

Culture and Well-Being: Impact of Culture on Individual Subjective Well-Being of Italian Population

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Abstract

Culture has become a particular investigated field in the relation with the development process of the western society. Investments in cultural infrastructures, activities and cultural policies provide benefits at social and economic levels, representing one of the main tools dealing with renovation policies for cities. The definition of a development strategy focused on cultural assets is seen as a priority and as a fast way to increase the value of the urban and regional areas since those have impacts on all the social actors.

The research will focus the attention on the relations between culture and individual well-being, in order to provide a possible estimation of the impact of the culture participation on the subjective perception of the quality of life of Italian population.

The paper is divided in three main parts: in the first will be present a literature review about QOL – Quality of Life, individual well-being and culture. Successively will be describing the methodology adopted, the instrument and the survey. In the third one will be presents some results of a survey undertaken on a representative sample of the Italian population.

1. Theoretical Approach

The research aims to question if participation to and consumption of culture can be associated with individual's health (well-being) in some ways. The idea start from evidences that substantially longer active life expectancy among individuals can be explained not only from socio-demographic features, but also by difference in leisure and participation/consumption of specific forms of cultural supply. In this respect, previous epidemiological studies substantiate the idea of a strong link between cultural participation and e.g. survive, in the way that participation to cultural activities and consumption of cultural goods can be linked to the social capital. Social capital refers to the capacity of individuals and to their ability to secure benefits through memberships in networks and other social structures. Culture can be seen as a tool that promotes cohesion through the creation of a common language thus setting the stage for socially-driven development of human potential (Matarasso, 1997), the creation and/or regeneration of the social fabric, the generation of systematic opportunities for social networking, and more generally the optimal management of accumulation processes for other key intangible assets such as social capital (Bourdieu, 1983), with consequential benefits in terms of social order and cohesion (Everingham, 2003).

In this perspective, participation to cultural activities and consumption of cultural goods set the stage for the establishment of some outcomes - which can be defined 'relational goods' – fundamental premises in order to enhance the goals previously described: tangible and intangible forms of cultural capital, participation to and consumption of various forms of cultural capital, represents an occasion for socializing building and the creation of networking activities, to build a strong connection between individuals and groups in a non-instrumental way, indeed providing benefits such as increasing level of well being in the participants and thus in communities. As Gui highlights (Gui, 1994) 'relational goods cannot be produced, consumed or acquired by single

individuals because they depend on the interaction with others and are enjoyed only if shared with others'. Furthermore, Gui defines relational goods as 'intangible capital assets that inhere in enduring interpersonal relationships and provide both intrinsic and instrumental benefits. They are local public goods that are formed or maintained through non-contractible, co-ordinate actions'. It is important also to define and bound the concept of QOL – Quality Of Life, well being and culture, in order to provide the theoretical basis of the research.

A. QOL - Quality of Life / well-being

Quality of life (QOL) and well-being are a vague and difficult concepts to delineate, they are widely used, but with little consistency, and a simply, accepted, uniform definition of either term does not currently exist. According to the opinion of some researchers these terms cannot be defined exactly, and there is a lack of consensus about the meanings (see Keith, 2001). Furthermore, authors from different disciplines approach the concept from the perspective of their own research interests, and so, the definition assigned to these terms, and the way in which they are used, are contingent upon research objectives and context.

A longitudinal analysis of these terms allow researcher to define 4 main dimensions which affect the individual perception about QOL and well being:

- subsistence, the basis of wherewithal of survival;
- belonging, identity that derives from being part of a group;
- self actualization, the settings and achievements of personal goals;
- experience, comfort and pleasure beyond subsistence:

Each one of the previous dimensions contain different elements, and each one of these show a different degree of impact on the individual well being perception (see Scottish Executive, 2005).

In respect to the two terms, QOL and well being, it is important to distinguish between them, in order to identify also the main dimension of this research.

QOL, a possible definition

In respect to QOL, it is possible to observe that QOL emerged as an academic discipline in its own right in the 1970s, and since 1985, over 21,000 academic articles have appeared in international literature containing the term 'quality of life' in the title, and the volume of academic articles concerned with QOL and well-being issues has steadily increased. Within this greater literature, it is quite obvious that exists confusion about what is QOL, what contributes and have to be considering part of the QOL (see Taillefer et al, 2003), and what are the outcomes of QOL (for a critical review of QOL outcomes see Hagerty, 2001). Unfortunately, in practice, making this distinction is not straightforward, and different authors have arrived at different conclusions. Naess summarizes the subjective approach to defining QOL as 'the individual's experience, or perception, of how well he or she lives' (see Naess, 1999). In his approach, QOL is exclusively about subjective well-being, rather than objective life circumstances.

Haas disagrees with this view and argues that a solely subjective assessment is actually concerned with well-being, and not QOL (see Haas, 1999a). This would appear to cover the WHO definition, which explicitly identifies the subjective perceptions of individuals as a defining attribute of QOL.

In respect to the possible outcomes, early efforts to measure QOL took either an economic or objective social indicators approach. But studies in the 1970s (see Haas, 1999b) showed that objective measures of life conditions accounted for only a modest proportion of individuals' subjectively reported QOL and/or well-being. In this respect, the prevalent use of economic indicators as measures of national QOL began to be challenged as studies refocused on subjective responses to life conditions (see Cummins, 2000). Key amongst these were studies by Andrews, Withey and Campbell et al (see Andrew et al, 1976), which helped re-orient QOL research towards subjective measures.

One of the best definitions of quality of life is provided by Campbell (see Campbell, 1976) who in the book *The Quality of American Life: Perceptions, Evaluations and Satisfaction* says that QOL is

“... a subjective sense of wellbeing derived from self experience of global life.”, “...in which all relevant factors have to be taken into consideration among which those spiritual, social, cultural and economic prevail...”.

Sometimes referred to as the ‘American’ social indicators approach, these studies embraced concepts such as happiness, life satisfaction, and well-being and attempted to measure these at a population level (see Rapley, 2003) An alternative hypothesis began to be put that individual well-being might owe more to the personality or inherent disposition of individuals than to objective conditions (see Felce & Perry, 1995).

Well being, a possible definition

Well-being concept is even more ambiguous, abstract and nebulous a term in comparison with QOL, and the idea well-being suffers from the same type of definitional problems as QOL. The inconsistency of definitions used, even within individual disciplines, is so great that producing a comprehensive overview of definitions in use within the literature is a formidable task.

For example Haas criticizes the common interpretation of well-being as purely psychological or emotional – for some it is synonymous with mental health or “psychological well-being” (see Kimweli et al, 2002) - and argues that well-being “...is concerned with all dimensions of life. Like satisfaction with life, it is a subjective assessment...” (see Haas, 1999a). A paradigmatically example is supply by Pollard and Lee (see Pollard and Lee, 2003). The authors, in their systematic review of the definition and measurement of child wellbeing, describe well-being as “...a complex, multi-faceted construct that has continued to elude researchers’ attempts to define and measure it...”. Given the lack of general consensus in respect to this concept, it is possible to observe a general agreement concerning the main conditions shaping well being. Researchers differentiate between well-being – which may incorporate objective conditions – and subjective well-being, which is well-being as defined, or assessed, by individuals themselves, and which may include subjective response to objective conditions.

QOL and Well being, two side of the same phenomena?

What it is possible to observe it is that there are competing views about the relationship between QOL and wellbeing (see Kinweli, 2002), some regard the terms as interchangeable, while others regard well-being as one component of the broader concept of QOL. An example of it is in the findings of a systematic review of health-related QOL models carried out by Tailleffer et al which found that of the 68 models evaluated, the concept of well-being was found in the definition of QOL of almost 30% of these (see Tailleffer et al, 2003) In other words, in the majority of models well-being was regarded as a concept related to, but separate from, the concept of QOL

Economists make a clear distinction between well-being, which in their view pertains to individuals, and QOL, which they see as concerned with comparisons of welfare between groups of individuals (through social indicators for example), an objective viewed with skepticism (see Bell, and Blanchflower 2004). However economists’ models of subjective well-being are similar to QOL models to the extent that subjective well-being is associated with a range of objective external factors relating to a person’s life, such as unemployment, more than a range of subjective internal factors of individuals - such as e.g. capability building (see Sen, 200) - “Taken together, the now extensive subjective well-being literature in economics has convincingly demonstrated important associations between how individuals describe their level of satisfaction and observable characteristics of both themselves and the society they live in.” (see Bell, 2005) These include external characteristics of individuals, such as gender, age, family and employment status, income, education and volunteering, as well as external characteristics of the social environment in which individuals live including GDP, the quality of governance and levels of interpersonal trust (social relationships) (see Bell, 2005).

Whereas QOL experts advocate the use of combination methods, economic studies of subjective well-being tend to be based on the statistical analyses of quantitative data alone.

To what extent the concept of well being is, there is a general convergence between different disciplines among the assessment methods for the evaluation of well being in the society. If for QOL, the most commonly approach regards as combining both subjective and objective component, a subjective assessment is required to evaluate well-being, and in this perspective it would therefore seem to be separate from QOL.

The issue concerning the definition of a possible measurement method for well being started in the 1950. In the late sixties Harold Dupuy, psychologist at the National Center for Health Statistics, developed a specific instrument, Psychological General Well Being Schedule, a questionnaire of 68 items to measure the degree of 'happiness' of the American population or the potential psychological distress. The questionnaire was considered one of the first generic measures of health-related quality of life with specific interest to mental health.

Some years after Dupuy together with John E. Ware revised the questionnaire and a final version of 22 selected items was validated under the name of PGWB Index (PGWBI) (see Dupuy, 1984). As stated by Dupuy "...the Psychological Well-Being relates to self-representations of intrapersonal affective or emotional states reflecting a sense of subjective well-being ...".

This scale has been adopted in our survey as the best compromise between comprehensiveness of quality of life and subjective well being attributes and feasibility in large epidemiological setting.

B. Culture

As for the aforementioned idea of QOL and well being, also in defining the term 'culture' it is possible to recognize a range of definitions.

In general, it is possible to assume that culture is often perceived as a certain type of activity that involves action, interacting, producing, creating, viewing, and spectating. Other elements inherent in culture theories are ideas, beliefs and heritage. The list of activities, traditions and heritage that are considered cultural varies depending on many things, including the person proposing the definition and the objectives to which the definition is being applied.

Two are the common approaches, the anthropological, which sees culture from an ethnographic or group identity formation perspective and the cultural economics approach, which sees culture as a set of activities that involve inputs and outputs, and even industrial 'value chains'.

- The Anthropological approach

The concept of culture is related to the particular way that groups of human beings adapt themselves to their physical and social environment. Just as the environment is dynamic and changing, culture is dynamic and changing too. Contemporary societies are characterized by an increase of interactions and connections among individuals and communities coming from different parts of the world, thus differing in tradition, beliefs, ideas, symbols and implicit/explicit language codes, indeed in culture. Cultural identity is not just an attributive dimension, but also the representation of how people behave in the social reality, in a dynamic construction (see Hall, 1997).

Richerson and Boyd (2005) realized a critical review of some definitions developed in the social science literature, such as anthropology and sociology, about culture. They present a perspective through which culture is a set of values and behavioral norms, or acts learned and socially shared, which are embedded in symbolic tangible and intangible forms.

For Bourdieu culture is recognizable in three forms mainly embodied in different levels such as individual minds and attitudes, cultural goods and institutional states (Bourdieu, 1983). Cultural capital is part of once personal endowment, in which elements such as education, the arts and traditions are advocated as having impacts on relationships between individuals and groups, affecting social economic output.

All these definitions describe culture as an output produced by social and human interactions, which leads to the idea of culture mostly connected to human capital and social capital.

-The Cultural Economic Approach

Culture can also be conceived as a form of capital presenting a different magnitude of impacts on the development process of a territory. The definition of culture as capital for human development has been elaborated quite recently. Cultural capital is conceived as being a value embodied in a stock that generates a value. Stocks could be tangible – e.g. buildings and arts collections -, and intangible – e.g. history, tradition, and ideas -. Tangible cultural capital flows could be related to the consumption of goods and services, intangible cultural capital flows are associated to attitudes, which allow individuals to set up relationship networks. Both create value in society in economic (i.e. consumption) and social (relationship network) terms and are also contribute to the production of new art and culture (Throsby, 1999).

The theories described provide the preliminary step for the definition of cultural policy, in the sense of types of cultural strategies developed by national regional and municipal governments not only focused on the promotion of the cultural sector, but also to foster culture in all aspects of human activity.

The debate on the relationship between culture and social development began in the 1970s. Since then, the literature has tried to clarify to what extent culture influences the capacity of different ‘social players’ to pursue their interests in terms of quality of life, social accessibility, attractiveness and the overall competitiveness of the city, and this debate has eventually led to a substantial repositioning of the perceived role and potential of culture in the context of urban change. Once understood as a relatively marginal aspect of individual and social activity, mostly confined to the sphere of entertainment and leisure, it has become increasingly entangled with the main issues of social development, thereby addressing an ever-expanding set of policy targets, in this respect having the possibilities to have a higher status and position within the strategic governance agenda of governments.

C. QOL, Well-being and Culture, the state of the arts

Due to the previous part, it is quite unforeseen that in the field concerning the relation between QOL, well being and culture there is a substantial lack of knowledge.

The first element that emerges it is that the research activity is not adequately implemented. Very few studies have investigated the impact of culture - in terms of participation or consumption of – on the QOL and well-being of individuals. Writing in 2004, Michalos underlined that in 30 years of publication in the volume of Social Indicator Research, not one article has looked at the impact of art on QOL; an element that it is surprisingly...’given the profoundly social impacts of the arts’.

In this respect, one of the most renewed researches has been conducted by Michalos (see Michalos, 2004). The same author in 2004, he undertook an investigation to measure the impacts of arts on quality of life. A randomly drawn household sample of 315 adults residents (aged 18 years and older) of Prince George British Columbia (CA) served as the working data set. A mailed-out questionnaire identified 66 arts-related activities and obtained information on respondents average weekly and yearly participation rates, as well as levels of satisfaction with their participation. Summarizing the multivariate results, the arts have a very small impact on QOL, and could only explain from 5% to 11% of the variance in four plausible measures of the self-perceived quality of respondents’ lives (see Michalos, 2005).

Other researches have tried to investigate the role of culture on living condition. Bygren, et al (see Bygren, Konlaan and Johansson, 1996) undertook a survey on a random sample of 15198 Sweden individuals ages 16-74, on two waves, the first one between 1982 – 1983 and a follow up in 1991, focusing on survival expectations. Thanks to this research, it has been possible to highlight that the influence on mortality for people who rarely attended events compared with those attending most often. The relative risk is of 1.57 (95% confidence interval 1.18 to 2.09). In other words, attending rarely to cultural events is associated to a mortality risk of the 60% higher rather than taking advantages of more cultural opportunities.

Furthermore, Hyypya et al (see Hyypya, Maki, Impivaara and Aromaa, 2006) undertook a study concerning cultural participation as a predictor of survival on a sample of 8.000 Finnish. They have observed a lower risk of mortality in individual attending an abundant leisure participation. The review of the literature in this realm, studies that look specifically at the relationship between cultural participation and QOL/well-being, just one found evidence of a substantial contribution, and this was in a sample of committed musicians. The other studies either found no effect on the QOL/well-being of subjects, or evidence of a very small contribution to them. In short, this is an area of research in its infancy: there are very few studies and those that exist have limitations.

2. Aim of the Research

The theoretical approach previously described, suggested to explore the relation between the cultural dimension and individuals, in this respect to investigate the possible correlation between participation/consumption of culture and individual well-being. Although the relevance of culture in everyday life of the society, few studies focused the relation between culture and well-being have been realized, and these are mostly focused on the relation among leisure participation and survival. In addition, no previous research was based on survey carried out on a considerable national representation of the whole population of a country. Our hypothesis is based on the assumption that the participation or consumption of different forms of culture, produce benefit in the psychological well being of individuals, and in this respect the forms of culture presenting forms of consumption based on the interaction with others rather than in exclusive forms, are those having more influence on the individual psychological well being.

3. Subjects and Methods

This Cross-sectional survey to assess the quality and quantity of cultural consumption and its relation with psychological well being has been undertaken in a large sample (n=3000) of community-dwelling Italians. The survey has been developed with the assistance of Doxa organization (Italy) through telephone interview, supported by the CATI system. The universe to which the National survey referred, were 52,4 million Italians of all regions aged 15 years and more, stratified according to region and size of the place of residence, and two paradigmatic municipality, Bolzano and Siracusa. These cities are located at the geographical extreme of the Italian territory, and has been chosen thank to several conditions, e.g. both cities present a quite comparable quantity (numerically) of population. In relation to the cultural dimensions, Bolzano, has been taken as example of city presenting a relevant grade of culture participation of the local population, on the other side Siracusa, presents a level of cultural consumption below the national level, evidence these provided through the analysis of data provided by the ISTAT – Italian National Statistic Institute, which have investigated the level of cultural consumption/participation in the Italian population (see ISTAT, 2006).

Information collected through the survey undertook, covered socio-demographic and health-related data well known as wellbeing determinants: Geography, Urban/rural environment, Gender, Age, Schooling, Civil status, Income level, Diseases presence. In addition 15 different variables has been selected after a revision of the main literature in the cultural field to assess ‘cultural consumption’ assessment. (Table 1).

Table 1: cultural activities considered in the survey

Jazz music concerts
Classic music concerts
Opera/ ballet
Theatre
Museums

Rock concerts
Disco dance
Paintings exhibition
Social activity
Watching sport
Sport practice
Book reading
Poetry reading
Cinema
Local community development

The Instrument: Psychological General Well Being Index (PGWBI)

The subjective psychological well being has been measured through a long standing validated instrument: The Psychological General Well Being Index (PGWBI). The Psychological General Well-Being Index (PGWBI), developed for the purpose of providing an index that could be used to measure self-representations of intrapersonal affective or emotional states reflecting a sense of subjective well-being or distress, measures the subjective perception of wellbeing. The original PGWBI consists of 22 self-administered items, rated on a 6-point scale, which assess psychological and general well-being of respondents in six HRQoL domains: anxiety, depressed mood, positive well-being, self-control, general health and vitality. Each item has six possible answers scores (from 0 to 5) referred to the last four weeks. Each domain is defined by a minimum of 3 or a maximum of 5 items. The scores for all domains can be summarized to provide a summary score, which reaches a maximum of 110 points, representing the best achievable “well being”.

In this survey we have adopted the short form of PGWBI, consisting in six items explaining more than 92% of global variance of the questionnaire. The PGWBI (22 items version) has been adopted for two previous waves of research about well-being of Italian population (2000 and 2004). This short version has been validated in a broad project carried out from 2000 to 2006 in Italy. (Grossi et al, 2006)

4. Data analysis

The sample selected for the analysis encompasses the three different samples (Italy, n=1500; Bolzano, n=750; Siracusa, n=750) and it is quite wide, reflecting the idea of this descriptive study. The greater sample submitted to the analysis - (n=3000) - has been selected in order to allow researcher to point out the maximum possible variance in relation to the different items, in this way to verify the possible relations of the items to the subjective individual well being linked to extreme distributions.

Univariate analysis has been carried out on the PGWBI mean values according to different degree of cultural consumption. Means have been compared with unpaired T test.

Multivariate analysis has been carried out with supervised artificial neural networks, according to method previously described (Penco et al, 2008). The choice of artificial neural networks (ANNs) has relied on the consideration that ANNs can handle simultaneously a very high number of variables irrespectively to their underlying non-linearity, and are able to build up models taking into account outliers and interactions among variables.

Supervised ANNs are networks that learn by examples, calculating an error function during the training phase and adjusting the connection strengths in order to minimize the error function. The learning constraint of the supervised ANNs make their own output coincide with the predefined target. The general form of these ANNs is: $y = f(x, w^*)$, where w^* constitutes the set of parameters which best approximate the function.

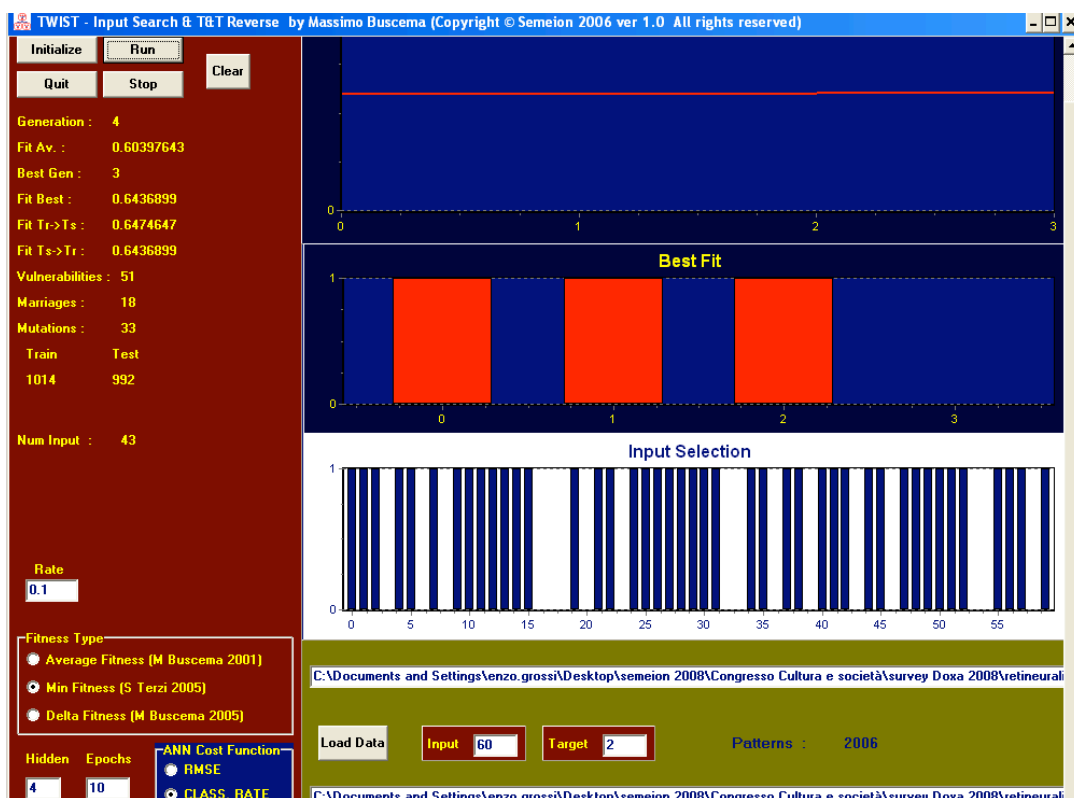
In order to reduce the number of variables that constitute a sort of ‘white noise’ for the problem under study we have employed a special ‘artificial organism’ called TWIST.

The TWIST system consists in an ensemble of two previously described systems: T&T and IS (see 16). The T&T system is a robust data re-sampling technique that is able to arrange the source sample into sub-samples that all possess a similar probability density function. In this way, the data is split into two or more sub-samples in order to train, test and validate the ANN models more effectively. The IS system is an evolutionary wrapper system able to reduce the amount of data while conserving the largest amount of information available in the dataset. The combined actions of these two systems allow us to solve two frequent problems in managing Artificial Neural Networks.

Both systems are based on a Genetic Algorithm, the Genetic Doping Algorithm (GenD) developed at Semeion Research Centre (see 17).

The TWIST system is described in detail in the appendix, and the figure below is a snap shot of TWIST system during its evolution in variable selection.

Figure 1 TWIST system



After this processing, the features that were most significant for the classification were selected and at the same time the training set and the testing set were created with a function of probability distribution similar to the one that provided the best results in the classification.

A supervised Multi Layer Perceptron, with four hidden units, was then used for the classification task.

5. Results

Sample description:

1651 females and 1349 males composed the sample, 750 subjects were extracted from Siracusa lists, 750 from Bolzano lists and the other 1500 from the whole Italian territory. The mean age of the sample was 47.53 years (17.26 SD); range 15-92 years. The values of short version of PGWBI were transformed in the 0-110 range scale according to an algorithm described in Grossi, 2006, in order to allow historical comparison with studies employing the 22 items version.

The average value of PGWBI in the overall population resulted to be 77.94 (17.65 SD); range 4-110. This value is almost identical to those recorded in previous surveys carried out in 2000 and 2004 (78.0). As expected, the average PGWBI value resulted higher in males in comparison with the females (80.85 vs 75.56 respectively).

Univariate analysis

Univariate analysis showed that major determinants of PWGBI score resulted as expected: diseases (PGWBI decreases as N° disease increase); income (PGWBI increases as income increases; age (PGWBI decreases as age increases); schooling (PGWBI increases as schooling years increase); job (PGWBI of white collar better than blue collar) and geography (PGWBI of northern people better than southern people).

In relation to the influence of cultural variables, the univariate analysis showed that with most cultural variables, the degree of consumption is highly correlated with psychological wellbeing (Table 2). The table below show analysis undertook on the whole sample, in which consumption correspond to null in case of no consumption, 10/year or more in case of maximal consumption.

Table 2: Mean values of PGWBI according to absence or maximal consumption of different cultural activities. All differences are statistically significant (**P< 0.001; * P<0.01)

Activity	no consumption	maximal consumption	difference	p
Classic music	77.32	88.31	14.21%	**
Jazz concerts	77.65	88.46	13.92%	**
Sport practice	73.76	80.82	9.57%	**
museums	75.36	82	8.81%	**
Local community developm	77.18	83.76	8.53%	**
opera/ballett	77.35	83.29	7.68%	**
poetry reading	73.8	79.38	7.56%	**
theatre	76.31	82.01	7.47%	**
painting exhibitions	76.18	81.85	7.44%	**
sport watching	76.8	81.15	5.66%	**
book reading	76.15	80.45	5.65%	**
rock concerts	76.91	81.03	5.36%	**
cinema	76.5	80.3	4.97%	*
social activity	76.57	79.8	4.22%	*
disco	77.66	80.73	3.95%	*

Artificial neural networks analysis

In order to highlight the variance of each item in relation to the well being, a sub-sample of 2006 subjects from the whole sample was created, satisfying these conditions:

- A. subjects with a PGWB Index lower than 70 (n=973);
- B. subjects with a PGWB Index higher than 85 (n=1033)

The reasons which have driven the creation of the sub-sample are related to the fact that a linear correlation index between independent variables and target variables were extremely low, no R² was found. This element gave a further rational to employ potent non linear approximation like artificial neural networks.

The first evaluation has been driven in order to define the distribution of the independent variable in the two classes (<70 ; >85), and results are shown in table 3

Table 3: Input relevance of each variable in relation to the two groups selected (PGWBI high >85; low <70).

	high	low	difference		high	low	difference
cinema	52.27%	43.37%	8.90%	osteoarthritis	93.22%	81.30%	11.93%
theatre	45.40%	34.64%	10.77%	migraine	0.48%	0.92%	-0.44%
opera_ballett	20.62%	16.24%	4.38%	gastritis	0.10%	0.92%	-0.83%
classic_music	20.81%	15.31%	5.50%	menopause	0.39%	1.23%	-0.85%
painting_exhibition	48.89%	37.82%	11.07%	obesity	0.58%	1.03%	-0.45%
museums	60.31%	47.38%	12.93%	kidney_diseases	0.19%	0.31%	-0.11%
romance_books	67.28%	62.18%	5.10%	liver_diseases	0.10%	0.21%	-0.11%
poetry_book	23.14%	21.99%	1.14%	multiple_sclerosis	0.29%	0.62%	-0.33%
disco	24.49%	21.99%	2.50%	thyroid_diseases	0.10%	0.51%	-0.42%
sport_practice	68.54%	54.06%	14.48%	Colitis	0.10%	0.21%	-0.11%
rock_concerts	32.72%	28.16%	4.56%	osteoporosis	0.10%	0.21%	-0.11%
jazz_concerts	13.84%	11.10%	2.74%	divorced	3.10%	4.62%	-1.53%
sport_watching	41.05%	31.14%	9.90%	urban_area	62.83%	57.35%	5.48%
social_activity	38.82%	32.58%	6.24%	rural_area	8.52%	10.28%	-1.76%
hypertension	15.30%	27.85%	-12.56%	semi_urban	28.65%	32.37%	-3.72%
miocardial_infarction	1.06%	4.62%	-3.56%	low_income	25.94%	37.20%	-11.26%
heart_failure	1.74%	6.17%	-4.42%	average_income	23.23%	23.84%	-0.61%
diabetes	3.78%	6.58%	-2.80%	high_income	20.52%	13.57%	6.96%
angina	0.97%	3.70%	-2.73%	Income_no_informa	30.30%	25.39%	4.91%
cancer	2.13%	2.98%	-0.85%	South	35.43%	48.41%	-12.98%
allergy	18.01%	25.28%	-7.28%	Centre	9.39%	9.56%	-0.17%
arthritis	21.01%	39.77%	-18.77%	North	55.18%	42.03%	13.14%
low_back_pain	17.43%	34.12%	-16.70%	male	52.95%	36.07%	16.88%
blindness	11.33%	20.35%	-9.02%	female	47.05%	63.93%	-16.88%
lung_diseases	3.49%	6.27%	-2.78%	unemployed	3.87%	5.14%	-1.27%
skin_diseases	7.45%	14.18%	-6.73%	retired	27.30%	25.28%	2.02%
depression	1.94%	10.17%	-8.24%	blue_collar	22.36%	26.41%	-4.05%
anemia	2.23%	4.73%	-2.50%	white_collar	33.88%	32.89%	0.99%
anxiety	0.87%	2.88%	-2.01%	student	12.58%	10.28%	2.31%

After this evaluation, has been used the Twist system, in order to process the full data set. The system allowed the selection of 35 variables with the maximal amount of information useful to tackle the problem under study. The list of these variables is provided in table 4.

Table 4 Variables selected by TWIST system

cinema	anemia
theatre	anxiety
opera_ballett	osteoarthritis
painting_exhibition	migraine
museums	gastritis
poetry_book	menopause
sport_practice	obesity
rock_concerts	multiple_sclerosis
sport_watching	Colitis
hypertension	osteoporosis
miocardial_infarction	age
diabetes	urban_area
angina	low_income
cancer	South
arthritis	male
low_back_pain	retired
skin_diseases	blue_collar
	student

Is interesting to see that nine out of 15 variables related to cultural consumption have been autonomously selected in the final model by TWIST system.

Standard supervised artificial neural networks belonging to back propagation family were then applied of the subset of 35 variables selected by TWIST system. We employed cross-validation protocol in which the study sample is randomly divided into two sub-samples, containing similar distribution of target variables: the training one (containing the dependent variable) and the testing one. During the training phase the ANNs learn a model of data distribution and then, on the basis of such a model, classify subjects in the testing set in a blind way. Training and testing sets are then reversed. We have therefore two experiments, the first called A-B (training on subset A and testing on subset B) and B-A (training on subset B and testing on subset A).

During the training phase it is possible to monitor in the complex interplay of the neural network computation, which is the relative importance of each variable in allowing the system to optimize the prediction of the target variable, in other words the ‘input relevance’ of each variable

It is interesting and quite surprising to see that according to input relevance that in both models 3 cultural variables occupy the first 10 places. Although the importance attributed to culture in...

We report here the top-down distribution of input variables during the late phase of the A-B and B-A training procedure.

Figure 2: Input relevance of the 35 variables selected by TWIST system during A-B training. The scale in an arbitrary scale in which the number is proportional to the importance of the variable in the model.

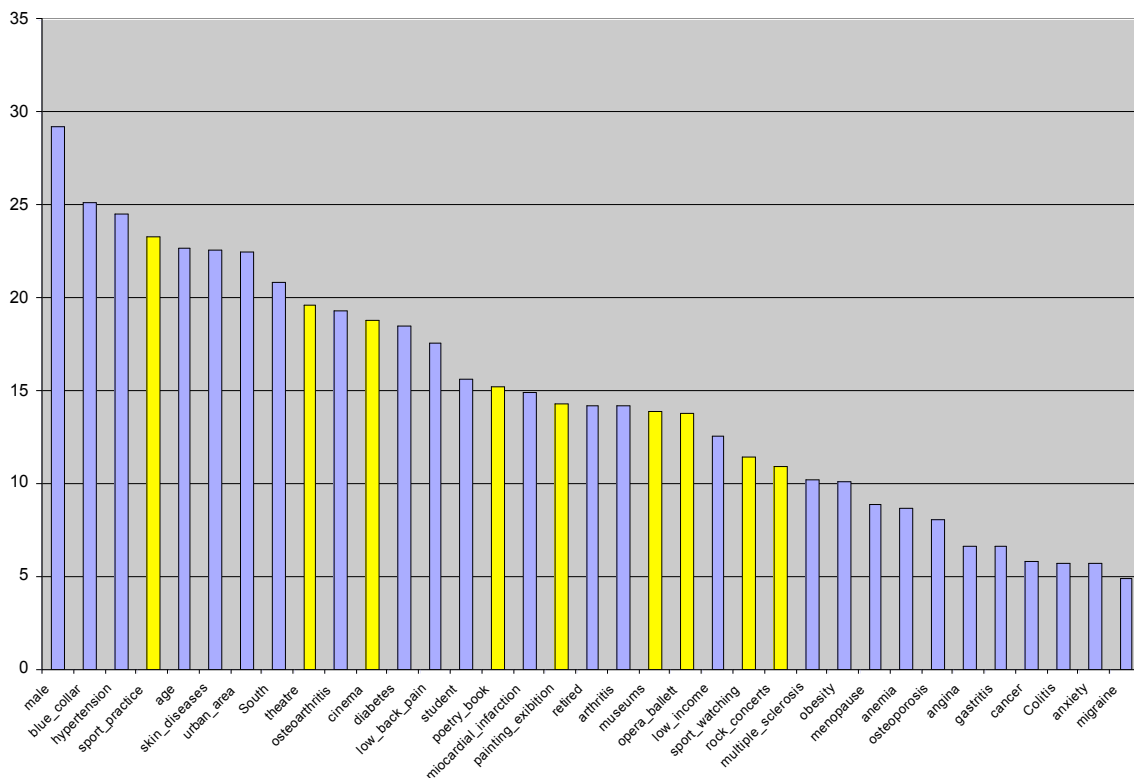
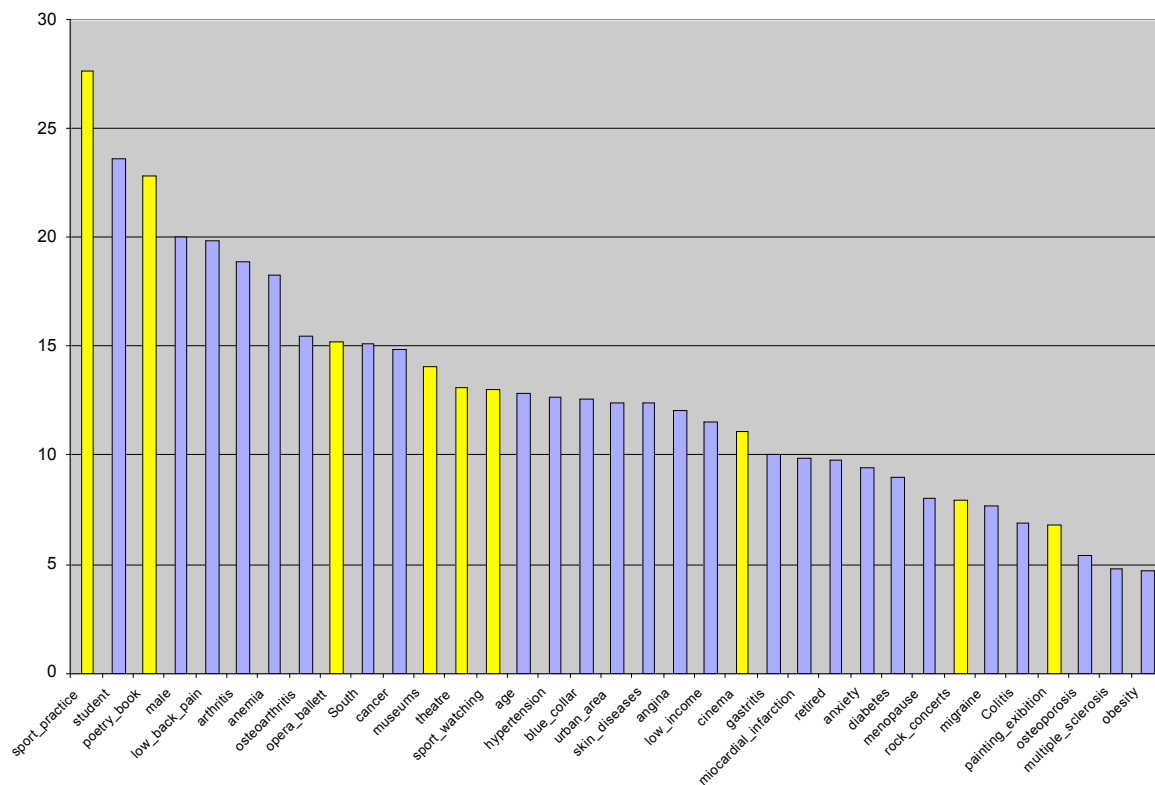


Figure 3: Input relevance of the 35 variables selected by TWIST system during B-A training. The scale in an arbitrary scale in which the number is proportional to the importance of the variable in the model.



6. Discussion

Evidence shown that for specific forms of cultural consumption affect individual well-being for the population and the beneficial effect emphasizes the significance of cultural participation/consumption for the promotion of men's health. The point of strength of this study are the sample size, the methodological criteria used for sample stratification, the soundness of wellbeing measuring instrument and the potency of analysis methods, based on artificial neural networks.

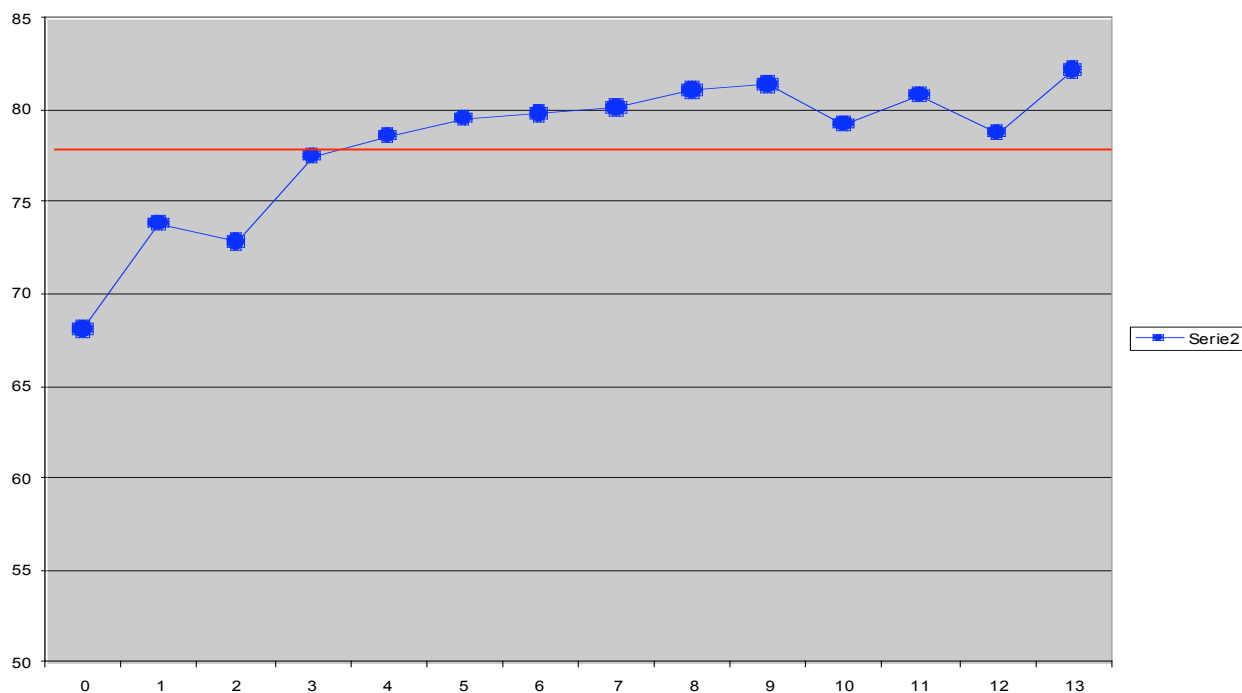
The results show beyond any doubt that specific forms of culture supply are associated with higher levels of well being in Italian general population. Parts of this forms are also those related to the consumption of culture in social contexts, validating the idea that culture produce 'relation goods' and those affect structurally the social well-being. The use of artificial neural networks, which can build up predictive model very complex, taking into account the interaction among variables, show that the contribution of the cultural consumption is net and not simply related to other well known determinants of subjective wellbeing, like instruction level, income, or age. Further studies will have to focus prospectively if investing in cultural supply is able to change the wellbeing status of the population.

7. Conclusions

The study carried out is one of the first attempts which has been methodologically conducted on a large sample of a national population, and in this respect it has the prerequisites to show some representative conclusions and exemplify the role of culture in relation to the psychological well being. Given the complexity of the interaction of many possible variables in each individual, classical statistical approaches based on univariate, bivariate or multivariate analysis are not helpful, in the way that these can create model with only few variables selected through linear correlations,

a model which cannot dynamically interact the different variables in order to assess the reciprocal weight. Thanks to the sophisticated techniques adopted, it has been possible to verify that 'culture count', in the way that there is a direct correlation in participation / consumption of culture and benefits provided to individuals in the well-being dimension. Figure 4 shows the correlation between intensity of cultural consumption and well-being in the greater sample (n=3000).

Figure 4. Change of PGWBI in relation to cumulative cultural consumption in overall Italian sample. The red line corresponds to the average value of PGWBI in the overall population (=77.94)



The results provided thanks to the survey undertaken shows that these phenomena call for the definition of new policies concerning the human and social dimensions, in which the architecture of social relations becomes an issue whose importance is no lesser than the architecture of physical spaces in the weaving of a territory. Cultural investments and actions targeted at specific communities have come to be regarded as a potentially effective policy tool to address the instances of human and social development, promoting also non-instrumental ways of relationship, and to support the forging and maintenance of a socially sustainable, vital collective identity. The strategic importance of culture in this particular context has to do not only with its capacity of shaping collective processes of meaning and of fostering new forms of sociability, but also with its strategic complementarity with the development of intangible resources such as education and skills, which are fundamental to local development processes. It is therefore necessary to investigate to what extent culture has been, and is currently, able to meet these demanding challenges.

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