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Title

Multilingual Iconographic Professional Interest Inventory (MIPII): development and initial validation

Abstract

Vocational interest inventories are widely used by career counselors to help individuals to make career choices. The most common approach to assess vocational interests is based on verbal or textual stimuli. However, some of them are based on pictorials to overcome reading limits and provide additional information about the working environment and the activities related to a particular job. This article aims to present two studies on the development and first validation of the Multilingual Iconographic Professional Interest Inventory (MIPII) on two samples, one composed of 792 high-school students, and one composed of 366 middle school students. The inventory aimed to assesses the vocational interests of people over 19 areas by illustrations representing 95 jobs, five for each one, combined with their title in six different languages (Arabic, German, English, Spanish, French and Italian in this order). Both illustrations and titles are provided separately in the male and female version on the same page.

Keywords

vocational interests; interests inventory; high-school students; middle-school students

Introduction

Vocational interests inventories are widely used by the career counselors to help individuals to choose academic majors and occupations, being predictors of vocational outcomes (Ludwikowski, Armstrong, & Lannin, 2018; Gasser, Larson, & Borgen, 2007), achievement and satisfaction both in study and work (Boerchi & Magnano, 2015).

As highlighted by Ion et al. (2019), the scientific study of vocational interests has a long and lasting tradition in vocational psychology dating back to the beginning of the 20th century (Parsons, 1909). Since their formal introduction in the realm of individual differences (Holland, 1958), vocational interests have a crucial role in career education and career counseling. Vocational interests have been defined as "relatively stable individual differences that influence behaviors through preferences for certain work activities and work environments" (Van Iddekinge, Putka, & Campbell, 2011, p. 14). Three key features can be identified in most definitions of vocational interests: (1) are traits, (2) are considered contextualized because they reflect the individual's preference for contexts or activities, and (3) serve as drivers or motivators (Rounds & Su, 2014).

Assessment of the vocational interests

Generally, the most common approach to assess vocational interests is based on verbal or textual stimuli. In the brief review reported by Šverko, Babarović, and Međugorac (2014), the most widely used verbal interest inventories are: Self-Directed Search (SDS; Holland, Fritzsche, & Powell, 1994); Strong Interest Inventory (SII; Harmon, Hansen, Borgen, & Hammer, 1994); Campbell Interest and Skill Survey (CISS; Campbell, Hyne, & Nilsen, 1992); and the new Personal Globe Inventory (PGI; Tracey, 2002). All these instruments have shown excellent psychometric properties and firm cross-cultural validity.

Despite the extensive use of these instruments in the last 30 years, there are some limitations related to the use of textual stimuli: as underlined by Nurchayo, Azwar, Martani, et al. (2019a), "the use of textual stimuli requires the respondents' reading ability (Boerchi & Magnano, 2015; Enke, 2009; Šverko et al., 2014)" (p.46). As an increasing part of people has trouble with reading, due to low education level, different kinds of disabilities or linguistic differences, the use of this type of instrument could not be applied to all the clients of career counseling activities. The use of the pictures could be an alternative, not requiring reading ability and providing additional information about the working environment and activities related to a particular job (Šverko, et al. 2014; Nurchayo et al., 2019a). Moreover, they do not require to be translated when adapted to different languages (Paunonen, Jackson, & Keinonen, 1990; Šverko et al., 2014).

On the other side, however, the use of pictorial stimuli for interest assessment also has some disadvantages. First of all, pictorial stimuli have a space of ambiguity because they can be interpreted differently by the respondents: to avoid this inconvenience, some instruments have associated the description of the activity to the pictures (e.i., PDII, Sverko et al., 2014), but this solution re-presents the problem for those who have difficulty in reading. Secondly, some jobs, especially the intellectual ones, are difficult to be represented, respect to manual jobs which require the use of specific tools or machines. Further problems can be associated with the person that is represented in the picture; in particular, some individual features, like gender or race, could be a source of bias, eliciting stereotypes regarding the representations of the working activities.

After considering the pros and cons, a growing number of vocational interest inventories with pictorial stimuli has been recently proposed by different research groups (Enke, 2009; Šverko et al., 2014; Boerchi & Magnano, 2015; Nurchayo et al., 2019a e b).

The existing pictorial measures of vocational interests

The oldest inventories that used pictures to assess childhood vocational interests are the Geist Picture Interest Inventory (GPII; Geist, 1959) and the Reading-Free Vocational Interest Inventory (R-FVII; Becker, 1973). Vacha-Haase and Enke (2009) defined the GPII as outdated because many of the depicted occupations no longer exist; furthermore, the GPII is constructed following the Kuder interests' model, which has been replaced by Holland's interest typology (Šverko et al., 2014). The R-FVII has been revised (R-FVII-2, R-FVII-3; Becker, 1981, 1987, 2000; Synatschk & Becker, 2001), but all the validations' studies have been conducted on persons with intellective disabilities.

More recent pictorial interest inventories, both for children and adults, are the following. The Wide Range Interest and Occupation Test—Second Edition (WRIOT2; Glutting & Wilkinson, 2003) consists of 238 pictures to help individuals to identify their preferences about a wide range of work situations, including unskilled, technical, professional, and managerial positions. It is based on both Holland's RIASEC types, assessing the needs, motives, and values influencing occupational choice, and 17 jobs' clusters (Su & Rounds, 2014). The Picture Interest Career Survey (PICS and PICS-2; Brady, 2007) is a nonverbal, self-reported interest inventory grounded on both Holland's (1959, 1997) RIASEC interest types and Prediger's preferences (1982): people, things, data, and ideas (Su & Rounds, 2014). The Career Interest Card Sort (Athanasou & Hosking, 1998) is a procedure used with adults in vocational guidance: it is composed of seven cards that the client has to rank in order of preference. The cards list seven work interests Outdoor, Practical, Scientific, Creative, Business, Office, and People Contact based on the Career Interest Test (Athanasou, 1988). A pictorial version of the RIASEC scales of the Personal Globe Inventory (Tracey, 2002) was developed by Enke (2009) for adults.

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Two inventories use photographs instead of illustrations. The Picture Interest Inventory (Stoll, Jungo, & Toggweiler, 2006; Toggweiler, Jungo, & Stoll, 2004) is a nonverbal test that uses photographs of people performing vocational activities. The Pictorial and Descriptive Interest Inventory (PDII; Šverko et al., 2014) was developed to provide students who are finishing elementary school with an Internet-based measure of RIASEC interests.

The most recent questionnaires are the Iconographic Professional Interests Inventory (3IP; Boerchi & Magnano, 2015), aimed to assess both Holland's RIASEC types and 19 jobs' clusters, further clustered in four areas (things; leisure; culture; and people) and The Pictorial Vocational Interest Inventory (PVII; Nurchayo et al., 2019a e b), a vocational interest inventory developed according to Holland's theoretical model.

Gender differences

Gender differences in vocational interests have been largely studied for more than a century (Thorndike, 1911); they are significant (e.g., Fouad, 1999; Hackett & Lonborg, 1993) and involve many of the areas of vocational interests. This evidence is supported by much theory and research, which considers gender to be a critical factor in vocational development (Stockard & McGee, 1990; Boerchi & Magnano, 2015). The most comprehensive review of gender differences in vocational interests was conducted by Su, Rounds, and Armstrong (2009): their meta-analytic study involved 47 vocational interest assessment technical manuals with a combined sample of over 500,000 people, including multiple versions of the Strong assessment. The results showed gender differences in five of six RIASEC areas (Morris, 2016): men expressed higher interests in things-oriented careers and women in people-oriented professions; men showed stronger realistic and investigative interests, and women more substantial artistic, social, and conventional interests (Su & Round, 2014). As underlined by Tracey and Caulum (2015), we can find these gender differences in interests

already in early elementary school (Liben, Bigler, & Krogh, 2001; Tracey, 2001; Tracey & Ward, 1998). The gender differences in STEM (Science, Technology, Engineering, and Math), according to Tracey (2002a), persist in the transition from elementary school into middle school, and also through the entry into college (Tracey & Robbins, 2005). These differences reflect, in turn, the gender differences in STEM occupations (Ceci, Williams, & Barnett, 2009; Schmidt, 2011; Watt & Eccles, 2008) and helping professions (Tracey & Caulum, 2015). On the other side, Morris (2016) highlighted that recent research has shown that "overall the interests of women and men are more similar than different" (Leuty & Hansen, 2014, p. 291), due to the measures of these differences, at least in part emphasized by the use of inventories based on the Holland's theory (Ludwikowski, Armstrong, & Lannin, 2018). However, it is doubtless that gender differences are significant for differential career achievement of women and men and may represent an essential explanation for the underrepresentation of women in many high-status and remunerative occupations (Su & Rounds, 2014). Furthermore, not only does gender affects occupational choices, but it also influences life outcomes (Ion, Nye, & Iliescu, 2019). The social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994), when describes how the vocational interests develop (Sheu, Lent, Brown, et al., 2010), explain the role of gender differences and their persistence in vocational decisions: first, gender belonging increases and decreases the likelihood of doing specific learning experiences; following, the developing of vocational interests, congruent on what is socially acceptable according to the gender, impacts the individuals' willingness to engage in new learning experiences selected by gender. This, over time, encourages or discourages individuals toward "gender-specific" careers (Ludwikowski et al., 2018).

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Materials & Methods

MIPII has been designed to overcome some of the limits of the inventories previously described, in particular, the problems of lengthy descriptions and stereotyping. It is aimed to measure vocational interests using the illustrations of some professions, each one in the masculine and feminine version, accompanied by their job title in different languages.

High-school study

This study aimed to design and examine its psychometric properties with the specific target of high-school students. The procedure and results are presented in three phases:

1) Designing the inventory structure;
2) Drafting, testing and improving the recognizability of the illustrations;
3) Testing psychometrics through the analysis of:
    a. Responses and scores' distributions;
    b. Monodimensionality of each scale;
    c. Reliability through internal consistency and test-retest;
    d. Concurrent validity with a classical Italian interest inventory;
    e. Gender differences.

Phase I – Structure designing

To design the structure of the inventory, we got inspired by the 3IP (Boerchi & Magnano, 2015). Both the direct experience of the researchers and a dozen interviews with experts in vocational guidance who used the 3IP suggested modifying, in part, the structure of the inventory. We decided to flow the scale Automotive into Technology one, to replace the name Military with Security, including a broader range of jobs not only in the army forces, and to add the scale Sport. Furthermore, the number of jobs has been increased to reach five items for each scale. Even if this inventory has not been designed to measure RIASEC

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personalities, we made an effort to represent, as much as possible, the six areas of the model, starting from a comprehensive list of occupations taken from the USA Department of Labor's O*NET database. We have chosen the new jobs with the support of a team of teachers, to guarantee they are well known by most of the children attending primary school. The list of the jobs has been submitted to a sample of around fifty primary school students attending the last two classes, asking them to select the professions they did not know: Information technology and Juridical were the two most critical areas, containing one or two jobs that the 15% of students said they did not know. This percentage has been considered acceptable since the target is usually not an expert in jobs.

Phase II – Drafting of the illustrations

We consider the 3IP's attempt to illustrate the jobs with gender-neutral figures inadequate because people tend, nevertheless, to attribute a gender to each character represented according to job gender stereotypes. Feedbacks gathered from college professors, experts in vocational guidance, suggested to overcome this limit by drafting two illustrations for each job, one in the male and the other in the female version, and to come up them beside with their job title in six different languages (Arabic, German, English, Spanish, French and Italian in this order), different for gender if requested by the specific language. An initial version of the illustrations, in black and white, was made by a professional cartoon school starting just from the Italian job titles. Because it is difficult to recognize a job only by its illustration, the male and female versions of each job have been presented, without their title, to a sample of 86 high school students attending classes from the first to the fifth, the last one. The students were asked to guess the title of each job, and the interviewers, after all the wrong titles were noted, gave the cartoonist some suggestions to improve the recognizability of around half of the jobs. Some examples of the MIPII's items are reported in Figure 1.

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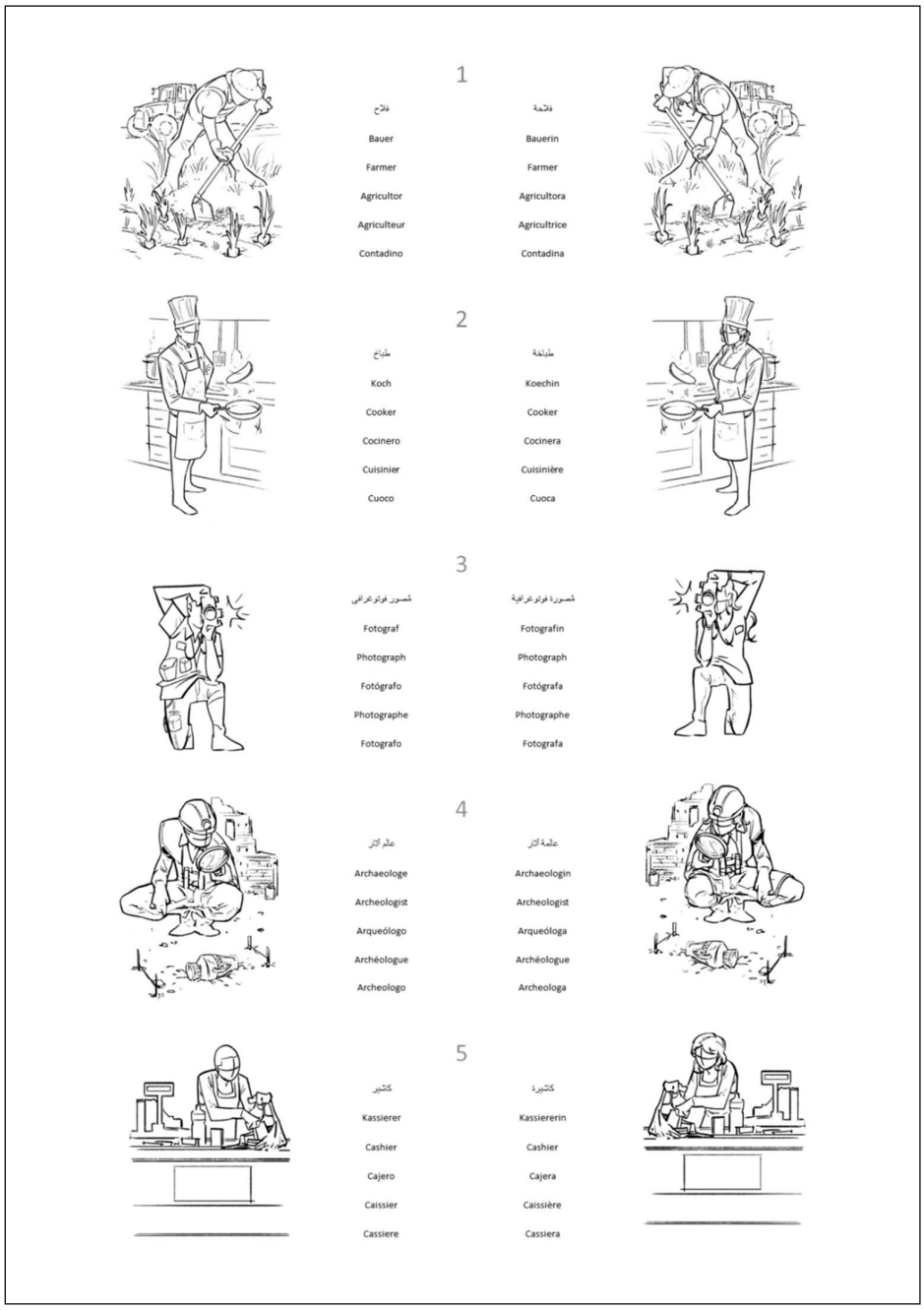

Figure 1. Examples of MIPII's items

To better understand the general level of recognizability of the final version of the inventory, the MIPII's illustrations have been compared with the 48 pictures of the PDII (Šverko et al., 2014). To a sample of 388 high school students, homogeneous by gender, with age ranging from 14 to 19 and attending classes from the first to the fifth, MIPII's illustrations and PDII's pictures, without their names and descriptions, were presented in randomly mixed series,

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asking them to guess the title of the job. As shown in Table 1, 80% of the students recognized at least 81% of the MIPII illustrations, versus just 30% of the PDII pictures. Only 3% of the students identified less than 71% of the MIPII illustrations, versus 41% of the DPII pictures.

Table 1

Percentage of students who recognized MIPII's illustrations and PDII's pictures

Percentage of items recognized	MIPII	DPII
31-40%	0%	0%
41-50%	0%	5%
51-60%	0%	14%
61-70%	3%	22%
71-80%	17%	29%
81-90%	33%	24%
91-100%	47%	6%

Note. N = 388

Phase II – Testing psychometrics

Participants and procedure

This study involved 792 students of an Italian high-school institute attending three different courses and classes from the first to the fifth. An online survey has been administered by the researchers in March, in the computer classroom of the school, one class at a time. All the students provided the legal authorization signed by them and their parents if minors. They were informed that data would be used both for scientific aims on measuring vocational interests, and to provide them with a personal profile, which has been described and delivered around one month later.

The courses attended were Scientific Lyceum (based on general topics), Linguistic Lyceum (similar to the first one but more focused on learning foreign languages), and Technical Institute (focused on the mechanic, IT, and electronic topics). Because these courses are

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attended by different percentages of males and females, with a significant presence of females in Linguistic Lyceum and males in the others, the sample was not equilibrated by gender: 66.2% (N = 524) was composed of males and 33.8% (N = 268) of females. 6.3% of students were older than 18 years old, while the others were relatively equally distributed from 14 to 18 years old.

The following year, 190 students, attending the fifth class, participated in a new study aimed to test the inventory's reliability (69.5% males and 30.5% females; age mean = 18.44 and SD = 0.806). One hundred nine of these had already compiled the MIPII the previous year when they were attending the fourth class (60.6% males and 39,4% females; age mean = 18.27 and SD = 0.572).

Responses and scores' distribution

The normality of the items' distribution was good or at least acceptable, excluded "5 Cashier" and "20 Breeder" whom kurtosis was slightly higher than 2. All the scales, instead, were normally distributed (see Table 2 for details).

Table 2

MIPII's scales distribution

	Mean	SD	Skewness	Kurtosis
1. Agriculture	1.92	0.6612	0.832	0.934
2. Hospitality	2.55	0.7902	0.107	-0.385
3. Arts	2.53	0.7803	0.317	-0.171
4. Classic	2.14	0.8451	0.747	0.100
5. Economy	2.27	0.7065	0.172	-0.576
6. Building	2.18	0.7070	0.414	-0.226
7. Aesthetics	2.16	0.7758	0.477	-0.321
8. Forensic	2.90	0.9547	0.009	-0.584
9. Computer	2.79	1.1192	0.184	-0.953
10. Linguistic	2.43	0.8338	0.353	-0.426
11. Security	2.44	0.8754	0.378	-0.408
12. Music	2.24	0.9303	0.683	-0.063

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13. Health	2.25	0.8130	0.403	-0.344
14. Science	2.55	0.9766	0.193	-0.792
15. Social	2.28	0.7728	0.272	-0.560
16. Technology	2.05	0.8910	0.689	-0.161
17. Transport	2.49	0.8563	0.299	-0.426
18. Tourism	2.49	0.8673	0.281	-0.375
19. Sport	2.50	1.0856	0.318	-0.898

Monodimensionality of each scale

The monodimensionality of each scale has been tested with confirmatory factor analyses (CFA), using the maximum likelihood method and AMOS software (Arbuckle & Wottke, 2003). We examined goodness-of-fit indexes through the chi-square test, root mean square error of approximation (RMSEA), and comparative fit index (CFI). Even if a non-significant chi-square is desired, because it is sensitive to sample size, models with a large sample can only be evaluated using RMSEA and CFI (Byrne, 2010). Models with acceptable fit present a RMSEA < .08 and CFI > .90 (Bentler, 1990), whereas models with optimum fit present a RMSEA < .05 and CFI >.95 (Hu & Bentler, 1999). Table 3 shows that, to obtain good or optimum fit indexes in all the scales, it was necessary to consider covariance between the errors of at least one couple of jobs. These results suggest that some items were more related than the others.

Table 3

MIPII scales monodimensionality through CFA

	N	χ2 (p)	Df	RMSEA	CFI
1. Agriculture	754	3.827	3	.019	.999
2. Hospitality	775	7.273	4	.033	.997
3. Arts	736	2.934	4	.000	1.000
4. Classic	766	7.272	4	.033	.998

5. Economy	748	13.903**	4	.058	.988
6. Building	764	14.480**	3	.071	.987
7. Aesthetics	769	6.825*	2	.056	.994
8. Forensic	726	8.652	3	.040	.997
9. Computer	755	7.902	4	.036	.998
10. Linguistic	772	12.931**	3	.066	.993
11. Security	762	6.838	4	.031	.997
12. Music	769	8.985	4	.040	.997
13. Health	781	4.746	3	.027	.999
14. Science	763	4.516	2	.041	.999
15. Social	760	5.859	3	.035	.996
16. Technology	732	6.038*	2	.053	.998
17. Transport	769	7.440	4	.033	.997
18. Tourism	761	15.993**	3	.075	.991
19. Sport	776	9.754*	4	.043	.997

Note. * p < .05; ** p < .01

Reliability

Each scale showed a good level of internal consistency, with Cronbach's alpha ranging from .712 to .881. Also, test-retest correlations were high, even more considering that the second administration was made one year later, ranging from .586 to .813 (Table 4).

Table 4

MIPII's scales internal consistency and test-retest correlations

	Cronbach's alpha (n = 792)	Test-retest correlations (n = 109)
1. Agriculture	.715	.639***
2. Hospitality	.793	.601***
3. Arts	.727	.694***
4. Classic	.830	.655***

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5. Economy	.712	.629***
6. Building	.715	.586***
7. Aesthetics	.734	.694***
8. Forensic	.827	.653***
9. Computer	.880	.766***
10. Linguistic	.767	.709***
11. Security	.800	.594***
12. Music	.855	.813***
13. Health	.831	.563***
14. Science	.850	.607***
15. Social	.717	.636***
16. Technology	.873	.746***
17. Transport	.754	.758***
18. Tourism	.819	.650***
19. Sport	.881	.797***

Note. *** $p < .001$

Convergent validity with a classical Italian interest inventory

To test convergent validity, to the sample of 190 students who answered the inventory while they were attending the fifth class, MIPII was administered with the IAP/5 (Interessi Accademici e Professionali – Professional and Academic Interests, Bonelli & Mancinelli, 2012a), an Italian vocational interest inventory widely used in the last two years of high-schools to support students in their professional and academic choice. It is composed of 108 items, four for each scale, and it refers to the Italian academic system based on 52 clusters of courses. With the sample of this study, all the scales, excluded “History,” were normally distributed, and Cronbach’s alphas were at least acceptable, ranging from .622 to .891.

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Because of the large number of IAP/5's scales, in Table 5 are represented just those who saturated the most with each one of the MIPII's scales, excluded Hospitality, Aesthetics, and Music whose correlations were all lower than .650.

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Table 5

Correlations between MIPII's scales and selection of IAP/5's scales

	Geological sciences	Fine arts	History	Economics and business administration	Building sciences and techniques	Jurisprudence	Computer science and technology	Linguistic mediation	Defense and security sciences	Medicine and surgery	Biological sciences	Social work	Information engineering	Navigation sciences and technologies	Tourism sciences	Motor activities and sports sciences
1. Agriculture	,749***	,381***	,514***	,174*	,457***	,266***	,232**	,149*	,514***	,476***	,530***	,398***	,388***	,533***	,341***	,355***
2. Hospitality	,467***	,363***	,294***	,214**	,378***	,244**	,189**	,145*	,348***	,345***	,324***	,298***	,346***	,462***	,427***	,376***
3. Arts	,460***	,775***	,601***	,055	,332***	,268***	,092	,370***	,280***	,222**	,213**	,321***	,136	,345***	,334***	,203**
4. Classic	,482***	,503***	,853***	,116	,278***	,210**	,075	,418***	,406***	,180*	,288***	,272***	,107	,424***	,426***	,209**
5. Economy	,334***	,207**	,274***	,757***	,379***	,335***	,384***	,260***	,396***	,081	,111	,123	,328***	,424***	,556***	,226**
6. Building	,621***	,341***	,341***	,391***	,740***	,354***	,338***	,158*	,579***	,377***	,362***	,207**	,555***	,632***	,406***	,436***
7. Aesthetics	,292***	,401***	,285***	,178*	,219**	,335***	-,018	,275***	,212**	,254***	,161*	,290***	,051	,293***	,335***	,235**
8. Forensic	,304***	,356***	,400***	,263***	,247**	,675***	,128	,252***	,452***	,372***	,219**	,388***	,134	,347***	,243**	,127
9. Computer	,312***	,268***	,178*	,200**	,257***	,045	,807***	,104	,331***	,117	,190**	,043	,558***	,406***	,048	,141
10. Linguistic	,318***	,503***	,607***	,130	,063	,255***	,052	,696***	,198**	,134	,149*	,356***	-,027	,298***	,328***	,079
11. Security	,541***	,239**	,334***	,090	,365***	,165*	,292***	,111	,663***	,440***	,381***	,223**	,380***	,582***	,207**	,401***
12. Music	,461***	,549***	,451***	,165*	,276***	,259***	,173*	,337***	,330***	,250**	,297***	,316***	,284***	,412***	,332***	,301***
13. Health	,385***	,131	,237**	,141	,221**	,322***	,056	,117	,303***	,742***	,485***	,411***	,142	,319***	,165*	,296***
14. Science	,634***	,280***	,467***	,091	,402***	,159*	,239**	,140	,407***	,449***	,671***	,285***	,401***	,492***	,216**	,343***
15. Social	,395***	,355***	,423***	,132	,162*	,298***	,029	,407***	,182*	,327***	,243**	,691***	,013	,204**	,276***	,148*
16. Technology	,451***	,132	,171*	,067	,434***	,063	,445***	,009	,350***	,243**	,367***	,112	,682***	,553***	,040	,260***
17. Transport	,518***	,305***	,365***	,301***	,464***	,237**	,325***	,264***	,525***	,300***	,304***	,152*	,476***	,760***	,402***	,458***
18. Tourism	,312***	,316***	,372***	,312***	,196**	,277***	-,027	,443***	,265***	,179*	,057	,265***	-,022	,347***	,680***	,278***
19. Sport	,427***	,235**	,329***	,275***	,393***	,208**	,203**	,167*	,390***	,262***	,287***	,173*	,307***	,463***	,345***	,838***

Note. * p < .05; ** p < .01; *** p < .001

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Gender differences

Because one of the aims of developing this inventory was to contrast gender professional prejudices, by describing the jobs with both male and female pictures and titles, we tested gender differences through Student's t-test and compared the Cohen's d index of the two inventories, limiting to the couples of scales which mostly correlated. Results have to be considered with caution because the interests' areas of the two inventories are not entirely overlapping. Apart for Tourism and Sport, IAP/5's indexes are bigger than those of the MIPII, but just slightly (Table 6).

Table 6

Mean differences and effect size of MIPII's scales

	MIPII						IAP/5
	Mean Male	SD Male	Mean Female	SD Female	Mean diff.	Cohen's d index	Cohen's d index
1. Agriculture	1,85	0,779	1,41	0,553	0,47***	0,63	0,75
2. Hospitality	2,19	0,773	1,91	0,727	0,29*	0,36	
3. Arts	2,25	0,815	2,24	0,903	0,05	0,01	0,07
4. Classic	1,91	0,897	1,84	0,890	0,18	0,08	0,13
5. Economy	2,10	0,711	1,74	0,737	0,35**	0,51	0,51
6. Building	2,10	0,775	1,57	0,515	0,55***	0,76	0,89
7. Aesthetics	1,79	0,743	2,01	0,758	-0,21	0,30	
8. Forensic	2,33	0,856	2,45	1,009	-0,09	0,13	0,16
9. Computer	2,63	1,062	1,59	0,747	1,03***	1,09	1,13
10. Linguistic	2,09	0,808	2,38	0,898	-0,12	0,34	0,46
11. Security	2,34	0,985	1,75	0,810	0,63***	0,65	0,68
12. Music	2,05	1,095	1,67	0,905	0,48**	0,37	
13. Health	1,79	0,739	1,85	0,881	-0,04	0,07	0,09
14. Science	2,12	0,852	1,70	0,856	0,48***	0,50	0,59
15. Social	1,85	0,700	2,12	0,799	-0,21	0,37	0,48
16. Technol.	2,11	0,849	1,23	0,456	0,89***	1,22	1,53
17. Transport	2,45	1,003	1,72	0,657	0,82***	0,83	0,98
18. Tourism	2,18	0,942	2,52	0,873	-0,18	0,37	0,13
19. Sport	2,55	1,131	1,59	0,821	0,93***	0,95	0,75

Note. Cohen's d index is considered big if > 0.80, medium if > 0.50, Small if > 0.20 (Cohen, 1988)

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Middle school study

Participants and procedure

This study involved 366 students of an Italian middle-school institute from the first to the third year, the last one. A paper-pencil survey has been administered by the researchers in February and March, in their classrooms, one class at a time. All the students provided the legal authorization signed by them and their parents if minors. They were informed that data would be used both for scientific aims on measuring vocational interests, and to provide them with a personal profile, which has been described and delivered around one month later.

Students were well equilibrated by gender: 47.8% (N = 175) was composed of males and 52.2% (N = 191) of females. 7.4% of the students were 14 y.o., while the others were relatively equally distributed from 11 to 13 years old.

Responses and scores' distribution

The normality of the items' distribution was good or at least acceptable, with Skewness and Kurtosis ranging from -1.281 to 1.297. All the scales were normally distributed with Skewness and Kurtosis ranging from -0.849 to 0.904 (see Table 7 for details).

Table 7

MIPII's scales distribution

	Mean	SD	Skewness	Kurtosis
1. Agriculture	1.98	0.7651	0.904	0.524
2. Hospitality	2.56	0.8591	0.349	-0.396
3. Arts	2.41	0.8743	0.544	-0.036
4. Classic	2.30	0.9364	0.479	-0.568
5. Economy	2.20	0.6919	0.414	-0.103
6. Building	2.17	0.7739	0.636	0.272

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7. Aesthetics	2.50	0.8993	0.225	-0.810
8. Forensic	2.58	0.9799	0.319	-0.655
9. Computer	2.49	1.0064	0.493	-0.607
10. Linguistic	2.32	0.9051	0.567	0.001
11. Security	2.44	0.9570	0.461	-0.455
12. Music	2.37	0.9459	0.569	-0.118
13. Health	2.47	0.9298	0.329	-0.487
14. Science	2.54	0.9984	0.405	-0.487
15. Social	2.31	0.8187	0.373	-0.446
16. Technology	1.96	0.8408	0.880	0.305
17. Transport	2.41	0.8670	0.380	-0.293
18. Tourism	2.44	0.8229	0.406	0.012
19. Sport	2.69	1.0633	0.309	-0.849

Monodimensionality of each scale

The monodimensionality of each scale has been tested with confirmatory factor analyses (CFA), using the same method, software, and goodness-of-fit indexes of the previous study. Table 8 shows that, to obtain good or optimum indexes of fit in all the scales, the need for considering covariance between the errors was clearly lower than the high-school sample. For two scales, it was not necessary, and just for two of them, we had to consider two covariances and not just one.

Table 8

MIPII scales monodimensionality through CFA

	N	χ2 (p)	Df	RMSEA	CFI
1. Agriculture	353	6.582	4	.043	.993
2. Hospitality	364	10.711*	4	.068	.985
3. Arts	338	5.654	4	.035	.996
4. Classic	350	11.635*	4	.074	.984
5. Economy	345	2.065	4	.000	1.000

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6. Building	350	6.847	4	.045	.991
7. Aesthetics	356	4.557	4	.020	.998
8. Forensic	315	9.859*	4	.068	.986
9. Computer	320	2.935	4	.000	1.000
10. Linguistic	358	6.558	3	.058	.992
11. Security	362	11.804*	5	.061	.985
12. Music	358	1.713	4	.000	1.000
13. Health	363	2.040	3	.000	1.000
14. Science	357	9.975*	4	.065	.989
15. Social	354	5.549	4	.033	.994
16. Technology	345	2.864	4	.000	1.000
17. Transport	357	9.121	4	.060	.985
18. Tourism	350	3.946	5	.000	1.000
19. Sport	356	12.348*	4	.077	.987

Note. * $p < .05$

Reliability

Most of the scales showed a good or at least acceptable level of internal consistency, with Cronbach's alpha ranging from .690 to .833. Just Economy was unsatisfactory with Cronbach's alpha equal to .600 (Table 9).

Table 9

	Cronbach's alpha
1. Agriculture	.723
2. Hospitality	.778
3. Arts	.761
4. Classic	.790
5. Economy	.600
6. Building	.699

7. Aesthetics	.722
8. Forensic	.787
9. Computer	.812
10. Linguistic	.760
11. Security	.789
12. Music	.773
13. Health	.798
14. Science	.813
15. Social	.690
16. Technology	.803
17. Transport	.719
18. Tourism	.716
19. Sport	.833

Convergent validity with a classical Italian interest inventory

To test convergent validity, the MIPII was administered with the PSP/3 (Preferenze Scolastiche e Professionali – School and Professional Preferences, Bonelli & Mancinelli, 2012b), an Italian vocational interest inventory widely used in the last year of middle-schools to support students in their high-school choice. It is composed of 105 items, five for each one of 21 areas of interest. With the sample of this study, all the scales were normally distributed, and Cronbach's alphas were good or at least acceptable, ranging from .624 to .803.

Table 10 represents all the correlations; the higher correlation of each scale of the SPS/3 is highlighted. Classic, forensic, security and sport's areas of MIPII have not a prevailing relation with any of the SPS/3's scales, because none of these measures those areas of interest.

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Table 10

Correlations between MIPII's scales and selection of SPS/3's scales

	Agricultural	Hospitality	Crafts	Artistic	Economy	Buildings	Aesthetics	Fashion system	Computer	Electronic	Graphic design	Linguistic	Classical letterature	Music	Health	Science	Chemistr	Human schiences	Mechanic	Transport	Turism
1. Agriculture	,508**	,351**	,461**	,309**	,113	,400**	,176**	,188**	,169**	,225**	,232**	,256**	,222**	,267**	,251**	,279**	,270**	,149*	,252**	,264**	,288**
2. Hospitality	,264**	,521**	,418**	,324**	,192**	,250**	,300**	,367**	,172**	,152*	,216**	,242**	,252**	,348**	,216**	,140*	,109	,125*	,120*	,183**	,320**
3. Arts	,182**	,334**	,541**	,534**	,233**	,291**	,277**	,443**	,146*	,133*	,356**	,395**	,473**	,447**	,282**	,355**	,300**	,275**	,125*	,210**	,359**
4. Classic	,217**	,191**	,364**	,306**	,269**	,322**	,041	,213**	,169**	,204**	,289**	,413**	,437**	,209**	,289**	,516**	,447**	,318**	,181**	,267**	,390**
5. Economy	,337**	,445**	,463**	,320**	,448**	,421**	,267**	,358**	,246**	,246**	,350**	,329**	,405**	,287**	,388**	,341**	,347**	,339**	,344**	,373**	,443**
6. Building	,291**	,197**	,366**	,233**	,340**	,518**	,081	,131*	,307**	,405**	,280**	,176**	,315**	,068	,196**	,379**	,415**	,157**	,393**	,391**	,214**
7. Aesthetics	,141*	,373**	,407**	,487**	,124*	,140*	,573**	,611**	,004	-,001	,172**	,339**	,446**	,444**	,323**	,112	,151*	,327**	-,050	,124*	,430**
8. Forensic	,104	,189**	,314**	,282**	,335**	,310**	,067	,233**	,126*	,108	,292**	,313**	,473**	,208**	,284**	,288**	,261**	,324**	,125*	,213**	,278**
9. Computer	,151*	,202**	,249**	,199**	,381**	,227**	,023	,076	,595**	,579**	,561**	,141*	,179**	,115	,100	,415**	,195**	,068	,482**	,358**	,187**
10. Linguistic	,101	,271**	,329**	,452**	,248**	,220**	,219**	,379**	,109	,063	,261**	,586**	,544**	,299**	,272**	,289**	,298**	,318**	,054	,158**	,415**
11. Security	,298**	,266**	,330**	,206**	,331**	,395**	,054	,122*	,309**	,318**	,302**	,159**	,268**	,091	,232**	,255**	,289**	,196**	,372**	,432**	,162**
12. Music	,176**	,366**	,406**	,500**	,159**	,154*	,266**	,468**	,071	,080	,257**	,336**	,403**	,675**	,199**	,234**	,222**	,226**	,075	,161**	,330**
13. Health	,164**	,259**	,292**	,251**	,312**	,315**	,213**	,231**	,210**	,108	,239**	,349**	,308**	,265**	,551**	,376**	,398**	,408**	,181**	,246**	,356**
14. Science	,238**	,195**	,345**	,270**	,284**	,354**	,102	,150*	,257**	,271**	,292**	,397**	,345**	,222**	,343**	,575**	,571**	,339**	,311**	,288**	,267**
15. Social	,278**	,381**	,434**	,418**	,260**	,263**	,408**	,486**	,020	-,046	,262**	,478**	,501**	,371**	,533**	,265**	,270**	,618**	,041	,160**	,399**
16. Technology	,369**	,272**	,275**	,075	,219**	,418**	,000	-,076	,402**	,537**	,303**	,043	,022	,052	,164**	,223**	,241**	,033	,568**	,447**	,160**
17. Transport	,275**	,344**	,322**	,363**	,355**	,374**	,165**	,237**	,312**	,353**	,365**	,339**	,361**	,216**	,232**	,258**	,312**	,099	,388**	,543**	,382**
18. Tourism	,283**	,441**	,424**	,538**	,252**	,265**	,344**	,496**	,126*	,112	,290**	,538**	,499**	,406**	,348**	,263**	,278**	,344**	,092	,204**	,588**
19. Sport	,304**	,357**	,372**	,299**	,265**	,346**	,163**	,230**	,246**	,301**	,299**	,107	,157**	,237**	,201**	,127*	,128*	,068	,306**	,323**	,249**

Note. * p < .05; ** p < .01; *** p < .001

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Gender differences

As for the previous study, we compared the gender differences between the two inventories. Nine indexes were bigger in the SPS/3 versus five in the MIPII; however, as for the high-school sample, the differences were slight (Table 11).

Table 6

Mean differences and effect size of MIPII's scales

	MIPII						SPS/3
	Mean Male	SD Male	Mean Female	SD Female	Mean diff.	Cohen's d index	Cohen's d index
1. Agriculture	2.04	0.786	1.94	0.744	0.10	0.13	0.02
2. Hospitality	2.54	0.878	2.58	0.843	-0.04	0.05	0.01
3. Arts	2.26	0.874	2.54	0.854	-0.29**	0.33	0.34
4. Classic	2.30	0.907	2.30	0.965	0.00	0.00	
5. Economy	2.18	0.754	2.22	0.631	-0.04	0.06	0.35
6. Building	2.29	0.832	2.06	0.700	0.24**	0.31	0.51
7. Aesthetics	2.07	0.780	2.89	0.819	-0.82***	1.03	0.66
8. Forensic	2.52	0.994	2.64	0.966	-0.12	0.13	
9. Computer	2.81	1.029	2.20	0.892	0.61***	0.64	0.82
10. Linguistic	2.20	0.909	2.44	0.887	-0.25**	0.28	0.34
11. Security	2.64	0.984	2.26	0.898	0.37***	0.40	
12. Music	2.23	0.920	2.49	0.954	-0.27**	0.29	0.34
13. Health	2.37	0.944	2.57	0.909	-0.20*	0.21	0.07
14. Science	2.56	0.999	2.52	1.000	0.04	0.04	0.34
15. Social	2.08	0.788	2.51	0.792	-0.44***	0.56	0.37
16. Technology	2.33	0.875	1.62	0.643	0.71***	0.94	0.99
17. Transport	2.56	0.907	2.28	0.809	0.28**	0.33	0.62
18. Tourism	2.27	0.871	2.59	0.748	-0.31***	0.39	0.18
19. Sport	2.93	1.066	2.48	1.017	0.45***	0.43	

Discussion

MIPII is a pictorial inventory developed, since the beginning, paying attention to: the knowledge, also by younger students, of the jobs selected; the recognizability of its illustrations; the contrasting of gender stereotypes using both the male and female version

of the pictures. Their job title had accompanied all the illustrations because it is hard, mostly for intellectual ones, that they can be recognized just by the figure. The attention paid to the recognizability of the illustrations had been useful because the MIPII's pictures have shown to be easier to be identified compared to those of the PDII (Šverko et al., 2014).

Psychometrics was good for all the scales for the two samples. Their distribution was normal, internal consistency was good, a part Economy scale just for the middle-school sample, and test-retest reliability, tested just on the high-school sample, was excellent. About the monodimensionality of the scales, for many of them, it was necessary to consider covariance between the errors of two or more jobs for all the scale of the high-school sample, while this was necessary for a limited extent for the middle-school sample. It is a limit hard to be overcome because the choice of selecting well-known professions reduced a lot the population of professions we could choose from, so we had to accept than some of them are more related than others.

Also, concurrent validity was good. For the high-school sample, just three scales did not correlate more than .650 with at last one of the scales of the IAP/5 (Bonelli & Mancinelli, 2012a), but it happened because none of the scales of this inventory is related to Hospitality, Aesthetics, and Music. Similar results were found in the middle-school sample, in which correlations were meanly lower than those of the high-school sample.

Results related to the gender differences were less satisfactory than we expected: the differences between males and females were just slightly lower than those obtained with the IAP/5 for the high-school sample and the SPS/3 for the middle-school sample.

Limitations and Future Research Directions

The principal limitation of this study is the nonoptimal representativeness of the students' population. For the high-school sample, it was large enough, and lyceum classes have quite different interests, while technical institutes were not enough representatives. Further studies should involve students from different areas of interest, also considering those related to agriculture, aesthetics, music, sport, tourism, and others here not considered. This will provide a better comprehension of the validity of the questionnaire: i.e., it is likely that the relations between the errors of some jobs of the same scale will reduce because those interested in a specific area will be able to better differentiate between the most similar jobs. For the middle-school sample, it should have represented different areas in the country because, for instance, rural and city areas or specific production districts could affect their population's vocational interests. Further studies, moreover, should test the questionnaire with different targets, like primary schools and adults.

Implications for Career Counseling Practice

The analysis of professional interests and the knowledge of the job features are two of the core activities in career counseling and career education interventions. The MIPII can be a very flexible instrument to be used in career counseling and career education as (1) it is a psychometric instrument, so allows to obtain an individual profile of the interests' areas; (2) it is multilingual so that it can be administered to people speaking different languages; (3) it uses pictorial stimuli, facilitating the use with students with different reading difficulties; (4) it is composed of pictures that can be cut as cards and used in a qualitative way, like stimulating the students to reflect about gender stereotypes in working activities or to detect the competencies related to each profession.

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