

Associations of state body images,  
physical self-descriptions, and body mass index  
*Associazioni tra immagini corporee di stato,  
auto-descrizioni del proprio corpo e indice di massa corporea*

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**ABSTRACT**

**Objectives:** To find any possible relationships between dimensions of state body image (SBI), physical self-description (PSD) and body mass index (BMI).

**Methods:** Body Image States Scale (BISS) and Physical Self-Description Questionnaire (PSDQ) were administered to 280 students (143 girls and 137 boys) aged between 14 and 18 years ( $M = 16.86$ ;  $SD = 1.28$ ). Participants answered also a demographic form. Written informed consent was obtained from all participants and their parents. The study was based on a cross-sectional research design. Appropriate statistical analyzes (such as the correlation circle) were conducted on the data to verify the hypotheses of the study. **Results:** Pearson's  $r$  correlations and the correlation circle have shown multiple correlations between variables, some of which have been very strong and significant ( $r$  closed to 1;  $p < .0001$ ), so much so that areas of overlap between survey instruments could be identified. **Conclusions:** Possible areas of overlap between the questionnaires that measure the dimensions of the SBI and those of the PSD, and also BMI have been identified (e.g., *appearance* BISS – *appearance* PSDQ; *obesity* BISS – *obesity* PSDQ – BMI).

**Obiettivi:** Trovare eventuali possibili relazioni tra le dimensioni dell'immagine corporea di stato (SBI), l'auto-descrizione del sé fisico (PSD) e l'indice di massa corporea (IMC). **Metodi:** La *Body Image States Scale* (BISS) e il *Physical Self-Description Questionnaire* (PSDQ) sono stati somministrati a 280 studenti (143 ragazze e 137 ragazzi) di età compresa tra 14 e 18 anni ( $M = 16,86$ ;  $SD = 1,28$ ). I partecipanti hanno risposto anche a un modulo demografico. Il consenso informato scritto è stato ottenuto da tutti i partecipanti e dai loro genitori. Lo studio si è basato su un disegno di ricerca trasversale. Sui dati sono state condotte opportune analisi statistiche (come il cerchio delle correlazione) per verificare le ipotesi dello studio. **Risultati:** Le correlazioni  $r$  di Pearson e il cerchio delle correlazione hanno mostrato molteplici correlazioni tra variabili, alcune delle quali molto forti e significative ( $r$  vicino a 1;  $p < 0,0001$ ), tanto da poter individuare aree di sovrapposizione tra strumenti di rilevazione. **Conclusioni:** Sono state individuate possibili aree di sovrapposizione tra i questionari che misurano le dimensioni del SBI e quelle del PSD, e anche con l'IMC (e.g., *aspetto* BISS – *aspetto* PSDQ; *obesità* BISS – *obesità* PSDQ – IMC).

## KEYWORDS

Body identities, State body image, Physical self-concept, Training processes, Assessment instruments in Sports Education.

Identità corporee, Immagine corporea di stato, Sé fisico, Processi formativi, Strumenti di valutazione in educazione sportiva.

## 1. Theoretical Framework

The expression 'the body in the mind' constitutes the perspective from which our research starts and can be identified with *multiple representations of corporeality*, that is the act or content of the act by which an external object or an external object is reproduced, internal state of which identity is probably the most pregnant, full of meaning and most 'founding' form for the sciences of education (cfr. Fisher, 1990; Husserl, 1952); Schilder, 1973; Stein, 1917; Zazzo, 1990). We will then proceed to an in-depth study of the psycho-pedagogical constructs that aim to identify and define body identities, highlighting the relevance they have for the constitution of the identity of the person in developmental age (Scarpa, 2011a,b).

The construct relating to bodily identity finds its roots in multiple and different fields of investigation and the history of the construct, with a multidisciplinary genesis, if on the one hand it has allowed the achievement of a considerable wealth of information, studies and research in this regard, from other has led to a fragmentation, at least as regards the terminology that allows to identify the construct itself. The multiplication of the number of nomenclatures to indicate different aspects of bodily identity, sometimes used arbitrarily by the authors, other times indiscriminately, still others unduly, has revealed on some occasions the lack of a serious attempt to integrate the different nomenclatures and constructs underlying them. In literature we find a multiplicity of nomenclatures with their respective definitions and related disciplines (cfr. Scarpa, 2011a,b).

The constructs of interest for this research, as we will explain better later, are the body image (BI) and the physical self-concept, as understood respectively by Cash & Pruzinsky (2002), who grouped several nomenclatures into a *unicum* and by Marsh & Richards (1994), who absorbed the Physical Self-Concept (Richards 1988), and Physical Self-Perception (Fox, 1990) constructs into the Physical Self-Description (PSD) domain. The concepts of body image (BI) and physical self-description (PSD) represent complex multifaceted constructs which have been elaborated with contributions from different fields: neurology, psychoanalysis, philosophy and psychology (Carraro, Nart & Scarpa, 2010) and they refer to the picture of the body built by the individual (Fisher, 1990).

### 1.1 The state multidimensional construct of body image

BI can be considered a *multifaceted construct that refers to the body's picture built by the individual and referring especially to his/her appearance* (Cash & Pruzinsky, 2002). It is possible to distinguish two main components of this construct: *perceptual* and *attitudinal*. The first component refers essentially to an individual's esti-

mation of his/her body size, whereas the second is related to the cognitions and emotions regarding one's body. Attitudinal body image consists of at least two *subcomponents* (cfr. Cash, 2004; Jankauskiene, Kardelis & Pajaujiene, 2005): *evaluation/affect* (body-image appraisals and satisfaction, as well as emotional experiences *vis-à-vis* one's body) and *investment* (the salience, centrality, or extent of cognitive-behavioral emphasis on one's appearance, including "appearance schematicity").

Currently, we can assert that BI can be considered as a multidimensional construction about perceptions and attitudes that individuals refer to their body and in particular to their appearance (Cash, Fleming, Alindogan, Steadman & Whitehead, 2002). A widespread belief is that athletes with 'perfect' and well-trained bodies, and more generally active people, are mostly satisfied with their bodies, but different studies underline how sport and physical activity may have both negative and positive effects on BI (Cash & Pruzinsky, 2002). Moreover, it is interesting to note that, when physical exercise focusing on appearance, it generally influences negatively BI, while recreational and playful physical activities usually influence positively BI (Davis, 2002). It has also been proved that physical exercise may positively influence BI through improvements in body conditioning (endurance, strength and flexibility) and in body composition, through skills learning and by the perception of wellbeing and self-efficacy (Martin & Lichtenberger, 2002).

BI has also two *dimensions*: one of *trait* and one of *state* (as happens for example for anxiety). Our research intends to focus on the second dimension considering the fact that BI experiences vary temporally and in situational contexts, not as a crosssituational and stable trait BI. State BI (SBI) varies according to contexts, moments, with the flow of time and the changing of situations, as well as in response to experimental manipulations (see Figure 1). SBI is assessed with *Body Image States Scale* (BISS validated in English by Cash *et al.* 2002).

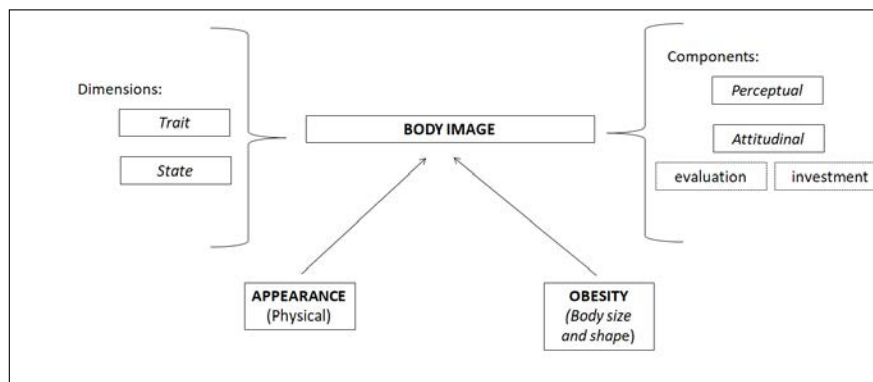


Fig. 1. Graphical representation of the multidimensional construct of body image(s)

## 1.2 The multidimensional-hierarchical and trait construct of physical self-concept

Self-concept is one of the most researched constructs within the framework of educational psychology, psycho-pedagogy, psychology of personality, and social psychology (cfr. Raedeke, Focht & Scales, 2007). Self concept can be defined as

the perception that an individual has of him or herself, with contents that are both *descriptive*, as well as *evaluative* (Harter 2003, 1999). As far as Fox (1998) affirms, self-concept refers to how an individual perceives him or herself, or the self-described profile based on a multitude of roles and attributes that we believe make up one's own self. The three main characteristics of the construct are multi-dimensionality, hierarchy, and stability. Self-concept is comprised of various dimensions (social, physical, and academic), that pose themselves in a hierarchical manner, in order to construct the global self and have an influence on self-esteem. The stability of self-concept, in a global form, refers to the fact that it is not measily susceptible to change (Marsh & Yeung, 1998).

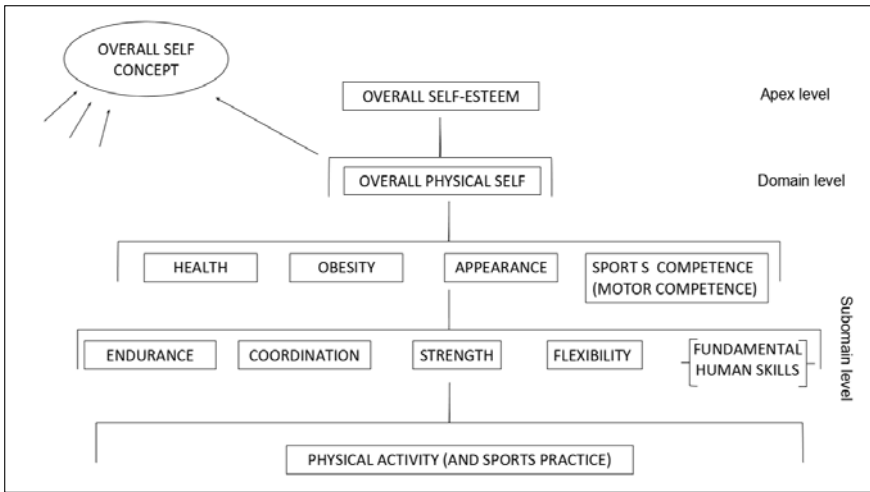
Corporeal self-recognition constitutes a component of self-concept that is not easy to define in unambiguous terms. However, it can be affirmed that corporeal self-recognition constitutes an ensemble of knowledge, feelings, memories, and experiences that the individual uses to refer to his or her body (Fox, 1988, 1998). Physical self-concept is considered a multidimensional subdomain of the overall self-concept that incorporates different characteristics, such as physical activity, fitness conditions, health and appearance (Marsh & Redmayne, 1994; Marsh, Richards, Johnson, Roche, & Tremayne 1994). It should be also mentioned that Fox and Corbin (1989) suggested the multidimensional organization of the physical self (sport competence, physical condition, body attractiveness and physical strength) and the role of physical self-worth as mediator between these dimensions and self-esteem. According to Fox (1990) and Marsh (1994), the multidimensional and hierarchical characterization of physical self-concept can be represented by a three level model with self-esteem at the top, global physical self-concept at the second level, and specific components of physical self-concept at the third level.

In the field of sport and exercise, physical self-concept is also considered a psychological construct with an impact on physical activity. It plays a considerable role in determining results (Carraro, Scarpa & Ventura, 2010). Scientific evidence also shows that physical self-concept is 'built' by the individual in his/her evolution under the influence and interdependence of three main components: somatic, psychological and social ones. The development of physical self-concept is not influenced only by the data which attest an individual's physical structure, or only by the mere psychological, emotional and affective vision of one's physicality, but by the close interaction of these two components with the social dimension (Cash, Thériault & Annis, 2004; Shapiro & Martin, 2010).

Physical self-concept plays a crucial role during adolescence and youth. In these phases of life, individuals experience many changes in their body. Sex differences become evident and boys achieve higher performance levels in most physical skills (Fletcher & Hattie, 2005; Harter, 2003, 1999). During adolescence and youth it is very important to have a positive physical self-concept in order to promote individual well-being (Maïano, Ninot & Bilard, 2004).

Some studies showed that children and young adults with disabilities which have fewer friends, experience more loneliness and are more teased and/or neglected compared to those without disabilities; they often receive negative 'feedback' related to their body, which contributes to the development of a poor body image (Arbour, Latimer, Martin Ginis & Jung, 2007; Martin, 2006; Martin & Mushett, 1996). Individuals with physical disabilities generally have a more negative physical self-concept than other people, but people with physical disability involved in regular sports practice can report higher levels of physical self than sedentary individuals without disability (Ferreira & Fox, 2008; Scarpa, 2011a,b).

Figure 2 below graphically represents the multidimensional-hierarchical construction of the physical self, considering both the classic factors related to the physical self (Fox & Corbin, 1989; Marsh *et al.*, 1994) and more recently used concepts, such as ‘motor competence’ (Scarpa & Palumbo, 2017), assuming that: (a) the specific sub-domains of the physical self construct have been hierarchically organized on the basis of past literature; (b) lower level percepts affect all higher level constructs; (c) components of the same level affect each other alike; (d) components placed in brackets are mentioned in current literature but not measured by the *Physical Self-Description Questionnaire* (Italian version of PSDQ-S validated by Scarpa, Gobbi, Paggiaro & Carraro, 2010) used in this study; (e) the global self-concept, inserted top left and circled, is not measured by the PSDQ but is certainly influenced by the physical self-concept and other components of the self (Marsh 1987).



**Fig. 2. Graphical representation of the multidimensional-hierarchical construct of the physical self-description and self-esteem**

### 1.3 Aims and hypothesis of the study

On the basis of the premises discussed so far, the present study aim at: (1) investigating the relationships between dimensions of SBI, PSD and body mass index (BMI); (2) investigating the temporal stability of the BISS through assessing correlations of its state dimensions with those of a trait physical self measure; (3) investigating the relationships between BISS state measure and PSDQ-S trait measure (both of them subjective measures) respectively with an objective external criterion such as BMI. In particular we would like to evaluate if there are possible areas of overlap between the questionnaires that measure the dimensions of the SBI and those of the PSD (*Body Image States Scale vs Physical Self-Description Questionnaire*), and also BMI.

Based on the rationale existing in the literature we hypothesize that *appearance* and physical self assessed by the BISS are significantly correlated with *appearance* measured by the PSDQ-S, creating an overlapping area. Furthermore we

hypothesize that *obesity* (and body sizes/shapes) assessed by the BISS is significantly correlated with *obesity* measured by the PSDQ-S and also with BMI, creating a second overlapping area between the three dimensions (cfr. Farrel, Lee & Shafran, 2005).

## 2. Material and methods

### 2.1 Participants and procedures

Participants were 280 students, 143 girls and 137 boys aged between 14 and 18 years ( $M = 16.86$ ;  $SD = 1.28$ ) that voluntarily participated in the study. The study was conducted in the Veneto region, Italy.

In the present study first was administrated the BISS in order to evaluate multi-item measure of momentary evaluative/affective experiences of one's physical appearance and body fat; second was administrated the PSDQ in order to evaluate trait and multidimensional physical self-concept. Participants answered also a demographic form that posed questions about gender, age, current height and weight. Written informed consent was obtained from all participants and their parents. The study was based on a cross-sectional research design.

### 2.2 Measures and instruments

**Body Image States Scale (BISS)** – BISS is a six-item questionnaire with a nine-point response format for each item. The components of the six items of the BISS are as follows: (a) overall satisfaction with one's appearance; (b) body size and shape satisfaction; (c) weight satisfaction; (d) feelings of physical attractiveness; (e) feelings about one's looks compared with how one usually feels; (f) appearance evaluation in comparison with how the average person looks. The measure of BI is obtained by the composite mean of the six items. Higher scores reflect a more positive BI state. The items have both positively and negatively worded questions (bipolar scales) in terms of how the respondent feels "right now at this moment". Items 2, 4, and 6 are reverse scored (Cash, Fleming, Alindogan, Steadman & Whitehead 2002). The internal consistency of the original version of the BISS was acceptable (Cronbach's Alpha = .77) and the test-retest reliability after two to three weeks demonstrated a moderate stability of the instrument ( $r = .69$ ,  $p < .001$ ). In the present study an Italian version of BISS was used, realized by means of back-translation of the original English version. Examining its AFE, AFC, internal consistency, test-retest reliability, relationships with body image traits, we have found that the Italian version has two subscales rather than one: *appearance* / (physical) and *obesity* / (body size and shape). The first one was composed by items 1, 5 and 6, the second one by items 2, 3, 4. Internal consistency measured by Cronbach's Alpha was .87 for *appearance* sub-scale and .82 for *obesity* sub-scale. The relevance of existing indices revealed a good adjustment of the original model to the Italian population with RMSEA = .056, NFI = .974, NNFI = .969, CFI = .977, GFI = .876, AGFI = .855, PGFI = .753. The invariance cross gender and age was also tested (cfr. Carraro, Nart & Scarpa 2010; Scarpa, Nart, Gobbi, & Carraro 2011)

**Physical Self-Description Questionnaire (PSDQ)** – PSDQ was developed and validated by Marsh *et al.* (1994) to assess nine specific factors of physical self-concept



and two global scales, placed at a higher hierarchical level: physical self-concept and self-esteem. PSDQ-S consists is a 47-item questionnaire with a six-point response format for each item. Responses to each item were based on 6-point, bipolar, Likert-type scales, semantically anchored at each point. The scale was presented both in a negative-to-positive direction and a positive-to-negative direction mixed in the full questionnaire. In the present study we used an short Italian version of the instrument, which was designed to measure the following components of physical self-concept: *sport* (items: 2, 12, 26, 41;  $\alpha = .90$ ), *obesity* (items: 11, 19, 25;  $\alpha = .86$ ), *appearance* (items: 3, 14, 20, 35;  $\alpha = .85$ ), *global physical* (items: 13, 27, 34, 42;  $\alpha = .91$ ) and *global esteem* (items: 7, 38, 45, 47;  $\alpha = .77$ ). Original internal consistency and reliability was tested using as average Cronbach's Alpha = .87 and the relevance of existing indices revealed a good adjustment of the original model to the Italian population with RMSEA = .053, NFI = .965, NNFI = .972, CFI = .975, GFI = .874, AGFI = .852, PGFI = .744. The invariance cross gender and age was also tested (Scarpa, Gobbi, Paggiaro & Carraro, 2010; cfr. Scarpa & Palumbo, 2017).

### 2.3 Data Analyses

Statistical data analysis was carried out with: SPSS software (version 28.0); Lisrel statistic softwer; R statistic softwer; Analyze-it for Excel. Exploratory factor analysis (EFA), confirmatory factor analysis (CFA), factor loadings, internal consistency and reliability, existing indices revealed a good adjustment of the original model to the Italian population and invariance cross gender and age were tested. Descriptive statistics (means and standard deviations) were calculated for each variables in order to describe the entire sample. Pearson's  $r$  correlations between BISS components, PSDQ scales and BMI was carried out in order to find significant correlations between variables (cfr. Carraro, Scarpa & Ventura, 2010; Scarpa *et al.*, 2010). Finally correlation circle graphic was used to test possible areas of overlap between variables.

### 3. Results and discussion

Table 1 shows the results of the Pearson correlations ( $r$  and  $p$ -value) between between BISS, PSDQ and BMI variables. Significant values have been identified with one or two asterisks ( $*p < .001$ ,  $**p < .05$  respectively). As can be seen in the table, there were a lot of significant and strong correlations between variables. Based on the objectives and assumptions the most relevant correlations for the purposes of this study are the following: *obesity* BISS and *obesity* PSDQ variables are strongly positively correlated with  $r$  approaching the value of 1 ( $r = .912$  and  $p < .001$ ), which suggests an almost total overlap between the two dimensions. *Obesity* BISS variable and BMI are strongly positively correlated ( $r = .792$  and  $p < .001$ ) such as *obesity* PSDQ variable and BMI ( $r = .801$  and  $p < .001$ ). *Appearance* BISS and *appearance* PSDQ variables are strongly positively correlated with  $r$  approaching the value of 1 ( $r = .921$  and  $p < .001$ ) which suggests an almost total overlap between the two dimensions. They are also significantly correlated with *global physical* ( $r = .824$  and  $.789$  respectively;  $p < .001$ ).

It should be noted that the two scales relating to *obesity* are negatively and strongly correlated with the two scales relating to *appearance* ( $r = -.765$ ,  $-.757$ ,  $-.667$  and  $-.658$ ;  $p < .001$ ).

Finally, it should be noted the strong positive correlation between *global physical* and *self-esteem* ( $r = .801$  and  $p < .001$ ) and the weak but positive correlation between *sport ability* and *self-esteem* ( $r = .453$  and  $p < .05$ ) such as *appearance* and *self-esteem* ( $r = .476$  and  $p < .05$ ).

In summary, the most salient data of Pearson's correlations showed a convergence between the variables BISS *appearance* (state's measure) and PSDQ *appearance* (trait's measure), discriminating all the other variables of the questionnaires administered. Pearson's correlations also showed a convergence between the variables BISS *obesity* (state's measure) and PSDQ *obesity* (trait's measure), discriminating all the other variables of the questionnaires administered (cfr. Huang 2007; Rudiger, Cash, Roehrig & Thompson 2007).

BISS - PSDQ Variables	<i>r</i>						
	2	3	4	5	6	7	8
1. Obesity (BISS)	-.765*	-.396	.912*	-.757*	-.706*	-.401**	.792*
2. Appearance and Physical (BISS)		-.379	-.667*	.921*	.824*	.375	-.359
3. Sport Ability (PSDQ)			-.412**	-.340	-.214	.453**	.235
4. Obesity (PSDQ)				-.658*	-.749*	-.367	.801*
5. Appearance (PSDQ)					.789*	.476**	-.457**
6. Global Physical (PSDQ)						.801*	-.264
7. Self-Esteem (PSDQ)							-.235
8. Body Mass Index (BMI)							1

Sign. \* $p < .001$ , \*\* $p < .05$ .

**Table 1**  
Pearson's *r* correlations between BISS, PSDQ and BMI variables

But Pearson's correlations allow to establish only significant and important or strong relationships but not overlapping areas between variables. The circle of correlations was used in the present work to fill this gap. It consists in a very innovative and sophisticated statistical analysis procedure that allows researchers



(and not only) to determine and view areas of overlap between variables and other interesting information that we will explain in the following paragraphs. With correlation circle it is possible to visualize the correlation between the first two principal components and the original dataset features. Each vector represents a variable. The vectors that come closest to the perimeter of the circle from the center of the same allow to identify more intense, thicker and stronger correlations between variables grouped together.

In addition to the advantage of having a graphic / visual support to see the relationships between variables through the correlation circle, the Pearson correlations are integrated by adding very useful information according to the following principles: (a) Features with a positive correlation will be grouped together; (b) Totally uncorrelated features are orthogonal to each other; (c) Features with a negative correlation will be plotted on the opposing quadrants of this plot<sup>1</sup>.

Figure 3 shows the correlation circle that identifies the correlations between the variables of this study.

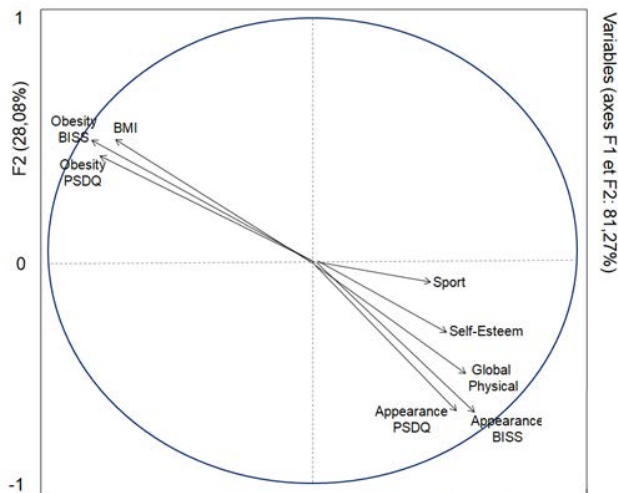


Fig. 3. Correlation circle for BISS, PSDQ and BMI and variables

	Factor loadings	
	F1	F2
APPEARANCE BISS	.856*	.309
OBESITY BISS	-.765*	.120
BMI	-.690*	.301
GLOBAL PHYSICAL	.832*	.380
SELF-ESTEEM	.463	.303
OBESITY PSDQ	-.889*	.354
APPEARANCE PSDQ	.736*	.376
SPORT	.420	.336

Note. Factor loadings with values > .6 are denoted with the symbol “\*\*”

1 Acknowledgements. Thanks to the Professors Bolzan M., Clerici R., Paggiaro A., and Ventura L. of the Department of Statistical Sciences of the University of Padua, who contributed a lot in personal training to the methods of quantitative empirical research during my stay at the same University.

The correlation circle clearly highlights how state's measure of *obesity* is anchored to the trait's measure of *obesity*; while state's measure of *appearance* is anchored to the trait's measure of *appearance* and *global physical*. The subjective dimensions that measure *obesity* are anchored in a convergent and discriminating way to the objective variable BMI.

Two overlapping areas can be identified where the variables are grouped together and the vectors representing them are quite close to the perimeter of the circle: (a) *obesity* BISS, *obesity* PSDQ and BMI variables (b) *appearance* BISS, *appearance* PSDQ and global physical variables (cfr. Pruzinsky, 2002). The groupings 'a' and 'b' are also found on opposite quadrants of the plot, this indicates a strong negative correlation between the variables grouped in 'a' area and those grouped in the 'b' area, as already evidenced by the Pearson correlations. There is almost the complete absence of vector variables that are approximately orthogonal to each other (cfr. Carraro, Scarpa & Ventura, 2010).

Coming to the end, it can be said that the variables *obesity* BISS vs *obesity* PSDQ and *appearance* BISS vs *appearance* PSDQ are rather redundant, although they measure different dimensions of body images and physical self concept: one of state and the other of trait (cfr. Cash et al., 2002).

## Conclusion

The aims of this study were: (1) investigating the relationships between dimensions of SBI, PSD and body mass index (BMI); (2) investigating the temporal stability of the BISS through assessing correlations of its state dimensions with those of a trait physical self measure; (3) investigating the relationships between BISS state measure and PSDQ-S trait measure respectively with an objective external criterium such as BMI. In particular we wanted to evaluate if there are possible areas of overlap between the questionnaires that measure the dimensions of the SBI and those of the PSD (*Body Image States Scale* vs *Physical Self-Description Questionnaire*) and also BMI. Through the research presented here, we believe it is possible to affirm that all the objectives have been achieved and the hypotheses confirmed.

In conclusion, it is therefore possible to affirm that: (a) *appearance* and *physical self* assessed by the BISS are significantly positively and strongly correlated with *appearance* and *global physical* measured by the PSDQ-S, creating an overlapping area; (b) *obesity* (and body sizes/shapes) assessed by the BISS is significantly positively and strongly correlated with *obesity* measured by the PSDQ-S and also with BMI, creating a second overlapping area between the three dimensions (cfr. Scarpa, 2011ab; Scarpa et al., 2010; Scarpa et al., 2011).

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