

Positive affect and age as predictors of exercise compliance

Danilo Garcia, Trevor Archer

Physical exercise is linked to individuals whose affect profiles are invariably positive and it induces anti-apoptotic and anti-excitotoxic effects, buttressing blood-brain barrier intactness in both healthy individuals and those suffering from disorders accompanying overweight and obesity. In this regard, exercise offers a unique non-pharmacologic, non-invasive intervention that incorporates different regimes, whether dynamic or static, endurance, or resistance. In this brief report we present a self-report study carried out on an adolescent and adult population ($N = 280$, 144 males and 136 females), which indicated that, the propensity and compliance for exercise, measured as the “Archer ratio”, was predicted by positive affect. This association is discussed from the perspective of health, well-being, affect dimensions and age.

1 **Positive Affect and Age as Predictors of Exercise Compliance**

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The introduction of exercise regimes has been found beneficial both under laboratory and clinical conditions; this observation is particularly evident with consideration of various health biomarkers. Any bodily activity that enhances or maintains physical fitness implies the involvement of regular and frequent exercise. Morris and Schoo (2004) have defined exercise as a planned, structured physical activity with the purpose of improving one or more aspects of physical fitness and functional capacity. Physical exercise influences cognitive, emotional, learning and neurophysiological domains, both directly and indirect, thereby rendering it essential that this noninvasive, non-pharmacological intervention ought to form a part of children's and adolescents' long-term health programs (Archer, 2014). In juvenile and adolescent populations, physical exercise holds benefits in association with the health of bones, cardiovascular fitness, healthy blood lipid profiles, psychological well-being and is linked inversely to levels of adiposity and stress (Loprinzi, Cardinal, Loprinzi, Lee, 2012).

The types of exercise relevant here have been characterized on the basis of type, intensity, frequency, and duration, with either endurance or resistance capacity as the training endpoint (Mougios, 2010). Endurance exercise develops one's ability to exert oneself over long periods of physical activity; whereas resistance exercise implies exerting resistance to the force of muscular contraction and elastic or hydraulic resistance (Ormsbee, Choi, Medlin, Geyer, Trantham, Dubis, Hickner, 2009). Physical exercise has been manifested in marked improvements both in function and biomarker integrity (e.g., Archer, 2011, 2013; Archer and Fredriksson, 2010; Archer and Kostrzewa, 2011; Archer, Fredriksson, Schütz, Kostrzewa, 2011, Archer, Svensson, Alricsson, 2012; Fredriksson, Stigsdotter, Hurtig, Ewalds-Kvist, Archer, 2011). Thus, the benefits of regular

physical exercise as a health-ensuring necessity over age, gender, occupation and affective status cannot be overestimated (Garcia, Archer, Moradi, Andersson-Arntén, 2012; Palomo, Beninger, Kostrzewa, Archer, 2008).

Nevertheless, the prevailing situation among youth populations suggests that these benefits are largely unrealized. For instance, the 2011 Centers for Disease Control and Prevention Youth Risk Behavior Surveillance System (2011) found that only 28.7% of healthy high school pupils showed physical activity levels that reached the Federal guideline of 60 min moderate-to-vigorous intensity physical exercise. Exercise compliance was even lesser among those presenting chronic disorders, such as type I diabetes (Lukacs, Mayer, Juhasz, Varga, Foder, Barkai, 2012; Maggio, Hofer, Martin, Marchand, Beghetti, Farpour-Lambert, 2010). Nevertheless, there is evidence that physical exercise influences academic performance and well-being positively in children and adolescents (Archer and Garcia, 2014), suggesting a strong indication of its benefits on cognition and affect. Exercise compliance presents advantages, not only regarding reduced stress, anxiety and depression, but also improved self-esteem and psychological well-being (Dunton, Huh, Leventhal, Riggs, Hedeker, Spruijt-Metz, Pentz, 2014; Garcia, Archer, Moradi, Andersson-Arntén, 2012; Gaz and Smith, 2012; Melnyk, Hrabe, Szalacha, 2013).

The affective domain presents a frequently studied issue within physical exercise interventions not least since the ability and capacity to interact with other individuals modulates the positive interaction with oneself. Thereby placing a premium on high levels of positive affect by presenting the conditions for developing personal characteristics and delivering affective qualities (Heidorn and Welch, 2010). Positive and negative affect have been shown to reflect stable emotional-temperamental dispositions (e.g., Watson and Clark, 1994; Tellegen, 1993). For instance, one of the most used instruments to measure affect, is the Positive Affect and Negative

Affect Schedule (Watson, Clark and Tellegen, 1988), which was developed on the idea that positive and negative affect represent two orthogonal independent dimensions (see also Watson and Tellegen, 1985). Moderate intensity physical exercise induces higher levels of positive affect and lower levels of negative affect in both younger (mean 20 years) and older (mean 56 years) adults (Barnett, 2013). In even older adults (65 to 95 years), both strength-based and aerobic-based physical activity improved skills and mobility with concurrent improvements in mood (Martins et al., 2011). In a study of both younger and older adults, 144 participants of ages ranging from 19 to 93 years, assigned to a moderate intensity exercise group (15 min moderate intensity cycling) or a control group (15 min rating neutral images), it was observed that exercise increased high-arousal positive affect and decreased low-arousal positive affect in comparison with controls (Hogan et al., 2013), as well as improving cognitive performance on a working memory task. In community-dwelling older adults (over 55 years) presenting mild cognitive impairment, a physical exercise intervention (SMART) was shown to improve psychological well-being, cognitive functioning and quality-of-life (Gates et al., 2014). Moreover, the benefits are not only at the cognitive level. For example, Östhus and colleagues (2012) studied cardiovascular fitness (VO_{2max}) and endurance training in younger and older individuals. They found that long-term endurance exercise training exerted a protective effect upon muscle telomere length in older adults— VO_{2max} being associated positively with telomere length. In this context, it is important to point out that telomeres, nucleoproteic complexes located at the ends of eukaryotic chromosomes composed by non-coding repetitive sequences (McEachern et al., 2000), seem to function as a mitotic ‘clock’, shortening progressively, the triggering of DNA damage response and apoptosis (Blackburn, 2001). Finally, physical exercise programs for older adults and elderly has improved dietary habits, memory for events and materials, emotional balance and the enjoyment of cultural, intellectual, affective and social activities (Caprara et al., 2013).

79 Finally, Solberg et al. (2014) obtained improvements in most measures of well-being after four
80 months of endurance training.

81 The purpose of the present study was to ascertain if affectivity and age predict compliance
82 with frequent and intensive physical exercise using self-reported data from a sample consisting of
83 Swedish high-school students and individuals employed in a number of administrative and skilled
84 labor occupations.

85 Method

86 Ethical statement

87 According to law (2003: 460, §2) concerning the ethical research involving humans we arrived at
88 the conclusion that the design of the present study (e.g., all participants' data were anonymous
89 and will not be used for commercial or other non-scientific purposes) required only informed
90 consent from participants.

91 Participants and procedure

92 A total of 280 participants (144 males and 136 females) were included in the analysis. This
93 sample included high school pupils, university students, and also white-collar workers from the
94 private and public sector (*age mean* = 25.60 *sd* = 12.81). All participants were residents of
95 Gothenburg, Sweden. Participants were made aware that the study was anonymous, voluntary
96 and that it took 15 minutes to complete all the self-reports. First, the participants completed the
97 background questionnaire and then a battery of instruments including one measure of affect. In
98 the background questionnaire we included the measures to exercise behavior.

99 Measures

100 Exercise Behavior

101 Besides collecting demographical data (e.g., age, gender), the background questionnaire included
102 two items to measure frequency ("How often do you exercise?"; 1 = *never*, 5 = 5 times/week or
103 more) and intensity ("Estimate the level of effort when you exercise"; 1 = *non or very low*, 10 =
104 *Very High*) of exercise behavior.

105 Affect

The Positive Affect Negative Affect Schedule (Watson, Clark & Tellegen, 1988) allows participants to respond on a 5-point Likert scale to what extent (1 = *very slightly*, 5 = *extremely*) they experienced generally the 20 adjectives encompassing 10 positive affect and 10 negative affect words within the last few weeks. The positive affect subscale consists of adjectives such as “strong”, “proud” and “interested”. The negative affect subscale consists of adjectives such as “afraid”, “nervous” and “ashamed”. The Swedish version has been used in a wide range of studies over the last decade (e.g. Garcia and Erlandsson, 2011; Nima, Rosenberg, Archer, Garcia, 2013; Schütz, Archer & Garcia, 2013). In the present study *Cronbach’s α* for the positive affect subscale was .82 and for the negative affect subscale .86.

Statistical treatment

The participants’ answers to both exercise-items were first standardized (i.e., transformed to *z-scores*) in order to summarize them into a composite measure for exercise behavior, that is, The Archer Ratio (Garcia & Archer, 2014). A principal components analysis, with oblimin rotation, suggested that a single primary factor accounted for at least 70.94% of the variance, thus supporting the calculation of The Archer Ratio. Further regression analysis was conducted using age, gender, positive affect and negative affect as the predictors and The Archer Ratio as the outcome. A correlation analysis showed that the variables did not correlated higher than .30, thus lower than what is suggested concerning multicollinearity (see for example Tabachnick & Fidell, 2007, p.88). A total of 10 participants (5% of the total participants) had missed to answer some of the questions and were therefore discarded from the analysis. The Archer Ratio has shown validity by predicting actual exercise compliance in a population at a training facility (Garcia & Archer, 2014), even when compared to larger, strong, and validated scales such as The Godin-Shephard Leisure-Time Physical Activity Questionnaire (Godin & Shepard, 1985).

Table 1 should be here

Results and discussion

A significant model emerged ($F(4,268) = 7.81, p < .001$). Table 2 provides information about regression coefficients for the predictor variables (i.e., age, gender, positive and negative affect) entered predicting The Archer Ratio. Age and positive affect were the only significant predictors of exercise behavior. Specifically, exercise behavior decreased with age but was positively associated to positive affect.

Table 2 and Figure 1 should be here

The present study indicates that exercise compliance is positively associated with positive affectivity and negatively with age. Currently, this account underlines the importance of individuals' basal levels of positive affect that mobilizes the compliance and propensity for exercise. Affective status, whether negative, e.g. in anorexia, or positive, e.g. as a health measure, is linked with behaviors that maintain dietary habits (Engel, Wonderlich, Crosby, Mitchell, Crow, Peterson et al., 2013). Regular physical exercise induces fuel utilization which mobilizes the energetic cost of storing excess nutrients during relapse and alterations in circulating nutrients that may modulate appetite thereby attenuating the biological drive to regain weight, involving both central and peripheral aspects of energy homeostasis, may explain, in part, the utility of regular activity in preventing weight regain after weight loss (Steig, Jackman, Giles, Higgins, Johnson, 2011). It provides a 'scaffolding effect' that alleviates the effects of TBI (Archer, 2013) and symptoms and biomarkers of depression (Archer, Josefsson, Lindwall, 2014). Exercise, in this regard particularly when linked to dietary restriction, offers a cheap and practical non-pharmacological, noninvasive intervention that, if introduced proactively, will provide marked elements of prevention. It has been recommended that physical exercise be perceived and employed in a similar manner to pharmaceutical, psychotherapy, physiotherapy and other biosocio-medical interventions involving the basic and continuing education and training of health care personnel and processes to assess its' needs and to prescribe and deliver it, to reimburse the services and programs related to it, and to fund research on its efficacy, applicability, feasibility, compliance and interactions and comparability with other preventive,

therapeutic, and rehabilitative domains (Vuori, Lavie, Blair, 2013). Autophagy appears to offer processes that physical exercise generates with marked health benefits involving life-span expansion, protection against several disease that compromise brain function and clear benefits for metabolic and bioenergetic dynamics. Accumulated evidence has underlined the premise that brain neural, muscular, neuroimmune and other physiologic systems are subject to the principle of “Use it-or-lose-it” intrinsic to all motor activity and exercise.

The present results associating positive affect but not negative affect with exercise compliance are also in line with recent suggestions with regard to the etiological difference between positive and negative affect. Cloninger and Garcia (2014), for example, pointed out evidence (Baker, Cesa, Gatz & Mellins, 1992) that suggest that the *situational* (i.e., that both positive and negative affect are related to the experience of pleasant and unpleasant experiences, respectively; e.g., Warr, Barter, & Brownbridge, 1983) and *dispositional* explanations (i.e., positive affect has its origin in Extraversion, while negative affect arises in Neuroticism; e.g., Costa & McCrae, 1980, 1984) of the origin of positive and negative affect do not fit the general pattern of data that has been accumulated in support of the independence of positive and negative affect: a primarily situational etiology for positive affect and a primarily dispositional etiology for negative affect (see also Bradburn, 1969; Diener & Larsen, 1984; Emmons & Diener, 1985). This observation led Baker and colleagues (1992) to investigate why positive and negative affect are independent of each other and why they have different patterns of correlation with other variables using data from twins and three-generational families. These researchers found significant effects for heritability for negative affect but not for positive affect. In contrast, positive affect was influenced by shared environmental effects for parents and offspring, assortative mating for spouses, and shared environmental effects for the twin pairs (Baker et al., 1992). Baker and colleagues (1992) concluded that “there may be important (heritable) personality factors that play a critical role in determining levels of negative moods from one

person to the next in the family. For positive affect, on the other hand, family resemblance is explained primarily by environmental effects common to family members” (p. 162).

Future studies ought to focus upon the threshold levels of exercise schedules among young and older people aiming at health benefits in different populations. For example, Sénéchal and colleagues (2012) observed that in a study of moderate-severe metabolic syndrome, the severity of disorder and age of patients were determinants of exercise intensity levels. The utility of pursuing exercise programs in aging populations seems, indeed, a growing necessity.

“Exercise to stimulate, not to annihilate. The world wasn't formed in a day, and neither were we. Set small goals and build upon them.”

Lee Haney

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References

Archer T (2011) Physical exercise alleviates debilities of normal aging and Alzheimer’s disease.

Acta Neurol Scand 123:221–238.

Archer T (2013) Influence of physical exercise on traumatic brain injury deficits: scaffolding effect. Neurotoxic Res 21, 418-434. DOI: 10.1007/s12640-011-9297-0.

Archer T (2014) Health benefits of physical exercise for children and adolescents. J Novel Physiother 4:2. DOI: 10.4172/2165-7025.1000203.

Archer T, Fredriksson A (2010) Physical exercise attenuates MPTPinduced deficits in mice. Neurotoxic Res 18:313–327.

Archer T, Fredriksson A, Schütz E, Kostrzewa RM (2011b) Influence of physical exercise on neuroimmunological functioning and health: aging and stress. Neurotoxic Res 20:69–83.

Archer T, Garcia D (2014) Physical exercise influences academic performance and well-being in children and adolescents. Int J School Cogn Psychol DOI: 10.4172/1234-3425.1000e102.

Archer T, Kostrzewa RM (2011) Physical exercise alleviates ADHD symptoms: regional deficits and developmental trajectory. Neurotox Res. Doi: 10.1007/s12640-011-9260-0.

Archer T, Josefsson T, Lindwall M. (2014) Effects of physical exercise on depressive symptoms and biomarkers in depression. Under editorial evaluation.

- 212 Baker, L. A., Cesa, I. L., Gatz, M., & Mellins, C. (1992). Genetic and environmental influences
- 213 on positive and negative affect: Support for a two-factor theory. *Psychology of Aging*, 7,
- 214 158-163.
- 215 Barnett F (2013) The effect of exercise on affective and self-efficacy responses in older and
- 216 younger women. *J Phys Act Health* 10, 97-105.
- 217 Blackburn EH (2001) Switching and Signaling at the telomere. *Cell* 106, 661-673.
- 218 Bradburn, N. M. (1969). *The structure of psychological well-being*. Chicago: Aldine.
- 219 Caprara M, Molina MA, Schettini R, Santavreu M, Orosa T, Mendoza-Nunez VM, Rojas M,
- 220 Fernandez-Ballesteros R (2013) Active aging promotion: results from the *Vital Aging*
- 221 Program. *Current Gerontology and Geriatric Research* DOI: 10.1155/2013/817813.
- 222 Centers for Disease Control and Prevention. (2011) Youth risk behavior surveillance – United
- 223 States. *MMWR Surveill Summ* 61, 1-162.
- 224 Cloninger, C. R., & Garcia, D. (2014). The Inheritance and Development of Positive Affect and
- 225 Emotionality. In M. Pluess (Ed.), *Genetics of Psychological Well-Being – The Role of*
- 226 *Heritability and Genetics in Positive Psychology*. New York: Oxford University Press.
- 227 Under evaluation.
- 228 Costa, P. T, & McCrae, R. R. (1980). Influence of extroversion and neuroticism on subjective
- 229 well-being: Happy and unhappy people. *Journal of Personality and Social Psychology*,
- 230 38, 668-678.
- 231 Diener, E., & Larsen, R. J. (1984). Temporal stability and cross-situational consistency of
- 232 positive and negative affect. *Journal of Personality and Social Psychology*, 47, 871-883.
- 233 Dunton GF, Huh J, Leventhal AM, Riggs N, Hedeker D, Spruijt-Metz D, Pentz MA (2014)
- 234 Momentary assessment of affect, physical feeling states, and physical activity in children.
- 235 *Health Psychol* 33(3):255-63. doi: 10.1037/a0032640.
- 236 Emmons, R. A., & Diener, E. (1985). Personality correlates of subjective well-being. *Personality*
- 237 *and Social Psychology Bulletin*, 11, 89-97.
- 238 Engel SG, Wonderlich SA, Crosby RD, Mitchell JE, Crow S, Peterson CB, Le Grange D,
- 239 Simonich HK, Cao L, Lavender JM, Gordon KH (2013) The role of affect in the
- 240 maintenance of anorexia nervosa: evidence from a naturalistic assessment of momentary
- 241 behaviors and emotion. *J Abnorm Psychol*. 122(3):709-19. doi: 10.1037/a0034010.

- 242 Fredriksson A, Stigsdotter IM, Hurtig A, Ewalds-Kvist B, Archer T (2011) Running wheel
- 243 activity restores MPTP-induced deficits. *J Neural Transm* 118:407–420.
- 244 Garcia, D., & Archer, T. (2014). The Archer Ratio: A Measure of Exercise Behavior. Unpublished
- 245 manuscript.
- 246 Garcia, D., Archer, T., Moradi, S., & Andersson-Arntén, A-C. (2012). Exercise Frequency, High
- 247 Activation Positive Affectivity, and Psychological Well-Being: Beyond Age, Gender, and
- 248 Occupation. *Psychology*, 3, 328–336. DOI: 10.4236/psych.2012.34047.
- 249 Garcia D, Erlandsson A (2011) The relationship between personality and subjective well-being:
- 250 different association patterns when measuring the affective component in frequency and
- 251 intensity. *J Happiness Stud* 12, 1023-1034. DOI: 10.1007/s10902-010-9242-6.
- 252 Gates N, Valenzuela M, Sachdev PS, Fiatarone Singh MA (2014) Psychological well-being in
- 253 individuals with mild cognitive impairment. *Clin Interv Aging* 9, 779-792.
- 254 Gaz DV, Smith AM (2012) Psychosocial benefits and implications of exercise. *Am Acad Phys*
- 255 *Med Rehab* 4, 812-817.
- 256 Godin, G. & Shephard, R. J. (1985). A simple method to assess exercise behaviour in the
- 257 community. *Can J Appl Sport Sci* 10, 141- 146.
- 258 Heidor B, Welch M (2010) Teaching affective qualities in physical education. *Strategies: A*
- 259 *Journal for Physical and Sport Educators*, 23(5), 16-21.
- 260 Hogan CL, Mata J, Carstensen LL (2013) Exercise holds immediate benefits for affect and
- 261 cognition in younger and older adults. *Psychol Aging* 28, 587-594, DOI:
- 262 10.1037/a0032634.
- 263 Loprinzi PD, Cardinal BJ, Loprinzi KL, Lee H (2012) Benefits and environmental determinants
- 264 of physical activity in children and adolescents. *Obes Facts* 5, 597-610.
- 265 Lukacs A, Mayer K, Juhasz E, Varga B, Foder B, Barkai L (2012) Reduced physical fitness in
- 266 children and adolescents with type 1 diabetes. *Pediatr Diabetes* 13, 432-437.
- 267 Lunn TE, Nowson CA, Worsley A, Torres SJ (2014) Does personality affect dietary intake?
- 268 *Nutrition*. 30(4):403-409. doi: 10.1016/j.nut.2013.08.012.
- 269 Maggio ABR, Hofer MF, Martin XE, Marchand LM, Beghetti M, Farpour-Lambert NJ (2010)
- 270 Reduced physical activity level and cardiorespiratory fitness in children with chronic
- 271 diseases. *Eur J Pediatr* 169, 1187-1193.

- 272 Martins R, Coelho E, Silva M, Pindus D, Cumming S, Teixeira A, Verissimo M (2011) Effects of
- 273 strength and aerobic-based training on functional fitness, mood and the relationship
- 274 between fatness and mood in older adults. *J Sports Med Phys Fitness* 51, 489-496.
- 275 McEachern MJ, Krauskopf A, Blackburn EH (2000) Telomeres and their control. *Annu Rev*
- 276 *Genet* 34, 332-358.
- 277 Melnyk BM, Hrabce DP, Szalacha LA (2013) Relationships among work stress, job satisfaction,
- 278 mental health, and healthy lifestyle behaviors in new graduate nurses attending the nurse
- 279 athlete program: a call to action for nursing leaders. *Nurs Adm Q* 37(4):278-85. doi:
- 280 10.1097/NAQ.0b013e3182a2f963.
- 281 Morris M, & Schoo A (2004). Optimizing exercise and physical activity in older adults.
- 282 Edinburgh: Butterworth Heinemann.
- 283 Mougios V (2010) Exercise metabolism. In: Bahrke MS (ed) *Exercise biochemistry. Human*
- 284 *Kinetics*, Champaign, p 122
- 285 Nima AA, Rosenberg P, Archer T, Garcia D (2013) Anxiety, Affect, Self-Esteem, and Stress:
- 286 Mediation and Moderation Effects on Depression. *PLoS ONE* 8(9): e73265.
- 287 doi:10.1371/journal.pone.0073265.
- 288 Ormsbee MJ, Choi MD, Medlin JK, Geyer GH, Trantham LH, Dubis GS, Hickner RC (2009)
- 289 Regulation of fat metabolism during resistance exercise in sedentary lean and obese men.
- 290 *J Appl Physiol* 106:1529–1537.
- 291 Östhus IDÖ, Sgura A, Berardinelli F, Alsnes IV, Brönstad E, Rehn T, Stöbakk PK, Hatle H,
- 292 Wislöf U, Nauman J (2012) Telomere length and long-term endurance exercise: does
- 293 exercise training affect biological age? A pilot study. *PLOS One* 7, e52769.
- 294 Palomo T, Beninger RJ, Kostrzewa RM, Archer T (2008) Affective status in relation to
- 295 impulsiveness, motor and motivational symptoms: personality, development and physical
- 296 exercise. *Neurotoxic Res* 14, 151-168.
- 297 Pulgaron ER (2013) Childhood obesity: a review of increased risk for physical and psychological
- 298 comorbidities. *Clin Ther* 35, A18-A32.
- 299 Sénéchal M, Bouchard DR, Dionne IJ, Brochu M (2012) Lifestyle habits and physical capacity in
- 300 patients with moderate or severe metabolic syndrome. *Metab Syndr Relat Disord*.
- 301 10(3):232-40. doi: 10.1089/met.2011.0136.

- 302 Schneiderman JU, Mennen FE, Negriff S, Trickett PK (2012) Overweight and obesity among
303 maltreated young adolescents. *Child Abuse Negl* 36, 370-378.
- 304 Schütz E, Archer T, Garcia D (2013) Character profiles and adolescents' self-reported affect. *Pers*
305 *Individ Diff* 54, 841-844.
- 306 Solberg PA, Halvan H, Ommundsen Y, Hopkins WG (2014) A 1-year follow-up of effects of
307 exercise programs on well-being in older adults. *A Aging Phys Act* 22, 52-64. DOI:
308 10.1123/japa.2012-0181.
- 309 Steig AJ, Jackman MR, Giles ED, Higgins JA, Johnson GC, Mahan C, Melanson EL, Wyatt HR,
310 Eckel RH, Hill JO, MacLean PS (2011) Exercise reduces appetite and traffics excess
311 nutrients away from energetically efficient pathways of lipid deposition during the early
312 stages of weight regain. *Am J Physiol Regul Integr Comp Physiol*. 2011
313 Sep;301(3):R656-67. doi: 10.1152/ajpregu.00212.2011.
- 314 Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics*, Fifth Edition. Boston:
315 Pearson Education, Inc.
- 316 Tellegen, A. (1993). Folk concepts and psychological concepts of personality and personality
317 disorder. *Psychological Inquiry*, 4, 122-13
- 318 Vuori IM, Lavie CJ, Blair SN (2013) Vuori IM, Lavie CJ, Blair SN (2013) Physical activity
319 promotion in the health care system. *Mayo Clin Proc* 88(12):1446-61. doi:
320 10.1016/j.mayocp.2013.08.020.
- 321 Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect*
322 *Schedule-Expanded Form*. Ames: The University of Iowa.
- 323 Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of
324 positive and negative affect: The PANAS scales. *Journal of Personality and Social*
325 *Psychology*, 54(6), 1063-1070.
- 326 Watson, D.. & Tellegen. A. (1985). Toward a consensual structure of mood.
327 *Psychological Bulletin*. 98. 219-235.

Table 1 (on next page)

Correlation between age, positive affect, negative affect, and the Archer Ratio.

Table 1. Correlation between age, positive affect, negative affect, and the Archer Ratio.

	Age	Positive Affect	Negative Affect	The Archer Ratio
Age	-			
Positive Affect	.27***	-		
Negative Affect	-.30***	-.04	-	
The Archer Ratio	-.14*	.24***	.03	-

Table 2(on next page)

The unstandardized and standardized regression coefficients for the variables entered into the regression model as predictors of The Archer Ratio (i.e., exercise behavior).

Table 2. The unstandardized and standardized regression coefficients for the variables entered into the regression model as predictors of The Archer Ratio (i.e., exercise behavior).

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Age	-.05	.02	-.22	-3.22	.001
Gender	.24	.35	.04	.69	.494
Positive Affect	1.13	.23	.30	4.95	<.001
Negative Affect	-.11	.24	-.03	-.45	.656

1

The association of positive affect in the prediction of long-term compliance in the propensity to perform physical exercise, i.e. “exercise behavior”.

