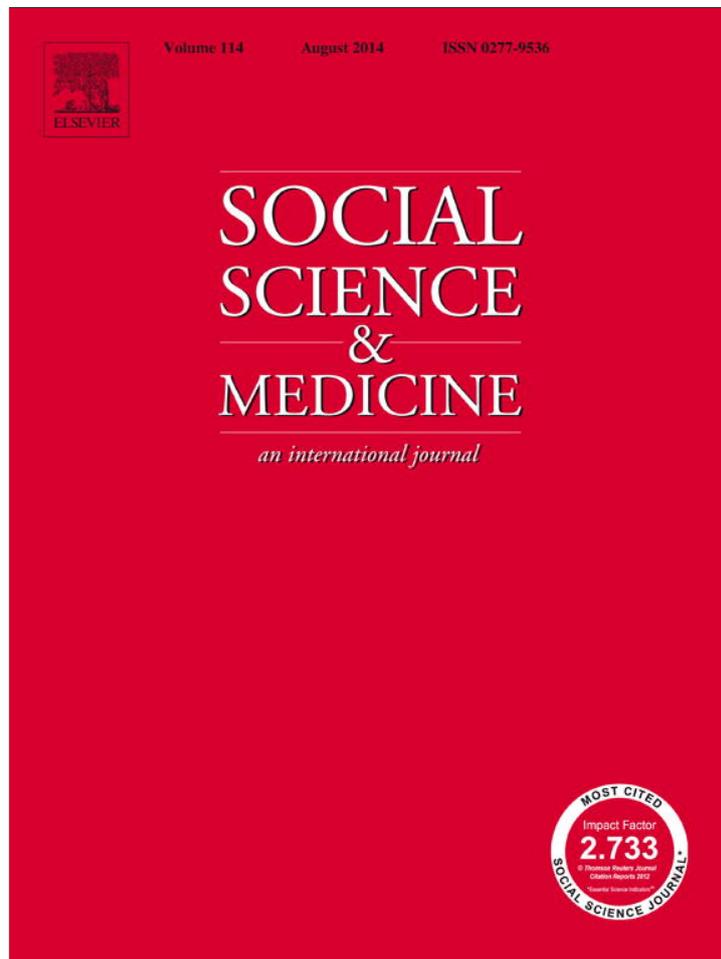


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The relationship between happiness and health: Evidence from Italy

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ABSTRACT

We test the relationship between happiness and self-rated health in Italy. The analysis relies on a unique dataset collected through the administration of a questionnaire to a representative sample ($n = 817$) of the population of the Italian Province of Trento in March 2011. Based on probit regressions and instrumental variables estimates, we find that happiness is strongly correlated with perceived good health, after controlling for a number of relevant socio-economic phenomena. Health inequalities based on income, work status and education are relatively contained with respect to the rest of Italy. As expected, this scales down the role of social relationships.

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1. Introduction

In recent years, subjective well-being and, more generally, happiness studies, have increasingly gained attention not only in the academic literature but also in the journalistic and political debates. The happiness literature started developing in the '70s and bloomed after 2000, when subjective quality of life became a recognized topic of various social sciences, including economics (Bruni and Porta, 2007; Sarracino, 2013). People's own evaluation of their own well-being is monitored through survey questions such as: "Taking all things together, how happy would you say you are?" or "All things considered, how satisfied are you with your life as a whole these days?" (Van Praag et al., 2003). A consolidated literature proved that subjective well-being is a reliable source of information about people's well-being. This is why an increasing number of researchers have employed it in many fields of social research. In economics and psychology, several authors have advanced the claim that happiness or, more generally, positive attitudes towards life can predict longevity and other indicators of physical well-being among healthy populations (Diener and Chan, 2011; Borghesi and Vercelli, 2012; Garrido et al., 2013; Siu et al., 2014; Straume and Vittersø, 2014).

Emotional states such as happiness and attitudes towards life are seen as a key determinant of the somatization of feelings of

stress and anxiety related to life events. Findings from medicine and psychology suggest that emotional reactions to life events can affect physiology in ways that are potentially damaging for health (Rozansky et al., 1999; Kuhn et al., 2009; Schröder, 2013).

Seminal studies pointed to the autonomic nervous system (ANS) as the main channel of transmission of the effects of happiness on health (Ekman et al., 1983; Levenson et al., 1991; Levenson, 1992). Unpleasant life events such as a job loss cause a negative emotional response which can significantly influence the functioning of the ANS. For example, Rozansky et al. (1999) found that the mortality of men who lose their wives doubles in the first month after the event. For women, the mortality rate after losing their husbands is three times higher than normal. The relationship between involuntary job loss, depression, and poor health conditions is well established in the literature (see for example Clark and Oswald, 1994; Field and Briggs, 2001; Kuhn et al., 2009). Sullivan and von Wachter (2009) estimated an approximately 20% excess risk of death in the 20 years following a job loss in two American states. Eliason and Storrie (2009) obtained similar results for job losers in Sweden. Using the Survey of Health, Ageing, and Retirement in Europe Schröder (2013) found that women who suffered from an involuntary job loss report poorer general health and more chronic conditions, which also causes limitations in their daily activities.

Numerous studies have shown that ANS responses to emotional states may activate physiological reactions that could have cumulative effects on health (Fredrickson and Levenson, 1998; Glassman and Shapiro, 1998; Carney et al., 2005). Adaptation to disruptive life events requires a variable amount of time depending, among other factors, on personality characteristics. Some people are unable to

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recover from the acute distress caused by the loss of a close friend or relative, while others suffer less intensely and for a shorter period of time (Bonanno, 2004). On the one hand, quick hedonic adaptation may make sustainable increases in well-being difficult, or even impossible to attain. Large increases in the standard of living (due for example to a lottery win) seem to have almost negligible effects on happiness (Kahneman and Krueger, 2006). On the other hand, quick adaptation contains the distress associated with negative events, thereby preventing damaging physiological reactions (Lucas, 2007). For example, in individuals with intensely negative emotional responses and slow hedonic treadmill, the ANS could prompt cardiovascular activity that accelerates certain pathologies such as atherosclerosis (Krantz and Manuck, 1984; Kubzansky and Kawachi, 2000; Stewart et al., 2007).

The claim that emotional responses to life events influence individual health is also supported by the evidence that happy people live longer (Diener and Chan, 2011). Happiness and positive attitudes towards life may in fact prevent the activation of physiological reactions to life events that could have cumulative detrimental effects on health (Frey, 2012). Field studies have shown the beneficial effects of positive mental states on physical health, as reported in recent reviews of the literature and meta-analyses of existing studies (Howell et al., 2007; Veenhoven, 2008). For example, Howell et al. (2007) integrated findings from 150 experimental, ambulatory and longitudinal studies that tested the impact of well-being on objective health outcomes. Results demonstrated that well-being positively impacts health outcomes, suggesting the existence of biological pathways, “such that well-being can directly bolster immune functioning and buffer the impact of stress” (2007, p. 83). In an experimental study, Cohen et al. (2003) exposed subjects to a cold virus and closely monitored their symptoms. Those who had reported a higher level of life satisfaction at baseline were less likely to contract the cold and quicker to recover if they became sick. According to Veenhoven (2008), the size of the effect of positive attitudes appears to be so strong to be comparable to that of smoking or not.

In addition to psychosomatization, the literature has mentioned other transmission mechanisms connecting happiness to health. Happy people are more inclined to live in a healthy way. They engage in sports more often (Rasciute and Downward, 2010), they are more likely to watch their weight (Veenhoven, 2008), to avoid unhealthy behaviours such as drinking, smoking and overeating, and less likely to commit suicide or be victim of accidents (Frey, 2012).

In this paper, we aim to test the relationship between happiness and self-reported health, after controlling for the influence of a number of economic and social phenomena, such as economic well-being, work status and education. Among control variables, particular attention is devoted to the role of social capital, which has been found to be strongly and positively associated with good health (Brown et al., 2006; De Silva et al., 2007; Engström et al., 2008; D'Hombres et al., 2010; Fiorillo and Sabatini, 2011a, 2011b). In this paper, we account for both the “structural” and the “cognitive” dimensions of the concept. The structural dimension of social capital deals with individuals' behaviours and can take the form of relational goods consumption, participation in social networks, and volunteering activities. Cognitive social capital deals with agents' perceptions and involves concepts such as trust, reciprocity, and shared beliefs (Uphoff, 1999). Structural social capital can influence health in a number of ways. More intense social relationships may facilitate individuals' access to social support and healthcare, as well as the development of informal insurance arrangements (D'Hombres et al., 2010). They can promote a more rapid diffusion of health information, increase the likelihood that healthy norms of behaviour are adopted (e.g. physical activity and

usage of preventive services), and exert social control over deviant health-related behaviours (Kawachi et al., 1999; Melchior et al., 2003; Brown et al., 2006; Folland, 2007). Cohesive networks may exert the so-called “buffering effect”, balancing the adverse consequences of stress and anxiety through the provision of affective support and by acting as a source of self-esteem and mutual respect (Kawachi et al., 1997; Greiner et al., 2004; De Silva et al., 2007). Less evidence is available about the role of cognitive social capital. While several studies find social trust to be correlated with good health, several other studies find this correlation not to be robust to different specifications (Kim et al., 2006; Folland, 2007; Baron-Epel et al., 2008; Mansyur et al., 2008). The measurement of social capital has been the subject of an intense debate in the economics literature. Following Sabatini (2007; 2008), it is possible to identify three main measurement-related weaknesses that affect the empirical literature on the topic. The first one is the use of macro indicators that are not directly related to social capital's key components. The use of these indicators – e.g. crime rates, teenage pregnancy, blood donation, participation rates in tertiary education – has led to considerable confusion about what social capital is, as distinct from its outcomes, and what the relationship between social capital and its outcomes may be. As stated in Stone (2001), research reliant upon an outcome of social capital as an indicator of it will necessarily find social capital to be related to that outcome. The second main problem is aggregation. Cross-country studies on the outcomes of social capital are based on measures of trust taken from international surveys. “Trust measured through surveys is a “micro” and “cognitive” concept, in that it represents the individuals' perception of their social environment, related to the particular position that interviewed people occupy in the social structure. The aggregation of such data, however, creates a measure of what can be called “macro” or “social” trust which loses its linkage with the social and historical circumstances in which trust and social capital are located (Fine, 2001). The third problem is multidimensionality. Most empirical studies on the topic generally focus on just one or two indicators of social capital's dimensions, neglecting the possibility that dimensions often influence each other and that each of them may exert a diverse effect on the outcome of interest (Antoci et al., 2013; Sabatini and Sarracino, 2014).

As explained in Section 2, we address these measurement issues by focussing on individual-level multiple indicators of the behavioural key elements of social capital, as given by measures of social relationships, social participation, and social support.

To reach our goal, we rely on a unique dataset collected through the administration of a questionnaire to a representative sample ($n = 817$) of the population of the Italian Province of Trento in March 2011. The sample was stratified by age, gender and area of residence. The questionnaire was specifically designed for the evaluation of various aspects of well-being at the individual level.

Our choice to focus on the Province of Trento was due to results from recent empirical studies which found the territory to be characterized by contained inequalities (including health disparities), as well as by exceptional levels of well-being and social capital (Degli Antoni 2006a, 2006b; Sabatini, 2008, 2009a). In our view, two main reasons make this case study worthy of attention in the health economics literature. First, the low level of health inequalities and the extension of the public healthcare system allow us to carry out a better assessment of the behavioural determinants of health. Also, the exceptional wealth of social capital which previous studies attribute to the Province of Trento should help in isolating the possible role of happiness: if most citizens are endowed with high levels of social capital, we should be less likely to find social capital-based health disparities in the sample.

Based on probit and ordered probit analyses, we find that happiness is strongly correlated with perceived good health. Health inequalities based on income, work status and education are relatively contained with respect to the rest of Italy. As expected, this scales down the role of social capital.

However, there are reasons to suspect the main result to be the fruit of a spurious correlation. First, there is a problem of omitted variables. It is difficult to distinguish the effect of happiness from that of other phenomena that potentially influence self-reported health. In this case the omitted variables may be objective health indicators or dummy variables capturing whether an individual has ever suffered from certain diseases. Second, individual effects, such as individuals' exogenous shocks, may be correlated with both the dependent and main independent variable, thus creating a common bias. Third, it is reasonable to assume the existence of reverse causality, since health may be considered as an important determinant of happiness. To deal with these problems, we turn to instrumental variables (IV) estimates.

When we address endogeneity in IV estimates, happiness remains the best (most significant and strongest) predictor of self-reported health. Even if these results pass robustness checks and hold in IV estimates, it must be remarked that the cross-sectional design of the research dictates extreme caution in the interpretation of correlations as causal relationships.

Nonetheless, the empirical analysis in this paper contributes to the literature by carrying out the first econometric test of the relationship between self-reported health and happiness in Italy. The analysis also adds to previous studies by controlling the role of important economic factors, such as measures of material well-being, work status, structural and cognitive social capital. The use of a unique and recent dataset collected in a province traditionally characterized by an efficient welfare system and very low health inequalities further improves the value of the analysis.

The outline of the paper is as follows: section two presents our data and the empirical strategy. Section three contains a presentation and discussion of the main results. Concluding remarks and a brief discussion of implications for further researches close the paper.

2. Data and empirical strategy

Raw data is drawn from a unique dataset collected through the administration of a questionnaire to a representative sample of the population of the Province of Trento in March 2011. The sample was stratified by age, gender and area of residence. The questionnaire was developed with the specific aim of assessing the determinants of individual well-being. A strong focus was given to social capital and various aspects of life satisfaction.

The questionnaire was administered through computer assisted telephone interviews by the Technical Unit of the Department of Sociology and Social Research of the University of Trento. Interviewers were recruited by the Technical Unit and trained by the author of this article through two seminars on the topics dealt with in the survey and on the meaning of questions to be asked to interviewees. A strong focus was put on questions measuring health, subjective well-being, and social capital.

2.1. Dependent and independent variables

Self-reported health is measured through the question "In general, would you say that your health is very good, good, fair, poor, or very poor?" Following a well-established practice (Carlson, 2004; Kim et al., 2006; Engström et al., 2008; Kawachi et al., 1999; Bjørnskov, 2010; D'Hombres et al., 2010) responses are coded into a binary variable that is equal to 1 in case of very good or good health.

In a robustness check, we perform an ordered probit employing the ordinal version of the variable. 7.47% of the sample reported poor or very poor health conditions. 26.07% reported fair conditions. Perceived health was good for 40.02% and very good 25.83% of respondents. 5 individuals (.61% of the sample) did not provide an answer and were omitted from the analysis.

The question about perceived health has been one of the most frequently employed health indicators in sociological health research since the 1950s (Maddox 1962; Suchman et al., 1958; Garrity et al., 1978). The use of self-rated health as an indicator of objective health status then spread in epidemiological and medical research when Mossey and Shapiro (1982) and Kaplan and Camacho (1983) demonstrated its strong association with mortality. According to Carlson (2004) the dichotomization of the score assigned by interviewees to their health conditions further improves the reliability of the indicator. In their review of 27 community studies, Idler and Benyamini (1997) conclude that self-reported health does a fairly good job even after controlling for objective health indicators. According to Jylhä (2009), even if self-ratings of health may be modified by age or culture, they remain a valid measure of health status. The author identifies bodily sensations reflecting physiological dysfunctions as pathways that mediate information from the human organism to individual consciousness, thus incorporating that information into self-ratings of health. The reliability of self-reported health has been questioned by prominent authors in economics in regard to developing countries and, more generally, economically depressed areas. According to Sen (2002), there may be a disconnect between perceived and actual health, since the individual's assessment of their health is strongly influenced by social experience. For example, individuals with no formal knowledge of diseases but living in an area with substantial disease burden that has inadequate infrastructure and facilities may be inclined to treat disease symptoms as "normal" given their lack of awareness, and therefore, health expectation. Thus, socially disadvantaged individuals may suffer from a form of "health illusion" causing them fail to perceive and report the presence of illness or health deficits (Sen, 2002). In our case study, by contrast, social experience and comparison are likely to lead individuals to expect a relatively high level of health. In addition, the Province of Trento is characterized by an extensive, inclusive and well-respected public healthcare system, which may further raise individuals' expectations about their health. It thus seems reasonable to assume that self-reported health is a reliable indicator of actual health in our sample.

Happiness is measured through the question "Considering all aspects of your life, how happy would you say you are?". Respondents were requested to give a score from 1 to 10, 1 meaning "Very unhappy", 10 meaning "Very happy" and the values in between representing intermediate states.

This wording follows some major surveys that measured satisfaction with life including response categories that explicitly refer to negative feelings or negative assessments of subjective well-being (e.g. unhappiness, or severe dissatisfaction with life). In our research design we specifically followed the two most relevant Italian nationally representative surveys on individual values, life styles, and behaviours - i.e. the Multipurpose Household Survey yearly conducted by the Italian National Institute of Statistics and the Survey on Household Income and Wealth carried out by the Bank of Italy every two years - where subjective well-being was specifically assessed through our same question on happiness. Other important surveys follow a similar approach. For example, the World Values Survey and the European Values Survey ask respondents whether, taking all things together, would they say they are 'Very happy', 'Rather happy', 'Not very happy' and 'Not at all happy', and how satisfied are they with their life as a whole on a 1

to 10 scale where 1 means “completely dissatisfied” and 10 means “completely satisfied”. In the British Household Panel, respondents are asked to rate their satisfaction with life on a 1 to 7 scale, where 1 means “Not satisfied at all”.

In their review on the measurement of subjective well-being, [Kahneman and Krueger \(2006\)](#) suggest to measure whether an episode or a feeling is pleasant or unpleasant. “The predominant emotional state for a vast majority of people is positive, so any episode when a negative feeling is a most intense emotion is a significant occurrence.” Responses referring to feelings of unhappiness are particularly reliable, as they are “Likely to be a mindful and deliberate choice”, because negative feelings are relatively rare ([Kahneman and Krueger, 2006](#), p. 19).

Several studies have shown that single-item questions on satisfaction with life provide useful, yet limited, information reliably synthesizing more complex multiple items measures of subjective well-being such as the Satisfaction with Life Scale ([Diener and Suh, 1999](#); [Layard, 2005](#); [Frey and Stutzer, 2001](#), [OECD, 2013](#)). In its guidelines for the measurement of well-being, the [OECD \(2013\)](#) identifies two questions for building a primary measure of subjective well-being. These are the Self-Anchoring Striving Scale (“Cantril Ladder”) and a version of the question on satisfaction with life. According to the OECD guidelines, “The Cantril Ladder and the satisfaction with life question are relatively similar in terms of their technical suitability for use as an overarching measure, particularly if both use the same 11-point (0–10) scale” (p. 164). Both these measures include response categories that refer to negative feelings. In the Cantril Ladder, as adopted in the Gallup World Poll, respondents are required to imagine a ladder with steps numbered from 0 at the bottom to 10 at the top, where the top of the ladder represents “the best possible life” and the bottom represents the “worst possible life” for them. The OECD explicitly suggests using a variant of the satisfaction with life question using a 0 to 10 scale. “The decisive factor in favour of this choice is the relative simplicity of the question, which will make it easier to incorporate in large-scale household surveys where respondent burden is a significant issue” ([OECD, 2013](#), p. 165). Most people are more familiar with 11 points (0–10) scales, which allows expressing a more accurate and reliable assessment. In addition, the OECD suggests that the concept of happiness may be easier to communicate to the public than the more “technical” satisfaction with life measures.

It is worth noting, however, that the wording and the length of the scale may significantly affect responses. For example, [Bjørnskov \(2010\)](#) compared Cantril's Ladder of Life and a general life satisfaction measure across a range of countries, finding considerable differences between these two measures. [Diener et al. \(2009\)](#) report evidence that, at the national level, responses to the Cantril Ladder are more closely centred on the scale midpoint than other subjective well-being measures of life satisfaction and happiness.

The considerations briefly outlined above, together with the cross-sectional nature of our analysis, suggest further caution about the generality of our results.

In the IV probit, we recoded the happiness measure in order to obtain a binary variable assuming a value equal to 1 in case the self-assessment of happiness was equal or higher than 8. In the robustness checks, however, we exploited all the information provided by the 11 points scale by employing the ordinal version of the variable performing an ordered probit regression (which fully confirms results of the probit and IV probit estimates). In our sample, 12 individuals (1.47%) did not answer the happiness question and were omitted from the analysis. 111 respondents (13.1% of the sample) declared to be very happy, while only 5 individuals (.61%) reported to be not at all happy.

The empirical analysis accounts for a number of indicators of social capital. In this paper, we measure structural social capital through the following indicators: 1) the frequency of meetings with friends, coded as 1 if the interviewee meets friends every day or at least twice a week; 2) the frequency of meetings with relatives, coded as above; 3) membership in voluntary organizations, coded as 1 if the interviewee is a member of at least one organization.

Cognitive social capital was measured through indicators of trust towards institutions. Namely, four indicators of trust were taken into account: trust towards local politicians, the police, the prime minister and the parliament. Interviewees were asked to score from 1 to 10 their trust towards the mentioned institutions. We followed the approach to code 1 for responses above the mean value.

In the sample, there were 44 missing values (5.39% of the sample) concerning trust towards local politicians, 63 missing values (7.71%) concerning trust in the Prime Minister, 52 (6.36) for trust in the Parliament, and 19 (2.33%) for trust in the police. Concerning the measures of structural social capital, there was one missing value for the frequency of meetings with relatives and 3 missing values for the frequency of meetings with friends. As for membership in organizations, there were no missing values. Cases with missing data were omitted from the analysis.

Moreover, we include in the analysis a number of dummies representing the relevance of an interviewee's social contacts in relation to possible health problems. Dummies are given by responses to the question: “In case of health problems, who would you turn to for assistance?”. In the administration of the questionnaire, interviewers explicitly specified that the term “assistance” meant any kind of support (e.g. transport to medical facilities, moral support, little errands such as going to the shops, etc.) beyond medical therapies. Possible (non-alternative) responses were relatives, friends, colleagues, public institutions, private institutions, cooperative enterprises, no one. Responses were coded as one any time a specific item was mentioned. More specifically, 79.07% of the sample declared they would turn to relatives for assistance. 29.87% would turn to friends, 4.90% to colleagues, 36.47% to public institutions, and 12% to cooperative enterprises. 1.51% of the sample (13 individuals) declared they would turn to no one for assistance in case of health problems.

As control variables, we included: 1) other indicators of social isolation as given by the composition of the household and a number of dummy variables indicating the relationship between the interviewee and the people with whom he/she lives; 2) education, treated as a categorical variable where each category corresponds to a degree of educational qualification; 3) work status, a categorical variable reporting whether the interviewee is employer, employee, self-employed or not working; 4) a measure of economic well-being, given by the response to the question: “How would you place your household income in respect to the average income of Italian households?”. Respondents were asked to give a score from 1 to 5, 1 meaning “Much below the average” and 5 meaning “Much above the average”. Robustness checks were performed by replacing this measure with two other indicators of economic well-being. The first one is given by responses to the question: “Is your household's income sufficient to see you through to the end of the month?”. Respondents were asked to give a score from 1 to 5, with 1 meaning “With great difficulty” and 5 meaning “Very easily”. The second measure of economic well-being used in robustness checks is given by responses to the question: “Overall, how satisfied are you with your economic conditions?”. Interviewees were asked to give a score from 1 to 10, with 1 meaning “Not at all” and 10 meaning “Totally satisfied”. 5) Usual socio-demographic controls such as gender, being in a stable relationship, age, and the area of residence (urban vs. rural).

Perceived economic well-being refers to the perception of one's economic situation in light of what is required and desired. Measures of subjective economic well-being we use in the analysis represent an approximation of the objective economic conditions of the household. However, we believe them to reliably measure the individual perception of their economic conditions, which is crucial in determining how a person feels (e.g. in terms of happiness, anxiety and mental distress) in relation to her income and wealth. In particular, the question about household income compared to the average income of Italian households may effectively capture the effect of social comparison on the perceived economic well-being of families in the sample. Summary statistics are reported in [Table 1](#).

2.2. Instrumental variables

As will be reported in the next section, probit estimates clearly show that happiness is the most significant predictor of good health and that this result is robust to different specifications. However, there are at least three reasons for which this result could be

Table 1
Descriptive statistics.

	Observations	Mean	St. dev.
<i>Dependent variable</i>			
Self-perceived good health	812	.6585067	.474501
<i>Main independent variable</i>			
Happiness	805	.6597307	.4740899
<i>Social capital</i>			
Meets relatives at least twice a week	816	.7723378	.4195803
Meets friends at least twice a week	814	.5875153	.492583
Membership of associations	817	.3206854	.467026
Trust towards the parliament	765	.5410037	.4986211
Trust towards the police	798	.5275398	.4995468
Trust towards the prime minister	754	.3929009	.4886943
Trust towards local politicians	773	.4908201	.5002219
<i>Health-specific social isolation</i>			
Would not turn to anyone for health assistance	817	.0159119	.1252113
Would turn to public institutions	817	.3647491	.4816546
Would turn to cooperative enterprises	817	.119951	.3251033
Would turn to friends	817	.2986536	.4579479
Would turn to relatives	817	.7906977	.4070598
Would turn to colleagues	817	.0489596	.2159158
<i>Socio-demographic and economic characteristics</i>			
Age 18–34	817	.2362301	.4250254
Age 35–49	817	.2949816	.4563139
Age 50–64	817	.2325581	.4227216
Age 65 and over	817	.2362301	.4250254
Gender	817	.5165239	.500033
Being in a stable relationship	813	.7172583	.4506078
No educational qualification	813	.003672	.0605225
Elementary school	813	.0893513	.2854249
Middle school	813	.2117503	.408799
High school	813	.5263158	.4996129
Bachelor degree or above	813	.1640147	.3705157
Not working	817	.4773562	.499793
Employee with a precarious job	817	.0110159	.104441
Employee with a permanent job	817	.4161567	.4932221
Self-employed	817	.0954712	.2940447
Lives alone	817	.122399	.3279469
Lives with parents	817	.2129743	.4096604
Lives with partner	817	.6107711	.4878741
Lives with children	817	.3671971	.4823361
Lives with siblings	817	.0856793	.2800614
Lives with other relatives	817	.002448	.0494467
Number of children	817	1.341493	1.224606
Area or residence (urban vs. rural)	817	.3561812	.479163
Economic well-being	812	.8935129	.3086491
<i>Instrumental variables</i>			
Quality of friendships	808	.4075887	.491687
Social trust	795	.4247246	.4946039

interpreted as the fruit of a spurious correlation. First, it is difficult to distinguish the effect of happiness from that of other phenomena that potentially influence health. Second, individual effects, such as exogenous shocks experienced by individuals, are correlated with both self-reported health and happiness. Third, it is reasonable to suspect the existence of reverse causality, since healthier people may be likely to be happier. To address these problems, we use instrumental variables estimates, as recently done by [Folland \(2007\)](#) and [D'Hombres et al. \(2010\)](#). To further investigate the causal relationship between happiness and health, we then test a simple structural equations model and some refinements thereof.

In instrumental variables (IV) estimates, we use two individual-level instruments given by measures of the quality of friendships and social trust.

The quality of friendships is measured through individuals' reported satisfaction with relationships with friends, as given by responses to the question, "How satisfied do you feel with your relationships with friends?" 9 respondents (1.10% of the sample) did not reply to this question and were dropped from the analysis. Social trust was measured through the standard trust question, "In general, do you think most people can be trusted or can't you be too careful?", conceived by Elisabeth Noelle-Neumann and introduced to large U.S. surveys by [Rosemberg \(1956\)](#). In both cases, respondents were asked to give a score from 1 ("Not at all") to 10 and responses were recoded as 1 if their value was above the mean. 22 cases with missing values (2.69%) were dropped from the analysis.

As the tests reported in Section 3 show, these variables satisfy the two necessary conditions for instrument validity, since they are both strongly correlated with happiness ("relevance" condition) and orthogonal to the disturbance term of the health equation ("orthogonality" condition).

Friendship has been claimed to be an important source of happiness. The concept can be defined as a "voluntary interdependence between two persons over time, that is intended to facilitate socio-emotional goals of the participants, and may involve varying types and degrees of companionship, intimacy, affection and mutual assistance" ([Hays, 1988](#), p. 395, retrieved in [Demir et al., 2007](#)). As the definition suggests, friendship is a qualitative concept, which cannot be measured just through the frequency of meetings with friends. Following [Diener and Seligman \(2002\)](#), in this paper we use satisfaction with relationships with friends as a proxy for the "quality" of friendship.

The quality of relationships with friends has been found to be strongly associated with happiness ([Baldassare et al., 1984](#); [Hussong, 2000](#); [Diener and Seligman, 2002](#); [Demir and Weitekamp, 2007](#); [Lyubomirsky et al., 2006](#); [Demir et al., 2007](#)). Drawing on a sample of 222 undergraduate students, [Diener and Seligman \(2002\)](#) find that the subjective rating of relationships with close friends is the best predictor of happiness. [Demir et al. \(2007\)](#) use a sample of 280 college students to analyse the role of best and close friendships in happiness. The authors find that best friendship quality – as measured by the subjective rating of respondents' relationships with their best friends – is the only significant predictor of happiness. Moreover, "individuals were happier when they experienced high quality first close friendships in conjunction with a high quality best friendship. Results also revealed that first close friendship quality buffered the negative impact of first close friendship conflict" ([Demir et al., 2007](#), p. 243). [Van Praag and Ferrer-i-Carbonell \(2008\)](#) find that overall life-satisfaction is significantly and positively correlated with friendships.

The arguments briefly discussed above find support in the significant correlation between the quality of friendships and happiness we find in the first stage of the IV probit. Thus, it seems reasonable to conclude that the quality of friendships satisfies the

relevance condition required for instrumental variables. As for the orthogonality condition, it must be stated that, drawing on pooled cross-section data for the period 1992–2000, Fiorillo and Sabatini (2011b) find a positive correlation between the quality of relationships with friends and perceived health in a representative sample of the Italian population. However, there are two reasons to argue that this finding does not apply to the sample we study in this paper. First, as shown in the empirical analysis in Section 3, the extension, efficiency and inclusiveness of the public healthcare system of the Province of Trento scales down the role of social relationships in facilitating access to health information and healthcare services (see Tables 2 and 3). The analysis in Fiorillo and Sabatini (2011b) differs as it was conducted at the nation-wide level, thereby including Southern regions which are traditionally characterized by less efficient public healthcare systems and significant health inequalities. In these regions, social contacts are a crucial asset in facilitating access to information and services. It is worth noting that Italy is currently experiencing a process of decentralization of social policies, which has led to the creation of a number of regional markets for health services. This process has resulted in marked and growing differentiation and inequalities between regions. Second, the authors do not account for measures of life satisfaction. Thus, the effect of the quality of friendships could be due to its positive correlation with happiness. In support of the hypothesis of orthogonality, probit and ordered logit regressions do not find any significant correlation between satisfaction with friendships and self-reported health in our sample.

As regards the other instrument, social trust has been found to be significantly and positively correlated with happiness in most individual-level studies on social capital and well-being (see, for example, Diener and Seligman, 2004; Heliwell, 2006; Leung et al., 2011; Requena, 2010). The correlation has also been confirmed at the cross-country level (Bjørnskov, 2008). On the other hand, a significant and positive association between interpersonal mistrust and unhappiness has been found in survey-based empirical investigations (see, for example, Tokuda and Inoguchi, 2008) as well as in experimental studies (see, for example, Charness and Grosskopf, 2001). As mentioned above, our finding of a significant and positive correlation between social trust and happiness in the first stage of the instrumental variables probit (see Section 3) supports the relevance of this instrument.

As for the orthogonality condition, it must be stated that there are studies that find a positive effect of social trust on individual health (Poortinga, 2006; De Silva et al., 2007; Giordano and Lindstrom, 2010), but they do not simultaneously include measures of happiness. Thus, the effect of social trust could be due to its positive correlation with happiness. Several studies do not find any correlation between social trust and perceived health (Kennelly et al., 2003; Carlson, 2004; Fiorillo and Sabatini, 2011a). Some studies find that the association between social trust and various measures of health is not robust to different specifications (Kim et al., 2006; Folland, 2007; Baron-Epel et al., 2008; Mansyur et al., 2008). While results from the empirical literature seem to be somewhat conflicting, it is worth noting that to date we lack a theoretical explanation of the causal mechanism possibly connecting social trust with health. In our sample, probit and logit regressions and structural equations models failed to find any correlation between health and social trust.¹

In light of the arguments outlined above and of the estimates carried out within the empirical analysis, it seems reasonable to

assume that, in the population under investigation, there is no direct link between social trust and health. Finally, as mentioned earlier, we test the validity of our instruments with an over-identification test. The Amemiya–Lee–Newey test statistic, which is distributed as a with one degree of freedom, is .033 (p -value = .8568), thus we cannot reject the orthogonality of the set of instruments with a conventional error of 1%.

3. Empirical analysis

Our empirical model of perceived health can be represented through the following estimation equation:

$$H_{it}^* = \alpha + Ha_{it}'\beta + SC_{it}'\gamma + Z_{it}'\delta + \varepsilon_{it} \quad (1)$$

where H is self-reported health for individual i at time t , Ha is happiness, SC are the social capital variables defined at the individual level, the Z vector consists of the other variables that are believed to influence self-perceived health, and ε is a random-error term.

We do not observe the “latent” variable in the data. Rather, we observe as a binary choice which takes value 1 (fair or good perceived health) if is positive and 0 otherwise. Thus, the structure of (1) makes it suitable for estimation as a probit model:

$$\Pr(H_{it} = 1) = \Phi(\alpha - Ha_{it}'\beta - SC_{it}'\gamma - Z_{it}'\delta) \quad (2)$$

where $\Phi(\cdot)$ is the cumulative distribution function of a normal standard.

Table 2 presents the results of the probit estimates. To compare relative magnitudes of the effects of the independent variables, we report their marginal effects. In model 1, we principally focus on happiness, which is found to be the most significant predictor of self-rated health. As expected, economic well-being and tertiary education are significantly and positively correlated with the dependent variable, while age exhibits a significant and negative correlation.

In model 2, we introduce the dummies representing the relevance of interviewees' social contacts in relation to possible health problems. No appreciable changes occur in the probit estimates and marginal effects. Contrary to what has been found in other samples, people living alone do not exhibit a significant probability of reporting bad health.

In model 3, we add the indicators of structural and cognitive social capital. Happiness remains the strongest predictor of self-rated health, exhibiting a highly significant and positive correlation with the dependent variable. The sign, significance and size of all the other independent variables remain unchanged.

Feeling happy raises the probability of reporting good health by 23.5%. Being satisfied with one's own economic conditions is related to a 14% higher probability of reporting good health.

Education is another relevant predictor of health, but only at the highest level of qualification. Having a bachelor degree (or above) increases the probability of perceived good health by about 20.9%.

Variables measuring the structural and cognitive aspects of social capital seem to be irrelevant. We interpret this finding as a result of the contained level of inequalities and of the inclusiveness and efficiency of the public healthcare system, which provides universal coverage for all citizens at the point of use. Since all citizens are entitled to quality healthcare services on a universal basis, it seems reasonable to expect interpersonal contacts not to have a significant role in accessing these services. Another important factor scaling down the possible role of interpersonal ties can be retrieved from the exceptional endowments of social capital of the Province of Trento registered by previous studies (Sabatini, 2008,

¹ Logit regressions were performed using health as a categorical dependent variable. Results are not reported in this paper and are available upon request to the author.

Table 2
Probit estimates.

	Model 1		Model 2		Model 3	
	Marginal effect	t stat.	Marginal effect	t stat.	Marginal effect.	t stat.
Happiness	.2338081	6.18	.230729	6.01	.233911	6.02
<i>Social capital</i>						
Meets relatives at least twice a week					.046254	1.04
Meets friends at least twice a week					.041779	1.10
Membership of associations					.023626	.60
Trust towards the parliament					.029858	.70
Trust towards the police					-.03862	-1.05
Trust towards the prime minister					-.04881	-1.14
Trust towards local politicians					-.01111	-.30
<i>People to whom the interviewee would turn for health assistance</i>						
Would not turn to anyone for health assistance			-.118482	-.79	-.10280	-.69
Would turn to public institutions			-.045383	-1.14	-.04610	-1.16
Would turn to cooperative enterprises			.042630	.84	.03846	.75
Would turn to friends			-.01862	-.46	-.03323	-.80
Would turn to relatives			-.025118	-.54	-.02886	-.60
<i>Socio-demographic and economic characteristics</i>						
Age 35–49	-.152483	-1.85	-.156059	-1.87	-.14266	-1.73
Age 50–64	-.195322	-2.32	-.193484	-2.26	-.17307	-2.04
Age 65 and over	-.273779	-3.00	-.269458	-2.92	-.24210	-2.67
Gender	-.058547	-1.65	-.057585	-1.61	-.05102	-1.40
Being in a stable relationship	-.074812	-1.16	-.073623	-1.13	-.06996	-1.06
Elementary school	-.027403	-.19	-.010581	-.07	-.02987	-.20
Low school	.107267	.88	.12136	.99	.09821	.77
High school	.149206	1.13	.170600	1.27	.1387	1.02
Bachelor degree or above	.216389	2.26	.233507	2.51	.210317	2.12
Not working	-.039563	-.30	-.026648	-.20	-.04208	-.32
Employee with a permanent job	-.006269	-.05	.012104	.09	-.00329	-.03
Self-employed	-.048902	-.33	-.028449	-.19	-.04156	-.28
Lives alone	-.020447	-.23	-.014482	-.16	-.00429	-.05
Lives with parents	-.059061	-.61	-.048015	-.49	-.04710	-.48
Lives with partner	.010525	.12	.011011	.12	.02949	.33
Lives with children	.034862	.73	.042958	.91	.05258	1.15
Lives with siblings	.102691	1.47	.100882	1.43	.09868	1.38
Number of children	.009593	.53	.008151	.45	-.0048	-1.47
Area or residence (urban vs. rural)	-.045349	-1.22	-.045108	-1.21	-.04748	-1.25
Economic well-being	.146178	2.49	.150521	2.54	.140579	2.37
Observations	796		796			710

Omitted categories are: "Age 18–34", "No educational qualification", "Employee with a temporary position", "Lives with other relatives", "Would turn to colleagues".

2009b). If most citizens are endowed with high levels of social capital, it is more difficult to find social capital-based health disparities in the sample. In a society rich in participation opportunities, where people meet frequently, health information is likely to be shared with the largest number of people.

Table 3 reports the marginal effects of the second stage of the instrumental variables estimates, along with diagnostic tests of the validity of our instrumental variable estimators. The Amemiya–Lee–Newey test of over-identifying restrictions does not lead us to reject the orthogonality of our instruments with respect to the disturbance term of the health equation with *p*-value greater than .85. The F-statistics, testing the hypothesis that the coefficient of the excluded instruments are all zero in each first-stage estimate, are well above the threshold of 10 suggested by the literature as the rule of thumb criterion of instrument weakness. This latter test was carried out in the Linear Probability Model. Taken together with the non-rejection of the test of over-identification, this suggests that our set of instruments is reasonable. When we address the endogeneity of happiness in IV estimates, we find an 88% increase in its marginal effect. Overall, happiness remains the best predictor of self-reported health. The significance of all the other independent variables is scaled down. In summary, the instrumental variable results confirm the role of happiness as presented in Table 2.

As a robustness check, and in order to exploit all the information provided by the ordinal versions of the health and of the happiness variable, we also performed ordered probit estimates, which fully confirm the results exposed so far in this section. Table 4 reports the

marginal effects describing the determinants of good health, i.e. self-reported health = 5 ("very good"). Variables measuring trust in institutions were not significant and were omitted for brevity.

4. Concluding remarks

This paper has carried out an investigation into the relationship between self-reported health and happiness in a representative sample of the population of the Italian Province of Trento.

Our choice to focus on the Province of Trento was due to results from previous empirical studies, which found the territory to be characterized by contained inequalities (including health disparities), as well as by exceptional levels of well-being and social capital. Moreover, the region is characterized by an extensive and efficient public healthcare system. In our view, these features may allow the researcher to better isolate the behavioural determinants of health.

The empirical strategy was based on probit and ordered probit regressions and instrumental variables (IV) estimates. Happiness is found to be the best predictor of health in all stages of the analysis.

The possible effect of happiness on health may work through two main channels of transmission. First, happiness and positive attitudes towards life prevent the autonomic nervous system from activating physiological reactions that could have cumulative detrimental effects on health. Second, happy people may be more inclined to behave in a healthy way (e.g. engaging in sports and

Table 3
Instrumental variables estimates.

	Marginal effect	t statistic
Happiness	.4404501	2.83
Meets relatives at least twice a week	.04979	1.16
Meets friends at least twice a week	.0357306	.92
Membership of associations	.0112679	.28
Trust towards the parliament	.0306624	.71
Trust towards the police	-.0559987	-1.42
Trust towards the prime minister	-.0475925	-1.08
Trust towards local politicians	-.0012596	-.03
Would not turn to anyone for health assistance	-.0475387	-.31
Would turn to public institutions	-.02596	-.62
Would turn to cooperative enterprises	.0328834	.62
Would turn to friends	-.0492604	-1.13
Would turn to relatives	-.0399402	-.84
Age 35–49	-.1001164	-1.22
Age 50–64	-.1405434	-1.64
Age 65 and over	-.1723438	-1.80
Gender	-.0646845	-1.68
Being in a stable relationship	-.0853556	-1.16
Elementary school	.0152156	.08
Low school	.1219033	.69
High school	.185989	.96
Bachelor degree or above	.2360765	1.71
Not working	.0627633	.37
Employee with a permanent job	.0960369	.59
Self-employed	.0907256	.59
Lives alone	-.0206704	-.22
Lives with parents	-.0354092	-.35
Lives with partner	.0002625	.00
Lives with children	.0245924	.50
Lives with siblings	.0640693	.84
Number of children	-.0034395	-.49
Area or residence (urban vs. rural)	-.0423224	-1.12
Economic well-being	.1184573	1.96
Observations	694	

Omitted categories are the same as in Table 2.

Instrumental variables diagnostics.

Test of over-identifying restrictions: Amemiya–Lee–Newey minimum chi-sq statistic = .033; Chi-sq(1) P-value = .8568.

Joint significance coefficient $F = 16.95$; Prob > $F = .0000$.

watching their weight) and to avoid unhealthy behaviours such as smoking, drinking and overeating.

Theoretical arguments, diagnostic tests and evidence from previous literature support the hypothesis that the instruments we accounted for within IV estimates can be reasonably excluded from the health equation. In order to avoid the risk of omitting variables that are simultaneously correlated with happiness and self-reported health, we have included many covariates in the probit and IV probit. The analysis has focussed in particular on the possible role of social capital, which, according to the literature, plays an important role in the determination of health.

Overall, the analysis does not find significant health disparities based on education and work status. This result differentiates the Province of Trento from the rest of Italy, where health inequalities have been found by previous studies, especially in southern regions (Atella et al., 2004; Giannoni et al., 2007; Masseria and Giannoni, 2010), and confirms the exceptional performance of this territory in terms of indicators of well-being, as previously found by comparative studies on the Italian regions (Sabatini, 2008, 2009b). As is to be expected, the absence of health disparities markedly reduces the role of social capital which, by contrast, has been found to play a major role in other Italian regions (Fiorillo and Sabatini, 2011a, 2011b) – the literature has shown that informal financial support and social contacts play a role in ensuring access to healthcare services mostly when public healthcare systems do not provide universal coverage for all patients. This is not the case of the population object of our study, as the Trentino province is characterized by an extensive and traditionally efficient public

Table 4
Determinants of good health.

	Model 1		Model 2	
	Marginal effect	t stat.	Marginal effect	t stat.
Happiness	.0509166	6.67	.0508032	6.58
<i>Social capital</i>				
Meets relatives at least twice a week			-.009919	-.27
Meets friends at least twice a week			-.003252	-.10
Membership of associations			.037531	1.35
Membership of cooperatives			.008114	.28
Volunteering			.017513	.24
<i>People to whom the interviewee would turn for health assistance</i>				
Would not turn to anyone for health assistance			-.02306	-.24
Would turn to public institutions			-.02378	-.90
Would turn to cooperative enterprises			-.013432	-.37
Would turn to friends			-.018165	-.66
Would turn to relatives			-.022073	-.64
<i>Socio-demographic and economic characteristics</i>				
Age 35–49	-.133420	-3.16	-.138684	-3.25
Age 50–64	-.169709	-4.53	-.172459	-4.53
Age 65 and over	-.196704	-4.95	-.198806	-4.94
Gender	-.066360	-2.67	-.058003	-2.25
Being in a stable relationship	.016717	.38	.017752	.40
Elementary school	-.166123	-4.06	-.162168	-3.85
Low school	-.140229	-2.92	-.136306	-2.80
High school	-.104401	-1.79	-.1006	-1.72
Bachelor degree or above	-.064077	-1.11	-.059092	-1.02
Not working	.054899	.47	.042586	.37
Employee with a permanent job	.038046	.33	.029623	.25
Self-employed	.056141	.43	.044281	.34
Lives alone	-.019551	-.33	-.020922	-.35
Lives with parents	-.021239	-.33	-.018478	-.28
Lives with partner	-.026442	-.43	-.028004	-.45
Lives with children	.038698	1.12	.038994	1.13
Lives with siblings	.042365	.76	.04234	.76
Number of children	.002247	.18	.001385	.11
Area or residence (urban vs. rural)	-.048527	-2.01	-.045678	-1.86
Economic well-being	-.011023	-.97	-.011473	-.99
Observations	796		710	

healthcare system, which renders the role of interpersonal ties less relevant.

Despite all the robustness checks we carried out in the different stages of the analysis, it must be remarked that the cross-sectional design of the research dictates extreme caution in the interpretation of correlations as causal relationships. Nonetheless, the paper contributes to the literature in three substantive ways. First, we have carried out the first empirical analysis of the relationship between happiness and health in Italy. Second, we have controlled for the role of important economic factors, such as measures of material well-being, work status and participation in different types of enterprises, as well as the influence possibly exerted by various dimensions of social capital. Finally, our unique and very recent dataset collected in a region traditionally characterized by an efficient welfare system and very low health inequalities adds further value to the analysis.

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