



## The medico-legal assessment of aesthetic damage. A correlation analysis between experts and an operative proposal



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### ABSTRACT

Aesthetic damage, defined as any detrimental modification of the individual morpho-functional exterior attributes, is difficult to assess, since the perception of its entity is rather subjective. This study aims to provide a medico-legal contribution to the assessment of this kind of damage.

60 photographic images, representing stabilized aesthetic damage, were collected and showed to 16 expert evaluators, who were required to exclusively quantify the objective component of the aesthetic impairment. The inter-observer agreement for the assessments was calculated using the Intraclass Correlation Coefficient (ICC). Looking into specific characteristics of both the injury and the damaged subject, the assessors were more consistent in quantifying the damage in male subjects (ICC 0.68) and in subjects aged over 50 years (ICC 0.81) as well as in assessing extensive damages (ICC 0.61) than those of mild severity (ICC 0.41). The assessment of impairments located in the facial area resulted in a high level of concordance (ICC 0.73), while damages located the head and neck regions presented the lowest concordance (ICC 0.35). The evaluators were more consistent in assessing the outcomes of burns (ICC 0.70). Regardless the various reasons underlying the different degree of concordance, these results and the high degree of the overall concordance (ICC 0.63) point out the skillfulness of medicolegal professionals to formulate a complex judgment as more objectively as possible. Finally, an operative proposal was outlined to guide medico-legal professionals or interns in evaluating the aesthetic damage as more objectively as possible.

### 1. Introduction

In the western world, over the last decades, personal injury claims have increased exponentially, leading to an escalation of the economic amount awarded as compensation for the health consequences of the injury, better known as non-pecuniary or, according to the denomination commonly adopted by the Italian jurisprudence, biological damage (BD); these rising trends have emphasized the urgent need for the development of a scientific methodology – characterized by accuracy, objectivity and reproducibility – for the evaluation of the impairment linked to this kind of damage [1–4]. The impairment, defined as any anatomical or functional abnormality or loss, is considered permanent when it has reached the maximal medical improvement, meaning it is well stabilized and unlikely to change [5].

Guides and tables have therefore been issued [6–10] to orient the assessment of the permanent impairment, that has been rendered

quantifiable as a percentage of the whole-body function.

Within the subject of biological damage, the aesthetic impairment represents a peculiar evaluative context.

The expression “aesthetic impairment” means any damage to beauty, to aesthetics and to the physical appearance of the person. Some Authors [11] used to speak of “aesthetic function,” since the “external face” of the person plays a primary role in relational life. Such a “function” is carried out not only by the facial features and expressions, but also by the ensemble of the person’s morpho-functional exterior attributes, that are considered under both static and dynamic conditions. Therefore, the aesthetic function of a person is an entirety including the external morphology of the human body and the facial expression, as well as the gestures, the gait, the bearing and, in summary, the general appearance of a person in the society and in the world.

According to a noteworthy definition [12], biological damage,

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compensable irrespective of its impact on the income generating capacity of the plaintiff, could not but include “lesions of the external morphological or morpho-functional integrity”.

The Italian Court of Cassation,<sup>1</sup> Third Civil Division, came to affirm that if injury to the physical and psychological integrity manifests itself in forms likely to alter or disfigure the person's appearance, thereby adversely affecting the interpersonal relationships, the judge should take account of such aesthetic component when settling biological damage, through quantitative and qualitative customization of the parameters adopted for this purpose.

There is, finally, the possibility that the damage to the physiognomic function, becoming aesthetic damage, may constitute pecuniary damage, coming to affect earning capacity.

Due to the broad meaning of aesthetic damage, this form of impairment is certainly one of the most complex to be assessed, since it is not possible to refer to rigid predefined frameworks.

In fact, the evaluation of aesthetic impairment is characterized by considerable empiricism, as a consequence of the double subjectivity of the assessment: the opinion of the medical experts on the one side and the perception of the victim on the other side [13,14].

The extent of the damage, therefore, should be carefully assessed on a case-by-case basis, both in relation to the objective characteristics of the outcome itself and to the somatic, expressive, psychological and social characteristics of the injured subject.

The main shared criteria for evaluating aesthetic damage are the stabilization of the lesion; the objective characteristics of the injury (location, shape, size, prominence, texture, color and number); the possible concomitant functional deficiencies; the consequences on the relational life; the possibility of recovery through surgery or prosthesis; the characteristics of the damaged party (like gender, age, profession, marital status, pre-existing health status).

In the context above depicted where a standardized approach for the medico-legal assessment of the aesthetic damage is needed, the aim of the present study is to provide a contribution to this objective by analyzing the level of concordance between the quantifications of the aesthetic impairment carried out by skilled professionals.

## 2. Materials and methods

### 2.1. Study setting and data collection

The medical records about personal injury claims for damage of aesthetic nature was looked over during the period from 01.01.2015 to 31.12.2017.

The exclusion criteria were: not having the photographic evidence of the aesthetic impairment; having the pictures taken before than 8 months away from the traumatic event.

A total of 60 cases was selected, with a sex ratio of males to females of almost 2:1 and age between 3 and 70 years.

These cases were classified according to the following variables: sex and age class of the injured party; the anatomical location of the aesthetic impairment; the cause that gave rise to the permanent outcome; and the gravity assigned to the outcome itself.

The gravity of the impairment was classified according to a scale graded from G1 to G4<sup>2</sup> (G = gravity), simplifying the main categories of aesthetic damage provided by the recent National Guidelines for the

<sup>1</sup> Civil Cassation Court, Section III, 10 Jan 1966, n. 198; Civil Cassation Court, Section III, 13 February 1968, n. 469; Civil Cassation Court, Section III, 15 February 1972, n. 405; Civil Cassation Court, Section III, 7 April 1979, n. 1996; Civil Cassation Court, Section III, 2 July 1991, n. 7262; January 231995, n. 755.

<sup>2</sup> G1: overall aesthetic prejudice is from practically nil to very mild (BD ≤ 5%); G2: overall aesthetic prejudice is mild to moderate (BD 6–10%); G3: overall aesthetic prejudice is moderate to important (BD 11–15%); G4: overall aesthetic injury is very significant (BD ≥ 16%).

assessment of personal impairment [10]. Subsequently, in the analysis and discussion of the results, the G2, G3 and G4 classes of gravity will be grouped together, so as to distinguish between mild (G1) and non-mild cases (G2-G4).

For each case the photographic image, that most clearly showed the aesthetic damage, was selected. To each image a form was attached, containing a few information on age and sex of the injured party, on the localization and cause of the injury.

Afterwards a recruitment of experts was carried out. The selection was based on a long expertise in the matter of aesthetic damage, defined as a specific evaluative activity longer than 10-years. The only exclusion criterion was the presence of visual impairments.

Following these criteria, 16 expert evaluators were identified, including a total of 13 professors of Legal Medicine, who also authored scientific articles on the topic, and 3 freelance medico-legal practitioners, who worked as consultants of central insurance companies with a great diffusion on the national territory. Both the two groups of experts were evenly distributed throughout the Italian territory (North, Center, South-Islands). After the experts expressed their willingness to participate in the study, a letter of presentation, detailing the characteristics and purpose of the work, was sent by e-mail to them. Neither the total number of participants nor their respective names were specified in the letter. Then, the experts were sent the pictures with the attached respective information forms and were asked to quantify the percentage of aesthetic damage, regarding the latter as a stabilized outcome and therefore susceptible to medico-legal assessment. The required evaluation pertained only to anatomical objectivity, considering also the age and sex of the subject. Any reference to impairments of a functional type or related to other factors (possible psychic repercussions, any hypothesis of correction through surgery or prosthetic use, etc.) had to be excluded. Once the percentage rating had been expressed, the experts transmitted their answers by mail after an average of 10 days.

### 2.2. Statistical analysis

All statistical analyses were performed by using SAS® Package, version 9.1 (SAS Institute Inc., Cary, NC, USA).

A spreadsheet was developed to process the variables and the evaluations of the experts, calculating measures of central tendency (mean, mode, median) and of statistical dispersion (minimum-maximum interval, standard deviation, interquartile range).

The analysis of concordance among the experts was carried out using the Intraclass Correlation Coefficient (ICC) or Reliability Coefficient<sup>3</sup>. To eliminate error related to concordance arising from the effect of chance, 95% confidence interval (CI) was calculated; so that when the ICC value remains within the CI, the probability that the concordance (or not) of the results is due to the effect of chance will be 5%.

## 3. Results

### 3.1. The casuistry

Out of the 60 selected cases, 39 were males and 21 were females. These cases were grouped into three classes of age: less than 18 years; 19–50 years; more than 50 years. The distribution of cases by sex and the 3 age classes is showed in Table 1.

The cause that gave rise to the permanent outcome was iatrogenic in 15 cases, deriving from surgical intervention or aesthetic medicine. Mostly of these cases were related to hypotheses of professional

<sup>3</sup> ICC values less than 0.2, between 0.2 and 0.4, between 0.4 and 0.6, between 0.6 and 0.8 and greater than 0.8 are indicative of absent/poor, mediocre, moderate, good, and excellent reliability, respectively.

**Table 1**  
Distribution of cases by sex and age class.

Age	M	F	Total	% M	% F
0–18	8	4	12	67	33
19–50	25	15	40	63	37
> 50	6	2	8	75	25
Total	39	21	60		

**Table 2**  
Distribution of cases by sex and location of the impairment.

Location	M	F	Tot	% M	% F
Face	9	3	12	75	25
Head/Neck (excluded facial area)	5	4	9	56	44
Chest/Abdomen/Back	4	5	9	44	56
Hands	7	1	8	87	13
Upper limbs (excluded hands)	5	3	8	62	38
Lower limbs	9	5	14	64	36
Total	39	21	60		

liability. In 10 cases, the causative mechanism was identified in a type of burn, while in the remaining 35 cases it was represented by wounds from gunshots, sharp weapons (cutting wounds) or blunt instruments (lacerations, contusions and excoriations).

Concerning the distribution by sex and location of the impairment, Table 2 shows that the female sex was proportionally the most affected only for the body segment represented by the trunk (chest-abdomen-back).

Intersecting the location of the impairment with the age classes, the majority of cases with an involvement of the facial area were equally distributed within the first 2 age classes (0–18, 19–50), while the subjects least affected by facial impairment were over fifty years old. Head and neck impairments, as well as those to the trunk (chest, abdomen, back), upper limbs (except the hands) and lower limbs, were more represented in the intermediate age class.

As far as hands are concerned, impairments were more widely distributed between subjects aged 0 to 18 and those above 50 years.

Cases were distinguished according to the location of the impairment and the gravity assigned, as shown in Table 3. For each body district, with the exception of the hands, most cases were assigned to the category of minor damage (G1).

Concerning the distribution of cases by sex and the class of gravity, showed in Table 4, G1, G2 and G4 impairments mostly involved male subjects, while both genders were equally distributed in G3 group.

### 3.2. Concordance analysis

As reported in Table 5, for each individual case (N.) the following were calculated: total number of the evaluations provided by the experts; minimum (min) and maximum (max) score of BD attributed to the case; mean, mode, median, minimum-maximum (max-min) interval, standard deviation (SD), 25th and 75th percentile with

**Table 3**  
Distribution of cases by location and gravity of the impairment.

Location	G1	G2	G3	G4	Tot	% G1	% G2	% G3	% G4
Face	6	4	–	2	12	50	33	0	17
Head/Neck (excluded facial area)	7	2	–	–	9	78	22	0	0
Chest/Abdomen/Back	7	1	–	1	9	78	11	0	11
Hands	3	3	1	1	8	38	38	12	12
Upper limbs (excluded hands)	6	2	–	–	8	75	25	0	0
Lower limbs	6	5	3	–	14	43	36	21	0
Total	35	17	4	4	60				

**Table 4**  
Distribution of cases by sex and gravity of the impairment.

Gravity	M	F	Tot	% M	% F
G1	20	15	35	57	43
G2	14	3	17	82	18
G3	2	2	4	50	50
G4	3	1	4	75	25
Total	39	21	60		

interquartile range (IOR) of BD values.

In order to perform the agreement analysis, the ICC and the related CI were calculated in relation to the evaluations provided by the totality of the experts. The same assessment was performed stratifying the whole casuistry (60 cases) by sex (2 classes: males, females); by assigned gravity (2 classes: mild gravity, non-mild gravity); by location of the impairment (6 classes: face, head and neck, trunk, back, hands, upper limbs, lower limbs); by cause of lesion (3 classes: medical-surgical, burn, other); and by age group (3 classes: 0–18 years, 19–50 years, > 50 years). A similar analysis (ICC computation with CI) was made taking the 16 evaluators into account, stratifying them by sex (2 classes: males, females), by type of profession (2 classes: university, freelance) and by geographical location (3 classes: North, Center, South-Islands). The results are reported in Tables 6 and 7.

Since the calculation of the ICC might have a bias because of the low number of evaluations provided by some experts, the analysis was re-made selecting only 9 evaluators who provided a number of responses above 50%. The results of the corrected ICC (C-ICC) are shown in Tables 8 and 9.

## 4. Discussion

Despite the assessment of aesthetic damage is based on tables with numerical values, it is well known that its appreciation remains subjected to a remarkable individual variability.

The analysis carried out in the present study leads to the define the degree of general concordance among the recruited experts as high (ICC 0.63). The concordance is even higher, when referring to the ICC corrected for the number of evaluators who complied more with the study (C-ICC 0.75). This is a particularly significant outcome, especially considering that the studies designed to establish the ICC on subjects where the inter-observer variability should be more limited (for example, those that seek to establish the agreement of the observers in determining whether or not there is a “suspected lesion” at imaging, or in diagnosing skin melanoma based on the characteristics of the nevus, or in quantifying the degree of motor disability after a nervous system injury, etc.) have resulted in ICC values which overlap or are slightly superior to those that have emerged in the presented study, notwithstanding the fact that the number of the recruited observers was lower [15–23].

The finding that medico-legal professionals express themselves with high concordance in the formulation of a complex judgment, such as that which is necessary to numerically translate the jurisprudential and experiential references in matter of personal injury, demonstrates that the medico-legal discipline has a solid heritage of shared understanding and knowledge.

It is noteworthy that the assessors are more consistent with each other in quantifying BD in the case of male subjects (ICC 0.68; C-ICC 0.78) as opposed to female subjects (ICC 0.52; C-ICC 0.66). This result can be related to the greater difficulty associated with assessing damage in the female sex, in which, for socio-cultural reasons, the pleasantness of the physical appearance commonly has greater relevance than in the male one.

Regarding the severity of the damage, the assessors are less congruent in assessing cases of mild gravity (ICC 0.41; C-ICC 0.54) as opposed to non-mild damage (ICC 0.61; C-ICC 0.76). A possible reason

**Table 5**  
Evaluation of BD with measures of central tendency and of statistical dispersion.

N.	Min	Max	Mean	Mode	Median	Max-Min	SD	25th %ile	75th %ile	IQR
1	2.5	9	4.7	4	4	6.5	1.97	4	5	1
2	2	5.5	3.0	2	2.5	3.5	1.18	2	3.5	1.5
3	3	9.5	6.2	5.5; 6; 7; 7.5	6	6.5	1.77	5.25	7.25	2
4	5.5	11	7.8	7.5	7.5	5.5	2.09	6.37	9	2.6
5	4	10	6.4	5.5	5.5	6	1.93	5.12	7.37	2.25
6	2.5	9.5	5.5	5	5.25	7	2.04	4.62	6.62	2
7	4	11	7.1	7	7	7	2.05	6.12	7.87	1.75
8	0	3	1.5	2	2	3	0.91	1	2	1
9	0	3	1.0	0.5	0.5	3	0.94	0.5	1	0.5
10	4	10	6.9	6.5;8	6,75	6	1.82	5.75	8	2.25
11	5	12.5	8.0	6; 6.5; 8.5;9.5	7.75	7.5	2.17	6.37	9.5	3.12
12	6.5	16.5	12.4	15	13.5	10	3.60	10	15	5
13	1	6.5	3.5	5	3	5.5	2.04	2	5	3
14	6	16	11.1	6; 13.5; 15	13	10	3.79	8	14	6
15	4	10	7.3	6.5;7; 8; 9	7	6	1.88	6.5	9	2.5
16	2	13.5	5.6	2	4.25	11.5	4.38	2.5	6.75	4.25
17	12	25	16.8	15	15	13	5.68	14.25	17.5	3.25
18	18	35	28.2	30; 35	30	17	6.15	24.75	32.5	7.75
19	1.5	5.5	3.4	3	3	4	1.09	2.75	4	1.25
20	4	15	9.0	6.5	8.25	11	3.25	6.5	11.5	5
21	3.5	12	6.6	3.5; 8	6.5	8.5	2.58	4.5	8	3.5
22	2.5	8	4.8	–	4.5	5.5	1.85	3.5	6	2.5
23	3.5	7.5	5.7	–	6	4	2.02	4.75	6.75	2
24	1	5	3.0	–	3	4	1.61	1.75	4.25	2.5
25	2	10	6.3	5.5; 8	5.5	8	2.47	4.75	8	3.25
26	1.5	15	5.3	4	4	13.5	4.43	3.5	4.75	1.25
27	2	10	4.3	5	3.75	8	2.31	2.62	5	2.37
28	1.25	7	3.2	2.5; 3	3	5.75	1.49	2.5	3.37	0.87
29	1.5	7	4.3	3; 3.5; 5	4	5.5	1.69	3.12	5	1.87
30	3.5	7.5	5.8	7.5	6.25	4	1.89	0.25	7.5	3.25
31	3	20	6.3	3.5	4	17	6.10	3.5	5	1.5
32	8	25	13.5	8; 15	13	17	5.05	11.5	15	3.5
33	1	4.5	2.6	3	2	3.5	1.10	2	3	1
34	1	3	2.2	2; 3	2.25	2	0.75	2	2.88	0.87
35	5	15.5	10.8	10	10	10.5	3.73	9.5	14	4.5
36	1	3	1.9	1; 2	2	2	0.75	1.25	2.25	1
37	3	8	4.5	3; 3.5	3.75	5	1.75	3.37	5.25	1.87
38	2.5	7.5	4.4	3	3.5	5	1.88	3	5.5	2.5
39	1	4	2.3	2	2	3	1.09	1.62	2.875	1.25
40	1.5	5	3.1	1.5; 2; 2.5; 5	2.5	3.5	1.42	2	4.375	2.37
41	1.5	7	3.9	3.5	3.5	5.5	1.68	3.25	4.25	1
42	4.5	9	6.7	6.5	6.5	4.5	1.50	6	7.5	1.5
43	1	5	2.9	3	3	4	1.36	2	4	2
44	1	3	2.2	2.5	2.5	2	0.75	2	2.5	0.5
45	4	15	7.7	7; 8	7.25	11	2.89	6.62	8	1.37
46	6	15	10.0	8; 15	9.5	9	3.17	7.75	12.25	4.5
47	0.5	6	2.3	1	2	5.5	1.87	1	2.75	1.75
48	1.5	5	3.8	4	4	3.5	1.10	3.75	4.5	0.75
49	2	7	4.9	4; 7	5	5	2.01	3.62	6.625	3
50	5	10.5	8.1	10	8.5	5.5	2.12	6	10	4
51	3	8	6.1	6.5; 7	6.5	5	1.53	5.75	7	1.25
52	1	8	4.1	3; 5.5	3	7	2.28	2.5	5.5	3
53	2.5	6	4.2	4; 5	4	3.5	1.09	3.5	5	1.5
54	1.5	8	4.1	–	3.5	6.5	2.37	2.25	5.5	3.25
55	8	15.5	11.2	–	10	7.5	3.04	9	13.5	4.5
56	3	8	5.2	3	4.5	5	2.21	3.25	7.25	4
57	1	7.5	3.4	2	2.75	6.5	2.21	2	4.125	2.12
58	0.5	3.5	2.4	3	2.75	3	0.99	1.87	3	1.12
59	0.5	7.5	3.4	–	3.25	7	2.44	1.37	5.125	3.75
60	2	10	4.7	–	4.25	8	2.56	2.87	5.625	2.75

may be sought in the instrument used to present the damage (photographic image), which, compared to the direct visual approach, can engender a higher degree doubt in the assessment of a mild permanent outcome, as opposed to the more serious impairments. Regarding the location of the impairments, the experts are more in concordance with each other concerning localized impairments to the face (ICC 0.73; C-ICC 0.81), while showing a lower degree of concordance, albeit always high, with regard to the trunk (ICC 0.66; C-ICC 0.73) and hands (ICC 0.65; C-ICC 0.80), demonstrating instead a moderate concordance in assessing lower limb damage (ICC 0.56; C-ICC 0.63) and little more than mediocre concordance in judging damage to the upper limbs (ICC

0.41; C-ICC 0.47). The lowest concordance (ICC 0.35; C-ICC 0.44) is recorded in assessing body regions represented by the head and neck. The facial area, ruling the expressiveness, is an area of greatest aesthetic influence. So, it can be hypothesized that the evaluation of the facial damage is more simply and uniformly oriented by a vast representativeness of this kind of impairment in the medical daily practice and by numerous examples in the scientific literature. Furthermore, as far as the Italian nation is concerned, permanent outcomes to the face are of fundamental importance, representing a possible aggravating factor of personal injury crime pursuant to the penal law. On the other side, the low concordance observed in the assessment of the neck and

**Table 6**  
ICC stratified by the variables of the injured subject.

Injured subject's variables		Cases (N°)	Experts (N°)	Evaluations (N°)	ICC	95% CI	
						Lower limit	Upper limit
Sex	Male	39	16	624	0.68	0.58	0.78
	Female	21	16	336	0.52	0.37	0.71
Gravity	Mild	52	16	832	0.41	0.32	0.53
	Non-mild	8	15	128	0.61	0.38	0.87
Location	Face	12	15	192	0.73	0.56	0.89
	Head/Neck (no facial area)	9	16	144	0.35	0.16	0.68
	Chest/abdomen/back	9	15	144	0.66	0.45	0.88
	Hands	8	15	128	0.65	0.43	0.89
	Upper limbs (no hands)	8	16	128	0.41	0.20	0.76
	Lower limbs	14	13	224	0.56	0.38	0.78
	Cause of injury	Medical-surgical	15	16	240	0.54	0.36
Age class (years)	Burn	10	14	160	0.70	0.50	0.89
	Other	35	16	560	0.46	0.34	0.60
	≤18	12	15	192	0.50	0.31	0.75
	19–50	40	16	640	0.51	0.40	0.64
	> 50	8	13	128	0.81	0.64	0.95
Total		60	16	960	0.63	0.55	0.72

**Table 7**  
ICC stratified by the variables of the expert.

Expert's variables		Cases (N°)	Experts (N°)	Evaluations (N°)	ICC	95% CI	
						Lower limit	Upper limit
Sex	Male	60	14	840	0.66	0.57	0.75
	Female	13	2	120	0.60	0.10	0.86
Profession	Professor	60	13	780	0.61	0.52	0.71
	Frelance	60	3	180	0.72	0.61	0.81
Geographical location	North	60	8	480	0.65	0.55	0.74
	Center	60	3	180	0.82	0.74	0.88
	South-Islands	51	5	300	0.56	0.44	0.68

**Table 8**  
ICC corrected (C-ICC) for the number of the most compliant experts and stratified by the variables of the injured subject.

Injured subject's variables		Cases (N°)	Experts (N°)	Evaluations (N°)	C-ICC	95% CI	
						Lower limit	Upper limit
Sex	Male	39	9	351	0.78	0.70	0.86
	Female	21	9	189	0.66	0.51	0.81
Gravity	Mild	52	9	468	0.54	0.44	0.66
	Non-mild	8	9	72	0.76	0.54	0.93
Location	Face	12	9	108	0.81	0.66	0.93
	Head/Neck (no facial area)	9	9	81	0.44	0.21	0.77
	Chest/abdomen/back	9	9	81	0.73	0.52	0.91
	Hands	8	9	72	0.80	0.61	0.95
	Upper limbs (no hands)	8	9	72	0.47	0.23	0.81
	Lower limbs	14	9	126	0.68	0.50	0.86
	Cause of injury	Medical-surgical	15	9	135	0.61	0.42
Age class (years)	Burn	10	9	90	0.83	0.67	0.94
	Other	35	9	315	0.56	0.43	0.70
	≤18	12	9	108	0.68	0.48	0.87
	19–50	40	9	360	0.61	0.49	0.73
	> 50	8	9	72	0.87	0.72	0.97
Total		60	9	540	0.75	0.68	0.82

head (excluding the face) is probably due to the greater difficulty in rendering this kind of damage appreciable, depending on the angle from which photographs are taken and the kind of clothes worn by the subject.

In analyzing the cause that gave rise to the impairment, the experts are more consistent in evaluating the outcomes of burns (ICC 0.70; C-ICC 0.83), showing a lower concordance about iatrogenic lesions (ICC 0.54; C-ICC 0.61) or of another nature (ICC 0.46; C-ICC 0.56). The greater concordance in assessing the outcomes of burns may be due to

the fact that, in the proposed casuistry, these impairments practically correspond to the cases affected by non-mild damage, that, in its turn, presents a low inter-observer variability, when assessed.

Considering the age classes of the damaged subjects, the concordance between the assessors is greater for the age group over 50 (ICC 0.81; C-ICC 0.87) as opposed to children and young adults. This is an expected outcome: the assessment of damage in children and young people, whatever the entity may be, usually involves greater complexity, primarily because of the difficulty encountered when it comes

**Table 9**  
ICC corrected for the number of the most compliant experts and stratified by the variables of the expert.

Expert's variables		Cases (N <sup>o</sup> )	Experts (N <sup>o</sup> )	Evaluations (N <sup>o</sup> )	C-ICC	95% CI	
						Lower limit	Upper limit
Sex	Male	All males					
	Female						
Profession	Professor	60	6	360	0,77	0,69	0,84
	Freelance	60	3	180	0,72	0,61	0,81
Geographical location	North	60	5	300	0,72	0,63	0,80
	Center	60	3	180	0,82	0,74	0,88
	South-Islands	38	1	60	–	–	–

to predicting the real significance that the aesthetic impairment may take on in the person's future life, in relation to the social, family and work life of the injured subject.

When stratifying by the characteristics of evaluators, the level of concordance appears to be substantially independent from sexual gender. The experts who have an academic position or live in central geographical regions show a slightly higher concordance with each other, as opposite to the ones who work as freelance or live in the other regions. These results may have been influenced by the gender and profession imbalance in the group of experts. This aspect, that may represent a limit of the study, is a consequence of the different willingness expressed by experts to participate in the study.

Compared to the direct observation, the evaluation of the aesthetic impairment through a photograph is the main limitation of this study, because it may negatively affect the objectivity of the assessment itself. However, this aspect is reliably tempered by the experience of the assessors and, in any event, unavoidable given that the assessors were recruited throughout the Italian territory.

A future development of the present study could consist in collecting a larger number of photographs in order to create a “visual guideline” to orient medico-legal professionals or interns in evaluating the aesthetic component of BD, by comparing their own assessment with the one expressed by experts in the guide itself for a similar impairment. For this purpose, each photograph should be associated with the relative Box Plot graph, indicating the IQR, the highest and lowest percentage value of the BD provided, and the mean, mode and median.

A problem might arise with the identification of the statistical parameter to which make reference. In fact, measures of central tendency appear misleading, because they are influenced by the set of values, including the extreme ones. So, it would be more appropriate to make reference to a dispersion measure. However, the direct reference to the minimum and maximum values does not provide information useful to the “inexperienced” physician, representing only the extreme values of the range within which the BD scores are distributed. In the absence of a normal distribution, also the use, as a reference score, of the standard deviation of the mean would not be a dispersion measure adequate for the purpose. A more appropriate reference score could be identified in the IQR, as this range groups together 50% of the ratings. So, the BD score would be comprised between the first quartile (25th percentile) and the third quartile (75th percentile) values and, given the asymmetry of distribution, should approach the median value, given that its position spatially indicates the asymmetry of the data.

In conclusion, this original study has objectively highlighted how the expertise of medico-legal professionals permits expressing assessments on this component of BD characterized by a high degree of concordance. The outcomes call for further investigation by means of a more detailed stratification of a larger casuistry. The preliminary result, at any rate satisfactory, given the high number of participants involved in the study – difficult to encounter in other epidemiological concordance studies – represents a good starting point for the creation of a “visual guide” for the assessment of aesthetic damage.

## Informed consent

The transmission of the photographs to the recruited experts was authorized by the Italian Data Protection Authority, according to the so-called privacy law (Law n. 675 of 31 December 1996), regulated by the Personal Data Protection Code (Legislative Decree n. 196 of 30 June 2003).

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## Declaration of Competing Interest

None.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.legalmed.2019.07.006>.

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