Role of self-efficacy (SE) and anxiety among pre-clinically disabled older adults when using compensatory strategies to complete daily tasks

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Classic developmental theory suggests that aging is associated with using compensatory strategies to prolong independence. While compensatory strategies are typically considered positive adaptations, they also signify an early phase in the disablement process – commonly known as pre-clinical disability. To build a better understanding of psychological constructs related to these early signs of disability, we examined the contribution of SE and state anxiety on using compensatory strategies among pre-clinically disabled older adults. Compensatory strategies were observed during performance of daily activities in 257 pre-clinically disabled older adults (67.6 ± 7.04), and SE and state anxiety were evaluated prior to performing each task. In univariate models, lower SE and higher anxiety were associated with more compensation (Spearman correlations: 0.15–0.48, p < 0.05). Multivariate logistic regression indicated that low SE (Odds Ratio: 1.70; 95% Confidence Interval: 1.40–2.08) and high anxiety (OR: 1.34; 95% CI: 1.10–1.63) were positively associated with using ≥6 compensatory strategies – a level signifying substantial compensation. When considered jointly with SE, the association with anxiety was reversed – higher anxiety demonstrated a lower likelihood of using compensation (OR: 0.70–0.73; 95% CI: 0.50–0.99). The addition of SE might remove the self-defeating cognitions characterizing anxiety allowing the remaining arousal component to appear beneficial. In conclusion, lower SE and higher anxiety are associated with using compensation to complete daily tasks among pre-clinically disabled older adults. Such psychological constructs may contribute to the use of compensatory strategies and represent future intervention targets to help reduce early signs of disability.

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1. Introduction

Successful aging is characterized by using compensatory strategies to cope with impairments and maintain function later in life (Baltes, 1997; Freund, 2008). Though various life-span developmental scholars have long presented the use of behavioral compensatory strategies as a positive adaptation in response to functional losses incurred during aging, the medical literature suggests that using compensatory strategies is an early indicator of physical disability (Fried, Young, Rubin, & Bandeen-Roche, 2001; Wolinsky, Miller, AndreSEN, Malmstrom, & Miller, 2007; Wolinsky, Miller, AndreSEN, Malmstrom, Miller, & Miller, 2007). Some even assert that using compensatory strategies to complete tasks of daily living is a hallmark sign of pre (sub)-clinical disability – a transitional stage that occurs prior to the onset of disability in some individuals (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995; Manty et al., 2007). Despite compelling research illustrating the significance of behavioral compensatory strategies during this transition, little is known regarding why individuals adopt compensatory strategies to cope with underlying impairments.

Pre-clinical disability was first conceptualized by Fried, Herdman, Kuhn, Rubin, and Turano (1991) and Fried et al. (1996) who observed that older adults who reported “changing the method or frequency of performing” certain daily tasks were at elevated risk of reporting outright difficulty with the same tasks during follow-up evaluations. This initial evidence, along with additional supporting research, solidified pre-clinical disability as an intermediary stage in the disablement process (Fried et al., 2001; Manty et al., 2007; Petrella & Cress, 2004; Wolinsky, Miller, AndreSEN, Malmstrom, & Miller, 2007; Wolinsky, Miller, AndreSEN, Malmstrom, Miller, & Miller, 2007). Pre-clinical disability literature advanced beyond the

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conceptualization phase with the development of objective methods for quantifying the degree of compensatory strategies observed during common daily tasks (Manini, Cook, VanArnam, Marko, & Ploutz-Snyder, 2006; Manini et al., 2007; Naugle, Higgins, & Manini, 2011). Such developments confirm indices of self-reported compensatory behaviors, which are the most common method employed to identify pre-clinically disabled adults (Wolinsky et al., 2005).

Though empirical findings clearly indicate that pre-clinical disability represents a pivotal transition in the disablement process, a number of key questions regarding the psychology of pre-clinical disability remain unanswered. Gregory and Fried (2003) suggest that the use of compensatory strategies increases older adults’ perceptions of task difficulty and eventually leads them to report having difficulty. However, we have yet to formally understand the psychology involved with using a compensatory strategy — specifically, whether cognitive and affective factors are associated with the decision to utilize compensatory strategies.

A growing body of evidence suggests that SE beliefs and anxiety play significant roles in the functional decline of older adults (Foldvari et al., 2000; Rejeski, Craven, Ettinger, McFarlane, & Shumaker, 1996; Rejeski, Miller, Foy, Messier, & Rapp, 2001; Seeman, Unger, McAvay, & Mendes de Leon, 1999). It therefore follows that these psychological constructs are involved in the etiology of pre-clinical disability. For example, low SE is associated with numerous adverse health outcomes, including increased risk of falls (Andresen et al., 2006), functional limitations (Rejeski et al., 1996, 2001), and physical disability (Rejeski et al., 2001; Seeman et al., 1999). Conversely, Rejeski et al. (2001) established that when task-specific indices of SE are implemented, high SE appears to protect against functional losses, particularly when individuals are coping with impairments (Rejeski et al., 2001). Because SE affects the persistence and intensity of effort individuals devote to achieving a certain level of performance (Bandura, 1997), SE theoretically could have an influential role in determining how older adults cope with physical impairments. In particular, SE beliefs may govern whether older adults choose to use compensatory strategies to facilitate task performance or attempt to complete daily tasks without them.

Because pre-clinical disability is defined as modifying the method or frequency of daily tasks, an imbalance likely exists between the perception of environmental demands and response capabilities. Such an imbalance is also a distinctive feature of anxiety (Martens, Burton, Vealey, Bump, & Smith, 1990). Anxiety represents an affective state characterized by feelings of uncertainty, worry, concern, and tension (Woodman & Hardy, 2001) and alters motor performance (Craft, Magyar, Becker, & Feltz, 2003; Janelle, 2002). Subclinical symptoms of anxiety appear to represent a risk factor for the progression of disability and are negatively associated with physical functioning (Brenes et al., 2005; Lenze et al., 2001). Importantly, previous work indicates that somatic anxiety (SA) and cognitive anxiety (CA) differentially influence physical function, with SA, but not CA predicting poor task performance among adults with varying levels of physical disability (Paukert et al., 2010). Due to inconsistent methodological approaches and divergent findings regarding whether anxiety correlates with both subjective and objective measures of function, the role of anxiety in the disablement process remains unspecified. Considering anxiety typically elevates in response to accumulated performance failures (Cooke, Kavussanu, McIntyre, & Ring, 2010), aging adults likely experience increased anxiety regarding daily tasks as they become aware of performance failures, but such a premise has yet to be empirically tested. Further, researchers have yet to assess how different components of state anxiety (i.e., CA and SA) are related to functional task performance in pre-clinically disabled older adults.

We sought to determine the association among SE, anxiety types, and use of compensatory strategies to more fully understand the etiology of pre-clinical disability. We hypothesized higher SE and/or lower state anxiety would be associated with using fewer compensatory strategies. Support for the current hypothesis would suggest that SE and/or anxiety may contribute to using compensatory strategies even when they may not be necessitated by poor physical function.

2. Materials and methods

2.1. Participants

Two hundred fifty-seven community dwelling older adults (141 female: average age 67.6 ± 7.04 years, 88.7% white) completed the study assessments. The data in this report represent an ancillary study to a clinical trial in pre-clinically disabled older adults. Potential participants were recruited through advertisements posted in local newspapers and mailings sent to residents over the age of 60 years within a 50-mile radius of the testing center. Fig. 1 shows the flow of participants through the study. Potential participants (n = 446) were screened by telephone. During the telephone screen, participants were asked whether a doctor had told them they had any of the following conditions in the last six months: coronary, myocardial infarction, heart attack, valvular disease, or stroke. Additionally, participants were asked whether they currently had any of the following conditions: chronic hepatitis, inflammation of the liver, cirrhosis, neurological condition, symptomatic rheumatoid arthritis or osteoarthritis that limits mobility, anemia, serious emotional problems or mental illness, chronic kidney disease, and fracture and joint replacement in the past 6 months. Twenty-six participants were excluded because they had one or more of the aforementioned conditions. Eighty-four participants were excluded for other reasons including: exercising more than 125 min/week (i.e., to rule out the effects of chronic exercise behaviors), moving out of area, and not willing to participate in all of study procedures. The University of Florida Institutional Review Board reviewed and approved the protocol. All participants gave written informed consent prior to their enrollment in the study.

Pre-clinical disability was defined according to Fried et al.’s (Fried et al., 1991, 1996; Miller, Wolinsky, Malmstrom, Andresen, & Miller, 2005) established criteria as a change in frequency or modification of daily tasks without having overt difficulty performing a particular task. During the phone interview potential participants were asked if they had difficulty performing or changed the manner or frequency with which they performed five tasks, including walking half a mile, climbing a flight of stairs, stooping, crouching, or kneeling, getting up off the floor, or lifting something as heavy as 10 pounds. An anchor was used for each question by asking, “as compared to when you were 40 years of age”. Those who reported a little, some or a lot of difficulty were excluded because they were considered disabled. Specifically, potential participants were excluded if they:

- Were inability (exercise >125 minutes per week): 29
- Had difficulty with stooling or climbing (1 mile): 2
- Had walking difficulty: 4
- Had medical condition: 26

Fig. 1. Participant flow through the study.

<table>
<thead>
<tr>
<th>Phone screened: 446</th>
<th>Insoluble/other interested: 176</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed in Laboratory: 270</td>
<td>Uninterested/cancelled: 55</td>
</tr>
<tr>
<td>Analyzed: 257</td>
<td>Too active (exercised &gt;125 minutes per week): 29</td>
</tr>
<tr>
<td>Excluded from analysis: 13</td>
<td>Difficulty with stooling or climbing (1 mile): 2</td>
</tr>
<tr>
<td>Did not complete all MCD tasks: 13</td>
<td>Medical condition: 26</td>
</tr>
</tbody>
</table>
reporting any difficulty walking half a mile, climbing a flight of stairs, stooping, crouching, or kneeling, getting up off the floor, or lifting something as heavy as 10 pounds were not invited for testing \((n = 52)\). Two hundred seventy participants reported no difficulty and changed the frequency or modified daily tasks, 14 participants had no difficulty and did not change the frequency or modify daily tasks.

2.2. Objective measure of pre-clinical disability

Traditionally, self-report has served as the primary method to identify pre-clinically disabled adults. For this study, it was critical to objectively determine the degree and severity of compensatory strategies to effectively examine the association with psychological processes. Therefore, we objectively measured compensatory strategies on 8 daily tasks using a reliable and valid performance scale developed to specifically rank the degree and severity of compensatory strategies – The Task Modification (MOD) scale (full details of the MOD scale are described in Manini et al., 2006, 2007). Participants performed a chair rise from three different seat pan heights (43 cm, 38 cm, and 30 cm), a knee rise, stair ascent, stair descent, a rise from the floor, and lifting then carrying a laundry basket filled with 10% of a participant’s body mass. Prior to performing the task, participants were read standardized instructions that encouraged no use of compensatory strategies unless absolutely necessary (e.g., “go down the stairs as fast as comfortably possible. If you do not need the handrail please do not use it…”). Complete task instructions are shown in Appendix A. These instructions were created to promote a conscious decision to perform the task with or without compensatory strategies. The MOD scale ranks each task from 0 to 5 according to the type of compensatory strategies used to complete the task. Previous research has demonstrated that the MOD scale is sensitive to change during a behavioral intervention, possesses good test-retest reliability (interclass correlation coefficient [ICC] > 0.90), and compares well with established measures of functional and muscular performance (Manini et al., 2006). To provide further evidence of the MOD scale’s validity, the score was compared to walking speed over 400 m — a common and valid test of physical function — in a subset of participants \((N = 69)\). We found a significant correlation between walking speed and the total number of compensatory strategies on the MOD scale (Pearson \(R = -0.44, p < 0.05\)), indicating that scores on the MOD scale are a good proxy for physical function and also provide descriptive information about how tasks were performed.

2.3. Measurement of state anxiety and SE

When assessing the effects of anxiety on motor performance, anxiety should be conceptualized as a multi-dimensional construct, with cognitive and somatic elements (Martenis et al., 1990). CA refers to negative thoughts, worries, and concerns, while SA arises from perceptions of physiological arousal, such as muscle tension. The Mental Readiness Form-Likert (MRF-L; Krane, 1994) measures these multi-dimensional constructs. The MRF-L consists of three-items, which index CS (thoughts are: calm–worried), SA (body feels: relaxed–tense), and SE (I am feeling: confident–scared) on an 11-point Likert scale, with desirable ratings (i.e., high confidence and low anxiety) anchoring the low end of the scale and undesirable ratings (i.e., low confidence and high anxiety) anchoring the high end. Consequently, positive correlations depict low SE and high state anxiety or vice versa. The MRF-L was originally developed and validated as a convenient and reliable alternative to longer indices of state anxiety and SE, such as the Competitive Sport Anxiety Inventory (CSAI: Martenis et al., 1990), which was initially implemented to measure affective changes during sport performance (Krane, 1994) but has since been applied to a wide range of motor performance situations, such as musical performances (Lacaille, Koestner, & Gadreau, 2007) and laboratory based motor tasks (Murray & Janelle, 2007). MRF-L items show moderate to strong concurrent validity with corresponding CSAI subscales for CA \((R = 0.60–0.74)\), SA \((R = 0.68–0.69)\), and SE \((R = 0.54–0.79)\) (Krane, 1994). Additionally, the internal consistency of the MRF-L in the current sample of participants was found to be excellent across tasks (Cronbach’s Alpha = 0.93–0.96).

The MRF-L was verbally delivered using standardized, task-specific instructions and participants were shown a graphic representation of the Likert scale prior to the performance of each MOD task. Participants were asked to indicate which number on the scale best represented their current feelings about the specific task they were undertaking. Participants submitted their responses verbally and these were recorded for data analysis.

2.4. Data analysis

The first set of data analyses included univariate statistics to delineate the association between objectively measured compensatory strategies – assessed on the MOD scale- and psychological constructs assessed on the MRF-L. Spearman Rank-Order procedures were performed to examine inter-correlations among CA, SA, SE, and MOD score for each task. CA, SA, SE and MOD scores were then pooled across tasks by summing the MOD scores (total MOD: range is 0–40) and averaging the MRF scores. Next, we wanted to examine the association between a high degree of compensation and psychological constructs. To do this we categorized the highest third (total MOD score \( \geq 6, N = 82 \), coded as one) and lowest two-thirds (total MOD score \(< 6, N = 175\), coded as zero) of the total MOD distribution. This cutoff value not only designates a third of the worst performers, but also allows for individuals who might compensate for reasons not due to underlying functional impairments (e.g., having to compensate when rising from a chair due to shorter leg length) to be categorized as having a low degree of compensatory strategies. Individuals who use six or more modifications demonstrate severe modifications on at least two tasks or moderate modifications on several tasks and can be firmly characterized as pre-clinically disabled. We then performed the multivariate logistic regression analysis. Predictors in the model included gender, age (in years), body mass index (BMI; in kg/m2), and average anxiety and SE scores across all tasks. Post hoc analyses were used to calculate the predicted probability of using ≥6 compensatory strategies on the MOD scale when anxiety and low SE were fixed at 25% (Lower) and 75% (Higher) of the mean. “Lower” anxiety and SE refer to MRF-L scores of 1.06 and 1.13, respectively. “Higher” anxiety and SE denotes MRF-L scores of 3.34 and 4.06, respectively. Statistical significance for all analyses was set at an alpha level of \( p \leq 0.05 \). Statistical analyses were done using STATA SE (Version 10.0; College Station, TX).

3. Results

Two hundred and fifty-seven of the 270 participants who visited the laboratory completed the protocol. Of the participants who performed all tasks, 67.7% made at least one modification (see Table 1). Mean MOD and MRF-L scores across all participants demonstrated that rising from a kneeling and supine position elicited the highest number of modifications, lowest SE ratings, and highest CA ratings.

In univariate correlations, lower SE ratings and higher anxiety ratings were associated with a higher number of compensatory strategies on the MOD scale (Table 2). Additionally, when considered as a whole, the total MOD score was significantly associated with CA \((r = 0.21, p < 0.05)\), SA \((r = 0.25, p < 0.05)\), and
low SE ($r = 0.51$, $p < 0.05$). Significant correlations were found between low SE and anxiety (CA: $r = 0.67$ and SA: $r = 0.68$, both $p < 0.05$). CA and SA across all tasks were highly correlated with each other ($r = 0.92$, $p < 0.05$). Because participants did not appear to differentiate between types of anxiety, CA and SA scores were averaged to create a more reliable indicator of state anxiety for each task.

### 3.1. Predictors of poor functional task performance

No significant interactions of age, BMI, and gender with MOD score were found. Thus, the models only included these variables as marginal effects. Table 3 illustrates results from logistic regression that modeled the probability of using ≥6 compensatory strategies measured on the MOD scale. Following adjustments for age, gender, and BMI, higher state anxiety ratings and lower SE rating were significantly associated with the probability of using ≥6 compensatory strategies. These data indicate that for every one-point increase in state anxiety participants were 1.34 times more likely to perform ≥6 task modifications. For every one-point decrease in SE, participants were 1.70 times more likely to perform ≥6 task modifications. Importantly, inclusion of low SE in the state anxiety model caused the OR to significantly reverse in direction (see Model 3 in Table 3). The effect was further explored in a post hoc analysis that examined the predicted probability of using ≥6 compensatory strategies on the MOD scale when anxiety and low SE were fixed at 25% (Low) and 75% (High) of the mean. The results (see Fig. 2) demonstrate that after considering SE, individuals who possess higher levels of anxiety are less likely to use extensive compensatory strategies compared to individuals with lower anxiety.

### 4. Discussion

The purpose of this study was to determine the relationships among SE, anxiety types, and use of compensatory strategies in older adults. Evidence of associations among these constructs can help clarify why pre-clinically disabled older adults may choose to use compensatory strategies during tasks of daily living. The use of compensatory strategies by individuals who do not report difficulty completing activities of daily living is thought to signify a critical transitional stage in the disablement process. Therefore, examining the association between common psychological constructs of anxiety and SE with compensatory behavior would elucidate potential psychological factors that are associated with very early signs of disability and would inform future research aimed at preventing disability. Two novel contributions emerged from this investigation: (1) low SE and high state anxiety were significantly associated with using compensatory strategies and (2) when simultaneously considering the effect of SE, state anxiety was associated with a lower likelihood of using compensatory strategies. These findings are elaborated below.

We hypothesized that low SE and state anxiety would be related to using compensatory strategies. Our findings confirmed
these expectations. Low SE beliefs and higher anxiety levels for each task were associated with a higher level of using compensatory strategies on specific tasks and as a whole. The results were verified in multivariate models adjusting for age, gender, and BMI. Notably, SE emerged as a more significant predictor of compensatory strategy use than state anxiety, which is in line with meta-analytical data suggesting that SE predicts performance more accurately than anxiety (Craft et al., 2003). These findings extend current knowledge by illustrating that low SE beliefs and higher state anxiety are associated with using compensatory strategies in pre-clinically disabled older adults. Our results suggest SE and state anxiety may influence whether individuals choose to compensate when performing daily tasks and that early use of compensatory strategies may not be entirely driven by physiological factors, such as reductions in muscle strength.

The present findings corroborate previous evidence that SE is associated with indices of physical function that include: ADL performance, chair rise speed, walking performance, balance performance, and lower-extremity strength in older adults with and without disease conditions (Berkman et al., 1993; Chou & Macfarlane, 2009; Malý, Costigan, & Olney, 2006; Malý, Costigan, & Olney, 2007; McAuley et al., 2006; Rejeski et al., 2001; Studenski, 2006). For example, Mendes de Leon, Seeman, Baker, Richardson, and Tinetti (1996) found that lower SE in ambulatory, community dwelling older adults was associated with performance speed after adjusting for sociodemographic factors and health-related factors. They also illustrated that low SE predicts low physical performance, thus raising the possibility that high SE may buffer against declining physical function. Subsequent research hypotheses have further supported claims that SE modulates the impact of physical impairments on functional status (Marks & Allegrange, 2005; Rejeski et al., 2001; Studenski, 2006). The current study adds to the knowledgebase by providing evidence that SE is associated with using compensatory strategies — an early indicator of disability in older adults.

Social cognitive theorists assert that SE influences the performance of health-promoting behaviors, such as coping with physical impairments, by playing an integral role in the regulation of motivation, action, and well-being (Bandura, 1998). Specifically, SE affects the selection of activities individuals choose to engage in, the degree of challenge they strive for when goal setting, and the amount of persistence and effort exuded in the pursuit of goals (Bandura, 1998). Accordingly, older adults with higher SE to perform common daily tasks without using compensatory strategies are more likely to be highly motivated and devote more effort to performing the task as instructed, without compensatory strategies. Our finding that SE was associated with the extent to which individuals compensated on each task supports these theoretical assertions. Further, our results complement Rejeski et al.'s (2001) assertion that high SE beliefs in disabled older adults may have a protective role by helping to maintain task performance. Together, such evidence indicates that SE plays a role in both early and late stages of disability.

Our results also indicate state anxiety levels are associated with using compensatory strategies. The present data support prior work demonstrating that poor functional task performance is associated with elevated levels of anxiety (Brenes et al., 2005; De Beurs, Beekman, Deeg, Van Dyck, & Van Tilburg, 2000). Notably, the anxiety levels reported here are low (~2.5 on an 11 point scale) and would not constitute a high level of anxiety in any context. The finding that state anxiety is positively related to the number of compensatory strategies employed by pre-clinically disabled older adults represents a unique contribution to the literature. While previous studies have reported that sub-clinical anxiety symptoms are associated with self-reported health and objective indices of physical function (Brenes et al., 2005; De Beurs et al., 2000), other researchers have argued that anxiety solely affects subjective health measures (Mehta et al., 2007; Paukert et al., 2010). Conflicting results may be attributed to the varying methods used to assess anxiety and a failure to accurately detect early signs of declining physical function. Notably, prior studies did not distinguish SA and CA components, thus failing to assess potentially distinct aspects of sub-clinical anxiety that could differentially alter performance. Our data suggest that state anxiety levels are significantly, albeit weakly, associated with using compensatory strategies in pre-clinically disabled older adults, with SA and CA demonstrating a similar magnitude of effect. Notably, reported CA and SA levels were almost identical, indicating state anxiety components may be more collinear in older adults than in younger adults. Future research is needed to establish whether collinearity accounts for the observed lack of differences between reported CA and SA levels.

Explanations for the negative effects of anxiety on physical function include activity avoidance due to high levels of worry (Li, Cardinal, & Vuchinich, 2009), interference of smooth muscle coordination, and feelings of fatigue caused by SA (Suinn, 2005). A viable explanation for the current results is that high anxious individuals might choose to utilize compensatory strategies to reduce feelings of worry thereby acting to decrease the potentially deleterious effects of muscle tension on task performance. However, we caution this interpretation without systematic manipulations of anxiety as reliable conclusions cannot be drawn regarding the degree to which state anxiety exerts a causal influence on the choice to use a compensatory strategy. Therefore, we propose that future studies experimentally manipulate state anxiety and SE to evaluate their individual contribution to adopting compensatory behaviors.

An unexpected result occurred when SE and state anxiety were modeled simultaneously. Based on data from Hardy, Beattie, and Woodman (2007) it would be expected that high anxiety would be counterproductive. However, we found that when state anxiety was assessed within the context of SE, higher levels of anxiety actually reduced the probability of using ≥6 compensatory strategies. Notably, this finding should be interpreted with caution, as reported anxiety levels remained relatively low across all participants. “Higher” anxiety, in this case, actually refers to an anxiety level of 3.34 on the 1–11 MRF scale, which is within the low range. “Lower” anxiety
denotes an anxiety score of 1.06, indicating calm, relaxed feelings and no anxiety. Barlow (2002) and Brown and Barlow (2009) assert that the core components of anxiety are negative affect and physiological arousal. As such, our results suggest that by adjusting for SE beliefs, which in theory removes the effect of self-defeating cognitions aspect of anxiety, the remaining arousal component reduces the likelihood of using compensatory strategies.

Several anxiety theorists agree that the anxiety–motor performance relationship is dynamic, with state anxiety either enhancing or compromising performance as a function of task demands, environmental conditions, or personality characteristics (Janelle, 2002; Murray & Janelle, 2003, 2007), which lends support to the current findings. Similar results have also been reported in athletes whose performance is enhanced when they experience low levels of anxiety (Edwards & Hardy, 1996; Shukla, 2008). Low levels of arousal are thought to motivate individuals to devote more attention to the tasks and “prime” the body for motor activity (Court, Bennett, Williams, & Davids, 2005; Yoshiie, Kudo, Murakoshi, & Ohtsuki, 2009). In the current population, low levels of arousal may have increased motivation to perform the tasks as instructed, without using compensatory strategies, and primed the muscles to facilitate task performance with fewer modifications. Such postulates are supported herein and are likely a function of the low levels of anxiety reported by our participants.

Compensatory behavior can be purposeful or highly automated (Backman & Dixon, 1992). The current findings, which suggest psychological characteristics such as SE and anxiety are associated with compensation, may be limited to strategic use of compensation. Testing conditions, specifically providing detailed instruction on how to perform each task without using a compensatory strategy, enhanced participants’ awareness of the strategies they would implement to complete the tasks, thus ensuring that compensatory behavior would be purposeful and not automated. While using compensatory strategies may not always be as purposeful in the real world, by definition, pre-clinically disabled individuals are in the initial stage of adopting these behaviors, therefore a high degree of automaticity within this population remains unlikely. Individuals occupying later stages in the disablement process might demonstrate more automatic compensatory behavior and thus, may be less influenced by feelings of anxiety and low SE compared to individuals in this study. Further examination of how psychological characteristics influence compensation as automaticity varies is required to determine the scope of the current findings.

The present study is not without limitations. First, participants with severe disease conditions were excluded from the study to help isolate the influence psychological factors as much as possible, thus the sample of older adults should not be considered generalizable to the population. Second, the MRF-L, which was developed as a short version of the Csat (Krane, 1994; Wilson, Smith, & Holmes, 2007), has not been well tested in older populations although we found good internal consistency among older adults in this study. Despite these issues, instructions given to participants before answering the MRF-L directed individuals to their feelings of SE prior to performance of each task, making the SE item highly task-specific and meeting the criteria for being a strong assessment of SE as advanced by Bandura (1997). However, using the terms confident/not confident, rather than confident-scared, on the SE item would have aligned more closely with established SE scales, as well as provided truly bipolar anchor terms. Though the current wording on the SE scale represents a potential limitation that should be remedied in future studies, prior studies indicate that the MRF-L SE item demonstrates strong concurrent validity with scores on the CSAI’s SE sub-scale (Krane, 1994) and that SE scores derived from the CSAI are strongly and consistently related to performance (Craft et al., 2003). Additionally, based on the current findings, items on the MRF-L reflected the demand of the tasks in this sample of older adults. While acknowledging potential limitations, the MRF-L seems to constitute an appropriate choice for the current assessment. The MRF-L enabled testing of associations among task-specific SE, state anxiety, and the use compensatory strategies in a performance situation, which represents an important step toward understanding underlying psychological mechanisms driving the progression of disability. Future research efforts dedicated to tracking how SE and anxiety change over the course of the disablement process, as well as exploring potential mechanisms such as attentional changes underlying the relationship between SE and compensatory behavior, are required to gain a comprehensive perspective on how psychological constructs influence functional status in older adults.

In conclusion, findings from the current study emphasize the importance of SE perceptions on the use of compensatory strategies in pre-clinically disabled older adults. Additionally, the use of compensatory strategies is positively associated with state anxiety, although this association is reversed when considering SE. The current data demonstrate that psychological constructs are associated with compensatory behavior in pre-clinically disabled older adults, suggesting that early use of compensatory strategies may not always constitute a positive adaptation or be driven solely by functional impairments, as conceptualized by life-span developmental theorists (Freund & Baltes, 2002; Fried et al., 2001). Finally, these results offer insight into the multidimensional changes that are associated with early signs of disability and indicate that variation in key psychological constructs, such as SE and anxiety, might underlie pivotal transitions in the disablement process.

Conflict of interest statement

The authors report no conflict of interest regarding any financial and personal relationships with other people or organizations that could inappropriately influence their work.

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MOD TASK

On the task modification scale (MOD) you will identify a compensatory strategy subjects use to complete a chair rise, stair ascent/descent, kneel to stand, supine to stand. The MOD scale is hierarchically arranged from No Difficulty (a score of zero) to subtle and severe compensatory modifications (score one to five). If a subject uses multiple modifications, record the one with the highest score.

MOD: CHAIR RISE

Describe: “This test will measure your ability to rise from three different height chairs”

Demonstrate and say: “On the word ‘Go’, you will rise from this chair as quickly as possible with your hands across your chest. Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.”

1.) My thoughts are: ______

2.) My body feels: ______

3.) I am feeling: ______

Test: “Now you will complete the task. Ready, Go”

_____ Rises in a steady and controlled action
_____ Stomps feet, rocks body, extends arms or elbows to thighs
_____ scoots to the front of the chair or makes multiple attempts
_____ uses hands on any part of chair for assistance
_____ needs investigator assistance
_____ refuses to attempt the task

Time to complete the task:
(e.g. 5.01)

Examiner note: If the participant is unsuccessful with their hands across their chest.

Say: “Please use whatever strategy you need to get out of the chair.”

Notes:

Examiner note: Adjust the chair to the middle height setting (38 cm seat pan)

Describe: “Now I would like you to try this chair that is lower to the ground.”

Demonstrate and say: “On the word ‘Go’, you will rise from this chair as quickly as possible with your hands across your chest. Before you start, please read the statements below and circle the appropriate number to indicate how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.”

11.) My thoughts are: ______

2.) My body feels: ______
3.) I am feeling: ______

Test: “Now you will complete the task. Ready, Go”

Examiner note: If the participant is unsuccessful with their hands across their chest.
Say: “Please use whatever strategy you need to get out of the chair”

Notes: __________________________________________________________

Examiner note: Adjust the chair to the lowest height setting (30 cm seat pan)

Describe: “Now I would like you to try this chair that is even lower to the ground.”

Demonstrate and say: “On the word ‘Go’, you will rise from this chair as quickly as possible with your hands across your chest. Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.”

1.) My thoughts are: ______

2.) My body feels: ______

3.) I am feeling: ______

Test: “Now you will complete the task. Ready, Go”

Notes: __________________________________________________________
MOD: kneel to stand

Describe: “This test will measure your ability to rise from a kneeling position on the floor.”

Demonstrate and say: “On the word ‘Go’, you will rise from your knee as quickly as possible with your hands across your chest”. Do not use your hands on the chair or your knee unless absolutely necessary.”

Say: “Do you think you can do this with or without help from the chair?”

If NO, Record why and move to the next test.

Say: “Why don’t you think you do the test?”

If YES, Say: Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.”

1.) My thoughts are: ______
2.) My body feels: ______
3.) I am feeling: ______

Now proceed and ask the participant to kneel on their left knee.

Say: “You may use the chair to kneel to the floor.”

Test: “Ready, Go.”

<table>
<thead>
<tr>
<th>Time to complete the task:</th>
<th>(e.g. 5.01)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rises from a kneeling position without the use of hands</td>
</tr>
<tr>
<td></td>
<td>Light use of hand/s on chair or knee (no shift in body weight)</td>
</tr>
<tr>
<td></td>
<td>Forcefully uses one or two hands on the chair causing a shifting of body weight</td>
</tr>
<tr>
<td></td>
<td>Kneels to the floor but requires assistance to rise</td>
</tr>
<tr>
<td></td>
<td>Cannot knee to the floor</td>
</tr>
<tr>
<td></td>
<td>Refuses to attempt the task</td>
</tr>
</tbody>
</table>

Notes:________________________________________________________

________________________________________________________________

Repeat on while kneeling on the right knee.
MOD: Stair ascent/descent

Describe: “This test will measure your ability to go up and down a flight of stairs.”

Demonstrate and say: “On the word ‘Go’, you will go up the stairs as fast as comfortably possible. If you DO NOT need the handrail please DO NOT use it, but if you absolutely need the handrail please use it.”

Say: “Do you think you can do this?”

If NO. Record why and move to the next test.
Say: Why don’t you think you can do the test? ____________

If YES, Say: Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.”

1.) My thoughts are: ______
2.) My body feels: ______
3.) I am feeling: ______

Now proceed.
Test: “Ready, Go.”

Stair ascent

Reciprocates in a steady and controlled action
Noticeable hesitations or unsteadiness
Nonconstant brushing/grabbing or light continuous grasp of the handrail
Constant grabbing of the handrail (pulling or bracing for support)
Does not reciprocate and/or uses the handrail
Refuses to attempt the task

Time to complete the task:
(e.g. 5.01)
Stair descent

Demonstrate and say: "On the word ‘Go’, you will go down the stairs as fast as comfortably possible. If you DO NOT need the handrail please DO NOT use it, but if you absolutely need the handrail please use it. Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best."

1.) My thoughts are: __________
2.) My body feels: __________
3.) I am feeling: __________

Test: "Ready, Go."

Reciprocates in a steady and controlled action
Noticeable hesitations or unsteadiness
Nonconstant brushing/grabbing or light continuous grasp of the handrail
Constant grabbing of the handrail (pulling or bracing for support)
Does not reciprocate and/or uses the handrail
Refuses to attempt the task

Time to complete the task:
(e.g. 5.01)

Notes: _______________________________________________________________________

MOD: Supine to stand

Describe: “This test will measure your ability to get up off the while lying on your back.”

Demonstrate and say: “On the word “GO” you will rise from the floor to a standing position as quickly as possible. Please do not use your hands on your knee or chair unless absolutely necessary.”

Say: “Do you think you can do this?”

If NO. Record why and move to the next test.
Say: "Why don’t you think you do the test?" _______________________________________________________________________

If YES, Say: Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best."

1.) My thoughts are: __________
2.) My body feels: _____
3.) I am feeling: _____

Say: "You may use the chair to help yourself onto the floor."

Test: "Ready, Go."

<table>
<thead>
<tr>
<th>Time to complete the task:</th>
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</thead>
<tbody>
<tr>
<td>(e.g. 5.01)</td>
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</tbody>
</table>

Notes:

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MOD: Lift & Carry

Describe: "This test will measure your ability to pick up and carry a weighted laundry basket."

Demonstrate and say: "On the word "GO" you will pick up the basket, carry it, and then place it on the shelf."

Say: "Do you think you can do this?"

If NO, record why and proceed to the next test.

Say: "Why don't you think you do the test?"

If YES, Say: Before you start, please read the statements on this card (MRF scale will be on a separate sheet) and tell me which number indicates how you feel right now about performing the task, that is, at this moment. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best."

1.) My thoughts are: _____
2.) My body feels: _____
3.) I am feeling: _____

Now proceed.

Test: "Ready, Go."
References


