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# Initial Validation of the Activity Choice Index Among Overweight Women

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**ABSTRACT**

**Purpose:** This prospective study was designed to evaluate psychometric properties of the Activity Choice Index (ACI), a measure for assessing one's choice to engage in more effortful, physically active behaviors in the course of daily routines over less-demanding, sedentary behaviors, in a sample of overweight women. **Method:** The sample included 192 overweight women ($M_{age} = 37.6 \pm 7$ years; $M_{body\ mass\ index} = 31.6 \pm 4.1\ kg/m^2$) who were assessed at baseline and 12 months after beginning a weight management intervention. **Results:** The unidimensional factor structure was confirmed for the 6-item version of the ACI. Group invariance and temporal invariance were also established. Moreover, ACI scores were positively correlated with self-reported physical activity (as measured by the 7-Day Physical Activity Recall), daily pedometer steps, and 3-day average accelerometer counts. **Conclusions:** This preliminary investigation provides evidence that a relatively brief self-report instrument for assessing lifestyle physical activity choices has strong psychometric characteristics although convergent evidence is limited. The ACI has potential utility for researchers and practitioners aiming to quantify, or track change in, physical activity in everyday, free-living conditions. This early investigation sets the stage for future research to further delineate and strengthen the measurement of the ACI construct.

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Accelerometry; measurement; physical activity; physical activity assessment



It is well-recognized that adult levels of physical activity engagement are low, and it is a widespread international problem (Bauman et al., 2009). There is also strong evidence that sedentary behavior is independently associated with health status (Katzmarzyk, Church, Craig, & Bouchard, 2009) and that engagement in daily-life physical activities such as cycling to work are inversely associated with obesity (Wen & Rissel, 2008). Thus, it is becoming more important to quantify the extent to which adults make physical activity choices throughout the day. Current global physical activity recommendations for overall health among healthy adults aged 18 to 64 years include 2 hr and 30 min (150 min) of moderate-intensity aerobic activities (i.e., brisk walking) every week and muscle-strengthening activities on 2 or more days per week (Bull & the Expert Working Groups, 2010; Haskell et al., 2007; World Health Organization, 2010). It is also recommended that adults engage in aerobic activity for bouts of at least 10 min in duration. Further recommendations from researchers have focused on the optimal minimal threshold for total number of daily steps (Tudor-Locke et al., 2011) and on recommendations to avoid long periods of sitting and other sedentary behaviors (Department of Health, Physical Activity, Health Improvement and Protection, 2011).

Apparently "lost" in physical activity recommendations is a class of active behaviors that may only reach levels of moderate or vigorous intensity for brief periods of time and may be shorter than 10 min in duration. Examples are choosing to stand instead of sitting (e.g., while waiting in a line or attending a lecture), taking the stairs instead of the elevator/escalator whenever possible, and purposely parking farther away from entrances or leaving a public transport one station earlier/later than the closest station to the destination. Although they have not been differentiated within current physical activity recommendations, increased engagement in this class of behaviors has the potential to contribute to health and well-being via mobilization of large muscle groups and increased daily energy expenditure. More broadly, they may be a behavioral marker for a general disposition or attitude toward being physically active in an opportunistic fashion.

Researchers have made various attempts to assess adult lifestyle activity, but no measures, to our knowledge, target self-selection of active over inactive lifestyle choices. Salmon, Owen, Crawford, Bauman, and Sallis (2003) developed a measure of "preference" for vigorous

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physical activities, moderate physical activities, and inactive recreational pastimes (sedentary behavior), but this scale has not been validated with objective measures of physical activity. Moreover, preference for activity type is an attitudinal measure, and an assessment of the degree to which adults report acting on their intentions is arguably a better index of behavior.

More recently, "use-of-time" measures have been developed for adults (Chilvers, Corr, & Singlehurst, 2010; Gomersall, Olds, & Ridley, 2011) to assess the frequency and duration of daily participation in activities ranging from sleep to sport participation. For example, Gomersall et al. (2011) found that minutes spent in activities that require greater exertion also yielded higher counts via accelerometry. Although these scales can provide detailed accounts of adults' activities, they do not capture specific tasks and choices that they are likely to encounter almost every day. For example, many people have a choice to use either an elevator or stairs at work or to e-mail a message versus delivering a message to a nearby colleague by foot. Thus, it may be of use to know the extent to which built environmental attributes, which make life easier but less demanding of physical effort, are purposely avoided or replaced with more effortful behaviors.

Furthermore, self-reported physical activity measures are generally assumed to be unidimensional and equivalent in meaning across groups and time. Establishing complete measurement equivalence (i.e., invariance) of a unidimensional measure means that items will reflect a singular factor structure when used among different groups of people (group invariance) or across measurement occasions (temporal invariance). Violating these assumptions can undermine research findings (for more details, see Horn & McArdle, 1992). For example, researchers could mistakenly associate physical activity change (or lack thereof) with a yearlong intervention, when such findings should be attributed to unstable measurement characteristics. Any number of psychometric properties could vary across group or time including the total number of underlying factors, the strength of item associations with factors, the scale's intercept, and the error variance associated with each item. Thus, it is essential to establish these properties in self-report measures, in addition to validating them with established objective measures.

The purpose of this study was to test the psychometric properties of a new measure for assessing lifestyle physical activity. The scale was initially developed to assess the extent to which women choose more effortful, physically active behaviors in the course of daily routines and in an opportunistic—yet mindful and volitional—fashion over less-demanding, sedentary behaviors during the course of 1 month. In this brief study, we planned to evaluate the factor structure, group invariance, and temporal invariance of a hypothesized unidimensional lifestyle physical activity index. In addition, to establish convergent validity, we planned to examine the scale's bivariate relationships with other objective physical activity measures.

## Methods

### Participants

Two-hundred fifty-eight adult women aged 25 to 50 years old ($M_{age} = 37.6 \pm 7$ years; $M_{body\ mass\ index} = 31.6 \pm 4.1\ kg/m^2$) were recruited to participate in a yearlong randomized, controlled weight-loss trial. The larger study's primary outcomes were physical activity and weight change (Silva et al., 2008; Silva, Vieira, et al., 2010). The study was approved by a university ethics committee and all inclusion/exclusion criteria relative to study eligibility have been previously described (Silva et al., 2008; Silva, Vieira, et al., 2010), but note that 37 women were excluded for various reasons (e.g., starting medication, pregnancy, chronic conditions). The present study involved a secondary data analysis of the 192 women (29 women failed to complete the Activity Choice Index [ACI]) at baseline and the 158 women (17.7% missing) at Month 12 who completed the ACI assessment.

### Procedure

Participants who had passed the screening protocol, signed the informed consent, and received medical clearance were scheduled for baseline testing and were mailed a questionnaire with an accelerometer and a pedometer (at 12-month follow-up only). After receipt of the questionnaire and accelerometer, an in-person interview was scheduled at which time the *7-Day Recall Questionnaire* was administered. Upon completion of all baseline assessments, all participants were randomly assigned to either the intervention or comparison group (111 vs. 81, respectively, which reflect the final subsamples for this study; these numbers vary from the larger parent study). Participants repeated the assessments, in the same order, at 12 months. See previous reports (Silva et al., 2008; Silva, Vieira, et al., 2010) for further details.

### Measures

#### Activity Choice Index

Self-reported lifestyle physical activities typical of the previous month were assessed with six items (using stairs or escalators, walking instead of using transportation, parking away from one's destination, using work breaks to be physically active, choosing to stand up instead of sitting, and choosing hand work instead of mechanic/automatic).[1] Items were based on a 5-point Likert scale (i.e., 1 = never, 5 = always). The composite score was calculated by averaging an un-weighted sum of each item (full instrument available in Appendix).

### Self-reported moderate-to-vigorous physical activity

The *7-Day Recall Questionnaire* (Blair et al., 1985) was used to assess participants' perceptions of their involvement in physical activity. Participants met with a trained interviewer and were asked to recall the number of days and duration of their typical physical activity sessions during the previous 7 days. This scale has been previously validated (Hayden-Wade, Coleman, Sallis, & Armstrong, 2003). Moderate-to-vigorous activity was calculated by summing the minutes for all activities of at least 3 metabolic equivalents (METs; see Ainsworth et al., 2011).

### Objectively measured physical activity

The Yamax Digi-Walker SW-200 step counter (New Lifestyles, Lee's Summit, MO) was used to assess participants' daily steps (Le Masurier & Tudor-Locke, 2003; Welk et al., 2000). Participants were instructed to wear the device every morning after resetting it to 0 every day. They were further instructed to wear the device during the course of the entire day (during 1 week, including weekend days). Data from the pedometers were processed on a daily basis. Total steps per day were averaged and then were averaged across 7 days (reflecting daily steps for the week).

Physical activity was also assessed by accelerometry (ActiGraph GT1M model; Fort Walton Beach, FL). Participants were asked to use an accelerometer for 4 consecutive days, including 2 weekdays and 2 weekend days (Trost, McIver, & Pate, 2005). The devices were activated on the 1st day at 6 a.m., and data were recorded in 1-min epochs. For analyses, a valid day was defined as having 600 min (10 hr) or more of monitor wear, corresponding to the minimum daily use of the accelerometer (Ward, Evenson, Vaughn, Rodgers, & Troiano, 2005). Periods of at least 60 consecutive minutes of zero-activity intensity counts were also considered nonwear time. Only participants with at least 3 valid days (including 1 weekend day) of data were included. The amount of activity assessed by accelerometry was expressed as the number of minutes per day spent in different intensities and in 10-min bouts or more. The cutoff values used to define the intensity of physical activity and therefore to quantify the mean time in each intensity (sedentary, light, moderate, or vigorous) were as follows: sedentary, $<100$ counts/min; light, 100–2,019 counts/min; moderate, 2,020–5,998 counts/min (corresponding to 3–5.9 METs); and vigorous, $\geq$5,999 counts/min (corresponding to $\geq$ 6 METs; Troiano et al., 2008).

### Data analysis

We planned a priori to test the full sequence of measurement invariance models (i.e., configural, metric, scalar, and strict) using *M*plus Version 7.11 (Muthén & Muthén, 1998–2015). Initially, a unidimensional ACI model was assessed via a confirmatory factor analysis (CFA) with a robust maximum likelihood estimator. To determine if our six-item measurement model could be generalized across participants in the weight-loss intervention group versus comparison group, we tested invariance across both conditions. Next, to determine if the same six-item measurement model could be generalized across the 12-month study period, we tested invariance across time.

We elected to use multiple criteria for evaluating model misspecification, including the model chi-square statistic ($\chi^2$), root mean square error of approximation (RMSEA), and the comparative fit index (CFI). The model $\chi^2$ tests the prediction that there are no discrepancies between the population covariances and those specified by the model (i.e., nonsignificant $\chi^2$ value or $p \geq .05$). The RMSEA and CFI are incremental fit indexes comparing the improvement in the specified model over the null model. Recommended values are: RMSEA $< .06$ and CFI $\geq .95$ (Hu & Bentler, 1999). Several criteria were also used for evaluating temporal invariance, including the corrected Satorra-Bentler (S-B) $\chi^2$ change ($\Delta$) test whereby $p \geq .05$ indicates (Satorra & Bentler, 2001) nested models are not significantly different; $\Delta$RMSEA $< .015$ (Chen, 2007); and $\Delta$CFI $< .01$ (Cheung & Rensvold, 2002). It should be noted, however, that $\chi^2$ and the S-B $\chi^2$ $\Delta$ test are sensitive to sample size. Thus, we opted to use multiple criteria to base our decisions on model fit and change in fit, as recommended by the majority of psychometricians. Model-based reliability was calculated for the ACI with standardized estimates using McDonald's (1999) omega coefficient ($\omega^1$), which measures the common variance in the scale as proportional to the total variance. This

[1]An additional item, "choosing to be physically active whenever possible," was reported in previous papers (Andrade et al., 2010; Carraca et al., 2012; Silva, Markland, et al., 2010). The wording of this item is vague and general and somewhat redundant with the more specific, identifiable behaviors offered as examples by the rest of the items in the scale. For the purpose of testing and refining this measure as a homogeneous set of items, this item was omitted from the analyses reported herein.

approach does not suffer from the same pitfalls of overestimation and underestimation as other measures, such as Cronbach's alpha (Ogasawara, 2009; Sijtsma, 2009). Note that model-based reliability estimates merely indicate conceptual redundancy within a given time point, whereas evidence of measurement invariance suggests that there is equivalence in the interpretation of items across groups or time. In addition to testing the factor structure of the ACI, we examined the bivariate relationships between the ACI and established subjective and objective indexes of physical activity using Pearson correlations. The strength of correlations was interpreted using the absolute criterion (i.e., 0 – .19 = no correlation, .2 – .39 = low correlation, .4 – .59 = moderate correlation, .6 – .79 = moderately high correlation, and ≥.8 = high correlation; Safrit & Wood, 1995).

## Results

### *Measurement modeling at baseline and 12 months*

At baseline, a CFA of the one-factor ACI model provided an adequate fit across the entire sample, $\chi^2 = 18.357$ (9), $p = .031$, RMSEA = .074 (95% CI [.021, .122]), CFI = .956, according to CFI. At 12 months, the model provided a better fit, $\chi^2 = 5.826$ (9), $p = .757$, RMSEA = .000 (95% CI [.000, .063]), CFI = 1.000, according to $\chi^2$, RMSEA, and CFI. Reliability ($\omega^1$) for Time 1 and Time 2 was .77 and .82, respectively.

### *Group invariance of the ACI*

#### *Invariance across exercise groups*

To test group invariance, we first examined the configural model, with each item regressed on a single latent factor, which fit the data extremely well, $\chi^2 = 22.666$ (18), $p = .204$, RMSEA = .052 (95% CI [.000, .110]), CFI = .978. The metric invariance model, with the addition of identical factor loadings across groups, also provided an excellent fit to the data, $\chi^2 = 27.309$ (23), $p = .243$, RMSEA = .044 (95% CI [.000, .099]), CFI = .979, and according to the adjusted S-B $\chi^2\Delta$ test, ΔRMSEA, and ΔCFI, the more restrictive metric invariance model was not significantly different from the configural model. Next, the item intercepts were constrained across groups, which also provided a very good fit to the data, $\chi^2 = 32.502$ (28), $p = .255$, RMSEA = .041 (95% CI [.000, .092]), CFI = .978, and again, all criteria suggest that this scalar invariance model was not significantly different from the metric invariance model. We then constrained residual variances across groups, and this model also provided an excellent model-to-data fit, $\chi^2 = 39.478$ (34), $p = .238$, RMSEA = .041 (95% CI [.000, .088]), CFI = .974, and again, indexes suggest the strict invariance model was not significantly different from the less restrictive, scalar invariance model. Finally, we tested latent mean invariance, $\chi^2 = 40.056$ (35), $p = .256$, RMSEA = .039 (95% CI [.000, .086]), CFI = .976, and variance invariance, $\chi^2 = 40.349$ (36), $p = .284$, RMSEA = .035 (95% CI [.000, .084]), CFI = .979, neither of which changed the fit of the model. Therefore, we can conclude that the measurement model was fully invariant and ACI levels were the same across the two groups at baseline (see Table 1 for factor loadings and residual variances).

### *Temporal invariance of the ACI*

Next, we conducted invariance testing across time. The configural invariance model (i.e., one-factor measurement model estimated at both time points [with no other restrictions]) provided a good fit to the data, $\chi^2 = 58.441$ (47), $p = .122$, RMSEA = .036 (95% CI [.000, .062]), CFI = .979. The metric invariance model showed little change in overall fit, $\chi^2 = 68.684$ (52), $p = .060$,

Table 1. Standardized factor loadings and residual variances (least restrictive, configural models).

| Group Invariance (Time 1) | Comparison ($n = 81$) | | Intervention ($n = 111$) | |
|---|---|---|---|---|
| Items | Loadings | Residuals | Loadings | Residuals |
| 1. Using stairs instead of escalators | .65 | .58 | .45 | .80 |
| 2. Walking instead of using transportation | .51 | .74 | .51 | .74 |
| 3. Parking away from your destination | .69 | .53 | .67 | .55 |
| 4. Using work breaks to be physically active | .64 | .60 | .71 | .49 |
| 5. Choosing to stand up instead of sitting | .58 | .66 | .70 | .52 |
| 6. Choosing hand work instead of mechanic/automatic | .39 | .85 | .63 | .61 |
| **Temporal Invariance** | **Time 1 ($n = 192$)** | | **Time 2 ($n = 158$)** | |
| Items | Loadings | Residuals | Loadings | Residuals |
| 1. Using stairs instead of escalators | .55 | .69 | .66 | .57 |
| 2. Walking instead of using transportation | .53 | .72 | .69 | .52 |
| 3. Parking away from your destination | .66 | .57 | .69 | .52 |
| 4. Using work breaks to be physically active | .68 | .54 | .78 | .39 |
| 5. Choosing to stand up instead of sitting | .66 | .57 | .58 | .66 |
| 6. Choosing hand work instead of mechanic/automatic | .52 | .73 | .53 | .72 |

RMSEA = .041 (95% CI [.000, .065]), CFI = .970, and the model was not significantly different than the configural model based on all three criteria (S-B $\chi^2$ Δ, ΔRMSEA, and ΔCFI). The scalar invariance model provided an adequate fit overall, $\chi^2 = 82.890$ (56), $p = .011$, RMSEA = .050 (95% CI [.024, .072]), CFI = .952, but based on S-B $\chi^2\Delta$ and ΔCFI, it appears that the model may be significantly different than the less restrictive metric invariance model; however, ΔRMSEA < .015 suggests that this difference may be negligible. The fit of the model also significantly worsened when we added strict residual invariance constraints, $\chi^2 = 99.619$ (62), $p < .001$, RMSEA = .056 (95% CI [.035, .076]), CFI = .932. Although the model did not meet the most restrictive, and perhaps unrealistic, requirements for temporal measurement invariance, it did meet minimal requirements (Horn & McArdle, 1992). Finally, we tested latent mean invariance, $\chi^2 = 214.616$ (63), $p < .001$, RMSEA = .112 (95% CI [.096, .129]), CFI = .728, which significantly impacted the fit of the model and suggested that the mean structures were different across time (as to be expected in a physical activity intervention). At this step, we discontinued further invariance testing. See Table 1 for standardized factor loadings and residual variances.

Together, these findings imply that under most circumstances, the ACI has strong psychometric characteristics (i.e., a singular factor structure that could be generalized across intervention groups) and the overall factor structure and magnitude of loadings did not change across a 12-month time period (see Table 1 for standardized factor loadings and residual variances). However, the scale was sensitive to change, likely resulting from the physical activity intervention.

### *Convergent validity*

The distribution of scores was assessed for all study variables. Distributions were approximately normal, with the exception of vigorous accelerometer counts, and attempts to transform vigorous activity were successful. We therefore deemed parametric Pearson correlations sufficient for examining bivariate associations between the ACI composite scores and steps counts at Times 1 and 2. Note that in the larger trial, pedometers were only used at 12-month follow-up (see Table 2 for means and standard deviations). As one might expect, relationships were statistically significant and positive between ACI scores and time-consistent objective indexes, with a pattern of association reflecting the greatest overlap with light and moderate physical exertion (see Table 3). It is worth noting, however, that the correlation coefficients (ranging from .22 to .36) should be interpreted as "low correlations" based on the absolute criterion (Safrit & Wood, 1995). Furthermore, no associations were found between ACI and sedentary behavior or between ACI and vigorous accelerometer counts.

Table 2. Means and standard deviations of study variables.

| Variables | Mean | *SD* |
|---|---|---|
| 1. ACI at 0m | 2.72 | 0.77 |
| 2. ACI at 12m | 3.48 | 0.84 |
| 3. 7-day recall min/week at 0m | 97.30 | 134.24 |
| 4. 7-day recall min/week at 12m | 240.21 | 188.63 |
| 5. Pedometer total steps at 12m | 9,101.84 | 3,528.09 |
| 6. Sedentary ACL at 0m | 993.36 | 91.32 |
| 7. Sedentary ACL at 12m | 1007.87 | 96.10 |
| 8. Light ACL at 0m | 348.44 | 80.12 |
| 9. Light ACL at 12m | 310.25 | 75.98 |
| 10. Moderate ACL at 0m | 31.17 | 15.51 |
| 11. Moderate ACL at 12m | 36.47 | 19.94 |
| 12. Vigorous ACL at 0m | 0.49 | 1.55 |
| 13. Vigorous ACL at 12m | 0.69 | 1.56 |

*Note.* 0m = baseline; 12m = 12-month follow-up testing; ACI = Activity Choice Index, lifestyle physical activity index; ACL = accelerometer counts (minutes per day). Descriptive statistics were based on sample sizes that varied across time accordingly: ACI 0m, 12m ($n = 186$, $n = 159$); 7-day recall 0m, 12m ($n = 198$, $n = 190$); pedometer 12m ($n = 147$); and ACL 0m, 12m ($n = 187$, $n = 105$).

Table 3. Zero-order correlations between the ACI and subjective and objective measures of physical activity.

| Variables | ACI at 0m | ACI at 12m |
|---|---|---|
| 1. 7-day recall min/week at 0m | .17 ($n = 178$) | .15 ($n = 152$) |
| 2. 7-day recall min/week at 12m | .10 ($n = 170$) | **.36** ($n = 150$) |
| 3. Pedometer total steps at 12m | .13 ($n = 138$) | **.34** ($n = 138$) |
| 4. Sedentary ACL at 0m | −.09 ($n = 176$) | −.16 ($n = 148$) |
| 5. Sedentary ACL at 12m | −.10 ($n = 96$) | −.21 ($n = 85$) |
| 6. Light ACL at 0m | .02 ($n = 176$) | .06 ($n = 148$) |
| 7. Light ACL at 12m | .11 ($n = 96$) | **.27** ($n = 85$) |
| 8. Moderate ACL at 0m | **.22** ($n = 176$) | .04 ($n = 148$) |
| 9. Moderate ACL at 12m | .09 ($n = 96$) | **.28** ($n = 85$) |
| 10. Vigorous ACL at 0m | .09 ($n = 176$) | .06 ($n = 148$) |
| 11. Vigorous ACL at 12m | .01 ($n = 96$) | .06 ($n = 85$) |

*Note.* Although statistically significant, bolded correlations belong to "low correlations" according to the absolute criterion (Safrit & Wood, 1995). ACI = Activity Choice Index, lifestyle physical activity index; ACL = accelerometer counts (minutes per day); 0m = baseline; 12m = 12-month follow-up testing.

## Discussion

In this study, we evaluated the psychometric properties of the ACI in a sample of overweight women. The ACI exhibited group invariance (across treatment conditions) and temporal invariance (across 12 months). No evidence of convergent validity was provided, as only low positive correlations—evidence of discriminant validity—were found with relevant objective indexes of daily physical activity. Together, these findings suggest that the scale has some potential for quantifying one aspect of adults' daily physical activity choices and daily routines, which other measurements do not specifically capture. To the extent that this facet of one's lifestyle options is found to predict important health or behavioral outcomes, it may be worthy of inclusion in assessment batteries in future studies and may be targeted by interventions meant to influence physical activity.

A consistent pattern of associations between ACI and conceptually relevant, objective measures was found. Specifically, with one exception, light-to-moderate physical exertion was most strongly related to ACI across time, whereas sedentary and vigorous physical activity were both unrelated. It is not surprising to find a lack of association between ACI and sedentary behavior nor to find an association between ACI and vigorous-intensity activity, as these types of behaviors share little conceptual overlap with the activities represented by the ACI. We believe that the lack of correlation between light activity and ACI at baseline only is attributable to previously inactive women not being attuned to their typical lifestyle behaviors and decisions. Exercise initiates are likely to have inaccurate and inconsistent perceptions at the start of a physical activity program, in the same way self-efficacy tends to be inflated at program entry (McAuley et al., 2011). As participants become immersed in a research study, they are asked repeatedly to recall or self-monitor their actions, and by intervention end, an improved alignment of activity-related perceptions with actual behavior is often observed. It should also be noted that the level of perceptual abstraction assessed by our two self-report measures differs. Furthermore, we would not expect high correlations between all-day activity monitor readings and brief instances of physical activity throughout the day.

Although much work is still needed to determine if the ACI can predict unique variance associated with important health outcomes compared to other measures, progress has been made toward understanding the relationships between ACI and relevant motivational and behavioral variables. Three previous studies on the same trial have reported results using the ACI. Silva and her colleagues (Andrade et al., 2010; Carraca et al., 2012; Silva, Markland, et al., 2010) reported on motivational predictors of the original seven-item ACI score at 1 year (intervention end) and found significant positive correlations for both introjected forms and, to a larger extent, autonomous forms of motivation (but not for external motivation). Despite the fact that opportunistic physical activities may require less cognitive processing than more structured and vigorous forms of exercise, associative environmental cues can consciously or unconsciously activate goal pursuits and subsequently influence motivation and behavior (Ratelle, Baldwin, & Vallerand, 2005). In another study, associations between different forms of physical activity, including the ACI, and eating behavior and weight loss were analyzed (Andrade et al., 2010). Results showed low correlations between lifestyle physical activity and several markers of eating self-regulation (e.g., flexible restraint and emotional eating), some of which mediated the association between physical activity and weight change. In a more recent study (Carraca et al., 2012), activity choices predicted body-image improvements up to 2 years after starting a weight control program. These three studies showed preliminary evidence that the ACI can be influenced by behavior change interventions and that it may have important correlates and consequences. These findings are encouraging and informative for professionals and provide further support for the inclusion and recommendation of this type of physical activity (as a complement to structured activities) at least within the context of weight-loss interventions.

Dunn, Andersen, and Jakicic (1998) suggested that "self-selected activities can be consciously planned by the individual or they can be unplanned by manipulation of the environment" (p. 399). Indeed, we have shown that a behavior change intervention, where largely it is the individual who is targeted, was successful in changing the types of physical activities captured by the ACI (Silva, Markland, et al., 2010). However, because these activities do not involve high levels of deliberation or significant cognitive (or physical) effort, it is possible that environmental interventions, where point-of-decision prompts or other "nudges" that affect contextual conditions and choice architecture where people live, can also be successful in influencing these behaviors.

This study has a number of strengths worth mentioning. The fact that we used established self-report and objective indexes of physical activity representing a range of intensity levels to evaluate evidence of convergent validity (albeit revealing low correlations indicating discriminant validity evidence) is certainly a strength. In addition, the ACI is unique in that it reflects an intention to avoid and replace inactive behaviors with more effortful physical activities. This dimension of lifestyle choice has been omitted by self-report physical activity assessments. Finally, we subjected the scale to the most rigorous psychometric tests to determine its structural integrity, properties that are typically assumed to be true of physical activity measures (and are rarely ever tested).

This study has several limitations. First, the sample included overweight and obese premenopausal women. It would be prudent to test for potential differences in the extent to which men may be more or less opportunistic in their physical activity compared with women. Additionally, attitudes (strength and valence) may differ by gender and age, contributing to the differences in one's motivation to be opportunistic toward daily physical activity. In addition, the trial was intended for weight loss, and participants' motives to engage in vigorous exercise were likely to be high. Thus, further validation of the scale is necessary in more diverse populations to determine the relevance of the particular environmental features included within the ACI (e.g., elevator, parking lots, machinery). Some may note that there was a fair amount of missing data at 12 months, which can sometimes indicate systematic bias. However, there was no correlation between the baseline ACI score and attrition at Month 12. Lastly, although the covariance shared by objective measures is weak, the pattern of relationships was highly anticipated given the nature of the activities and their minimal, day-to-day frequency of occurrence and duration. Data extraction algorithms representing shorter bursts of activity (e.g., 30-s intervals) relative to the 10-min threshold used herein may reveal different patterns of relationships or relationships that differ in magnitude. Therefore, this preliminary investigation should be interpreted with caution, yet one should not discount the complete pattern of findings.

## What does this article add?

There is a plethora of self-reported measures of physical activity that have been developed to capture some combination of duration, frequency, and intensity of engagement in a variety of lifestyle and recreational physical activities as well as structured exercise. Each measure has its strengths and weaknesses, but most importantly, research questions should always drive the method. Here, we have highlighted occasions whereby some action-oriented individuals are capitalizing on opportunities to engage in physical activity by adapting to their environment throughout the course of their day. These activity choices have strong potential for added health benefits and for serving as targets for behavior change interventions. Developing sound measures of activity choices is necessary to provide benchmarks for assessing change. This early investigation merely sets the stage for future research to further delineate the ACI construct, strengthen its measurement, and explore its correlates. In conclusion, we provided preliminary evidence for the utility of the ACI among overweight women.

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## Appendix

### *Activity Choice Index*

Instructions: During the past 7 days, how often have you engaged in the following activities?

1. Using stairs instead of escalators (1 = never, 3 = sometimes, 5 = always)
2. Walking instead of using transportation (1 = never, 3 = sometimes, 5 = always)
3. Parking away from your destination (1 = never, 3 = sometimes, 5 = always)
4. Using work breaks to be physically active (1 = never, 3 = sometimes, 5 = always)
5. Choosing to stand up instead of sitting (1 = never, 3 = sometimes, 5 = always)
6. Choosing hand work instead of mechanic/automatic (1 = never, 3 = sometimes, 5 = always)