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A Psychological Description of the Swiss Labor Market from 1991 to 2014: Occupational Interest Types, Gender, Salary, and Skill Level

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Abstract

This study aimed at conducting a representative analysis of the Swiss labor market from 1991 to 2014 by applying Holland's (1997) classification of occupations according to six vocational interest types: realistic, investigative, artistic, social, enterprising, and conventional (RIASEC). Results based on data of the Swiss Labor Force Survey showed that realistic occupations consistently represented the largest share of jobs over this period, albeit with a declining tendency. Increased numbers of people were employed in social and enterprising types of work. The lowest numbers were found in artistic and investigative occupations. Gender segregation along the six RIASEC occupational types could be found on the Swiss labor market as well, with most men working in realistic, and most women in social, occupations. Further, we observed large salary differences between the six occupational types, even when controlling for required skill level. In line with findings concerning gender pay inequalities, men earned more than women in each RIASEC occupational type in each year. We moreover found that RIASEC occupations differed meaningfully with regard to skill level, and that required skill level increased across all RIASEC occupations over the examined 23-year period.

Keywords: Swiss labor market, occupational interest types, RIASEC, gender, salary, skill level

Introduction

Vocational interests are an important factor for career choices (Lent, Brown, & Hackett, 1994), often relied on by career counselors to find a suitable occupation for their clients. Whereas personal vocational interests are a well-researched area, little is known about the extent to which existing occupations in the labor market satisfy different vocational interests. Previous research describing labor markets predominantly made use of non-psychological indicators, such as unemployment rate (Nickell, 1997), level of qualification of job incumbents (Groot & Van Den Brink, 2000), or industrial sectors (Piore, 1972), and mainly ignored indicators that are built on psychological variables, such as vocational interest typologies. As an exception, Reardon, Bullock, and Meyer (2007) and McClain and Reardon (2015) described the U.S. labor market from a psychological viewpoint. They applied the predominant classification of vocational interests from Holland (1997), characterizing occupations as realistic, investigative, artistic, social, enterprising, or conventional (i.e., the RIASEC typology). Their results showed that the proportion of workers in each RIASEC type of occupation vary in size, and changed considerably over time.

However, no such description of a European labor market more generally, or the Swiss labor market more specifically, exists. This is problematic because results from the United States cannot directly be transferred to other economies due to differing sizes of economic sectors (Henderson, 2015; Swiss Federal Statistical Office, 2016e) and educational systems (Allmendinger, 1989; Swiss Conference of Cantonal Ministers of Education, 2015). In Switzerland, for example, early vocational education and training is common, which significantly affects employment opportunities and career paths (Scharenberg, Hupka-Brunner, Meyer, & Bergman, 2016), thereby shaping the future labor market. Especially for career guidance, it would be crucial to know which occupations are more or less frequent in the labor market, and what development trends occur over time, in order to properly guide clients.

To address this issue, we classified the occupations of workers on the Swiss labor market in terms of this RIASEC typology using data from the Swiss Labor Force Survey (SLFS), which is available from 1991 onward. In addition, we provided more fine-grained analyses of gender segregation, as well as the typical salary level and required skill level across RIASEC types. Occupational gender segregation is relevant from a broader societal perspective, where men and women are encouraged to participate more equally in the labor market. Holland's (1997) RIASEC typology is systematically linked to gender role expectations: for example, social occupations' stress communal traits (e.g., friendly, warm), which are more gender typical for women (Prentice & Carranza, 2002). As a further variable, salary is included due to its importance for workers and because shortcomings of previous studies do not allow for a detailed analysis of salary development over time. We further examined salary differences between women and men, contributing to an ongoing debate in Switzerland on equal pay (Swiss Federal Council, 2015). We also compared salary of each RIASEC type with similar occupational skill requirements, to rule out one major explanation of salary differences.

Such a description of the RIASEC labor market in Switzerland promises several important insights and is especially useful for career decision-making and career guidance. In Switzerland, as well as in many other countries, Holland's typology is commonly used to assess vocational interests as a basis to identify occupations that match a client's preferences (Bergmann & Eder, 2005; Jörin, Stoll, Bergmann, & Eder, 2004). RIASEC vocational interests can thus serve as a starting point when looking for a fitting job for people who want to enter the labor market or for workers in a professional reorientation. Describing the Swiss labor market in terms of RIASEC types can inform this process by providing information concerning the current situation and long-term trends within the job market that directly correspond to individual vocational interests. Knowing how many people are employed in different work fields may guide career decisions insofar as occupations with many workers point to more available positions and higher chances to find employment. Moreover,

developmental trends over time could serve as an indicator of future employment opportunities. Such information is especially important for career planning of people in education or unemployment, because it can be used to spot trends on the labor market and can thereby be considered as a proxy for future job openings.

Existing Labor Market Descriptions

Generally, existing labor market descriptions focus either on the supply side, such as workers who provide labor, or on the demand side, such as offered occupations and available jobs (Brown, Fry, & Harris, 2008; Jacobsen & Skillman, 2004). Labor markets are frequently described in terms of (1) labor market participation, indicated by participation or employment rate (Swiss Federal Statistical Office, 2016d); (2) the type of work employees perform, such as classified by the International Standard Classification of Occupations ISCO (International Labour Organization, 2012) or by the industry sectors (Swiss Federal Statistical Office, 2015a); (3) horizontal occupational segregation by sex, indicated by the percentage of men and women working in a field (Anker, 2001; Swiss Federal Statistical Office, 2016b); (4) workers' wages (Akerlof & Yellen, 1986); or (5) needed qualification of job incumbents, indicated by their educational attainment (OECD, Eurostat, & UNESCO Institute for Statistics, 2015). Despite these labor market characteristics being related to psychological variables such as vocational interests, labor markets are rarely described from such a psychological view.

A RIASEC Analysis of the Labor Market

The present paper enriches existing labor market descriptions by applying a psychological viewpoint. Labor market participation, horizontal segregation, and the size of industry sectors are influenced by psychological characteristics because people choose vocations partly based on their interests (Holland, 1996). In fact, meta-analyses confirmed that vocational interests exert a strong influence on occupational choice and career goals (Sheu et al., 2010). The most established model of how to categorize vocational interests is the RIASEC typology by Holland (1997). This typology not only allows one to categorize an individual's vocational interests (called *personality*

type), but also to describe work environments (called *environmental type*) based on the typical vocational interests that incumbents in these occupations exhibit (Holland, 1996). Holland's RIASEC classification is therefore a unique model that can simultaneously describe personal vocational interests and occupational environments, thus covering the two previously mentioned aspects of labor markets in terms of supply and demand. Our analysis of the labor market based on the RIASEC typology thus represents a description of the typical vocational interests addressed by different occupations.

Two previous studies described the U.S. labor market in terms of RIASEC types based on census data from 1960 in 10-year intervals (McClain & Reardon, 2015; Reardon et al., 2007). Over 50 years, most job incumbents worked in realistic occupations and less in investigative or artistic areas. At the same time, employment grew fastest among investigative and social occupations and declined sharply in realistic fields (McClain & Reardon, 2015). Whereas men worked predominantly in realistic occupations, women were more evenly distributed over the six RIASEC work environments (Reardon et al., 2007). In line with these results, a study of the Swiss apprenticeship market classified most vocational trainings as realistic—by far the most frequent occupational type among young men (Hirschi, 2009). The present study builds upon these analyses by providing the first available description of the Swiss labor market in terms of the RIASEC typology of occupations. In addition, we went beyond existing studies by analyzing gender segregation, salary differences, and skill level across different RIASEC types of occupations.

RIASEC Work Environment and Gender

Gender fundamentally structures labor markets, in part by shaping men and women's vocational aspirations (Gottfredson, 1981) and career choices (Anker, 2001; Fejes & Haake, 2013; Hirschi, 2009). According to Gottfredson's (1981) cognitive map of occupations, people assess occupations based on simple characteristics, such as how masculine or feminine a field of work is. Perceived gender typicality of a profession could, in turn, serve as a signal of which tasks or interests

are regarded as appropriate for a given gender and which are not (Luzadis, Wesolowski, & Snavely, 2008). By affecting career aspirations and choice, this cognitive map of occupations manifests itself in horizontal segregation. This is true for the U.S. labor market, where more men than women worked in realistic occupations, and more women than men in social and conventional occupations (Reardon et al., 2007).

Gender differences in the labor market are explained by two basic processes: supply and demand. On the supply side, socialization of women and men affects their vocational interests (Evans & Diekmann, 2009; Lippa, 2010; Woods & Hampson, 2010), (work) values (Weisgram, Dinella, & Fulcher, 2011), and skills (Barron, Black, & Loewenstein, 1993; Sharif, 2014). For example, based on mere exposure effects (Zajonc, 1968), socialization can influence occupational interests insofar as men become more familiar with realistic tasks than do women (Schuette, Ponton, & Charlton, 2012), come to like them more (Konrad, Ritchie Jr, Lieb, & Corrigan, 2000), and therefore develop more skills in this domain, such as operating machines or handling tools (Glick, Wilk, & Perreault, 1995; Gottfredson, 1981). This is in line with results of vocational interest research, where men are most interested in realistic occupations (Jörin et al., 2004; Su, Rounds, & Armstrong, 2009). On the demand side, gender differences in type of exercised occupations can be amplified due to gender-specific selection procedures (Bosak & Sczesny, 2011; Isaac, Lee, & Carnes, 2009; Rice & Barth, 2016). Based on role congruity theory (Eagly & Karau, 2002), incongruent role expectations concerning occupations (e.g., being a manager) and gender (e.g., being female) can lead to less favorable perceptions of applicants, which, in turn, fosters lower hiring chances. In order to examine potential gender differences in RIASEC occupational types, we will also analyze whether gender segregation changed over time.

RIASEC Work Environment and Salary

Salary is an aspect in career decision making that makes certain occupations more or less attractive for people to enter (McLean, Smits, & Tanner, 1996; Saks, Wiesner, & Summers, 1996).

Therefore, salary differences between the six RIASEC types of occupations may affect career decision making and workers' actual occupation. Existing labor market analyses in the United States showed income differences between the occupational types, with the highest income level in investigative, and lowest in conventional or enterprising, occupations (McClain & Reardon, 2015; Reardon et al., 2007). McClain and Reardon (2015) reported income levels for the year 1990, 2000, and 2010 only, and Reardon et al. (2007) included just the two time points 1990 and 2000. However, the time points are potentially not directly comparable because income calculations differed for 1990 and 2000 census data, and salary information for 2010 was obtained from a different data source (McClain & Reardon, 2015; Reardon et al., 2007). Another critical point is that the mean, instead of median, income for an occupational type was used. The median would be more robust to typically occurring outliers in salary. McClain and Reardon (2015) further did not correct the income for inflation and/or deflation. We take these points into account when describing the RIASEC labor market in Switzerland in regard to salary level, and analyze changes in median income over 23 years.

In addition, we describe how RIASEC work environments are related to salary differences between men and women, contributing to an ongoing debated in Switzerland on equal pay for equal work (Federal Constitution of the Swiss Confederation, 2016; Swiss Federal Council, 2015). Salary differences between women and men is a well-researched field at the global and national level (Arulampalam, Booth, & Bryan, 2007). Among all OECD members in 2010, the difference in income between men and women amounts to 15% (OECD, 2014). The wage gap in Switzerland is even higher, with women earning 18% less than men. The difference in salary even persists when comparing similar occupations: According to Reardon et al. (2007), women earned less than men in every RIASEC category in the United States, except for conventional occupations in 2000.

RIASEC Work Environment and Skill Level

Educational and skill-level requirements of jobs are frequently applied in existing labor market descriptions (OECD, 2013; Swiss Federal Statistical

Office, 2015c). Huang and Pearce (2013) showed that investigative occupations positively, and realistic occupations negatively relate to required training. In the study of Reardon, Vernick, and Reed (2004) realistic and conventional occupations showed the lowest, and investigative occupations the highest complexity ratings. However, skill level requirements of RIASEC work environments have not yet been used to characterize whole labor markets. Based on previous findings, we expect typical skill levels to differ in their frequency across the six RIASEC work environments. For example, compared to realistic occupations, the highest skill level should be represented to a greater extent in investigative occupations because many academic professions belong to the latter type (Holland, 1997; Jörin et al., 2004). Having examined occupational requirements over time, we further expect an increase in skill level over the last few decades, reflecting the general trend toward higher educational attainment of labor market participants (Hara, 2000; Swiss Federal Statistical Office, 2016c).

Skill level is further a crucial consideration when comparing the median salary across RIASEC types because varying occupational requirements are a major explanation of salary differences. We will therefore compare salary across RIASEC types at the same skill level to check if salary differences persist even when occupational requirements are comparable.

Method

Participants

We used the official data from the Swiss Labour Force Survey (SLFS) of the Federal Statistical Office (FSO). The data of the SLFS is collected by computer-aided telephone interviews based on a random sample of the resident population aged 15 and above, with approximately 70,000 participants per year in recent years (Swiss Federal Statistical Office, 2004, 2012). The interviewers were trained, especially in regard to occupational coding, and quality checks were made during data collection to ensure high data quality. For our analyses, we excluded military professions, people who were not employed at the time of the interview, and apprentices. Our analyses were based on a total of

568,956 interviews from 1991 until 2014 (47.6% female; mean age of 43.1 years, ranging from 15 to 100 years old). Data was weighted to be representative at the national level (Swiss Federal Statistical Office, 2004).

Measures

RIASEC type of occupation. We coded occupations based on the ratings of the six environment types *realistic, investigative, artistic, social, enterprising, and conventional* (Holland, 1996) provided by O*NET (version 20.0), an online database from the U.S. Department of Labor containing the RIASEC score of hundreds of occupations. The RIASEC ratings on O*NET are developed by experts judging how characteristic each of the six RIASEC types is for a given occupation, leading to a value from 0 to 100 for each RIASEC category, whereby higher scores indicate that the Holland type is more descriptive and characteristic for a given occupation (Rounds, Armstrong, Liao, Rivkin, & Lewis, 2008; Rounds, Su, Rivkin, & Lewis, 2013). The interrater agreement was high for the initial ratings in 2008 (Goodman-Kruskal's $\gamma = .76$) as well as for the additional ratings of new occupations in 2013 ($\gamma = .86$). The SLFS collects an eight-digit occupational stem code by telephone, which is converted into the ISCO by the FSO. Because the occupations on O*NET are based on the Standard Occupational Classification (SOC) and not the ISCO, RIASEC ratings could not directly be linked to the SLFS' occupations. Therefore, we used the crosswalk from the ISCO to the SOC provided by the U.S. Bureau of Labor Statistics (2012) and averaged all RIASEC ratings of SOC codes belonging to the same ISCO code. Afterwards, we assigned one single RIASEC type to an occupation according to the score with the highest rating. No RIASEC code was available for 112 occupations, due to lack of crosswalk information, no ratings on O*NET, or ambiguity because of multiple maxima. These occupations were independently rated by the first and second author based on an available RIASEC first letter code of a related professions within the same ISCO minor group or based on detailed descriptions in the ISCO manual (International Labour Organization, 2012). The two raters agreed in 92.9% of all cases.

Discrepancies were resolved by mutual agreement on a final code.

Gender. We used the information provided by the SLFS participants concerning their sex to distinguish men and women.

Salary level. The SLFS data include a composite variable that captures the gross total annual earned income of each participant. In order to control for inflation and deflation, and to capture actual purchasing power, we set the salary level of 1991 as a baseline and adapted the salary of the following years based on information by the FSO regarding changes in real wages by multiplying the salary with a scaling factor for each year (Swiss Federal Statistical Office, 2015b, 2015d). We moreover scaled the salary to full-time equivalents.

Skill level of occupation. We used a crosswalk between the ISCO codes and four broad skill levels provided by the International Labour Organization (2012) to assign a skill level to each occupation represented in the SLSF dataset. Occupations at *skill level 1* comprise simple and routine tasks, which require completion of primary education or a short on-the-job training (International Labour Organization, 2012). For *skill level 2*, the completion of the first stage of secondary education is needed in order to meet the required knowledge and skills, such as reading information, making written records, or simple computation. Occupations at *skill level 3* comprise complex tasks that usually require knowledge and skills acquired through higher education, as well as a high level of

literacy and numeracy. At *skill level 4*, tasks typically require complex problem solving, decision making, and creativity, wherefore a tertiary education is needed to meet the high level of literacy and numeracy required for analysis and research.

Results

RIASEC Type of Occupations

For each examined year, we calculated how many people were employed in each of the six RIASEC categories based on their primary occupation (Figure 1). Over the observed 23-year period, most workers were in occupations classified as realistic (1991: 41.2%; 2014: 30.2%), compared to less than 9% in investigative (1991: 6.2%; 2014: 8.8%) and 3% in artistic (1991: 2.4%; 2014: 2.6%). Looking at absolute figures, the number of workers in realistic occupations decreased by 8.5%. It represents the only work environment where fewer workers are employed today compared to 20 years ago. In investigative and artistic professions, the number of workers increased by 77.1% and 36.1%, respectively. An increasing number of people work in enterprising occupations (1991: 16.8%; 2014: 24.9%), with an 84.8% increase over the observed period. Starting on different levels, the percentage of workers in social occupations (1991: 11.5%; 2014: 15.9%) approximated the level in conventional occupations over the time span (1991: 21.9%; 2014: 17.7%).

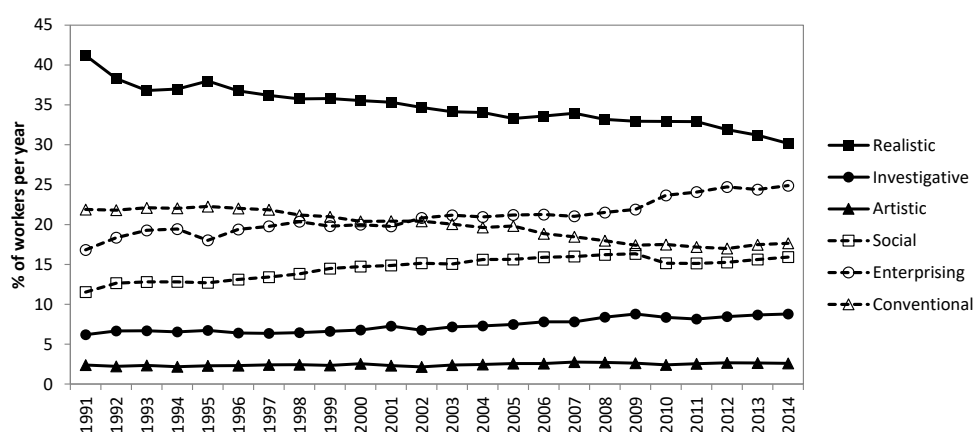


Figure 1. Percentage of people working in Switzerland in realistic, artistic, investigative, social, enterprising, and conventional occupations per year from 1991 to 2014, based on data of the SLFS and coded with O*NET.

RIASEC type differences between women and men. Men and women were unequally represented in the six occupational types with social, realistic, and investigative occupations being the most gendertyped (Figure 2). Between 1991 and 2014, the percentage of women and men in realistic (women $M = 27.7\%$; $SD = 1.1$), social (women $M = 73.6\%$; $SD = 1.2$), enterprising (women $M = 43.1\%$; $SD = 1.3$), and conventional occupations (women $M = 63.0\%$; $SD = 1.0$) remained relatively stable, compared with more variation in artistic (women $M = 33.3\%$; $SD = 3.4$) and investigative (women $M = 26.4\%$; $SD = 4.7$) occupations. After the percentage of women in investigative occupations declined in the mid-90s, it grew steadily afterwards. The proportion of women in artistic occupations increased from 26.7% in 1991 to 39.4% in 2014. Enterprising occupations were most gender balanced, with over 40% women (range: 40.7% in 1999 to 45.9% in 1995). More than 70% of social and 60% of conventional occupations were held by women, ranging from 71.6% (1992) to 76.1% (2014) for social occupations, and from 60.5% (1995) to 64.2% (1998) for conventional occupations. When looking at within-gender differences, men worked mostly in realistic (40.2%) and enterprising occupations (26.1%). Women were more equally

distributed on the Swiss labor market: 26.0% worked in social, 23.8% in conventional, 23.4% in enterprising, and 18.7% in realistic occupations.

Salary Level of RIASEC Occupations

We analyzed the median gross annual salary within each RIASEC type of occupation (see Figure 3). Over the observed 23-year period, the median salary was consistently lowest in realistic (1991: 50,400 CHF; 2014: 76,383 CHF) and second lowest in conventional occupations (1991: 52,500 CHF; 2014: 89,818 CHF). By far, the highest median salary was consistently found in investigative occupations (1991: 80,400 CHF; 2014: 123,178 CHF). The median salaries in artistic, social, enterprising, and conventional occupations were very close in 1991 and showed a similar growth ratio to that of 2014 (artistic: +70.7%; social: +66.3%; enterprising: +74.8%; conventional: +70.1%). The growth ratio was lowest in realistic (+51.6%) and investigative occupations (+53.2%). When considering occupations' skill level, a slightly different picture emerged (see Figure 4). The highest median salary was obtained by workers in enterprising occupations at the highest skill level. When controlling for occupational skill level, realistic and investigative occupations paid approximately the same median salary, and artistic occupations showed the lowest median income.

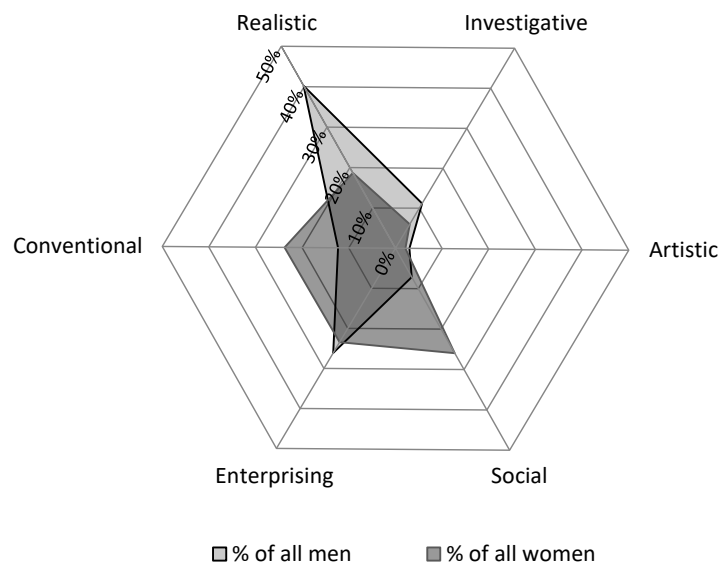


Figure 2. Within-gender distribution in realistic, investigative, artistic, social, enterprising, and conventional occupations (Holland, 1996) in 2014, based on data of the SLFS.

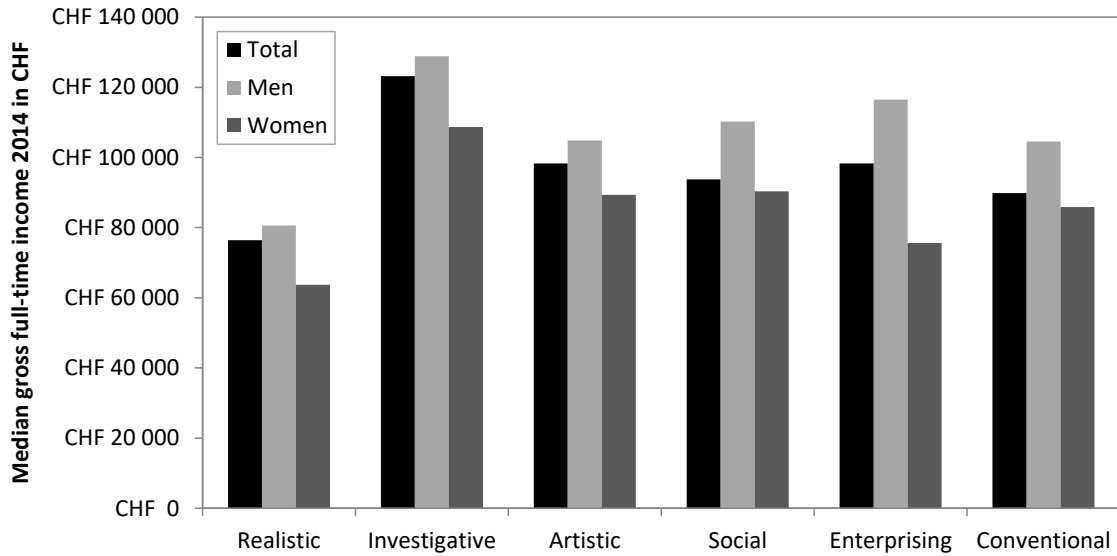


Figure 3. Median gross annual salary in CHF in 2014 based on the principal job scaled to full-time employment for each RIASEC category, separately for men and women, based on data of the SLFS.

Salary differences between women and men. We analyzed the median salary of men and women in each RIASEC type of occupation, scaled to full-time employment (see Figure 3). Every year from 1991 to 2014, men had a higher median salary than did women in each RIASEC category. Especially in

enterprising occupations men earned 89.4% more than did women in 1991, and 54.1% more in 2014. In absolute terms, men working in enterprising occupations earned on average 33,034 CHF more than women in 1991, and 36,500 CHF more in 2014.

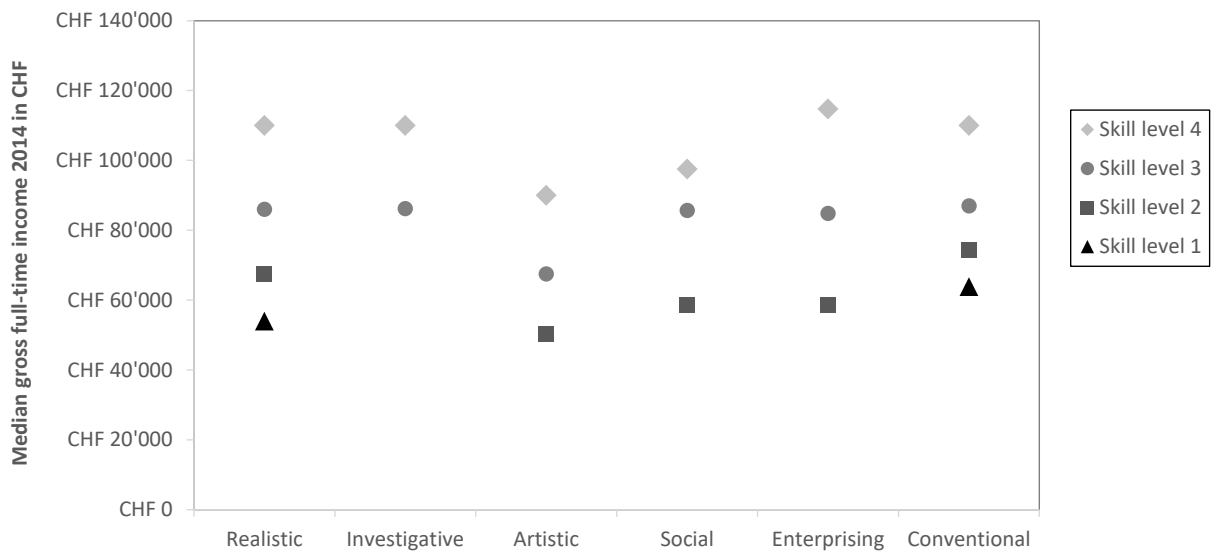


Figure 4. Median gross annual salary in CHF in 2014 based on the principal job scaled to full-time employment for each RIASEC category, considered separately for each skill level, based on data of the SLFS.

Skill Level of RIASEC Occupations

The percentages of skill levels within realistic, investigative, artistic, and social occupations remained quite stable from 1991 to 2014. Enterprising occupations saw an increase in skill level 4, from 25.0% in 1991 to 42.9% in 2014. An increase in higher skill level was also observed in conventional occupations, with 3% at skill level 4 in 1991 and 14.7% in 2014. Moreover, whereas 18.6% of conventional occupations were skill level 3 in 1991, this increased to 31.4% in 2014. Over all six RIASEC categories during the assessed 23-year period, an increasing number of people worked in occupations which required the highest (1991: 19.4%; 2014: 33.8%) or second highest skill level (1991: 17.1%; 2014: 19.6%), and the

percentage of occupations in the lowest (1991: 7.3%; 2014: 4.1%) or second lowest skill level (1991: 56.1%; 2014: 42.5%) declined. This percentage change is mainly due to a 117.4% increase in the number of people working at skill level 4.

A more detailed analysis of how RIASEC occupations differed in the composition of the four skill levels in 2014 is shown in Figure 5. People working in realistic occupations were predominantly at skill level 2. Moreover, only in realistic occupations were incumbents in skill level 1 (13.5%). Investigative, artistic, and social occupations were predominantly composed of skill level 4, compared to mostly skill level 2 in conventional professions.

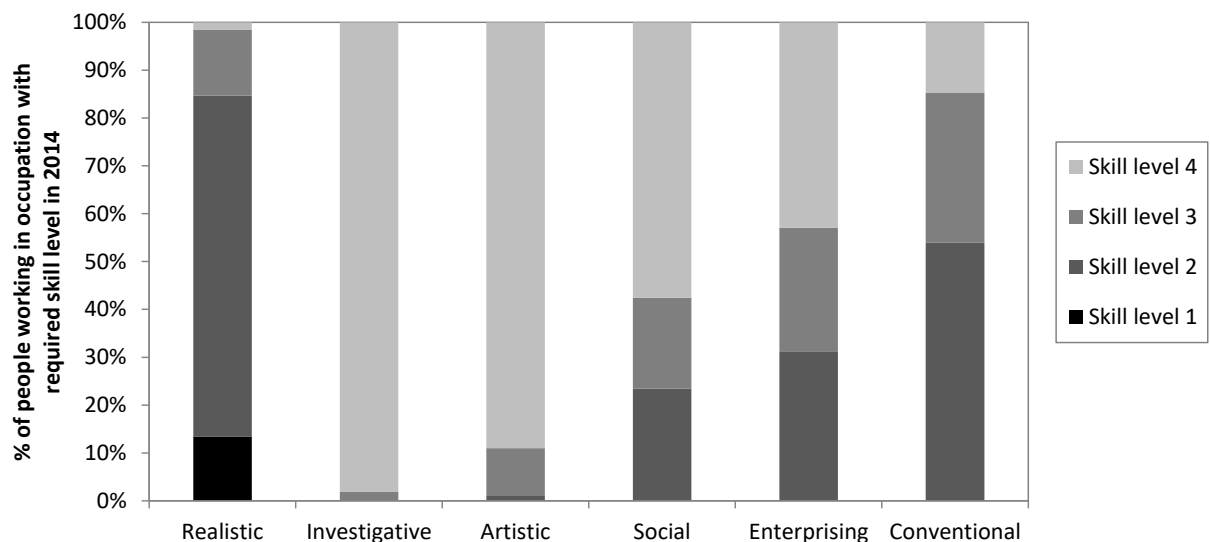


Figure 5. Percentage of people working in Switzerland in realistic, artistic, investigative, social, enterprising, and conventional occupations classified in regard to the required skill level of the profession in 2014, based on data of the SLFS.

Discussion

This paper describe the Swiss labor market from a psychological perspective in terms of Holland’s RIASEC work environments over 23 years. Our results support the assumption of an unequal distribution of vocational interest RIASEC types in the labor market (Rayman, 1998). This unequal distribution was prevalent across the entire 23 years analyzed in this study, with shifting

frequencies across time. In 1991, workers in realistic occupations dominated the labor market. Despite a steady decline, the realistic type remained the biggest work environment until 2014. This development is in line with findings from the U.S. labor market (McClain & Reardon, 2015), possibly reflecting shifts in economic sectors across industrialized economies (Sheldon, 2005). One might argue that occupations are not comparable across countries, because even when

they share the same occupational title the specific work tasks could differ. Tijdens, De Ruijter, and De Ruijter (2013) investigated task importance of 160 occupations on O*NET and found them to be rated similar across different European countries. This indicates comparable occupational profiles beyond boundaries, suggesting RIASEC first letter of an occupation not to systematically differ between labor markets.

A possible explanation for the asymmetrical distribution of RIASEC types of occupations in the labor market is that differences in occupations reflect differences in vocational interests. According to Holland (1997), workers search for work environments congruent to their vocational interests, whereas incongruence enhances change of occupational fields. Therefore, it is probable that the RIASEC type of an occupation is congruent with the job incumbent's vocational interests. This assumption is further fostered by meta-analytic findings that vocational interests predict goals to pursue a career in a particular RIASEC type (Sheu et al., 2010). However, contrary to that person-environment-fit assumption, more people are working in realistic occupations than would be expected based on the vocational interest literature. International research showed that people are generally the least interested in realistic work when compared to the other six occupational types (Bergmann & Eder, 2005; Creed, Wong, & Hood, 2009; Iliescu, Ispas, Ilie, & Ion, 2013; Paessler, 2015; Tracey & Rounds, 1992). Hence, the realistic type of work seems overrepresented in the current labor market when compared to the prevalence of vocational interests in this domain, which might be explained by strong labor market demands or could reflect promising employment opportunities that attract workers into such occupations.

In sharp contrast to the high frequency of workers in realistic occupations, artistic jobs represented the smallest type of work over the whole time span, which corresponds to the U.S. labor market structure (McClain & Reardon, 2015). According to prevailing vocational interests, artistic occupations would be expected to be more frequent within the Swiss labor market (Bergmann & Eder, 2005). This incongruence between the

extent of artistic interests and job incumbents could be due to lower labor market demands than supply. This is also reflected by a higher probability of unemployment in artistic occupations (Stoll et al., 2016), meaning that some people might end up in other, less preferred types of work (Brown, Fry, & Harris, 2008).

In the Swiss as in the U.S. labor market, more and more people worked in investigative occupations over the last 23 years, but it remains the second smallest RIASEC type. This is in line with a general development in society toward higher education levels (Hara, 2000; Swiss Federal Statistical Office, 2016c). The number of people working in social occupations also increased from 1991 to 2014 in Switzerland. It might be due to demographic changes (Swiss Federal Statistical Office, 2016a) where an increasing number of older people need care. In the U.S. labor market, there has been a similar increase until 2000, followed by a much sharper increase up to 24% of workers in social occupations in 2010. Compared to Switzerland, the recent proportion of people working in social occupations in the United States seems to correspond better to the rather great interest in social work found in vocational research (Bergmann & Eder, 2005; Paessler, 2015; Stoll et al., 2016; Tracey & Rounds, 1992). However, some contradictory findings in vocational interest research can be found, such as a low prevalence of social interests in the study from Creed et al. (2009). Given a high interest in social jobs among the working population, our analyses suggest that the Swiss labor market does not provide enough employment opportunities. Finally, enterprising occupations showed the biggest growth ratio and are the second biggest area of work in 2014, employing every fourth worker. Due to this increase over the last couple of decades, the proportion of workers corresponds to the prevalence of enterprising interests, which is generally one of the most strongly endorsed interest types (Bergmann & Eder, 2005; Creed et al., 2009; Paessler, 2015).

In sum, the size of RIASEC work environments reflects the prevalence of major vocational interests to some extent, but this is by no means the only factor shaping the labor market. The observed

gaps between typically prevalent vocational interests and job incumbents in different types of work indicate other driving forces in the labor market, such as more general societal developments or changing labor market demands due to digitalization and automation (Autor, 2015). The larger trends are assumed to reduce realistic occupations such as manufacturing jobs and foster investigative occupations such as technicians, social occupations such as personal service jobs, and enterprising occupations in management and sales.

Gender Segregation across RIASEC Types

Men and women were asymmetrically distributed in the Swiss labor market across RIASEC occupational types, with most men working in realistic and most women in social occupations. Enterprising represents the most gender-balanced RIASEC type today. The findings from the present study are in line with the U.S. labor market (Reardon et al., 2007), where almost the same proportion of men and women are working in each RIASEC work environment. Additionally, this gender segregation into different types of jobs was quite stable over time, which corresponds to the stability found in the U.S. labor market (Reardon et al., 2007) and to only small changes in vocational interests of men and women over time (Hansen, 1988; Morris, 2016).

Our findings raise the question of whether gender segregation on the RIASEC labor market simply reflects differences in vocational interests. Overall, the actual RIASEC work environment seems to correspond more closely to men's, compared to women's, typical vocational interests. Men are generally most interested in realistic, enterprising, and investigative occupations, and least so in artistic and social work (Morris, 2016; Paessler, 2015). This is well reflected in the male distribution across RIASEC occupations in the labor market. By contrast, women are generally interested in artistic and social occupation, and less so in realistic work (Iliescu et al., 2013; Morris, 2016; Paessler, 2015). However, whereas social occupations are the most frequent type of job among women, unexpectedly, every fifth female worker was in a realistic occupation—the area in which women are clearly least interested (Su et al.,

2009). Because we only took the RIASEC first letter into account it is possible that women's realistic occupations have a strong social component as well. Post-hoc analyses revealed that women's compared to men's realistic occupations indeed scored higher on the social dimension. However, in line with the hexagonal structure, realistic occupations generally did not have a strong social component—neither for men nor women. Maybe women are falling back on less fitting occupations due to high labor market demands for realistic work, or because the labor market does not provide enough occupations matching their predominant vocational interests. It is notable that this finding is in line with a previous analysis of the Swiss apprenticeship market (Hirschi, 2009), with women being more equally distributed over the RIASEC types and men being more concentrated in realistic apprenticeships. Bubany and Hansen's (2011) results indicate an increasing interest of female college students in enterprising work and a decreasing interest of men in realistic work. This corresponds to our findings of fewer men working in realistic occupations over time, but not in regard to enterprising work, where we did not find a gender-specific development.

RIASEC Types and Salary Level

Salary is an important characteristic of labor markets, reflecting the interplay of labor demand and supply: If demand is higher than supply, salary is expected to increase and vice versa (Sheldon, 2005). From 1991 to 2014, the income of all RIASEC types increased, indicating an increased economic welfare in general. Over the examined years, realistic occupations showed the lowest income and investigative the highest, both with comparatively small growth rates. Therefore, the income of realistic occupations especially falls behind the other occupational types, maybe reflecting decreasing labor demands. The salary developments for artistic, social, enterprising, and conventional occupations were more advantageous: Starting around the same level as realistic occupations in 1991, they showed a comparatively high growth rate up to 2014.

Especially for enterprising occupations, this could be due to more workers in highly skill-demanding occupations. Indeed, skill level needs to

be considered: When comparing RIASEC occupations at the same skill level, salary levels of conventional, realistic, and investigative occupations become highly similar. Enterprising occupations reached the highest income and showed the biggest variability in income. The income of artistic occupations fell below the income of the other work types despite the high number of workers in highly skilled occupations. This could be explained by a lower labor market demand of artistic work or, a too high supply. Another reason for lower salaries could be a potential higher rate of self-employment among artistic workers.

Besides occupational requirements, gender showed to be important to consider when discussing salary level. Salary differences between women and men emerged in each occupational type, which is consistent with various research concerning gender pay inequalities (Arulampalam et al., 2007; Bonjour & Gerfin, 2001; Busch, 2013). Men earn more than women in every RIASEC category in every year. This is in line with income differences in the United States from 1990, and for all but conventional occupations in 2000 (Reardon et al., 2007). The biggest gap between women and men was found in enterprising occupations.

RIASEC Types and Skill Level

The analysis of the RIASEC labor market in terms of skill requirements showed that the number of people working in occupations at the highest skill level increased over the 23-year period, probably reflecting an increased labor market demand for better-qualified work. Especially pronounced was the increase in skill level in enterprising occupations. This is in line with findings from Huang and Pearce (2013), where more enterprising occupations positively correlated with the amount of education or training typically required. Occupations of investigative workers were almost all at the highest skill level, which is in line with previous research on apprenticeships (Hirschi, 2009), ratings of occupational titles (Reardon et al., 2004), and Holland's (1997) description of investigative work environments. Surprisingly, most workers are in the artistic field work in occupations at the highest skill level, despite the more diverse pattern of requirements when looking at apprenticeship or job titles

(Hirschi, 2009; Reardon et al., 2004). In sharp contrast to all other RIASEC types, only realistic work environments provide a niche for less qualified workers.

Limitations

Some limitations of the present study need to be considered. First, we classified an occupation according to the first letter Holland code and did not consider second or third letters. As Reardon et al. (2007) state, this may reduce the level of detail but increase the accuracy of occupational classification. The finding that the RIASEC first letter reaches the highest agreement rate compared to second or third letter (Eggerth, Bowles, Tunick, & Andrew, 2005) fosters the assumption that it is most representative for characterizing an occupation. Moreover, using only one RIASEC type to describe an occupation instead of 30 second-letter or 120 third-letter combinations is more parsimonious to depict time trends, gender segregation and average salary and skill level. Second, a basic assumption of our analysis is that the RIASEC first letter of an occupation does not systematically differ between Switzerland and the United States, even when the specific tasks could be slightly different. According to findings from Tijdens, De Ruijter, and De Ruijter (2013) task importance of 160 occupations of O*NET were rated similar across different European countries, indicating comparable occupational profiles beyond boundaries. Third, we further assume the RIASEC first letter does not vary over time even when occupational characteristics or specific tasks may slightly change. This assumption is strengthened by a close match between occupations' initial RIASEC first letter on O*NET (Rounds, Smith, Hubert, Lewis, & Rivkin, 1999) and their rerating (Rounds et al., 2008). Comparing O*NET database version 3.0 with version 14.0, 84% of all occupations were assigned the same RIASEC first letter and additional 5% were classified as neighboring RIASEC work environment; only 1.8% of occupations were assigned to the complete opposite RIASEC category. Fourth, O*NET and the SLFS are based on different occupational classifications. The crosswalk we used to link an occupation's RIASEC rating on O*NET with the occupation of the SLFS reduced the number of occupations from 840

to 436. Besides the loss of information, it could be critical if several occupations with highly divergent RIASEC profiles were merged into one because the resulting averaged profile would limitedly represent the initial occupations. However, we consider this constraint to be negligible because the crosswalk aggregated similar occupations, therefore not affecting the accuracy of the RIASEC first letter. Fifth, cross-country comparisons between the Swiss and U.S. labor market should be made with caution. Previous descriptions of the U.S. labor market we refer to (McClain & Reardon, 2015; Reardon et al., 2007) are based on U.S. Census data which were subject of criticism. Steckel (1991) for example discusses quality issues such as underenumeration, and Alexander, Davern, and Stevenson (2010) make aware that labor market participation of persons around retirement were misrepresented. Sixth, we used the weighting variable provided by the Federal Statistical Office to generalize the SLFS data to the national level. These weights take diverse demographic information into account (Swiss Federal Statistical Office, 2004), but there is no evidence regarding how well they represent different types of work at a national level. We assume the weighting factor not to be systematically biased toward misrepresenting one RIASEC category in particular.

Conclusion and Implications

Our study provided a psychological view of the Swiss labor market and contributed new knowledge regarding how different psychological types of work have been distributed in the labor market over the last 23 years. Because we applied Holland's occupational typology, our analyses provide especially useful knowledge for different stakeholders (e.g., career counselors, educators, economists), who are looking to connect different types of occupations in the labor market with the vocational interests of people. For them it is important to know the current size of each RIASEC work environment and developmental trends over time because they are related to employment opportunities and changing labor market supply and demand.

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