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Validation of the Stanford Brief Activity Survey: Examining Psychological Factors and Physical Activity Levels in Older Adults

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Abstract

Background—This study examined the construct validity and reliability of the new 2-item Stanford Brief Activity Survey (SBAS).

Methods—Secondary analysis was conducted using data collected from the healthy older controls (n = 1023) enrolled in the Atherosclerotic Disease Vascular Function and Genetic Epidemiology (ADVANCE) study. Construct validity was examined by regression analyses to evaluate significant trends ($P \leq .05$) across the SBAS activity categories for the selected psychological health factors measured at baseline and year 2, adjusted for gender, ethnicity and education level. Test-retest reliability was performed using Spearman's rank correlation.

Results—At baseline, subjects were 66 ± 2.8 years old, 38% female, 77% married, 61% retired, 24% college graduate, and 68% Caucasian. At baseline, lower self-reported stress, anxiety, depression, and cynical distrust, and higher self-reported mental and physical well-being were significantly associated with higher levels of physical activity (p trend ≤ 0.01). These associations

held at year 2. The test-retest reliability of the SBAS was statistically significant (r_s= 0.62, P < .001).

Conclusion—These results provide evidence of the construct validity and reliability of the SBAS in older adults. We also found a strong dose-response relationship between regular physical activity and psychological health in older adults, independent of gender, education level and ethnicity.

Keywords

instrument psychometrics; older adults; physical activity assessment; psychological health

Negative psychological factors such as major depression, anxiety, or chronic stress can aggravate pathophysiological mechanisms associated with cardiovascular disease, and also contribute to poor health behavior.[1–3] On the other hand, regular physical activity promotes cardiovascular disease risk reduction and better psychological health.[4,5] However, few large population studies have conducted comprehensive assessments of physical activity, cardiovascular disease risk factors and psychological health factors to permit full exploration of the association among these factors. As a result, the dose-response relationship between physical activity and psychological health is not well documented.

A newly developed tool, the Stanford Brief Activity Survey (SBAS), was piloted in the Atherosclerotic Disease Vascular Function and Genetic Epidemiology (ADVANCE) study, a case-control genetic association study.[6,7] The SBAS provides a quick assessment of the usual amount and intensity of physical activity that a person performs throughout the day. Initial validity of the SBAS in the healthy older controls (66 ± 2.8 years old, n = 1010) enrolled in ADVANCE was established by comparison with the 7-day physical activity recall interviewer-administered questionnaire and has been previously reported.[6] In that study, the SBAS effectively classified subjects into 5 distinct activities levels, ranging from inactive to very hard intensity, using established MET equivalents.[6] In addition, cross-sectional dose-response relationships in the expected direction between self-reported physical activity using the SBAS with selected cardiovascular disease risk factors, including body mass index, high density lipoprotein cholesterol, triglycerides, fasting blood glucose and insulin, and metabolic syndrome were found (p trend < 0.01).[6] A subsequent published validation study in ADVANCE among early-onset coronary artery disease cases (45.9 ± 6.4 years old, n = 500), found similar gender-specific results (p trend < 0.05).[7]

Given the significant associations between incremental decreases in physical activity using the SBAS with increasing cardiovascular disease risk,[6,7] our next step in evaluating this tool and the primary objective of this study was to examine the construct validity of the SBAS with self-reported psychological health factors obtained from established questionnaires in the ADVANCE older controls. Psychological factors selected were based on previously reported associations and expected directions with physical activity.[4,8–10] The hypotheses were that higher levels of physical activity would be associated with: a.) Lower self-reported stress, anxiety, depression, anger, and cynical distrust; and b.) Higher self-reported mental and physical well-being. In addition, test-retest reliability of the SBAS was examined.

Methods

Subjects

Subjects who were healthy older controls without known cardiovascular disease enrolled in the ADVANCE study. A total of 1000 older men and women were targeted for enrollment in the study. Details of the recruitment plan have been previously reported.[6] Briefly, male and female members of Kaiser Permanente of Northern California, aged 60 to 69 years old (as of January 6, 2001), were identified in the health plan's electronic databases as potentially eligible participants, after excluding those with a severe chronic disease or living >50 miles from the research clinic. A total of 1023 older controls enrolled in the study, following screening and confirming eligibility. Complete data were available for 1017 subjects at baseline and 996 subjects at year 2 (deaths, n = 5; withdrawals, n = 16).

Approval to conduct the study was obtained from the Institutional Review Boards at Stanford University Medical School and the Kaiser Foundation Research Institute. The investigation was carried out according to the principles outlined in the Declaration of Helsinki, including written informed consent from all subjects.

Data Collection Procedures

A comprehensive, self-administered health survey was mailed to subjects for completion before their baseline and year 2 clinic visits. Baseline data were collected between December 2001 and January 2004, while year 2 data were collected between February 2004 and November 2005, as close as possible to 2 years after baseline for each individual. At baseline, the health survey ascertained medical history information, cardiovascular disease risk profile, the amount and intensity of physical activity using the SBAS[6,7] and psychological health factors. Self-reported psychological health factors assessed included: perceived stress, anxiety, depression, anger, cynical distrust, mental and physical well-being. In this study, race/ethnicity was classified carefully using a uniform algorithm, which has been reported elsewhere.[11] Briefly, information on self-reported birthplace, grandparents' race/ethnicity, and grandparents' country of origin were collected to determine race/ethnicity. Education level was by self report. At year 2, the main study investigators were concerned about subject burden, and a shorter health survey was mailed to subjects and included a subset of the salient baseline self-reported psychological health factors (ie, depression, mental and physical well-being). During both clinic visits, trained staff reviewed the health survey, measured resting blood pressure and anthropometrics using standard methods, and obtained fasting blood samples.

Data Collection Instruments

Physical Activity—Physical activity was assessed using the Stanford Brief Activity Survey (SBAS). The SBAS provides a quick assessment of the usual amount and intensity of physical activity during the past year that a person performs throughout the day.[6,7] A description of the SBAS tool and instructions for its use has been reported elsewhere.[6] Briefly, the SBAS contains 2 items. The first item describes 5 different patterns of on-the-job activity, ranging from mostly sedentary to hard physical labor, such as carrying bricks. The second item describes 5 patterns of leisure-time activity ranging from sedentary to

regular vigorous activity, such as jogging, on 5 or more days per week. Respondents select the one pattern that best describes their on-the-job activity, and the one that best describes their leisure-time activity pattern. Each response pattern includes a global statement about the activity, and as well as dimensions of frequency, intensity, time, and type of activity.

The SBAS activity category is determined using a color-coded scoring table representing 5 different activity categories (inactive, light, moderate, hard, and very-hard intensities).[6] On-the-job activity patterns are located on the vertical axis (response options A–E; ie, sedentary—hard physical labor), while leisure-time activity patterns are located on the horizontal axis (response options F–J; ie, sedentary—regular vigorous activity) of the color-coded scoring table. The intersection of these 2 responses on the color-coded scoring table, determines the respondent's current activity pattern. For example, a person that works in an office mainly sitting at a desk all day and plays doubles tennis for 45 or more minutes/day 3 times/week, would choose “B” as their on-the-job activity and “H” as their leisure-time activity. The intersection of these 2 responses on the color-coded table would place them in the moderate-intensity activity category.[6] For respondents that are retired and have no job or regular work, they would select response option A for their on-the-job activity and then select the best option for their leisure-time activity (sedentary—regular vigorous activity), for determining their activity pattern (ie, inactive, light, moderate, hard, and very-hard intensities).

Psychological Health Factors—Self-reported psychological health factors assessed in ADVANCE included perceived stress, anxiety, depression, anger, cynical distrust, and mental and physical well-being. The Perceived Stress Scale (PSS) designed by Cohen and colleagues[12,13] is the most commonly used self-administered tool to measure stress, and was designed for community samples. The PSS contains 14 items on a 5-point Likert format (0 = never, 4 = very often), with possible scores range from 0 to 56. A higher score indicates more perceived stress. Strong reliability (r = .85) with good test-retest reliability (r = .85 & 0.55) as well as concurrent and predictive validity have been reported.[12] Known-groups validity was demonstrated by the tool's ability to detect differences between age groups (P = .01), income (P = .01) and education levels (low versus high) (P = .01).[13] Internal consistency of the PSS in this study was high (r = .87).

Anxiety was measured using Spielberger's Trait-Anxiety Inventory (STAI).[14] The STAI is a well-established scale used extensively in research and clinical practice. It contains 20 items and uses a 4-point Likert format (1 = not at all, 4= very much so). Possible scores range from 20 to 80, with higher scores indicating greater anxiety (low anxiety = 20 to 39, moderate anxiety = 40 to 59, high anxiety = 60 to 80). Psychometric testing has established content, construct, convergent and discriminate validity.[14] In this study, a very high internal consistency for the STAI was found (r = .93).

Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) short form, a 10-item scale.[15] The CES-D is widely used in research and clinical settings as a screening tool to detect depressive symptoms.[15] The CES-D asks questions pertaining to how the respondent felt or behaved in the past week, using a 4-point Likert format (0 = none of the time, 3 = most of the time), with possible scores ranging from 0 to 30. Higher scores represent more depressive symptoms. A score of ≥10 using the CES-D

short-form is considered a clinical cut-point warranting further evaluation for depression.[15] Construct, convergent and discriminate validity and test-retest reliability of the CES-D short form for use in older adults has been reported.[15] Internal consistency of the CES-D in this study was high at both baseline and year 2 (r = .84 and 0.82, respectively).

Anger was measured using Spielberger's (Trait) Anger Expression Inventory (STAXI).[16] Trait anger is defined as the disposition of an individual to perceive a wide range of situations as annoying or frustrating and the tendency to respond to such situations in an angry manner. The STAXI trait anger scale contains 10 items, using a 4-point Likert format (1 = almost never, 4 = almost always). Possible scores range from 10 to 40, with higher scores indicating greater trait anger.[16] Based on reported normative data collected on a sample of 9000 adults, individuals with scores above the 75th percentile are likely to experience angry feelings to a degree that interferes with optimal functioning.[16] Convergent validity and test-retest reliability of the STAXI has been reported.[16] The STAXI had a high internal consistency (r = .83) in this study.

The Cynical Distrust Scale, a subscale of the Cook-Medley's Hostility Scale was used to assess cynical distrust.[17] Cynical distrust is defined as a negative view toward others in society. The cynical distrust scale contains 8 items, using a true/false format.[18] Possible scores range from 0 to 8, with higher scores representing more cynicism and distrust. Convergent and discriminate validity have been reported.[17–19] In this study, the Cynical Distrust Scale had good internal consistency (r = .76).

The Medical Outcomes Study 12-item Short Form (SF-12) health survey was used to assess mental and physical well-being.[20] Scores are standardized to population norms using published algorithms, with the mean score set at 50 (SD = 10).[21] Higher scores indicate better perceived physical and mental well-being.[21] Psychometric testing of the SF-12 has established construct, predictive, and known-groups validity for the mental and physical component summary scores, as compared with the SF-36.[20] Good test retest reliability (r = .86 to 0.89) of the SF-12 has been reported.[20] Internal consistency of the SF-12 in this study was high at both baseline and year 2 (r = .82 and 0.86, respectively).

Analysis Plan

All forms were reviewed for accuracy and completeness at the time of the clinic visit. Variable frequency distributions were used to check for extreme values. Descriptive statistics were calculated for all variables. Frequency distributions of SBAS activity levels at baseline and year 2 were calculated. Internal consistency of all psychological heath measures was calculated using Cronbach's alpha coefficients. Construct validity was examined through regression analyses, to evaluate significant trends ($P \leq .05$) across the SBAS activity categories for the selected psychological health factors measured at baseline and year 2, adjusted for gender, ethnicity and education level. Test-retest reliability of the SBAS was calculated using data collected at baseline and year 2, using Spearman's rank correlation with a tie correction; >0.60 was considered statistically significant. The long interval between testing was considered acceptable because no exercise intervention occurred and while absolute levels of activity might be expected to decline, the relative ranking of individuals is likely to be stable. In addition, associations of the SBAS categories

between baseline and year 2 were examined. Finally, unadjusted paired *t* tests were calculated to examine possible change (ie, stability, in psychological health factors collected at both baseline and year 2). Data were analyzed using SAS (Version 9.1, SAS Institute Inc., Cary, NC).

Results

At baseline, subjects were on average 66 years old, and the majority were married, Caucasian men (Table 1). Despite being selected as a cohort free of major chronic disease (ie, cardiovascular disease, cancer, dementia, severe liver disease and HIV/AIDS), there was a reasonably high prevalence of hypertension and hyperlipidemia. Compared with women, men were more likely to be married, have diabetes, hyperlipidemia, and a BMI >25 kg/m^2 ($P \leq .05$) (Table 1). The distribution of responses and examples of response options for the 2 items in SBAS are reported in Table 2. Regular physical activity at a moderate-intensity or greater was reported by 61% of subjects at baseline (Table 3), and 62% of subjects at year 2 (Table 4). In addition, subjects in the higher SBAS activity categories had more favorable psychological health factors than their less active counterparts, regardless of gender, ethnicity and education level at both time periods (Tables 3 and 4). Finally, given that the majority of subjects in our study were not employed, we calculated the level of physical activity at baseline for only those subjects indicating regular work and found that 55% (n = 511) reported their level of physical activity at a moderate-intensity or greater, which is comparable to the total sample at baseline (61%) reporting moderate-intensity or greater level of physical activity.

Construct Validity

As hypothesized, at baseline higher levels of physical activity were significantly associated with lower self-reported stress, anxiety, depression, and cynical distrust (p trend ≤ 0.01), as well as with higher self-reported mental and physical well-being (p trend ≤ 0.01) (Table 3). These associations held at year 2, with lower self-reported depression, and higher self-reported mental and physical well-being significantly associated with higher levels of physical activity (p trend ≤ 0.01) (Table 4). However, at baseline, our hypothesis that lower trait anger would be associated with higher levels of physical activity was not supported (p trend = 0.98) (Table 3).

Reliability

The correlation between the SBAS score reported at baseline and at year 2 was statistically significant ($r_s = 0.62$, $P < .001$), providing initial evidence for the reliability of the SBAS.

Stability of Measures

The associations between baseline and year 2 SBAS categories were calculated to determine the stability of the tool (Table 5). More than half of the subjects (54.4%) reported no change in their level of physical activity between baseline and year 2. However, 22.4% of subjects reported an increase in activity level and 23% of subjects reported a decrease in activity level at year 2, when compared with baseline (Table 5). Generally, we observed only a 1-step change in activity level in either direction, between baseline and year 2.

The associations between the psychological variables measured at both baseline and year 2 were calculated to examine any significant change over time (Table 6). There was no statistically significant change in depression or mental health over time. While a statistically significant change in physical health over time was observed, the effect size was very small and not considered clinically relevant.

Discussion

In this study, the validity and reliability of the SBAS in relation to psychological health factors were examined using data collected from the older controls enrolled in ADVANCE. Construct validity is the major form of validation for measures of health-related indices and is a lengthy process of accumulating many different kinds of evidence. The basic issue is whether measures of health-related indices relate to other measures in ways consistent with plausible hypothesis. In other words, do the measures behave as expected. If the results support the hypothesis, then further evidence of the validity is provided.

The hypotheses in our study examined both convergent and discriminate types of construct validity. We found evidence of construct validity for the SBAS, as all but 1 of our hypotheses were confirmed, consistent with previous meta-analyses[4,8–10] reporting that regular physical activity is associated with lower levels of negative emotions (eg, stress, anxiety, depression); and higher levels of well-being (eg, physical and mental health). There were also significant dose-response relationships in the expected direction between decreases in perceived stress, anxiety, cynical distrust, and depression with increasing levels of physical activity (p trend = 0.01). Finally, significant dose-response relationships between increasing levels of physical activity and greater perceived physical and mental health were found (p trend = 0.01), while no dose-response for anger was observed. These statistically significant dose-response relationships in the expected direction between self-reported physical activity using the SBAS with perceived psychological health provides further evidence of known-groups validity of the SBAS, which is another type of the construct validity. The 1 hypothesis that was not confirmed was that lower self-reported trait anger would be significantly associated with increasing levels of physical activity. Although our hypothesis was based on findings from a previous[4] meta-analysis examining the effect of physical activity among older adults on anger, it is possible that the low level of self-reported anger among the subjects in our study produced a floor effect. On the other hand, self-reported trait anger assessed in our study, is generally viewed as the disposition of an individual to respond to situations in an angry manner, and may not be influenced by physical activity. Further study of the relationship between state anger (ie, the intensity of anger as an emotional state at a particular time) and physical activity among clinical populations, such as persons with coronary artery disease, may be warranted. In addition, future validation studies of the SBAS may consider examining the associations between SBAS activity categories and physical performance or functioning tests, in other populations.

Our findings also provide initial evidence of the reliability of the SBAS. Given that the study was observational and that no significant change in the variables measured overtime was found, the 2-year interval between testing was acceptable for examining the initial

reliability of the SBAS. In addition, level of physical activity among older adults tends to be a relatively stable characteristic, unless concentrated efforts to change the behavior are implemented.[22,23] However, it is recommended that future studies examine the reliability of the SBAS with shorter time intervals.

In this study, consideration needs to be given to the fact that subjects were fairly active, with a high percent classified at the moderate-intensity or greater level using the SBAS (61% at baseline and 62% at year 2), and may not be representative of older adults living in the United States. First of all, subjects lived in the San Francisco Bay Area in Northern California and were selected as healthy older controls for a case-control genetic association study, and may be healthier than older adults living in the general population. For example, the Centers for Disease Control and Prevention U.S. Physical Activity Statistics[24] reported lower National and California average physical activity levels for similar aged adults at both time points (ie, 2003 and 2005) than subjects in our study. Secondly, the SBAS takes into account both on-the-job activity as well as leisure-time activity for classifying an individual's total physical activity, where as population-based physical activity data such as the National Health Interview Survey[25] uses only leisure-time activity for classifying level of physical activity. Finally, in our initial validation study,[6] the SBAS classification at a moderate or greater intensity reported a sensitivity of 0.73 and specificity of 0.61 to detect the national physical activity recommendations of 150 minutes or more/week at a moderate or greater intensity when compared with an established interviewer-administered questionnaire. Therefore, SBAS classification at a moderate-intensity level may not be equivalent to national physical activity recommendations. Likely combinations of all these factors may partly help explain the high percentage of older adults classified at the moderate-intensity or greater level using the SBAS.

Conclusion

The results obtained in this study provide further evidence of the construct validity and reliability of the SBAS. In addition, we found a strong cross-sectional dose-response relationship between regular physical activity and psychological health in older adults. Subjects in the higher SBAS activity categories had more favorable psychological health factors than their less active counterparts, regardless of gender, ethnicity and education level. Finally, these findings lend additional support for the potential positive psychological benefit of physical activity among older adults.

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Table 1
Baseline Characteristics in ADVANCE Older Controls, n = 1017

	Total, n = 1017	Women, n = 382	Men, n = 635	*p*-value, gender differences
Age, mean years (SD)	65.8 (2.8)	65.8 (2.8)	65.8 (2.9)	0.71
Employed part or full-time, %	39.1%	36.6%	40.6%	0.21
Married, %	77.0%	64.9%	84.3%	**<0.001**
College graduate, %	23.5%	21.0%	24.6%	0.19
Race/ethnicity[a]				
Caucasian, %	67.6%	67.2%	67.7%	0.88
African-American, %	8.2%	6.8%	9.0%	0.22
Hispanic, %	5.9%	6.5%	5.5%	0.50
Asian/Pacifc Islander, %	6.6%	6.5%	6.6%	0.97
Mixed-Hispanic, %	3.1%	2.6%	3.5%	0.45
Mixed-non Hispanic, %	7.6%	9.7%	6.3%	**0.05**
Cardiovascular disease risk factors				
Diabetes[b], %	18.0%	11.5%	21.9%	**<0.001**
Metabolic Syndrome[c], %	26.1%	24.0%	27.3%	0.26
Metabolic Syndrome with Diabetes, %	9.6%	7.1%	11.1%	**0.04**
Metabolic Syndrome without Diabetes, %	16.5%	16.9%	16.2%	0.77
Current smoker, %	7.9%	8.1%	7.7%	0.82
Hypertension[d], %	66.8%	63.9%	68.5%	0.13
Hyperlipidemia[c], %	44.2%	40.3%	46.6%	**0.05**
Body Mass Index, mean (SD)	28.4 (5.2)	28.1 (6.2)	28.5 (4.6)	0.23
Body Mass Index ≥25 kg/m^2, %	72.5%	63.1%	78.1%	**<0.001**

Note. Bold indicates statistically significant findings.

[a]Based on self-reported birthplace, grandparents' race/ethnicity, and country of origin.[11]

[b]Defined according to Diabetes Mellitus Expert Committee Report.[26]

[c]Based on Adult Treatment Panel III guidelines.[27]

[d]Defined according to JNC-6 guidelines.[28]

Table 2

Baseline SBAS Responses in the ADVANCE Older Controls, n = 1017

	Response Options				
SBAS on-the-job activity	A	B	C	D	E
Examples	No job or regular work	Sitting or standing (eg, typing, driving a truck)	Moderate exertion walking or using upper body (eg, delivering mail or painting)	Lifting or carrying heavy objects (eg, stacking cargo)	Hard physical labor (eg, digging)
n (%)	506 (49.8)	331 (32.6)	145 (14.3)	31 (3.1)	4 (0.4)
SBAS leisure-time activity	F	G	H	I	J
Examples	Sedentary (eg, watch TV)	Light exercise (eg, play golf once a week)	Moderate activity (eg, brisk walk 15–20 min., 3 times a week)	Vigorous activity 3 times a week (eg, running)	Vigorous activity ^{3}5 times a week (eg, running)
n (%)	265 (26.1)	141 (13.9)	397 (39.0)	134 (13.2)	80 (7.9)

Table 3

Baseline Mean Scores (± SD) for Psychological Factors Across Physical Activity Levels Using the SBAS in ADVANCE Older Controls, n = 1017

SBAS categories	Inactive	Light-intensity	Moderate-intensity	Hard-intensity	Very hard-intensity	*p*-value* for linear trend across groups	Possible range of scores	Desired direction of score
n (%)	137 (13.5)	257 (25.3)	396 (38.9)	145 (14.3)	82 (8.1)	—	—	—
Stress	17.5 ± 8.6	16.5 ± 7.8	15.1 ± 7.0	14.4 ± 7.2	13.9 ± 7.4	**<0.001**	0–56	↓
Anxiety	32.7 ± 9.4	31.7 ± 8.7	29.9 ± 8.1	29.7 ± 8.5	29.3 ± 7.8	**<0.001**	20–80	↓
Anger	14.6 ± 3.6	14.5 ± 3.5	14.3 ± 3.4	15.0 ± 4.2	14.2 ± 3.1	0.98	10–40	↓
Cynical distrust	1.9 ± 2.0	1.7 ± 1.8	1.5 ± 1.8	1.5 ± 1.7	1.3 ± 1.6	**0.01**	0–8	↓
Depression	7.0 ± 5.8	5.1 ± 4.6	4.6 ± 4.3	4.5 ± 4.4	3.8 ± 4.4	**<0.001**	0–30	↓
Mental health	53.0 ± 8.9	53.7 ± 7.3	53.8 ± 7.2	55.2 ± 6.1	55.4 ± 6.2	**0.01**	0–100	↑
Physical health	44.4 ± 10.8	49.6 ± 8.2	51.6 ± 7.4	53.8 ± 5.1	53.9 ± 5.4	**<0.001**	0–100	↑

Note. Values are mean ± SD. Bold indicates statistically significant findings.

*Regression analyses across SBAS categories adjusted by gender, ethnicity, and education level.

Table 4

Year 2 Mean Scores (± SD) for Psychological Factors Across Physical Activity Levels Using the SBAS in ADVANCE Older Controls, n = 996

SBAS categories	Inactive	Light-intensity	Moderate-intensity	Hard-intensity	Very hard-intensity	*p*-value* for linear trend across groups	Possible range of scores	Desired direction of score
n (%)	164 (16.5)	215 (21.6)	389 (39.1)	138 (13.9)	90 (9.0)	—	—	—
Depression	6.8 ± 5.5	5.1 ± 4.8	4.8 ± 4.5	3.9 ± 3.9	3.9 ± 4.0	**<0.001**	0–30	↓
Mental health	51.8 ± 9.0	53.7 ± 7.4	54.0 ± 6.8	55.0 ± 6.8	54.6 ± 6.8	**0.002**	0–100	↑
Physical health	43.3 ± 11.7	49.4 ± 8.3	50.7 ± 7.8	53.0 ± 5.9	53.4 ± 7.0	**<0.001**	0–100	↑

Note. Values are mean ± SD. Bold indicates statistically significant findings.

*Regression analyses across SBAS categories adjusted by gender, ethnicity, and education level.

Table 5

Correspondence Between Baseline and Year 2 SBAS Categories in ADVANCE Older Controls, n = 996

	Baseline SBAS ca tegory				
Year 2 SBAS category	**Inactive**	**Light-intensity**	**Moderate-intensity**	**Hard-intensity**	**Very hard-intensity**
Inactive	**77 (7.7)**	48 (4.8)	35 (3.5)	4 (0.4)	0
Light-intensity	22 (2.2)	**130 (13.1)**	55 (5.5)	5 (0.5)	3 (0.3)
Moderate-intensity	28 (2.8)	63 (6.3)	**229 (23.0)**	45 (4.5)	24 (2.4)
Hard-intensity	5 (0.5)	10 (1.0)	47 (4.7)	**65 (6.5)**	11 (1.1)
Very hard-intensity	3 (0.3)	3 (0.3)	20 (2.0)	23 (2.3)	**41 (4.1)**

Note. Values are n (%). Bold indicates percentage of subjects with no change in physical activity.

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Table 6

Change in Mean Scores (± SD) for Psychological Variables Measured at Baseline and Year 2 in ADVANCE Older Controls, n = 996

	Baseline	Year 2	Change score Year 2—baseline	*t* test	*p*-value	Effect size
Depression	5.0 ± 4.7	5.0 ± 4.7	0.01 ± 4.0	0.15	0.88	0.0
Mental health	54.0 ± 7.3	53.8 ± 7.4	-0.2 ± 6.8	-0.91	0.36	0.001
Physical health	50.6 ± 8.2	49.8 ± 8.9	-0.9 ± 7.5	-3.70	**<0.001**	0.09

Note. Values are mean ± SD. Bold indicates statistically significant findings.