (35), and demographics (16).

### *Cognitive interviews*

People with SCI participated in a cognitive interview and completed the online survey that was previously approved by the expert panel. The cognitive interview provided an opportunity to assess comprehensibility, readability, and time required to complete the survey. Each interview lasted for approximately 30 min and involved participants completing the survey and discussing thoughts, feelings, or ideas concerning the wording and purpose of each item and survey format. The PI then asked the participants to complete the instrument, and requested clarification of any words or statements they did not understand at any time while they were filling it out. After completion of the survey, the researcher asked participants about clarity of survey directions, questions, and layout and to provide suggested revisions. The feedback from the cognitive interviews indicated that instrument items were readable and comprehensible for participants. The sample for the cognitive interview was comprised of five people with SCI that were Non-Hispanic, Caucasian/White (100%), Males (60%) and Females (40%), with ages ranging from 20 to 36 years. Causes of SCI among participants were motor vehicle accidents (40%) and birth defects (60%), and mean years since experience of the SCI was 17.6 ( $\pm 7.1$ ).

### *Test–retest reliability*

The implementation of a test–retest reliability study established internal consistency and stability. The sample size at the completion of this study was 31, which is an appropriate sample size for assessing reliability.<sup>30</sup> After completion of the survey, another brief survey collected information on participants' availability to complete an identical follow-up survey in two weeks. If participants agreed to the follow-up, they provided their email address, which the researcher used to distribute a link to an identical survey on Qualtrics to the participant for one to two weeks.

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