

Original Article

The effect of physical activity on the perception of body image and well-being during aging

ARIO FEDERICI, CARLO FERRI MARINI¹, FRANCESCO LUCERTINI², LUCA ZOFFOLI³, VITO FANELLI⁴, ALESSANDRO CAPRIOTTI⁵, VAHID SHOAEI⁶
^{1,2,3,4,5,6}Department of Biomolecular Sciences – Division of Exercise and Health Sciences, University of Urbino
Carlo Bo, Urbino, ITALY

Published online: July 31, 2019

(Accepted for publication: June 22, 2019)

DOI:10.7752/jpes.2019.s4194

Abstract:

Problem Statement: Physical activity levels have been positively associated with mental and physical well-being. Nevertheless, associations between physical activity levels, which decrease with aging, and body image perception and indices of psycho-physical well-being have never been studied in adult and elderly subjects as a function of aging.

Approach: This observational study was carried out in several provinces and regions of Italy. Information was collected from 192 men and 260 women between 50 and 98 years using a questionnaire on place of residence, physical activity level, perceived well-being and body image.

Purpose: This study aimed to assess the influence of the level of physical activity on perceptions of body image and well-being in adult and elderly subjects.

Results: Physical activity levels were positively associated with body image perception.

Interactions between physical activity levels and the other investigated variables showed no significant effect on body image. Hence, the main effect of physical activity on body image does not vary according to the subject's age, place of residence (rural or urban), kind of job (active or sedentary) or educational level.

The well-being index was not significantly associated with either physical activity levels or the other variables investigated in this study.

Conclusions: Physical activity levels are positively correlated with the body image perception, and high levels of physical activity are associated with more accurate perceptions of body image. The effect of physical activity is not influenced by different individual characteristics; hence, increasing levels of physical activity could improve body image perception across a broad range of subjects.

On the other hand, the well-being index was not influenced by either physical activity levels or the other characteristics examined in this investigation.

Additional experimental studies are needed to develop a specific intervention to improve the well-being and body image perception in adults and elderly subjects.

Key Words: elderly, adults, psychological, body image perception.

Introduction

Starting in adulthood, aging is a process of natural involution resulting from the progressive deterioration of biological functions. This process has a negative impact on the individual, in both mental and physical terms, and is therefore reflected in his/her health, defined by the World Health Organization (WHO) as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

As regards mental well-being, from a cognitive standpoint, the involution that occurs as we age is quite slow, and apart from pathological conditions, in most cases, it does not manifest itself overtly before we reach an advanced age. Nevertheless, some processes that are more closely linked to the psychological aspect of mental well-being, such as our body image perception, have been associated with aging. Body image is defined as “the image that we have in our minds of our body's shape, size and build, and the feelings that we experience with regard to these characteristics and the single parts of our body” (Slade, 1994). Hence, body image is not an innate preexisting static structure, but rather, it should be understood as a highly dynamic structure that depends on the maturation of the nervous system, psycho-emotional experiences, the level of sensory-motor perception and processes made possible by experience and continuous motor and postural learning. This dynamic structure operates in the private and social spheres on both conscious and unconscious levels (Schilder, 1950).

Physical aging manifests itself more overtly than mental aging, in particular, with regard to the classic physical functions that are part of the cardio-circulatory, respiratory and musculoskeletal systems. A commonly used parameter to take into account potential individual subjectivity in these investigations is an evaluation of the individual's state of psycho-physical well-being, usually taking the form of an assessment of the well-being

index. Hence, most of the multiple aspects that characterize aging from a physical health standpoint can be evaluated with a single parameter, which though somewhat lacking in precision, is still a valid measure.

Physical activity plays a crucial role in our health. In particular, as we age, it allows us to maintain functional abilities that are important in everyday life (Young, 1986). Moreover, physical activity helps us to maintain our physiological resources, which are fundamental to our ability to function physically and cognitively (Archer, Paluch, Shook & Blair, 2013).

The main reason we may feel embarrassed and dissatisfied with our image lies in the discrepancy between our perceived and desired body image, i.e., between our real self and our ideal self, and too often, the latter is influenced by societal models. It has been widely shown that a positive self-image is significantly associated with several indicators of emotional and somatic balance and social adjustment, and that it correlates positively with self-esteem and self-confidence and negatively with anxiety, depression and stress (Dobmeyer & Stein, 2003). While a generally positive self-image points to a positive relationship with our body and is an indicator of psycho-physical well-being, a body image associated with a negative relationship with our body can be an indicator of discontent and be a predisposing factor for the development of pathologies (Schilder, 1950).

Modern society plays a major role in generating the search for the ideal body, and body image is greatly influenced by what our culture considers beautiful (Cattarin, Thompson, Thomas, & Williams, 2000). The myth of a powerful body for young men and a thin body for young women conditions not only how men and women see themselves but also how they relate to others. Having a perfect body is a symbol of control, which in turn is a symbol of hard work and ambition (Tiggemann & Lynch, 2001). It is well-established that both women and men often exercise more to improve their appearance rather than to enjoy the benefits of exercise related to well-being.

Our body image is influenced by gender differences deriving from the representation of male and female models within the society to which we belong (Schilder, 1950).

For example, when a woman feels sad and failed, she becomes hypercritical of her body considering it the cause of her failures («... they reject me because I am ugly...»), while when a man feels sad and failed, he becomes hypercritical of himself as a person viewed as a whole (Schilder, 1950; Slade, 1994).

Body image is also influenced by socio-economic conditions and life experiences. Among the latter, moving from one area to another has been shown to have a big effect on our body image perception.

Our body changes as we age; hence, our perception of our body also changes over time. Age may in fact be one of the most influential variables on body image perception. Consider, for example, adolescents, who see their bodies undergo major changes during a moment of important psycho-social and emotional transitions. However, body image perception is not influenced by age only during adolescence (Confalonieri & Gatti, 2008), but also in old age (Tàmmaro, Cesana, & Decio, 2008), especially as regards our being more or less accepting of our bodies. Such acceptance, or lack thereof, stems from our body image perception, which may correspond to reality to varying degrees. Indeed, it has been shown that with aging, even under 'stable' conditions of dissatisfaction with our own bodies, self-objectification decreases (Algars et al., 2009; Tiggemann & Lynch, 2001), i.e., the ability to assess our own body image independently with a high degree of objectivity.

Mental health is just as important as physical health in terms of its contribution to overall health and well-being (Snowden et al., 2014). Mood is an important predictor of physical and psychological well-being, and physical activity is an important factor in psychological well-being (Janisse, Nedd, Escamilla, & Nies, 2004). Physical activity can therefore indirectly improve subjective well-being and quality of life, which in turn have a direct effect on mental health (Fox, 1999). Indeed, it is well known that both non-structured and structured physical activity are positively correlated with our sense of well-being and mood (Bouchard, Shephard, Stephens, Sutton, & McPherson, 1990; Greig et al., 1994); hence, the positive association between physical activity and physical health is widely supported by the international medical-scientific community (including WHO).

Since physical activity is influenced by multiple factors, it is important to take those factors into consideration when investigating the development of strategies to promote physical activity (Molanorouzi, Khoo, & Morris, 2015).

One of the key factors that influences the initiation and continuation of physical activity is motivation (Hagger & Chatzisarantis, 2008). As regards motivation, we can draw a distinction between intrinsic and extrinsic aspects. Intrinsic motivation refers to the subject's engagement in an activity for the sake of pleasure and personal satisfaction. (Deci & Vansteenkiste, 2004). On the other hand, extrinsic motivation refers to the subject's engagement in an activity for instrumental reasons such as external pressure or rewards. Extrinsic motivation is fundamental when someone first initiates a physical activity, whereas intrinsic motivation is fundamental to the continuation of physical activity programs (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). The factors that determine systematic differences in motivation to engage in physical activity include gender (Egli, Bland, Melton, & Czech, 2011), age (Brunet & Sabiston, 2011; Gallagher et al., 2012), country of origin (Walker, 2009; Yan & McCullagh, 2004), and preferences for specific forms of physical activity (Rogers, Morris, & Moore, 2008; Ryan et al., 1997). Men are usually more motivated by intrinsic factors such as strength, competition and challenge, while women are more motivated by extrinsic factors such as weight control, appearance and health (Chowdhury, 2012; Egli et al., 2011).

Age alone can diminish our physiological capacity to perform everyday tasks (Archer et al., 2013). It is well-established that in the adult population, participation in physical activity decreases significantly with age (Caspersen, Pereira, & Curran, 2000; Guthold, Ono, Strong, Chatterji, & Morabia, 2008), and the motivation to engage in physical activity can also vary with age (Trujillo, Brougham, & Walsh, 2004). Indeed, middle-aged adults have been shown to be less intrinsically motivated than younger adults (Brunet & Sabiston, 2011). Moreover, younger adults are more concerned with results linked to interpersonal attraction, whereas older adults are more concerned with the health benefits of physical activity (Trujillo et al., 2004).

In young people, physical activity levels have been positively associated with mental and physical well-being. On the other hand, to the best of our knowledge, associations between physical activity levels, which notoriously diminish with age, and body image perception and indices of psycho-physical well-being have never been studied in adults and the elderly as a function of aging. These associations are the focus of this observational study.

Material & methods

Participants

We interviewed 474 subjects over the age of 50 (minimum age 50, maximum age 98). Of these subjects, 22 were rejected for reasons related to their interview answers. Hence, ultimately, 452 subjects (192 men and 260 women) were recruited for the study. The subjects resided in the following provinces in Central Italy: Arezzo, Grosseto, Perugia, Pesaro Urbino and Teramo.

Procedures

Interviews

The interviewers had a questionnaire composed of various sections corresponding to the various aspects of the investigation. The questions in each section of the questionnaire were chosen by the authors from among questions validated in the scientific literature for the respective lines of investigation pursued in the present study. The interviews were conducted face to face and the interviewee's answers were recorded by the interviewer directly onto the questionnaire. Each interview, on average, lasted 45 minutes, and the recorded data was then entered into a database for subsequent processing (see the data analysis paragraph).

Questionnaire on personal details and inclusion/exclusion criteria

Data were collected on the subjects' personal details (age, gender, weight, height, birthplace, residence, educational level, etc.) and health (brief medical history, previous history of heart attack, metabolic disorders, fever in past few months, prescription drugs used, etc.). The information on the subject's health was collected using a series of 17 questions, validated and currently used to define health status in older subjects (Greig et al., 1994; Lighthart et al., 1984; Lighthart et al., 1990). All of the subjects who responded affirmatively to at least one of the questions designed to assess possible exclusion were excluded from the study, and interviews with these subjects proceeded no further. Those who were excluded at this stage were not counted among the study subjects.

Questionnaire on physical activity level

Physical activity levels were evaluated with a questionnaire called "Seven Day Physical Activity Recall" (7dayPAR) (Sallis, Haskell, & Wood, 1997; Sallis et al., 1985). The questionnaire has been validated in the literature to identify the subject's current level of physical activity by assessing his or her answers to a series of questions regarding the quantity and intensity of the physical activity that he or she has engaged in over the past seven days in terms of energy expenditure.

This section also included a question regarding the representativeness of the 7d-PAR questionnaire with respect to the physical activity performed habitually in the months leading up to the study. The 22 subjects who emphasized that their answers to the questionnaire, which focuses exclusively on the seven days prior to the interview, were not representative of their habitual physical activity were excluded (see subjects section).

Questionnaire on perceived well-being

Perceived well-being was assessed with the "WHO-5 Well-Being Index", a questionnaire consisting of five questions created by WHO in 1998. The questionnaire allows the quantification of the subject's perceived well-being and also the possible presence of a depressive state, and if present, its level of seriousness. Low point totals corresponded to a high level of well-being and vice versa.

Questionnaire on body image

The discrepancy between ideal and perceived body image was assessed using the "Silhouette Matching Task" (SMT), which has already been used for this purpose in the literature (Marsh & Roche, 1996; Stunkard, Sorensen, & Schulsinger, 1983). Specifically, interviewees were asked to choose from among two identical rows of nine silhouettes (different for men and women) the silhouette that corresponded to their ideal image and the one that corresponded to their current perceived image. Each silhouette had been assigned a numerical value, and the difference between the values of the two silhouettes represented the discrepancy between ideal and perceived body image. The closer the value was to zero, the more positive the perceived body image.

Statistical analysis

The influence of the level of physical activity on perceived body image and well-being were assessed using a multivariate linear regression (performed by the “R” statistical software) , also taking into account the effect of the other variables collected during the interview, namely age, place of residence (urban or rural), job (active or sedentary: retirees were considered sedentary) and educational level (five categories). The results were considered significant when the p value was less than 0.05.

Results

Association between physical activity levels and body image

Figure 1 shows the relationship between physical activity levels (expressed in kCal/kilogram per week) and body image. The data regarding body image are expressed with values ranging from 0 to 4; the higher the numerical value, the greater the subject’s dissatisfaction with his or her body image. The statistical analysis showed that physical activity levels had a significant positive influence on body image perception, i.e., subjects who engaged in high levels of physical activity had more favorable perceptions of their body image.

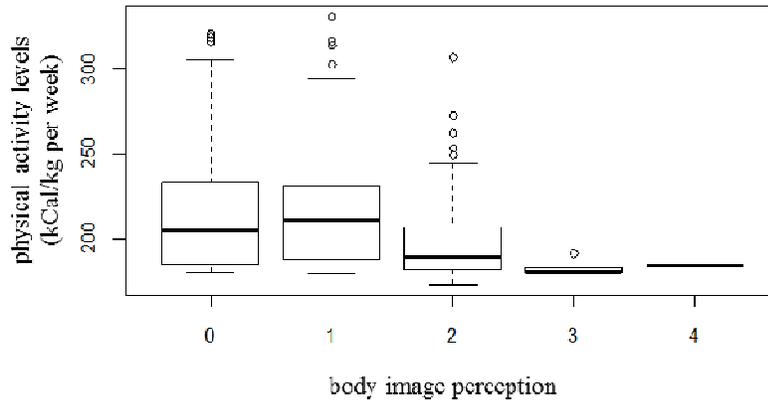


Fig. 1 – Variations in body image perception in relation to physical activity levels.

The influence of other variables on body image

The interactions between physical activity levels and the other investigated variables did not show a significant effect on body image. In other words, the main effect of physical activity levels on body image does not change with variations in the subject’s age, place of residence (rural or urban), job (active or sedentary), educational level (the last level of education completed by the subject: three years of elementary school, five years of elementary school, middle school, high school, university).

The association between physical activity levels and the well-being index

Figure 2 shows the relationship between the subject’s physical activity level (expressed in kCal/kilogram per week) and the well-being index. The data in the well-being index are expressed in values ranging from 0 to 25; the higher the numeric value, the greater the subject’s perceived well-being. The statistical analysis did not reveal a significant association between these two parameters.

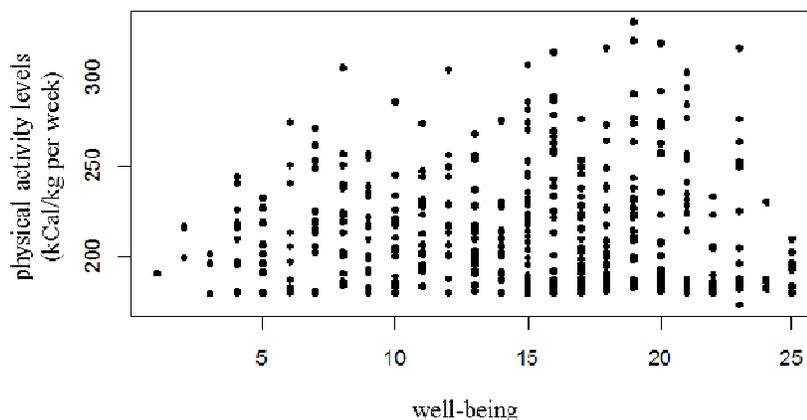


Fig. 2 – Variations in well-being in relation to physical activity.

The influence of other variables on the well-being index.

None of the investigated variables was found to be significantly associated with the well-being index.

Association between physical activity levels and other variables

Taken individually, all the investigated variables were found to be significantly associated with physical activity levels, as indicated below.

Age of subjects

An increase in age was found to be negatively correlated with physical activity levels (Fig. 3), while physical activity level was found to be positively correlated with body image.

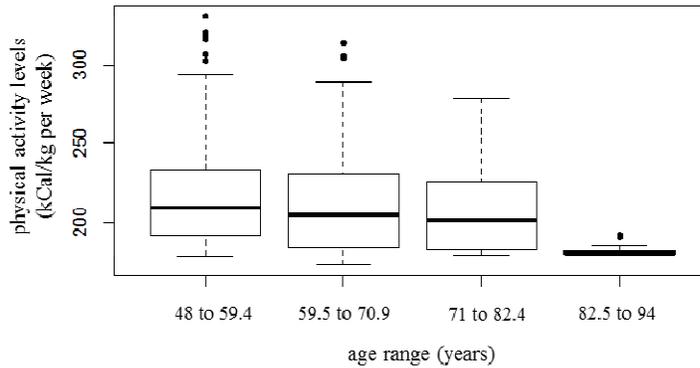


Fig. 3 – Variations in physical activity levels as a function of age (grouped into four classes).

Place of residence

Subjects from rural areas were found to be significantly more active than those from urban areas (Fig. 4).

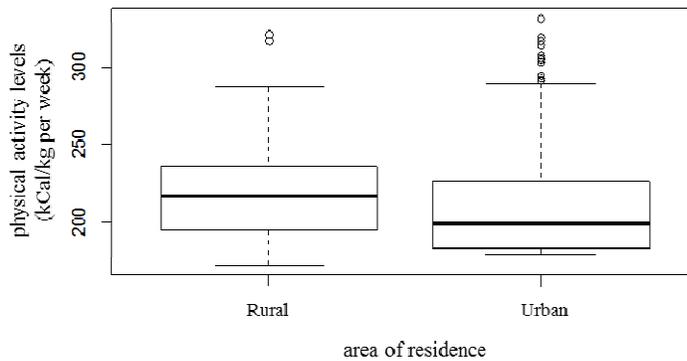


Fig. 4 – Variations in physical activity levels as a function of the rural or urban nature of the subject's area of residence.

Job type

Subjects with sedentary jobs (and retired subjects, who were included in this category) were found to be significantly less active during their free time than subjects who have non-sedentary jobs (Fig. 5).

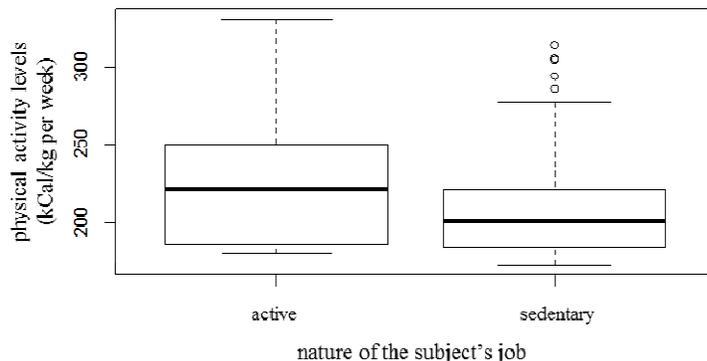


Fig. 5 – Variations in physical activity levels as a function of the active or sedentary nature of the subject's job.

Educational level

A significant association between the educational level of the subjects and physical activity levels was found. Specifically, we found a growing positive correlation between education levels and physical activity levels through middle school and subsequently, a growing negative correlation between the two variables (Fig. 6).

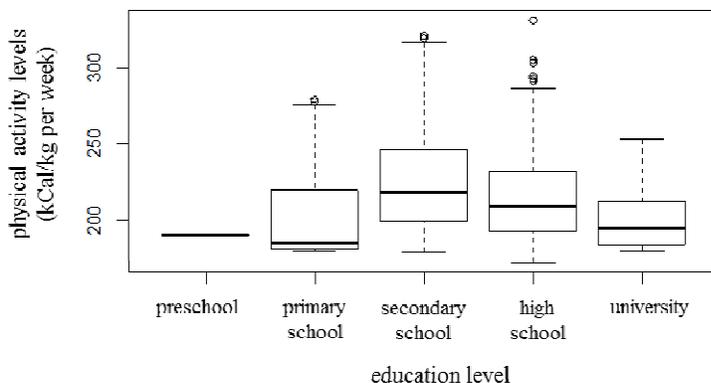


Fig. 6 – Variations in physical activity levels as a function of the subject’s educational level.

Discussion

Physical activity levels were found to be an effective predictor of discrepancies between ideal and perceived body image. This finding supports the long held and empirically observed idea that physical activity sharpens our perceptive capacity, both forms of perception linked to our sense organs and those of a more unconscious kind linked to our psychological and emotional spheres. The data at our disposal, obviously, do not offer a causal explanation of this phenomenon. Nevertheless, it can be hypothesized that physical activity influences the discrepancy between the two forms of perception under study. On the one hand, physical activity improves our appearance, which therefore becomes closer to the ideal body image that everyone has of himself/herself. On the other hand, physical activity produces psychophysical benefits that over time foster self-awareness, including esthetic self-awareness.

The significant relationships that were found between physical activity and age and between physical activity and body image suggest that the decrease in physical activity levels that occurs as we age has a significant negative impact on perceived body image. Obviously, this finding provides support for recommendations that call for maintaining high levels of physical activity as we age, which could have a positive impact not only on our physical health, but also on our emotional state.

The greater propensity for physical activity of subjects living in rural areas is likely related to the fact that those who live in rural areas tend not to have managerial jobs, which are professionally very demanding and leave little free time. Indeed, this reflects the nature of the Italian industrial/social fabric, which tends to concentrate the main offices of its biggest companies in large cities. This hypothesis appears to be confirmed by the analysis of subjects’ educational levels, which shows a relationship between high educational levels and low levels of physical activity.

Of particular note is the bimodal pattern of physical activity levels, which initially rise through the early stages of education (through middle school), but then begin to decrease with further increases in the subject’s educational level, a phenomenon that is often defined as the ‘nerd effect.’ Indeed, a high educational level normally allows individuals to get jobs with a limited physical component, and such jobs are generally concentrated in urban areas. Both of these factors, namely sedentary jobs and urban residence, as shown above, are associated with lower levels of physical activity.

In conclusion, this study suggests that maintaining a high level of physical activity as we age has a positive effect on our perceived body image.

Although there was some interaction between physical activity levels and perceived well-being, the former were not found to be an effective parameter for predicting perceived well-being. Nevertheless, this result should not be considered in an absolute sense, but interpreted in light of the conditions of the present study. Indeed, a series of factors contribute to determining the association between physical activity and well-being, above all, the single factors that separately influence the two variables.

Well-being, by definition, is a subjective state, and there are multiple reasons why it may undergo variations, including temporary variations; however, such variations lie outside the scope of the present study. Likewise, there are multiple variables that can influence physical activity levels. To mitigate their clear biasing effects, several variables that could potentially influence the investigated associations were included in the

statistical analysis. Nevertheless, the study took into consideration only a few of the numerous potentially biasing variables. Such variables could be the focus of future studies.

There are a number of factors that may affect perceived well-being, making it difficult to establish the direct effect of physical activity. However, we remain convinced of the crucial role that physical activity plays in combating discontent, stress and depression, and obviously attenuating these negative conditions has positive effects on perceived well-being.

Conclusions

In conclusion, physical activity levels are positively correlated with body image perception, and high levels of physical activity are associated with the most positive perceptions of body image. The effect of physical activity cuts across different groups and is not influenced by different individual characteristics (e.g., the subject's age, place of residence, job or educational level). This implies that increasing levels of physical activity could lead to an improved perception of body image, and such improvements would likely occur across the entire population.

On the other hand, we found that the well-being index was not influenced by either physical activity levels or other characteristics measured in the present study. Hence, further studies are needed to find the characteristics that can have a positive effect on these index values.

Future experimental studies, which have a more complete set of information regarding the individual subjects and the society in which they live, are necessary to develop an intervention that can improve perceived well-being and body image among adults and the elderly.

References:

- Algars, M., Santtila, P., Varjonen, M., Witting, K., Johansson, A., Jern, P., & Sandnabba, N. K. (2009), The adult body: how age, gender, and body mass index are related to body image. *Journal of Aging and Health*, 21, 8: 1112-1132.
- Archer, E., Paluch, A. E., Shook, P. R., & Blair, S. N. (2013), Physical Activity and the Science of Successful Aging. *Kinesiology Review*, 2: 29-38.
- Bouchard, C., Shephard, R. J., Stephens, T., Sutton, J. R., & McPherson, B. D. (1990), *Exercise, fitness, and health: the consensus statement*. In C. Bouchard, R. J. Shephard, T. Stephens, J. R. Sutton & B. D. McPherson (Eds.), *Exercise, fitness, and health: a consensus of current knowledge* (pp. 3-28). Champaign: Human Kinetics.
- Brunet, J., & Sabiston, C. M. (2011), Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport and Exercise*, 12, 2: 99-105.
- Caspersen, C. J., Pereira, M. A., & Curran, K. M. (2000), Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine and Science in Sports and Exercise*, 32, 9: 1601-1609.
- Cattarin, J. A., Thompson, J. K., Thomas, C., & Williams, R. (2000), Body image, mood, and televised images of attractiveness: The role of social comparison. *Journal of Social and Clinical Psychology*, 19, 2: 220-239.
- Chowdhury, D. (2012), *Examining reasons for participation in sport and exercise using the physical activity and leisure motivation scale (PALMS)*. (Doctorate), Victoria University.
- Confalonieri, M., & Gatti, E. (2008), *Sfaccettature identitarie. Come adolescenti e identità dialogano tra loro La fatica di ritrovarsi in un corpo che cambia*. Milan, Italia-ITA: UNICOPLI.
- Deci, E., & Vansteenkiste, M. (2004), Self-determination theory and basic need satisfaction: understanding human development in positive psychology. *Ricerche di Psicologia*, 27: 17-34.
- Dobmeyer, A. C., & Stein, D. M. (2003), A prospective analysis of eating disorder risk factors: drive for thinness, depressed mood, maladaptive cognitions, and ineffectiveness. *Eating Behaviors*, 4, 2: 135-147.
- Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011), Influence of age, sex, and race on college students' exercise motivation of physical activity. *Journal of American College Health*, 59, 5: 399-406.
- Fox, K. R. (1999), The influence of physical activity on mental well-being. *Public Health Nutrition*, 2, 3A: 411-418.
- Gallagher, P., Yancy, W. S., Jr., Swartout, K., Denissen, J. J., Kuhnle, A., & Voils, C. I. (2012), Age and sex differences in prospective effects of health goals and motivations on daily leisure-time physical activity. *Preventive Medicine*, 55, 4: 322-324.
- Greig, C. A., Young, A., Skelton, D. A., Pippet, E., Butler, F. M., & Mahmud, S. M. (1994), Exercise studies with elderly volunteers. *Age and Ageing*, 23, 3: 185-189.
- Gualdi-Russo, E., Rinaldo, N., Khyatti, M., Lakhoua, C., & Toselli, S. (2016), Weight status, fatness and body image perception of North African immigrant women in Italy. *Public Health Nutrition*, [Epub ahead of print]: 1-9.
- Guthold, R., Ono, T., Strong, K. L., Chatterji, S., & Morabia, A. (2008), Worldwide variability in physical inactivity a 51-country survey. *American Journal of Preventive Medicine*, 34, 6: 486-494.
- Hagger, M., & Chatzisarantis, N. (2008), Self-determination theory and the psychology of exercise. *International Review of Sport and Exercise Psychology*, 1, 1: 79-103.

- Janisse, H. C., Nedd, D., Escamilla, S., & Nies, M. A. (2004), Physical activity, social support, and family structure as determinants of mood among European-American and African-American women. *Women & Health*, 39, 1: 101-116.
- Ligthart, G. J., Corberand, J. X., Fournier, C., Galanaud, P., Hijmans, W., Kennes, B., . . . Steinmann, G. G. (1984), Admission criteria for immunogerontological studies in man: the SENIEUR protocol. *Mechanisms of Ageing and Development*, 28, 1: 47-55.
- Ligthart, G. J., Corberand, J. X., Geertzen, H. G., Meinders, A. E., Knook, D. L., & Hijmans, W. (1990), Necessity of the assessment of health status in human immunogerontological studies: evaluation of the SENIEUR protocol. *Mechanisms of Ageing and Development*, 55, 1: 89-105.
- Marsh, H. W., & Roche, L. A. (1996), Predicting self-esteem from perceptions of actual and ideal ratings of body fatness: is there only one ideal "supermodel"? *Research Quarterly for Exercise and Sport*, 67, 1: 13-23.
- Molanorouzi, K., Khoo, S., & Morris, T. (2015), Motives for adult participation in physical activity: type of activity, age, and gender. *BMC Public Health*, 15: 66.
- Rogers, H., Morris, T., & Moore, M. (2008), A qualitative study of the achievement goals of recreational exercise participants. *The Qualitative Report*, 13, 4: 706-734.
- Ryan, R., Frederick, C., Lepes, D., Rubio, N., & Sheldon, K. (1997), Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology*, 28: 235-254.
- Sallis, J. F., Haskell, W., & Wood, P. (1997), Seven-day physical activity recall. *Medicine and Science in Sports and Exercise*, 29: 89-103.
- Sallis, J. F., Haskell, W. L., Wood, P. D., Fortmann, S. P., Rogers, T., Blair, S. N., & Paffenbarger, R. S., Jr. (1985), Physical activity assessment methodology in the Five-City Project. *American Journal of Epidemiology*, 121, 1: 91-106.
- Schilder, P. (1950), *The image and appearance of the human body: studies in the constructive energies of the psyche*: International Universities Press.
- Slade, P. D. (1994), What is body image? *Behaviour Research and Therapy*, 32, 5: 497-502.
- Snowden, M. B., Steinman, L. E., Carlson, W. L., Mochan, K. N., Abraido-Lanza, A. F., Bryant, L. L., . . . Anderson, L. A. (2014), Effect of physical activity, social support, and skills training on late-life emotional health: a systematic literature review and implications for public health research. *Frontiers in Public Health*, 2: 213.
- Stunkard, A. J., Sorensen, T., & Schulsinger, F. (1983), *Use of the Danish Adoption Register for the study of obesity and thinness*. In S. S. Kety, R. P. Rowland, R. L. Sidman & S. W. Matthyse (Eds.), *Genetics of Neurological and Psychiatric Disorders* (Vol. 60, pp. 115-120). New York: Raven Press.
- Tàmmaro, A. E., Cesana, L., & Decio, G. (2008), Attività fisica, salute, cognitivà nell'anziano. *Ricerche di Psicologia*, 1, 2: 209-226.
- Tiggemann, M., & Lynch, J. E. (2001), body image across the life span in adult woman: the role of self-objectification. *Developmental Psychology*, 37, 2: 243-253.
- Trujillo, K., Brougham, R., & Walsh, D. (2004), Age differences in reasons for exercising. *Current Psychology*, 22, 4: 348-367.
- Walker, G. J. (2009), Culture, self-construal, and leisure motivations. *Leisure Sciences: An Interdisciplinary Journal*, 31, 4: 347-363.
- Yan, J. H., & McCullagh, P. (2004), Cultural influence on Youth's motivation of participation in physical activity. *Journal of Sport Behavior*, 27, 4: 378-390.
- Young, A. (1986), Exercise physiology in geriatric practice. *Acta Medica Scandinavica. Supplementum*, 711: 227-232.