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Insurance holdings: Does individual insurance literacy matter?

Paola Bongini [a], Doriana Cucinelli [b,*], Maria Gaia Soana [b]

[a] University of Milano Bicocca, Italy
[b] University of Parma, Italy

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ABSTRACT

Using a representative sample and a measure of insurance literacy developed and validated by an insurance supervisor, this study tests the impact of insurance literacy on the holding of insurance products in Italy. We show that insurance literacy influences insurance purchase decisions along with age, marital status, education, employment status, and having children. The greater the literacy, the higher the individual's participation in the insurance market. Given the lower level of insurance literacy compared to financial literacy, policymakers and institutions must provide more insurance education.

1. Introduction

Underinsurance in both life and non-life segments is a social problem worldwide (MAPFRE, 2021). Although extant literature examines some reasons explaining individual underinsurance, such as the perceived complexity of insurance products, behavioral biases, and institutional, economic, and socio-demographic factors (Driver et al., 2018; Pittman and De Witte, 2021), the lack of insurance literacy (IL) has been so far almost totally ignored. We aim to fill the gap by investigating whether individuals' IL supports insurance policies' holdings in Italy.

We make twofold contributions to the literature. First, to the best of our knowledge, we are the first to use a measure of IL developed and validated by an Insurance Supervisory Authority. Contrarily to what happens in the domain of financial literacy, no shared definition of insurance literacy is present in the academic literature or international bodies and networks, such as the OECD INFE (OECD/INFE, 2022; Ye and Yue, 2023). Besides, our measure of IL considers both basic and advanced knowledge of insurance characteristics, providing more comprehensive evidence of its impact on the holding of insurance products. Moreover, this is the first study investigating the effect of IL on the holding of insurance products in a developed country. In this context, Italy is a valuable investigation site. IL in Italy is particularly low (IVASS 2021, 2022), both in absolute terms and when compared to FL (Cesari and D'Aurizio, 2021), and underinsurance is widespread, especially in the non-life sectors. The high proportion of uninsured Italians raises concern about the vulnerability of individuals, and it also suggests ample room for growth of the insurance industry if underinsurance determinants are adequately known and addressed.

The remainder of the paper is structured as follows. Section 2 reviews previous literature. Sections 3 and 4 describe the sample, variables, and methodology. Our main results are discussed in Section 5. Section 6 reports additional analysis and robustness checks. Our conclusions are reported in Section 7.

* Corresponding author.
E-mail address: Doriana.cucinelli@unpr.it (D. Cucinelli).

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2. Literature review

Insurance represents an essential economic element in addressing risks, from traditional life risks to more recent climate-related ones (Liu et al., 2023). However, most individuals perceive decision-making about risk as particularly difficult (Huang et al., 2016) and consider insurance policies one of the most complex products purchased in a lifetime (Tennyson, 2011; Driver et al., 2018). Extant literature has so far documented that this perceived high complexity, together with behavioral biases, the quality of insurance supervision, and the degree of trust in the insurers, affect the demand for insurance and lead individuals to ignore the opportunity to insure against risks (Driver et al., 2018; Lin et al., 2019; Pitthan and De Witte, 2021). In this context, a lack of insurance literacy (IL) can also explain individual underinsurance.

While the link between financial literacy (FL) and financial choices is well documented, showing that high FL leads individuals to better financial decisions (Van Rooij et al., 2011; Lusardi and Tufano, 2015; Chhatwani and Mishra, 2022; Kim et al., 2022; Yamori and Ueyama, 2022), surprisingly very little literature considers the impact of individuals' IL on insurance decisions.

Some studies focus on the impact of FL on insurance decisions. They find that individuals with higher FL tend to plan for retirement (Bucher-Koenen and Lusardi, 2011; Gallego-Losada et al., 2022) and to hold life insurance products (Armantier et al., 2023; Wang et al., 2021; Lin et al., 2017; Allgood and Walstad, 2016; Luciano et al., 2016).

However, FL does not necessarily translate into IL (Lin et al., 2019; Sanjeewa and Hongbing, 2019); moreover, only a few papers have studied the impact of IL on insurance decisions. Mare et al. (2019) demonstrate the positive influence of self-rated life insurance knowledge of 1579 Romanian citizens on premiums per capita in Romania. Lin et al. (2019) show that Australian post-graduate students with higher IL can better apply their knowledge to insurance decisions than other students. Sanjeeva and Hongbing (2019) find that Sri Lankans' IL positively affects their favorable attitude toward personal insurance and behavioral intention toward purchasing an individual insurance plan. Lin et al. (2017) demonstrate that IL is positively and significantly associated with possessing life insurance in Taiwan. Uddin (2017) shows that a higher IL score increases the likelihood of owning all micro-insurance policies (health, life, automobile, and property insurance) in India.

Interestingly, there is currently a lack of analyses on the impact of IL on insurance decisions in developed countries. However, exploring the consequences of IL on insurance purchase decisions is crucial for developing the insurance sector and contrasting underinsurance. It also has practical implications for policymakers to invest in educational programs purposefully. Our analysis, conducted on a representative sample of 2053 individuals, aims to fill this gap. Specifically, our study demonstrates the positive impact of IL on the holding of insurance products and, therefore, the crucial role of IL in supporting insurance purchase decisions.

3. Sample and variables

IVASS, the Italian insurance supervisory authority, provided data for our analysis; in 2020, the authority surveyed Italian adults' IL and insurance behaviors ("Conoscenze e comportamenti assicurativi degli Italiani"). Although the survey was conducted during the first wave of the COVID-19 pandemic, when lockdowns significantly reduced economic activity in most countries and created uncertainty for many about their future income, the respondents' answers are not likely to be considerably affected by the pandemic outburst. Insurance Europe (2020) and Swiss Re (2021) report in fact that there was no marked trend in the impact of the pandemic on the insurance market for both the life and non-life sectors during the period under investigation. At the same time, questions used to measure respondents' insurance literacy level focus on general aspects of insurance contracts that should be known by an aware consumer and help capture a latent variable such as insurance literacy.

The sample is composed of 2053 Italian residents at least 18 years old. The sample was stratified per quota based on gender, geographical area of residence, and municipality size. The names of the potential interviewees were randomly extracted from the lists of municipal constituencies following defined "extraction steps." All the interviews were conducted face-to-face in suitable and private areas.

We measure IL using the questions provided by the IVASS questionnaire (see Appendix 2). Following the literature on FL (see, among others, Lusardi, 2008; Lusardi and Tufano, 2015), we assign one point to each correct answer and zero to both incorrect and "don't know" responses. IL can assume values from 0 to 25.

Table 1 summarizes the sample composition, the information about IL, and the average number of insurance products owned by the respondents.[1]

Italians' IL is shallow globally, with an average score of 7.9 over 25. This evidence confirms Cucinelli et al. (2021) and IVASS (2021) findings. Considering Italians' low IL level, it is unsurprising that they own a minimal number of insurance policies. Of over 11 insurance products investigated, Italians have, on average, 2.64 insurance products in their portfolio.[2]

4. Methodology

To answer our research question (*does insurance literacy play a role in insurance holdings?*), we run an ordered probit regression that is specified as:

[1] The complete descriptive statistics are reported in the Appendix in Table A2.
[2] The description of variables is reported in the Appendix in Table A1.

Table 1
Sample description.

Variable	Obs	%	Insurance Literacy	Owned insurance products
Total	2053	100%	7.899	2.64
Gender				
Female	1042	50.76%	6.534	2.445
Male	1011	49.25%	9.308	2.845
Age				
18 −34	327	15.93%	6.107	2.434
35 −54	766	37.31%	8.655	2.809
55 −64	444	21.63%	8.984	2.984
65 −74	296	14.42%	7.834	2.429
74	220	10.72%	5.832	1.964
Employment status				
Employed (total)	–	–	*9.238*	*3.073*
Employed public	215	10.47%	9.037	2.632
Employed private	557	27.13%	8.811	2.913
Self-employed	305	14.86%	10.157	3.675
Looking for a job	72	3.51%	5.694	1.806
Retired	514	25.04%	7.097	2.259
Unemployed	390	19.00%	5.669	2.11
Marital Status				
Divorced	153	7.45%	8.797	2.386
Single	497	24.21%	7.157	2.332
Married	1248	60.79%	8.474	2.913
Widows	155	7.55%	4.768	1.703
Children				
No	1198	58.35%	7.578	2.405
Yes	855	41.65%	8.35	2.974
Education				
University or more	402	19.58%	9.674	2.97
High school	974	47.44%	8.786	2.838
Secondary school	515	25.09%	6.118	2.417
Primary school or less	162	7.89%	3.827	1.364
Home owners				
Lives for rent	401	19.53%	6.81	2.581
Home owners	1652	80.47%	8.164	2.686
Geographical Area				
Center	352	17.15%	8.071	2.48
Islands	233	11.35%	5.485	1.695
North east	418	20.36%	9.469	3.328
North west	581	28.30%	9.141	3.255
South	469	22.85%	6.034	1.864

The table reports the sample description in terms of socio-demographic and -economic characteristics for the number and percentage of individuals. It also shows the average score of basic, product, and total insurance literacy and the average number of insurance products owned by respondents. The average scores are reported for each category of socio-demographic and socioeconomic variables.

$$Y_i = \alpha_i + \eta_i IL_i + \sum_i^n \beta_i X_i + \sum_i^n \gamma_i Z_i + \sum_i^n \delta_i W_i + \sum_i^n \rho_i R_i + \varepsilon_i \quad (1)$$

Y_i denotes the holding of insurance products (life and non-life) owned by the respondent.

IL is the individuals' insurance literacy. X_i is the vector of socio-demographic variables and includes gender, age, marital status, education level, and the presence of children in the family. Z_i is the vector of socioeconomic variables and includes respondents' employment status and if the respondent is a homeowner (Lusardi and Mitchell, 2011; Chen and Garand, 2018; Cupàk et al., 2019; Cucinelli et al., 2021; Armantier et al., 2023). We also include the geographical area in which the respondent lives (W_i) and the information (R_i) about the respondent's risk aversion and risk perception (Amantier et al., 2023; Cupàk et al., 2019; Bannier and Schwarz, 2018). ε_i is the error term. A detailed description of the variables is reported in the Appendix 1.

An instrumental variable (IV) ordered probit regression is also run to consider potential endogeneity. Jappelli and Padula (2011), Cupàk et al. (2019), Yamori and Ueyama (2022) and Ye and Yue (2023) theoretically investigate the endogeneity of financial literacy in savings and financial decisions and show that omitted variables can be problematic. In our case, IL endogeneity may derive from experience, i.e., the experience of investing in insurance products, an individual's efforts to learn how to manage risks, or other unobserved factors that simultaneously drive both decisions to purchase insurance products and improve one's IL. Reverse causality is also a potential problem; holding insurance products likely provides some insurance literacy training. Therefore, we instrument IL as:

- First stage:

$$IL_i = \alpha_i + \sum_i^n \beta_i X_i + \sum_i^n \gamma_i Z_i + \delta_n IL\_AREA_n + \varepsilon_i \quad (2)$$

- Second stage:

$$Y_i = \alpha_i + \eta_i \widehat{IL_i} + \sum_i^n \beta_i X_i + \sum_i^n \gamma_i Z_i + \sum_i^n \delta_i W_i + \sum_i^n \rho_i R_i + \varepsilon_i \quad (3)$$

Following the literature, we use the average insurance literacy of the geographical area where the respondent lives (IL_AREA) as an instrumental variable. Since individuals can improve their IL by learning from others around them Bucher-Koenen and Lusardi, 2011; Calcagno and Monticone, 2015), average IL at the geographical level represents an ideal instrumental variable. So $\widehat{IL}$ enters in the second stage as the predicted value from the first stage.[3] All the other vectors included in Eqs. (2) and ((3) are the same as Eq. (1).

5. Results

Table 2 reports our results on the relationship between IL and the holding of insurance products.[4] Column (1) shows the results of the ordered probit regression, Column (2) the findings of the first step of the IV-ordered probit regression, while Column (3) reports the results of the second step of the IV-ordered probit model.

Columns (1) and (3) display the determinants of insurance purchase decisions and show that the higher the IL, the higher the number of insurance products owned. This supports the little existing evidence on the topic (Uddin, 2017; Lin et al., 2017; Mare et al., 2019). Our results suggest that knowledge of insurance terminology, the main characteristics of insurance contracts, including rights and responsibilities, and the functioning of deductibles increases the probability of holding insurance products. Our evidence highlights how IL is critical in developing an insurance market. As in the case of FL, the higher the literacy level about insurance, the higher the individual's participation in the insurance market. As the level of IL is lower than that of financial literacy (Cesari and D'Aurizio, 2021), more significant efforts in education in insurance are required from policymakers and institutions.

With regards to the first step of the IV regression, we confirm that our instrumental variable, i.e., the average IL at the geographical level, shows a positive and statistically significant relationship with individuals' IL, consistent with previous findings in the financial literacy domain (Lachance, 2014; Cucinelli et al., 2019) that highlighted the crucial role of the local context in which the individual lives in affecting their literacy.

Our results also show that some socio-demographic variables influence insurance purchase decisions: age, marital status, education, employment status, number of children, and where people live.

Table 2 (Model 2) confirms that the traditional socio-demographic variables - age, gender, marital status, education, employment status, and homeowners - influencing FL also affect IL.

6. Additional analyses and robustness checks

We run several additional analyses and robustness checks.

6.1. Additional analyses

First, we consider life and non-life insurance decisions separately, distinguishing our work from the previous literature. The dependent variable of Eq. (3) is alternatively measured by: a) the number of life insurance products owned by the respondent; b) the number of non-life insurance products owned by the respondent. Our Findings are reported in Table 3 and strongly confirm our main results, i.e., the higher the IL, the higher the number of insurance products owned independently of the type of insurance holdings.

Second, we distinguish between a *basic IL* and an *advanced IL*. Basic insurance literacy concerns understanding the classical terms of insurance products (premium, deductible, and insurance ceilings). As we sum all the correct answers to 11 questions, this variable takes values from 0 to 11. Advanced insurance literacy requires the respondents to demonstrate familiarity with specific insurance products that: *i)* insure against injuries; *ii)* insure against cases of death; *iii)* allow pension investments; *iv)* are life insurance products. ADVANCED_LITERACY is calculated as the sum of all correct answers and ranges from 0 to 14.

Results of the first and second steps of the IV-ordered probit regression are reported in Table 4. The findings of the main analysis are confirmed: basic insurance literacy has an impact that can be further improved when this literacy flourishes.

[3] In the tables of results, we report this variable as IL_inst.

[4] The nonsignificant Anderson canonical correlation LM statistic and the associated p-values reveal no strong evidence of under-identification issue. The weak identification test suggests a reasonably strong identification power of the instruments. The Sargan statistic confirms that the model is precisely identified, with no overidentification.

Table 2
Insurance literacy and holding of insurance products.

	(1) Ordered probit	(2) I step IV regression Dependent IK	(3) II step IV regression
IL/IL_inst	0.058***	–	0.134***
	(0.005)		(0.010)
FEMALE	0.035	−0.521***	−0.026
	(0.052)	(0.049)	(0.094)
AGE	−0.010	0.071***	−0.039**
	(0.010)	(0.009)	(0.017)
AGE2	0.000	−0.001***	0.000**
	(0.000)	(0.000)	(0.000)
DIVORCED	−0.250***	0.045	−0.440***
	(0.093)	(0.088)	(0.167)
SINGLE	−0.212***	−0.095	−0.238**
	(0.074)	(0.073)	(0.027)
WIDOWED	−0.373***	−0.231**	−0.383***
	(0.105)	(0.102)	(0.145)
HOME-OWNER	0.502***	0.262***	0.670***
	(0.063)	(0.061)	(0.097)
UNIVERSITY	0.349***	1.038***	0.188**
	(0.121)	(0.109)	(0.067)
HIGH SCHOOL	0.403***	0.900***	0.292**
	(0.110)	(0.096)	(0.144)
LOWER SECONDARY SCHOOL	0.378***	0.300***	0.432***
	(0.109)	(0.097)	(0.142)
EMPLOYED_PRIVATE	0.208***	0.205***	0.298**
	(0.071)	(0.068)	(0.119)
EMPLOYED_PUBLIC	0.182*	0.160*	0.223
	(0.093)	(0.093)	(0.162)
RETIREED	0.197**	0.092	0.176
	(0.099)	(0.094)	(0.160)
SELF_EMPLOYED	0.468***	0.299***	0.854***
	(0.085)	(0.084)	(0.159)
CHILDREN	0.174***	0.038	0.298***
	(0.057)	(0.053)	(0.096)
CENTER	0.365***	–	0.361***
	(0.072)		(0.114)
NORTHEAST	0.722***	–	1.062***
	(0.069)		(0.123)
NORTH -WEST	0.66***	–	0.999***
	(0.064)		(0.109)
RISK PERCEPTION	0.298***	–	0.483***
	(0.040)		(0.068)
RISK AVERSION	0.007***	–	0.012***
	(0.001)		(0.002)
IL_AREA	–	0.187***	–
		(0.015)	
Constant	–	–	−0.995**
			(0.472)
Observations	2053		2053
R-squared/Pseudo R2	0.1033	0.0581	0.294
Under-identification test (Anderson canon. corr. LM statistic)	–	0.413	–
Weak identification test (Cragg-Donald Wald F statistic)	–	25.06	–
Sargan Test	–	0.000	–

The table reports results of our main analysis. Column (1) shows the results of the ordered probit regression. In column (2) we report the result of the first step of the IV ordered probit regression where we instrument the insurance literacy. IK AREA is the instrumental variable and it is a categorical variable that measures the insurance literacy at geographical area in which the respondent lives. Column (3) reports results of the IV ordered probit regression and test the relationship between insurance literacy and insurance purchased products. Robust standard errors are in parentheses.

*** $p<.01$,.

** $p<.05$,.

* $p<.1$.

Table 3
Insurance literacy and holding of insurance products (IV ordered probit regression).

	(1) Non-life products	(2) Life products
IL_inst	0.095***	0.039***
	(0.008)	(0.004)
FEMALE	0.002	−0.027
	(0.072)	(0.037)
AGE	−0.034***	−0.005
	(0.013)	(0.006)
AGE2	0.000**	0.000
	(0.000)	(0.000)
DIVORCED	−0.297**	−0.143**
	(0.134)	(0.058)
SINGLE	−0.218**	−0.026
	(0.097)	(0.047)
WIDOWED	−0.353***	−0.022
	(0.115)	(0.128)
HOME-OWNER	0.557***	0.110***
	(0.076)	(0.039)
UNIVERSITY	0.100**	0.090**
	(0.030)	(0.016)
HIGH SCHOOL	0.227**	0.073**
	(0.114)	(0.014)
LOWER SECONDARY SCHOOL	0.381***	0.056
	(0.112)	(0.052)
EMPLOYED_PRIVATE	0.210**	0.078
	(0.091)	(0.048)
EMPLOYED_PUBLIC	0.264**	−0.048
	(0.124)	(0.059)
RETIREED	0.212*	−0.037
	(0.125)	(0.062)
SELF_EMPLOYED	0.615***	0.247***
	(0.122)	(0.062)
CHILDREN	0.190**	0.114***
	(0.074)	(0.037)
CENTER	0.415***	−0.043
	(0.088)	(0.045)
NORTHEAST	1.020***	0.052
	(0.095)	(0.046)
NORTH -WEST	0.956***	0.053
	(0.083)	(0.043)
RISK PERCEPTION	0.360***	0.124***
	(0.053)	(0.025)
RISK AVERSION	0.010***	0.002**
	(0.002)	(0.001)
IL_AREA	–	–
Constant	−0.587	−0.423**
	(0.363)	(0.176)
Observations	2053	2053
R-squared/Pseudo R2	0.302	0.135

The table shows the results of the relationship between insurance literacy (instrumented) and the insurance products owned by individuals, distinguishing between non-life insurance products (Column (1)) and life insurance products (Column (2)). Robust standard errors are in parentheses.
*** $p<.01$,.
** $p<.05$,.
* $p<.1$.

6.2. Robustness checks

The first robustness check excludes the two non-life mandatory policies among the insurance products considered in the survey.[5] We therefore run Regression (3) on the holding of the total number of non-mandatory insurance products (a) and the total number of non-mandatory non-life insurance products (b). Our findings are reported in Table 5. They show that the relationship between IL and non-mandatory insurance products is statistically significant and positive. These results confirm our main analysis.

[5] In Italy, car insurance is compulsory for individuals owning a car, and fire insurance is mandatory for house-owners with bank mortgages. However, the information about car owners and house-mortgage owners was not available from the survey questions, so in this study, both car and house fire insurance are treated as mandatory products.

Table 4
Basic and advanced insurance literacy and holding of insurance products (IV ordered probit regression).

	(1) I step IV ordered probit IK_basic	(2) II step IV ordered probit	(3) I step IV ordered probit IK_product	(4) II step IV ordered probit
IL_inst BASIC	–	0.222***	–	–
		(0.017)		
IL_inst_ADVANCED	–	–	–	0.337***
				(0.025)
FEMALE	−0.550***	−0.106	−0.255***	0.098
	(0.050)	(0.101)	(0.051)	(0.009)
AGE	0.069***	−0.043**	0.058***	−0.032*
	(0.010)	(0.018)	(0.009)	(0.016)
AGE2	−0.001***	0.000**	−0.001***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
DIVORCED	−0.020	−0.393**	0.074	−0.512***
	(0.089)	(0.175)	(0.096)	(0.168)
SINGLE	−0.054	−0.232*	−0.058	−0.245*
	(0.075)	(0.134)	(0.074)	(0.126)
WIDOWED	−0.317***	−0.299*	−0.033*	−0.510***
	(0.110)	(0.155)	(0.005)	(0.145)
HOME-OWNER	0.247***	0.651***	0.197***	0.699***
	(0.062)	(0.104)	(0.062)	(0.095)
UNIVERSITY	0.919***	0.169	0.912***	0.216
	(0.116)	(0.177)	(0.118)	(0.166)
HIGH SCHOOL	0.818***	0.259*	0.769***	0.342**
	(0.105)	(0.154)	(0.106)	(0.143)
LOWER SECONDARY SCHOOL	0.260**	0.413***	0.329***	0.460***
	(0.105)	(0.151)	(0.106)	(0.141)
EMPLOYED_PRIVATE	0.196***	0.285**	0.147**	0.318***
	(0.071)	(0.125)	(0.070)	(0.118)
EMPLOYED_PUBLIC	0.089	0.280	0.196*	0.138
	(0.096)	(0.171)	(0.093)	(0.160)
RETIRED	0.170*	0.118	−0.020	0.262*
	(0.103)	(0.170)	(0.095)	(0.156)
SELF_EMPLOYED	0.229***	0.877***	0.272***	0.819***
	(0.086)	(0.168)	(0.084)	(0.156)
CHILDREN	0.019	0.307***	0.067	0.284***
	(0.056)	(0.101)	(0.055)	(0.095)
CENTER	–	0.286**	–	0.474***
		(0.121)		(0.112)
NORTHEAST	–	0.995***	–	1.164***
		(0.130)		(0.119)
NORTH -WEST	–	0.919***	–	1.122***
		(0.116)		(0.106)
RISK PERCEPTION	–	0.509***	–	0.445***
		(0.072)		(0.067)
RISK AVERSION	–	0.011***	–	0.013***
		(0.002)		(0.002)
IL_advanced_area	–	–	0.339***	–
			(0.053)	
IL_basic_area	0.274***	–	–	–
	(0.022)			
Constant	–	−1.020**	–	−0.966**
		(0.495)		(0.466)
Observations		2053		2053
R-squared/Pseudo R2	0.066	0.218	0.043	0.311

The table reports the results of the IV ordered probit regression. In the first step of the analysis, the dependent variables are basic insurance literacy (column (1) and advanced insurance literacy (3)). In columns (2) and (4) we report the results of the second step of the analysis, i.e., the relationship between insurance literacy and holding of insurance products. Robust standard errors are in parentheses.

*** $p<.01$,.

** $p<.05$,.

* $p<.1$.

As second robustness check to control for endogeneity bias, we run a propensity score matching (PSM). We distinguish between individuals with a high and low level of IL, i.e., individuals in the last quartile of the distribution and individuals below this quartile. We use the nearest-neighbor procedure as a matching algorithm based on the same propensity score estimated (Caliendo and Kopeinig, 2008; Casu et al., 2013). Regarding the logistic regression, we use the same variables used in Eq. (2) as determinants of the dichotomous IL variable.

Table 5
Insurance literacy and holding of life and non-life (non-mandatory) insurance products.

	(a) Total non-mandatory Insurance products owned	(b) Non-mandatory Non-life insurance products owned
IL_inst	0.119***	0.079***
	(0.009)	(0.007)
FEMALE	−0.047	−0.019
	(0.085)	(0.063)
AGE	−0.037**	−0.032***
	(0.015)	(0.011)
AGE2	0.000**	0.000***
	(0.000)	(0.000)
DIVORCED	−0.337**	−0.193*
	(0.150)	(0.116)
SINGLE	−0.106	−0.085
	(0.113)	(0.082)
WIDOWED	−0.173	−0.144
	(0.127)	(0.097)
HOME-OWNER	0.482***	0.370***
	(0.089)	(0.066)
UNIVERSITY	0.143	0.059
	(0.153)	(0.114)
HIGH SCHOOL	0.186	0.121
	(0.131)	(0.098)
LOWER SECONDARY SCHOOL	0.312**	0.261***
	(0.129)	(0.096)
EMPLOYED_PRIVATE	0.216**	0.128
	(0.108)	(0.079)
EMPLOYED_PUBLIC	0.109	0.150
	(0.146)	(0.107)
LOOKING_FOR_A_JOB	0.104	0.139
	(0.144)	(0.106)
SELF_EMPLOYED	0.756***	0.515***
	(0.145)	(0.105)
CHILDREN	0.247***	0.139**
	(0.087)	(0.064)
CENTER	0.293***	0.346***
	(0.103)	(0.076)
NORTHEAST	0.940***	0.897***
	(0.111)	(0.082)
NORTH -WEST	0.860***	0.815***
	(0.101)	(0.073)
RISK PERCEPTION	0.415***	0.292***
	(0.062)	(0.046)
RISK AVERSION	0.010***	0.008***
	(0.002)	(0.001)
Constant	−1.502***	−1.094***
	(0.430)	(0.315)
Observations	2053	2053
R-squared	0.265	0.273

The table reports the results of the second step of the analysis, i.e., the relationship between insurance literacy and holding of insurance products (non-mandatory). Robust standard errors are in parentheses.
*** $p<.01$,.
** $p<.05$,.
* $p<.1$.

The results of the PSM are reported in Table 6 and underline a positive and significant effect of high insurance literacy and the holding of insurance products, confirming our main evidence. These results also hold when we divide the respondents considering the average level of insurance literacy instead of the last quartile.

Table 6
Propensity score matching.

Holding of insurance products	Coefficient	P-value	[95% conf.	interval]
Total insurance products	1.167	0.000	0.891	1.445
Non-life insurance products	0.032	0.001	0.013	0.050
Life insurance products	0.172	0.000	0.111	0.231

The table reports the results of the propensity score matching where the treated group is composed by individuals with the highest insurance literacy and the no-treated group is composed by individuals with low insurance literacy (below the last quartile).

7. Conclusions

This study demonstrates that IL is a significant positive determinant of holding insurance products. Our findings have implications for both policymakers and industry.

From the policy point of view, they suggest that supervisory authorities and governments should promote insurance education programs among consumers. Increased IL can be seen as the goal of insurance education and is necessary to challenge behavioral biases and accomplish behavioral changes, reflected in higher acceptance and better utilization of insurance products to achieve individuals' financial well-being (Sanjeewa and Hongbing, 2019). Our study suggests that those clusters in most need of educational intervention in insurance are also the typical targets of financial education programs, which should facilitate the design of comprehensive programs. Well-developed insurance literacy programs could raise awareness of the advantages of insurance policies and thus directly improve the quality of life, reduce state social spending, and stimulate the life insurance market. More insurance-literate clients should result in higher levels of demand for insurance products.

These findings have important implications for insurance companies and advisors, who thus need to target marketing and increase market penetration among less insured categories, i.e., elderly individuals without a partner, those less educated, jobless, and without children.

This study has certain limitations. First, our sample considers only Italy. Future studies could extend the investigation to other countries and compare results, as it happens in the domain of financial literacy, where there exists a questionnaire recognized at the international level (see e.g. the most recent OCSE/INFE 2022). The questionnaire proposed and validated by the Italian insurance supervisory authority could represent an initial step towards an international initiative promoting insurance literacy and insurance education programs.

Second, our data are limited to just one survey, therefore failing to consider different macro-financial environments, which can differently impact life and non-life insurance demand (Hodula et al., 2021). For instance, the pandemic has contributed to increasing awareness of risk and the possibility of managing it by resorting to insurance contracts. This aspect, together with the acceleration of digitalization, is expected to stimulate a future structural evolution of the global insurance market and, therefore, the demand for insurance (Swiss *Re*,2021). These trends should lead to an institutional effort in running further and periodical waves of the survey, which can allow the analysis of the evolution of IL considering different macro-financial scenarios. Besides, we are also aware that time series analyses would be useful to design and implement financial/insurance literacy policies and measuring their impact, as experienced in some countries for financial literacy (Angrisani et al., 2023; Bongini et al., 2023).

Declaration of Competing Interest

We endure that we do not have any conflict of interest.

We have ensured that this manuscript has not been published elsewhere and is not under consideration by any other journal.

Data availability

Data will be made available on request.

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Appendix 1 Tables

Table A1, Table A2.

Table A1
Variables description.

Variable	Description
TOTAL INSURANCE PRODUCT	It is the sum of insurance products owned by respondents and can assume value from 0 to 11.
IL	Insurance Literacy is a categorical variable that spans from 0 to 25
IL_BASIC	Basic Insurance Literacy is a categorical variable that spans from 0 to 11
IL_ADVANCE	Product Insurance Literacy is a categorical variable that spans from 0 to 14
FEMALE	A dummy variable that equals 1 if respondent is a woman, zero otherwise
AGE/AGE2	The natural logarithm of age and its squared
MARRIED	A dummy variable that equals 1 if respondent is married, zero otherwise
DIVORCED	A dummy variable that equals 1 if respondent is divorced, zero otherwise
SINGLE	A dummy variable that equals 1 if respondent is single, zero otherwise
WIDOWED	A dummy variable that equals 1 if respondent is widowed, zero otherwise
HOME-OWNER	A dummy variable that equals 1 if respondent own his/her home, zero otherwise
UNIVERSITY	A dummy variable that equals 1 if respondent has at least a university degree, zero otherwise
HIGH SCHOOL	A dummy variable that equals 1 if respondent has at least a high school diploma, zero otherwise
SECONDARY SCHOOL	A dummy variable that equals 1 if respondent has at least a secondary school diploma, zero otherwise
PRIMARY SCHOOL	A dummy variable that equals 1 if respondent has at least a primary school diploma, zero otherwise
UNEMPLOYED	A dummy variable that equals 1 if respondent is unemployed, zero otherwise
EMPLOYED PRIVATE	A dummy variable that equals 1 if respondent is employed in the private sector, zero otherwise
EMPLOYED PUBLIC	A dummy variable that equals 1 if respondent is employed in the public sector, zero otherwise
LOOKING FOR A JOB	A dummy variable that equals 1 if respondent is looking for a job, zero otherwise
RETIRED	A dummy variable that equals 1 if respondent is retired, zero otherwise
SELF EMPLOYED	A dummy variable that equals 1 if respondent is self-employed, zero otherwise
CHILDREN	A dummy variable that equals 1 if respondent lives at least with one child, zero otherwise
RISK PERCEPTION	The average of the score obtaining by answering to the following question "I read you a list of possible fears, for the present or the future, tell me which ones does it share a lot, which enough, which little and which not at all?" where the events are: job loss; income reduction when retired; health problems from illness or injury; suffer thefts, muggings, assaults…; not being able to provide for the welfare of children / grandchildren; having to support loved ones who are not self-sufficient; damage to homes; natural disasters (e.g. floods, earthquakes, etc.); cyber risks when browsing o buy online; damage that you or your family can do unintentionally causing others. Respondents can answer 1 (for nothing) to 4 (completely)
RISK AVERSION*	The score is defined following the instruction of IVASS (2021) and is a score that spans from 0 to 100. The higher the score, the higher the risk aversion
CENTER	A dummy variable that equals 1 if respondent lives in the center of Italy, zero otherwise
NORTHEAST	A dummy variable that equals 1 if respondent lives in the northeast of Italy, zero otherwise
NORTH -WEST	A dummy variable that equals 1 if respondent lives in the northwest of Italy, zero otherwise
SOUTH AND ISLANDS	A dummy variable that equals 1 if respondent lives in the south or on the islands of Italy, zero otherwise

*The risk aversion index is measured as follow:

1. Insurance is meaningless because the probability of damage is very low. Answer: Yes (−1); No (+1)
2. Insurance makes sense because it allows you to cover yourself from the possibility that you experience damage, but only when this probability is high. Answer: Yes (−1); No(+1)
3. Insurance makes sense because it allows you to cover yourself from the possibility that you experience damage even if this probability is very low. Answer: Yes (−1); No(+1)
4. In your opinion, after an accident has been suffered, compared to the average, what is the probability to suffer a similar accident in the following year? Answer:
   - More likely than mean = (+1).
   - Less likely than mean = (−1)
   - Probability equal to the mean = (0)
5. A claim will occur 25 times out of 100. Would you take out an insurance policy to protect yourself against the risk of that accident? Answer: Yes (+1); No(−1)
6. Given the annual probability of 1 over 1000 of losing €50,000 because of damages related to domestic accidents, would you prefer:
   - pay a policy of 100 euros per year (+1)
   - risk and not pay a policy (−1)
7. In the event of possible damage to the house (broken pipes, infiltrations, etc.) quantifiable with 2000 euros, would you prefer:
   - have paid an insurance premium of 200 euros per year covering the damage for 10 years (+1)
   - pay 2000 euros out of own pocket when the event occurs (−1)

The points assigned to each answer are reported in brackets. The same weight was established for each question. The score was finally transformed on a 0–100 scale.

Table A2
Descriptive statistics.

	N	Mean	Median	SD	Min	Max
TOTAL INSURANCE PRODUCTS	2053	2.641	2.000	2.194	0	11
IL	2053	7.900	8.000	5.697	0	25
FEMALE	2053	0.492	0.000	0.500	0	1
AGE	2053	52.38	53.000	16.482	19	95
MARRIED	2053	0.608	1.000	0.488	0	1
DIVORCED	2053	0.075	0.000	0.263	0	1
SINGLE	2053	0.242	0.000	0.428	0	1
WIDOWED	2053	0.075	0.000	0.264	0	1
HOME-OWNER	2053	0.580	1.000	0.494	0	1
UNIVERSITY	2053	0.196	0.000	0.397	0	1
HIGH SCHOOL	2053	0.474	0.000	0.499	0	1
SECONDARY SCHOOL	2053	0.251	0.000	0.434	0	1
PRIMARY SCHOOL	2053	0.079	0.000	0.270	0	1
UNEMPLOYED	2053	0.190	0.000	0.392	0	1
EMPLOYED PRIVATE	2053	0.271	0.000	0.445	0	1
EMPLOYED PUBLIC	2053	0.105	0.000	0.306	0	1
LOOKING FOR A JOB	2053	0.035	0.000	0.184	0	1
RETIRED	2053	0.250	0.000	0.433	0	1
SELF EMPLOYED	2053	0.149	0.000	0.356	0	1
CHILDREN	2053	0.416	0.000	0.493	0	1
RISK PERCEPTION	2053	2.691	2.700	0.630	1	4
RISK AVERSION	2053	51.900	50.000	20.059	0	100
CENTER	2053	0.171	0.000	0.377	0	1
NORTHEAST	2053	0.204	0.000	0.403	0	1
NORTHWEST	2053	0.283	0.000	0.451	0	1
SOUTH AND ISLANDS	2053	0.342	0.000	0.474	0	1

Appendix 2

Insurance products owned (0–11)

Are you or any other member of your family currently protected by one of the following types of insurance policy? Refer only to policies signed personally and not to those signed by the employer, with sports clubs, condominiums, etc.

a) car policy
b) house fire-explosion policy linked to the mortgage
c) credit protection policy: to protect yourself in case you are not able to pay the installments of a mortgage or loan (e.g. for serious illness or job loss)
d) civil liability policy of the family/RC family
e) house policy
f) policy for natural disasters (e.g. earthquakes, floods)
g) accident policy
h) health insurance policy
i) policy to guarantee financial support in case of loss self-reliance in old age
j) life insurance policies
k) life insurance policy for savings or supplementary pensions

Questions of Insurance Literacy (IVASS 2021)
Insurance literacy
BASIC INSURANCE LITERACY (0–11)
The policy premium is: (4 points)

a) the price you pay to take out a policy (TRUE/FALSE)
b) the return on a policy (TRUE/FALSE)
c) the principal on repayment (TRUE/FALSE)
d) the figure obtained if the claim does not occur (TRUE/FALSE)

The insurance deductible is: (4 points)

a) The amount of damage that remains to be paid by the customer who has signed the contract (TRUE/FALSE)
b) The maximum amount compensated (TRUE/FALSE)

c) The minimum amount compensated (TRUE/FALSE)
d) The amount, upon reaching which, the damage is not compensated (TRUE/FALSE)

The insurance ceiling is: (3 points)

a) The maximum sum indicated in the policy that the insurer has undertaken to pay in the event of a claim (TRUE/FALSE)
b) The sum reimbursed by the insurer in the event of a claim (TRUE/FALSE)
c) The fixed amount to be paid by the insured (TRUE/FALSE)

ADVANCED INSURANCE LITERACY (0–14)

I'll read you some possible guarantees, tell me if you think they are offered by accident policy. I read them all once and then I will re-read them one by one. (4 points)

a) hospitalization in case of accident (YES; NO; DNK)
b) permanent disability resulting from illness (YES; NO; DNK)
c) death, permanent disability, medical expenses arising from injury (YES; NO; DNK)
d) death, permanent disability, medical expenses arising from serious illness (YES; NO; DNK)

I'll read you some possible guarantees, tell me if, in your opinion, are they offered by temporary life insurance policy? I read them all once and then I will read them again to one. (4 points)

a) disbursement of a sum in the event of death, by period of validity of the policy, even if deriving from accident at work (YES; NO; DNK)
b) payment of a lump sum in case of death, during the validity period of the policy (YES; NO; DNK)
c) Disbursement of a death benefit, in any moment it happens (YES; NO; DNK)
d) Disbursement of an annuity to beneficiaries upon death within the effective date of the policy (YES; NO; DNK)

In your opinion, what benefits does a supplementary pension policy give? I read about the possible performances for the first time and then I will re-read them one by one. A supplementary pension policy could allow you to.. (4 points)

a) set aside sums of money for short-term needs in medium term (YES; NO; DNK)
b) supplement the public pension with a private provision (YES; NO; DNK)
c) protect yourself in the event of illness and injury (YES; NO; DNK)
d) protect oneself in the event of loss of income from work or in case of unemployment (YES; NO; DNK)

Let's talk about life insurance policies, in your opinion the capital that the company disburses to maturity is at least equal to the sum of the premiums paid? (1 point)

a) Yes, always
b) No, never
c) Yes, if it is a re-valuable policy
d) I don't know

In your opinion, can the principal be obtained in a life policy before expiry? (1 point)

a) No, you have to wait for the deadline
b) Yes, it can be received at any time without penalties
c) Yes, but you may receive less than the premiums paid
d) I don't know

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