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OF CURRENT RESEARCH****RESEARCH ARTICLE****X-RAY VISION: MENTAL REPRESENTATION OF THE HUMAN BODY'S INNER MORPHOLOGY*****¹Maria do Rosário Dias, ²Ana Cristina Neves, ³Nádia Pereira Simões, ⁴José Grillo Evangelista, and ⁵José Martins dos Santos**¹PhD in Clinical Psychology, Associate Professor at Egas Moniz – Cooperativa de Ensino Superior, Coordinator of Egas Moniz – Multidisciplinary Research Center in Health Psychology, Monte de Caparica, Portugal²MA in Clinical Developmental Psychology; Adjunct Professor at Egas Moniz – Cooperativa de Ensino Superior, Member of Egas Moniz – Multidisciplinary Research Center in Health Psychology, Monte de Caparica, Portugal³Speech Language Pathologist, Researcher at Egas Moniz – Multidisciplinary Research Center in Health Psychology, Monte de Caparica, Portugal⁴PhD in Odontology, Associate Professor at Egas Moniz – Cooperativa de Ensino Superior, Member of CiiEM – Interdisciplinary Research Center of Egas Moniz, Monte de Caparica, Portugal⁵PhD in Medical Sciences; President of Egas Moniz – Cooperativa de Ensino Superior, Monte de Caparica, Portugal; Full Professor at Egas Moniz – Cooperativa de Ensino Superior; President of CiiEM – Interdisciplinary Research Center of Egas Moniz, Monte de Caparica, Portugal**ARTICLE INFO****Article History:**Received 07th March, 2016

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27th April, 2016Accepted 06th May, 2016Published online 15th June, 2016**Key words:**Representation of the human inner body,
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The present study examines how undergraduate students of Health Sciences represent the human body inner morphology. A quantitative- and qualitative-based longitudinal study was conducted where 123 health sciences students were asked to draw the inner morphology of a *Healthy Person* and of a *Sick Person* in two separate moments: (i) before and (ii) after taking a Human Anatomy course unit. Those drawings were evaluated according to a content analysis matrix specifically designed for the purposes of the current research. A comparative analysis (before vs after academic training) of the collected data suggests atypicality of contents and a differential approach to the inner body at the structural anatomy level. Overall, *Healthy Person* representations show considerable younger individuals than those found in *Sick Person* representations. In most drawings, the body outline, which would represent the human body's largest organ (the skin), is absent. Drawings also show a desexualization of the depicted bodies, for both representation types (healthy vs sick) failed to include reproductive organs. The pathologies most frequently portrayed in *Sick Person* representations were neoplasms of specific organs. Interestingly, the damaged organs were highly invested pictorially, in contrast with the lesser investment and amount of accessory organs depicted in *Healthy Person* representations.

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INTRODUCTION

Conceptualization of the visible part of the body becomes structured over the course of the individual's life-span (Barrett and Eames, 1996; Ericsson, Winblad and Nilsson, 2001; Martlew and Connolly, 1996). A crucial element for a child's personality formation is, in fact, her/his mental representation of their own body, *i.e.*, of their body image (Cox, Koyasu,

Hiranuma and Perara, 2005; Freitas, 2008; Jones and Badger, 1991). Vygotsky (2003) argued that image production, particularly drawings of the human body, is linked to what each individual knows; one does not draw what one sees, one draws what one knows. According to Vygotsky, knowledge is an individual formation process that takes shape amidst social interaction and involves higher mental functions, *viz.*, abstract thought, imagination and mental representations. Following Camargo, Goetz, Bousfield and Justo (2011), a person's perception on his/her body image is a key feature in understanding subjective representations of the body. The issue of body image has been an important focus of interest for numerous academics (Golomb, 1977; Khan, Kanchan, Jahan

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and Singh, 2011; Lima, Lemos and Aguiar, 2012; Prokop and Fancovicová, 2006; Shukla, Ram, and Sengar, 2012). Some studies have focused on the mental representation and assessment of dimensions such as aesthetics and physical health (Camargo, Goetz, Bousfield and Justo, 2011); others have examined the notions of 'healthy person' versus 'sick person' (Dias, Duque, Neves, Soares, Cardoso, and Carrão, 2006; Dias and Neves, 2016).

The current study aims at gaining access to mental representations of the human body's interior via the projective technique of drawing. The goal is to understand whether mental representations of the human body's internal morphology arise from a somewhat more "magical and inductive" perspective. Likewise, we found it important to empirically assess how people develop their understanding of what is inside of them. How do health sciences students understand their internal body image? Do those students have a clear picture of the anatomy and physiology of the human body? It is a rare person who actually knows the location of his/her inner organs, or is able to give a structured and connected account of the body's various physiological systems. Most people seem to project the human body's internal morphology as a "caricature" of its anatomical-physiological model. Could this same "anatomy-blindness" also be found in a specific group? Namely, in a group of health sciences undergraduates, prior to their attending a Human Anatomy course unit? Some psychological theories claim that the unconscious has no knowledge of the internal morphology of the human body. However, images depicting internal aspects of the body may elicit in those who look at them, surprising "*phantasmal*" movements.

So, does the so-called *unconscious* know and acknowledge the internal anatomy of the body? Does the inner body image integrate the sexual and reproductive organs? What kind of mental images do men and women hold as representations of the male and female internal body regarding their respective sexual and reproductive systems? Are those images similar to those rendered in biomedical images? To what extent, if any, has exposure to biomedical visual representations been assimilated by the health student population? Is that knowledge of anatomy, physiology and internal morphology an asset to medical-therapeutic actions? In attempting to explore those questions, drawing emerges as a privileged methodology (instrument) to assess mental representations of the inner body image. The use of drawings offers a particular view on specific aspects of each student's conceptions (Reiss and Tunnicliffe, 2001; Reiss, Tunnicliffe, Andersen, Bartoszeck, et al., 2002). Several studies seem to strongly suggest that to elicit drawings vis-à-vis approaches that rely on words is less likely to intimidate students who are very shy in conversation, lack certain linguistic skills, or speak a language(s) other than the researcher's (Barrett and Eames, 1996; İlkörücü-Göçmençelebi and Tapan, 2010; Kamano, 1960; MacPhai and Kinchin, 2004; Reiss and Tunnicliffe, 2001; Reiss et al., 2002; Saur, Pasian and Loureiro, 2010; Tait and Archer, 1955). Drawings of the human figure have been one of the most popular instruments in gaining access to individuals' mental representations and, consequently, into the workings of deeply unconscious and cognitive processes (Vedder, Van De Vijfeijken, and Kook,

2000; Wilkinson and Schnadt, 1968). The act of drawing requires information to be organised, letting the experiences lived and/or thought by the person making the drawing to be processed, thus forging one's learning and representation of the world (Cox, 2005; Duffy, Beaty and DeJulio, 1982; Goldberg, Yunes and Freitas, 2005). That makes it a reliable source for purposes of identifying body image psychological contents. Drawing is an inexhaustible research instrument in studies on body image (*imago*), and it can also show specific developmental patterns (Bartoszeck, Machado and Amann-Gainotti, 2008). Amann-Gainotti (1988) suggests that representations of internalised body image, and of how knowledge on human anatomy is acquired, develops through a sequence of stages that span from childhood to adulthood, until it forms an internalised pattern. In the course of her research, Amann-Gainotti found that there is a "perceptive dissonance" of the internalised body image, indicative of a cleft between the subjects' *biological reality* and their *psychological perception* (Amann-Gainotti, 1988; Bartoszeck et al., 2008).

Bartoszeck and colleagues (2008) claim that the inner body image is a representative element of anatomical issues and symbolic properties, as well as of interrelations with his/her own culture. Some authors (Victoria and Knauth, 2001; Victoria and Knauth, 2004) suggest that representation and signification of socio-cultural specificities concerning health and sickness are perceived by the individual through his/her body. Further and in-depth studies on internal body image could thus be applied to several areas of knowledge, namely to the fields of Psychology, Health Sciences and Health Education, for long before an individual holds a scientific preconception of a concept, s/he already assumes theories on several elements that will later guide her/his self-knowledge determination (Amann-Gainotti and Pallini, 2006). Understanding the measure of self-control an individual holds over his/her body image becomes a crucial aspect in the process of recovering from a chronic disease, particularly in oncologic patients (Weber, 2001). Body image mental modelling can likewise be a significant therapeutic instrument in the rehabilitation of patients with anorectic disorders (Skarderud, 2007).

Those examples show how knowledge of the psychological processes involved in the development of (external or internal) body image could contribute to appropriate decision making when designing and implementing Health Education programs aimed at specific target-populations, as well as in improving pedagogical practices applied to Health sciences (Machado et al., 2011). Drawings are not only a rather effective research tool, they also stand as a more suited measure for purposes of international comparative studies (e.g., Amann-Gainotti, 1994; Barrett and Eames, 1996; Patrick and Tunnicliffe, 2010; Reiss and Tunnicliffe, 2001; Reiss et al., 2002; Saur, Pasian and Loureiro, 2010; Tait and Archer, 1955; Tielsch and Allen, 2005). There are but a few studies that bring together the health sciences and the psychological perspectives into the visual representation of the inner morphology of the human body (Amann-Gainotti and Grazioso, 1991; Bartoszeck, Machado and Amann-Gianotti, 2008, 2011). Also, there is virtually an absence of studies that show how knowledge of the *healthy* and *sick* human body is mentally represented.

In the present study, a longitudinal approach was adopted for purposes of inquiring into the mental representations of the inside of the human body in undergraduate students of Health Sciences, before and after they were subject to specific training, i.e., before and after they were exposed to the contents of the course unit Human Anatomy. The assessment of those mental representations, accessed via pictorial images, is based on two fundamental axis of analysis: (1) *Sexual identity* – through the evaluation of gender differentiation; and (2) *Intriguing data on personal identity* – through the evaluation of self-object differentiation. *Gender Differentiation* will be evaluated in terms of: (1.1) presence vs absence of sexual and reproductive features; and (1.2) correspondence between depiction of sex and reproductive organs and participant's sex – i.e., possible correspondence between psychological identity and biological identity. *Intriguing Data* will address: (2.1) presence vs absence of a “boundary” between the exterior and the interior of the human body – the outline which denotes the human body's largest organ (the skin); and (2.2) the body's internal structural integrity, in terms of biological systems and respective organs.

MATERIALS AND METHODS

For purposes of satisfying the research's analytical model, a descriptive and longitudinal study of exploratory character was conducted that follows a qualitative-based methodological strategy – content analysis of 492 drawings – combined with quantitative parameters.

Participants

The study was conducted in Portugal, at a private higher education institution located in the Lisbon and Vale do Tejo area. All subjects were 18 years old or older at the time data was collected and had no previous advanced academic training on Human Anatomy. Our sample was recruited in classroom context; a total of 123 undergraduate students of various health sciences degrees, of both sexes (30 male and 93 female), aged between 18 and 34 years old, took part in the study.

Data Collection

Participants' knowledge of the human body was accessed via drawings (projective instrument). This method has been used in previous studies (e.g., Amann-Gainotti and Antenore, 1990; Reiss and Tunnicliffe, 2001, Reiss *et al.*, 2002), where children, adolescents or adults were asked to draw the inside of the human body. In our study, participants were similarly instructed to draw the *Human Figure* so as to depict what the inside of the body looks like. They were, however, specifically asked to render two separate depictions, one representing a *Healthy Human Body* and another representing a *Sick Human Body*. They were further instructed to characterize the human figures they had depicted as to age and gender. Two-hundred and forty-six drawings were collected in each of the two phases of the study. Two research protocols were used in collecting the data. Protocol I is divided in two sections (A and B). Section A accounts for the *Pictorial Representations* (drawings). It consisted of two A4 sheets per participant; one where the participant were to draw, with a graphite pencil, the pictogram denoting the *internal morphology of a Healthy*

Human Figure (HF); the other, where s/he were to portray the *internal morphology of a Sick Human Figure* (SF). Section B accounts for the collection of socio-demographic data (age, gender, health sciences degree attended) on each participant. Protocol II concerns the *Drawing Content Analysis Grid*. Participants' drawings (a total of 492 drawings in the two phases) were subject to content analysis using a grid of analytical categories specifically designed to the present study (drawings content analysis). The grid encompasses two major elementary categories: *Anatomical Drawings* and *Metaphorical Drawings*. Within the *Anatomical Drawings* category, nine subcategories were typified to accommodate the embryonic body systems: (i) *Neurological* (brain, bone marrow); (ii) *Immune* (spleen); (iii) *Circulatory* (heart, veins, arteries); (iv) *Respiratory* (superior airways, pharynx, larynx, trachea, bronchi, lungs); (v) *Gastrointestinal* (mouth, esophagus, stomach, pancreas, liver, small intestine, large intestine, rectum, anus); (vi) *Skeletal* (skull, spine, ribs, collarbone, sternum, humerus, radius, ulna, hand, hucklebone, femur, patella, tibia, fibula, foot, joints); (vii) *Musculoskeletal* (deltoid, sternocleidomastoid); (viii) *Urinary* (kidneys, bladder, ureters, urethra); (ix) *Reproductive* (male: prostate, penis, testicles; female: ovaries, fallopian tubes, uterus, vagina). In the present paper, we will only present and discuss results pertaining to the *Anatomical Drawing Category* and related subcategories. Data concerning the *Metaphorical Drawings Category* will not be here examined.

Methodological Procedures

Data was collected in two separate moments: on the first day of students attending the course unit Human Anatomy (Phase I); and at the end of the semester (Phase II). Each participant was given two A4 sheets of white blank paper. They were asked to draw the internal aspect of a *Healthy Human Figure* on the first sheet of paper (specifically, how they thought the inside of the human body was like), and to draw the internal aspect of a *Sick Human Figure* in the second sheet. Once both pictograms were finished, participants were then asked to characterize the figures they had made according to age and gender, and asked to label the organs portrayed in their respective drawings. Participants were given 30/40 minutes to complete the task. Prior to their participation in the study, students were given all the relevant information concerning the study itself. They were also informed that their participation was anonymous, voluntary-based, and that any information collected during the study would remain confidential. All students gave their informed consent to take part in the study. Because data was collected in two separate phases, students were asked to write down the last four digits of their national identity card on the sheets of paper where their drawings were made.

This procedure secured anonymity and allowed protocols obtained in the Phase II (246 drawings) to be paired, by participant, with those obtained in Phase I (246 drawings). A total of 492 drawing protocols were collected. Drawings were analyzed so as to evaluate participants' knowledge of the body's inner structures, and scored by a multidisciplinary team of judges (two clinical psychologists, two human anatomy professors, and one speech and language therapist) using the content analysis grid designed for this study (Protocol II).

Further scoring was independently carried out by two of the current paper's authors, following criteria developed in the ranking protocol definition. Quantitative data was analysed using SPSS (Statistical Package for the Social Sciences), version 19.0 for Windows. Two limitations on the methodology used could be pointed out: (i) drawing space was limited by the size of the A4 sheet, a limitation that may hinder the introduction or legibility of some details of the anatomy; (ii) some systems are notoriously difficult to draw, which may cause difficulties of expression and, thus, a difference between what students intended to draw and their ability to accurately render it.

RESULTS AND DISCUSSION

Gender Differentiation

Representation of sex and reproductive organs: In Phase I (before academic training), none (0%) of the 30 male subjects included any sex or reproductive organs in their drawings (e.g., Fig.1a).

Drawings collected in Phase I show that 2 of the 93 female participants (2.2%) included (male) sex organs (e.g., Fig. 1b), and that 13 of the 93 female participants (16%) included reproductive (i.e., internal) but not sex organs in their representations (e.g., Fig. 2).

In Phase II (after academic training), only 1 (e.g., Fig. 3a) of the 30 male students (3.3%) and 2 (e.g., Fig. 3b) of the 93 female students (2.2%) included sex organs (male sex organs) in their drawings. Thirteen of the 93 female students (16%) included reproductive (internal) but not sex organs in their drawings (e.g., Fig. 4). A comparison between Phases I and II strongly suggests that depiction of sex organs was not affected by academic training or learning. This strengthens the idea that sexual identity is fundamentally emotional and psychosocial in character, and unconscious in its essence. In other words, our data suggests that sexual identity is the result of a very deep, mostly unconscious process of intrapsychic constructions – identifications – directly connected with significant intersubjective relationships.

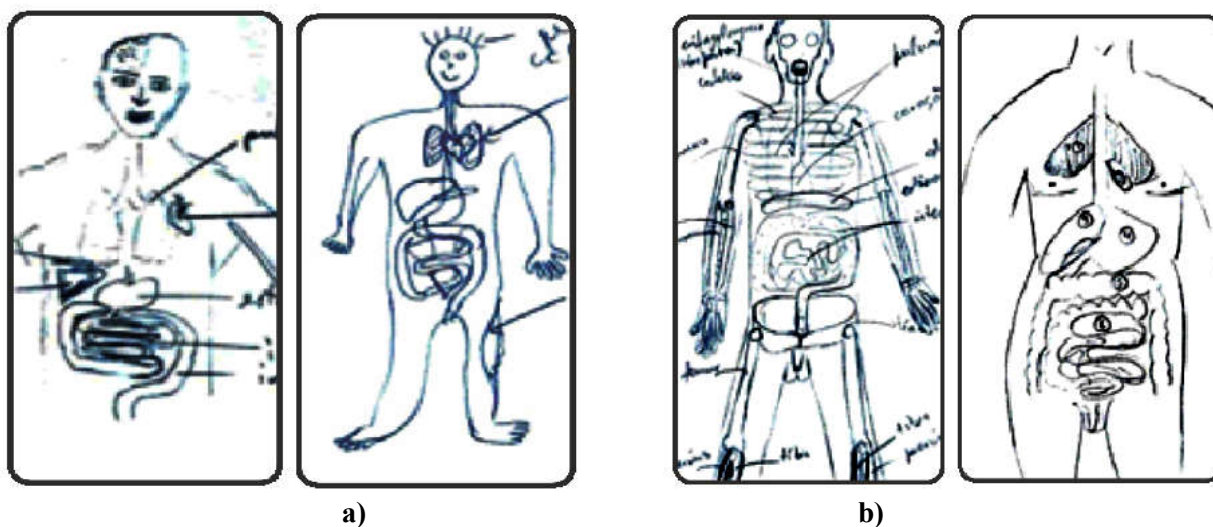


Figure 1. a) Phase I: Absence of sexual or reproductive organs in representations of HF (left) and SF (right) – drawings by a male student. b) Phase I: Representation of male genitalia – HF (left) and SF (right) – drawings by a female student.

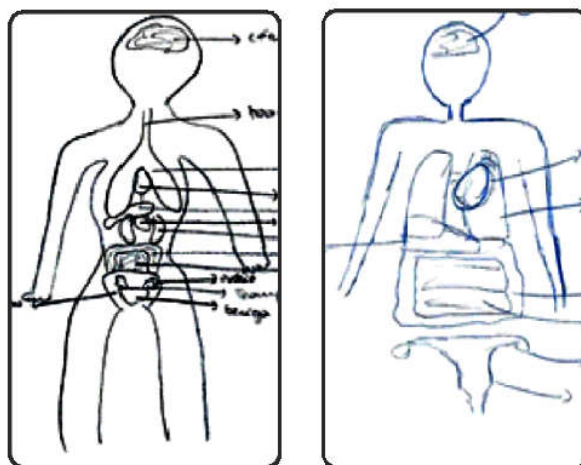


Figure 2. Phase I: Presence of reproductive female organs in representations of SF (left) and HF (right) – drawings by a female student

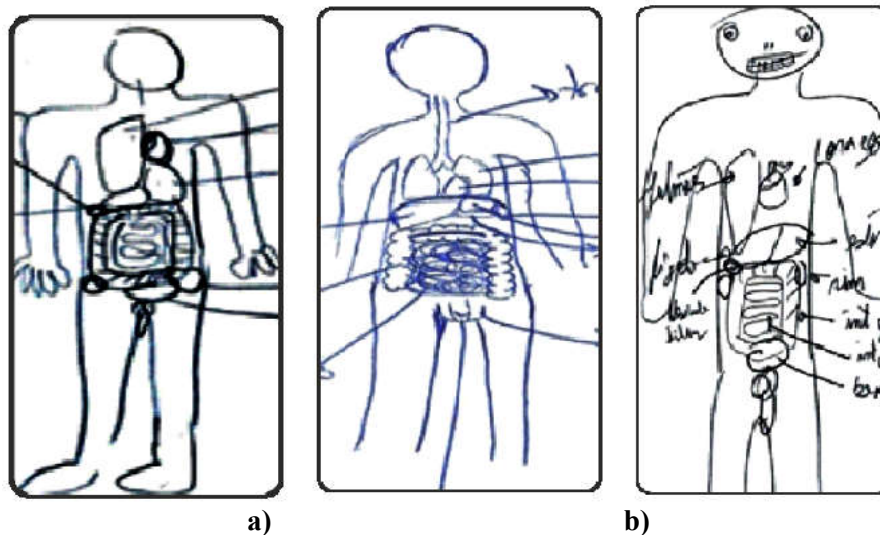


Figure 3. a) Phase II: Presence of male sex organs in SF representation – drawing by a male student
 b) Phase II: Presence of male sex organs in SF representations – drawings by a female students

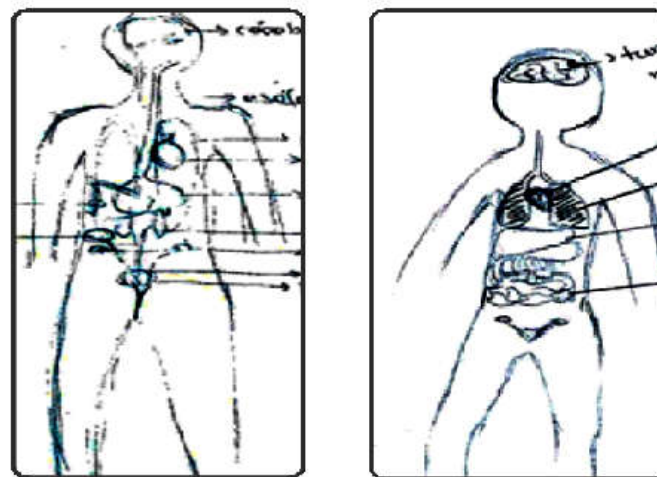


Figure 4. Phase II: Presence of female reproductive organs in representations of HF (left) and of SF (right) – drawings by female student

Such finding is in line with other studies (Amann-Gainotti, 1994; Bartoszeck *et al.*, 2008; Reiss and Tunnicliffe, 2001).

Two further questions can be raised: why is it that so few participants represented sex organs (9.9%) and why is it that male organs were the only sex organs represented? Of those participants who did represent reproductive organs in their drawings, why is it that all of them (100%) were women?. The answer to the second question might, to some extent, be an answer to the first. If we were to consider the first question in isolation, we could simply think that: a) the almost complete absence of sex organs indicates, in general, the unconscious presence of a *strong repression* of sexuality in female participants; b) the fact that male organs are the only sex organs represented could suggest that *repression* of sexuality, and its derivative (shyness), is generally stronger in women than in men. On the other hand, an alternative explanation that cannot be neglected stems from the fact that there were more female than male participants in this study. However, when we also bring into consideration the second question – why is it that all of those who have represented inner reproductive

organs were women? – a different line of thought presents itself. The fact that only a few students depicted sex organs in their drawings is of less significance than this datum: of those who represented internal reproductive organs, all of them were women. Why? Because of the specific nature of the instruction, *i.e.*, drawing the internal morphology of the human body? The results obtained concur with the internal orientation of the female sex organs (opposed to the external orientation of their male counterparts).

On the other hand, female anatomy and feminine sexuality are strongly and deeply connected. It is so because female anatomy and feminine sexuality have the same direction in terms of libidinal cathexis – inwards (they are both directed towards the interior of the body) – and the same biological destiny – the beginning of a new life (bearing children). Therefore, and this is perhaps the most important point, female sexuality seems to have been *repressed* and unconsciously replaced (and masked) by the biological/reproductive function.

Correspondence between depiction of sex and reproductive organs and participant's gender –i.e., possible correspondence between psychological identity and biological identity.

When looking at representations of male figures (both *Healthy* and *Sick*) we see that a projective identification emerges between the student's gender and the gender of the figure they chose to depict (e.g., Fig. 5). When considering representations of female figures, we see that the match between the student's gender and that of the figure they chose to depict is relatively balanced. When focusing our attention on *Sick Figure* representations, those patterns does not hold: there is a tendency for participants – of both sexes – to depict figures whose gender is the opposite of their own.

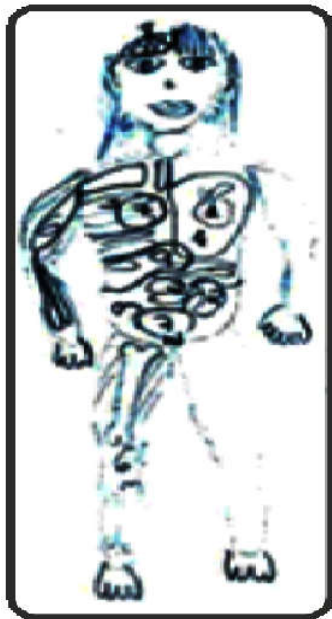


Figure 5. Phase I: Representation of a female HF – drawing by a female student

Previous studies developed by the Egas Moniz – Multidisciplinary Research Center in Health Psychology (Dias et al., 2006; Dias and Neves, 2016) have shown that pictorial representations of 'healthy person' appear as a *projective identification*, for the gender of the participant is consistent with that of the human figure they portrayed. On the contrary, in pictorial representations of 'Sick Person', the gender of the figure depicted is the opposite of that of the participant who sketched the drawing. This shows how difficult it is for participants to identify themselves with their mental representation of 'Sick Person'.

Intriguing data on personal identity – through evaluation of self-object differentiation

There is an intriguing aspect concerning the presence or absence of a boundary between the exterior and the interior of the human body (the body outline which corresponds to the human body's largest organ, the skin). Although not statistically significant (Phase I = 30 drawings; Phase II = 14 drawings), we noted that, in some drawings, the largest organ

in the human body – the skin – is not depicted (e.g., Fig. 6). That absence occurs regardless of representation type (*Healthy Figure* or *Sick Figure*). Rather than interpreting that result as a "broad-spectrum disorder" in self-object differentiation, we could interpret it as a symptom of a normal, yet defensive, *dehumanization* of the inner body mental representation.

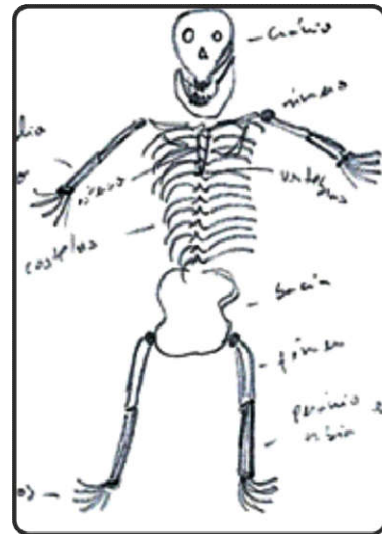


Figure 6. Phase I: Absence of skin in SF representation – drawing by a male student

Perhaps this dehumanization could serve the unconscious purpose of keeping a "safe emotional distance" from the notion of mortality. Anzieu (1995) highlighted the importance of "cutaneous encasement" as foundation of the "I-skin". It is as if a body without "skin encasement" failed to obey the human condition for, deprived of identity, personality and life, it assumes a cadaver-like representation – a dead body, a body without individuality, turned naked as the "skin encasement" disappears, and muscles, nerves and tendons become exposed.

Also noteworthy is the musculoskeletal system absence. Very few participants have represented it. Some of the internal body depictions express major fragmentation – an unexpected result considering the specific sample of the study (Health Sciences students); that fragmentation is present both before (Phase I = 31 drawings) and after (Phase II = 41 drawings) academic training in Human Anatomy (e.g., Fig.7).

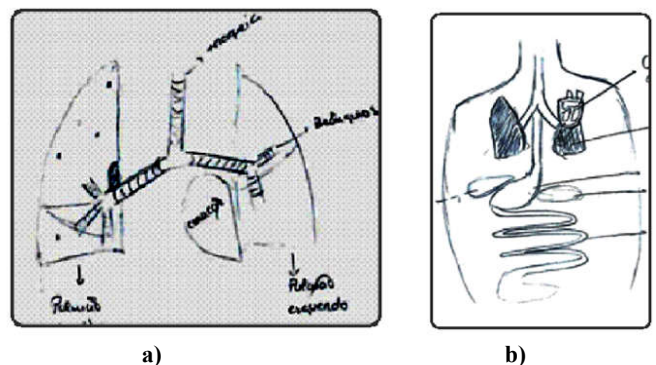


Figure 7. Phase I: Representation of lungs in a SF – drawing by a female student. Phase I: Fragmented body in a SF – drawing by a male student

As to the structural integrity of the internal body, i.e., its organs and biological systems, it was earlier mentioned that some drawings are suggestive of representations of dead bodies; it is as if we were before a picture of a corpse, such is the impression of an image devoid of life. In some drawings, - bodies appear as amputees-, only a partial representation of the body (half of a body) was portrayed.

Given that most drawings do not include a *skeletal system* (Phase I: HF = 60.2%; SF = 69.1%; Phase II: HF = 72.2%; SF = 77.2%) or a *brain* (Phase I: HF = 43.9%; SF = 55.3%; Phase II: HF = 73.2%; SF = 75.6%), we are left with an image of «*body puppets*» – bodies deprived of their own thoughts and identity. That may have been caused, or at least partially caused, by the notable extent to which students answered to the instruction to “draw what is inside of a human body” in *anatomical* terms. For instance, in those drawings where brains were portrayed, no student has labelled “thoughts” (or equivalents thereof) inside the heads of the figures depicted.

Healthy Figure representations are far more complete than representations of *Sick Figure* in both phases of data collection. That could mean an “embarrassment” of students’ projective movements when facing mental and conceptual representations of ‘illness’. *Sick Figure* representations are less invested from an emotional point of view. Illness is usually equated with a more or less unconscious notion of mortality – a notion that all human beings probably need to somehow repress or deny.

they seem to have invested heavily when it came to tumours’ representation. The most frequently represented pathology is located at the lungs (Phase I: 35.7%; Phase II: 38.9%). Nonetheless, some drawings do show *metaphorical representations* – representations associated with emotions, life and death.

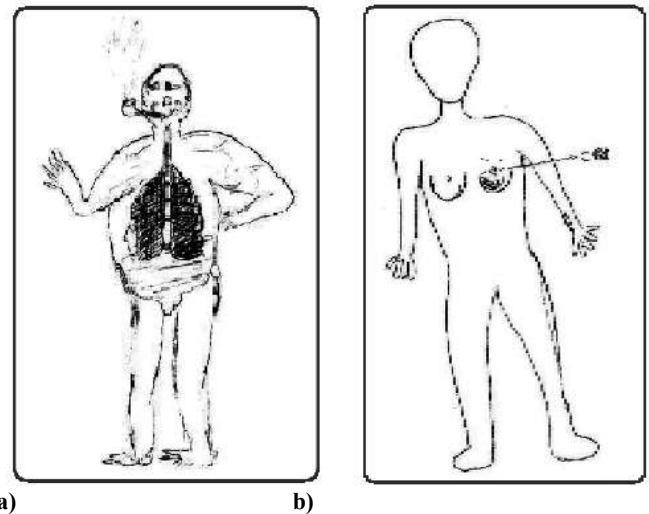


Figure 8.a) Phase I -Representation of lung cancer caused by tobacco in a SF – drawn by a male student. b) Phase II - Representation of breast cancer in a SF – drawn by a female student

Table 1. Descriptive statistics on the most frequently represented human body systems

		Phase I		Phase II		n	freq	N	Freq
		Male Students N=30	Female Students N=93	Male Students N=30	Female Students N=93				
Healthy Figure	Neurological System	15	50.0%	56	60.2%	3	10.0%	30	32.3%
	Circulatory System	25	83.3%	86	92.5%	24	80.0%	72	77.4%
	Respiratory System	26	86.7%	88	94.6%	26	86.7%	81	87.1%
	Gastrointestinal System	29	96.7%	83	89.2%	28	93.3%	80	86.0%
Sick Figure	Neurological System	11	36.7%	45	48.4%	4	13.3%	28	30.1%
	Circulatory System	22	73.3%	71	76.3%	20	66.7%	60	64.5%
	Respiratory System	23	76.7%	87	93.5%	27	90.0%	78	83.9%
	Gastrointestinal System	24	80.0%	76	81.7%	26	86.7%	69	74.2%

Human body systems which representation is prevalent in the drawings collected, in both *Sick* and *Healthy Figure*, are: the *circulatory*, the *respiratory* and the *gastrointestinal* systems (see Table 1). In terms of *proprioceptive* system, the three systems mentioned are those which performances are connected to body awareness – they signal life, a function, a movement, kinaesthetic rhythms. The aggregated data show that *lungs*, *heart* and *intestine* were depicted more often than any other organs. In Phase I, the most frequently represented “major organ” in *Healthy Figure* was the *heart* (90.2%); in Phase II, the *lungs* (89.4%).

The most frequently represented “major organ” in *Sick Figure*, in both phases, were the lungs (89.4% and 85.4%, respectively). In *Sick Figure* representations, the pathologies most frequently selected were neoplasms of specific damaged organs (e.g., Fig. 8). Interestingly, while students did not appear to have made a noticeable effort in the overall pictorial aspect of the drawings, or in the amount of organs depicted,

Conclusion

On the whole, the age attributed to individuals represented in *Healthy Human Figure* is, in most cases, inferior to that attributed to those in *Sick Figure*. There seems to be an association between the concepts of ‘*health*’ and ‘*youth*’. In most mental representations of both healthy and sick persons (which is to say, in most drawings of both *healthy* and *sick figures*), there was an absence of sexual organs, indicative of a *desexualization* of the depicted human body. In those drawings that represented sick persons, the drawing of the damaged organ is, in comparison with the remaining organs, pictorially more invested. *Sick Figure* representations also contain fewer organs than *Healthy Figure*’s. According to the main guidelines, some hypotheses can be pursued in further reflection and tested in future research: (i) anatomy still decides the direction of the unconscious sexual investment: towards external discharge in men, towards internal *capture* in women; (ii) although men and women can unconsciously deny their sexual differences, none of them can escape their

reproductive destiny. In our research, male sexuality seems to have been *repressed* or *suppressed* under the instruction to draw the internal morphology of the body. Nonetheless, such explanation for the absence of male sex organs (i.e., the instruction to draw the body interior) can also be a rationalization, one that emphasizes the unconscious nature of sexual representations. Of the few female students who have depicted internal organs associated with the sexual-reproductive system, all of them depicted female reproductive organs, but none included female sex organs in their drawings. Since sex and reproductive organs are anatomically related, this unconscious choice of drawing one (the reproductive) but not the other (the sexual) may be relevant – unconsciously, the reproductive and the sexual aspects seem to have been treated as equivalents, and therefore as inter-changeable. In this sense, female sexuality seems to have been unconsciously replaced (and masked) by the biological/reproductive function.

Anatomy continues to be the reality core around which representations are constructed, regardless of how far we could take repression of sexuality and/or denial of sexual differences, and regardless of the fact that we are now surgically able to change a person's sex. We cannot change, nor choose, one's sexual destiny: a man cannot bear children and a woman cannot inseminate. The absence of oneiric activity, the fact that people do not dream about the interior of the human body, supports the hypothesis that the unconscious does not in fact recognize the inside of the body. What continues to pertain to the realm of unconsciousness is the mental representation.

At this point, several pertinent questions can be put forward for further research: (i) could the rejection of transplanted organs be a somatic consequence of an unconscious repudiation, by which the subject refuses to identify her/himself with an "alien" organ, one that comes from another place/body?; (ii) could the method used in the present study be useful in evaluating psychological profiles, including inner body representations, of subjects who want to have their sex changed? Finally, we are convinced that the representation of the body, and the body itself, enclose the most profound meanings and mysteries of psychological life, including the transience and permanence of all human life. Perhaps all human beings need to maintain a very simple fact unknown: that both *life* and *death* come from one and the same place, the inside of the human body.

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