



RESEARCH

A Quantitative Review of Gender Differences in Vocational Interests in Iceland: Pervasive and Persistent

Sif Einarsdóttir¹ and James Rounds²

¹ Department of Sociology, Anthropology and Ethnology, University of Iceland, IS

² Department of Psychology, University of Illinois at Urbana-Champaign, US

Corresponding author: Sif Einarsdóttir (sif@hi.is)

Iceland ranks highly on international indices of gender equality, but the labor market is among the most gender segregated in the world. Gender differences in vocational interests play an important role in explaining these disparities, as interests are highly related to career and educational choices. In this quantitative review, we examine gender differences in both Holland's RIASEC categories and basic interest scales using data from 10 studies in Iceland. The studies contained populations ranging in age from 13–60 years ($N = 9494$). Both imported (SII, SDS) and indigenous (Bendill) interest inventories were used to measure interests. First, we found that the RIASEC scales in the inventories conform to Holland's structural model both for women and men, except in the youngest age group. Second, and most importantly, the results show the same pattern and extent of mean gender differences that have emerged in other countries. The largest gender differences are in Social interests, which favor women, and Realistic interests, which favor men. Women are also higher on Artistic interests, and men are higher on Investigative and Enterprising interests. These gender differences reflect the gender segregated labor market and educational choices. We discuss the possible influence of sex-role socialization, gender identity, and gender essentialist ideologies on the development of interests and career choices in Iceland.

Keywords: vocational interests; gender; sex-role socialization; gender identity

Ísland situr gjarnan í efstu sætunum á alþjóðlegum mælikvörðum um kynjajafnrétti, vinnumarkaðurinn er þó á sama tíma einn sá mest kynjaskipti í heiminum. Þar sem starfsáhugi mótar náms- og starfsval getur kynjamunur í áhuga hjálpað til við að skilja hvers vegna konur og karlar velja ólík störf. Í þessari grein eru niðurstöður 10 rannsókna teknar saman til að kortleggja kynjamun í sex áhugasviðum Hollands – HVLFS og á 35 undirsviðum. Rannsóknirnar ná til fólks á aldrinum 13 – 60 ára ($N = 9494$) og eru bæði innfluttar (SDS og Strong) og innlendar (Bendill) áhugakannanir notaðar til að meta starfsáhuga. Í ljós kom að þessar kannanir falla vel að formgerðarlíkan Hollands bæði fyrir konur og karla, nema í allra yngstu aldurshópunum. Kortlagning á kynjamun sýnir álíka mynstur og mikinn kynjamun í áhuga á jafnréttislandinu Íslandi og fram hefur komið í öðrum löndum t.d. Bandaríkjunum. Mestur munur kemur fram á félagssvið þar sem konur eru að jafnaði hærri og á handverkssviði þar sem karlar eru hærri. Konur hafa einnig meiri áhuga á störfum sem falla á listasvið og karlar á störfum á vísinda- og athafnasviði. Kynjamunur í áhuga endurspeglar kynskiptingu íslensks vinnumarkaðar og menntakerfirs. Vísbendingar eru um að mestur munur sé á áhuga kynjanna á unglingsárum en hann minnki með aldrinum og aukinni reynslu. Áhrif kynbundinnar félagsmótunar, sjálfsmyndar og ríkjandi samfélagslegar hugmyndir um ólíkt eðli kynjanna á þróun starfsáhuga og námsval eru ræddar.

Vocational interests have played a pivotal role in theories of career development. Interest inventories were introduced in Iceland in the 1980's and have been used in guidance since then (Einarsdóttir, Björnsdóttir, & Lerkkanen, 2020). Large gender differences have been detected in vocational interests, raising many concerns about the career development of women and men (Hansen, 1988; Su, Rounds, & Armstrong, 2009). In spite of Iceland high rank on international indices of gender equality (World Economic Forum, 2018), the labor market is, as in other equalitarian Nordic countries, one of the most gender segregated in the world (Jarman, Blackburn, & Racko, 2012; Melkas & Anker, 2001) and educational choices are gendered (Nordic council of ministers, 2015). In economically advanced countries with liberal values emphasizing individual choice (Schulstok & Wikstrand, 2020; Stoet & Geary, 2018), preferences are likely to play important role in vocational decisions.

It is important to understand gender differences in interests because they predict for example, educational choices (Gasser, Larson, & Borgen, 2007; Sinclair, Nilsson, & Cederskar, 2019; Zafar, 2013), occupational preferences (Hanna & Rounds, 2020) and degree completion. In Germany, interests were found to predict a broad range of work and life-outcomes beyond ability and personality (Stoll et al., 2017), supporting the contention that interests are independent motivational forces that influence life trajectories. It is vital to start charting the extent of gender differences in vocational interests in Iceland because they are related to gender equality (Lög um jafna stöðu og jafnan rétt kvenna og karla, 10/2008). The main goal of this article is to provide an integrated review of research on gender differences in interests in Iceland.

Development of Gendered Interests

Holland (1997) categorized vocational interests into six types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Realistic types enjoy working with physical objects; Investigative types like analyzing ideas and scientific pursuits; Artistic types enjoy creating and expressing; Social types like helping people; Enterprising types prefer influencing people, leading, and managing; and Conventional types seek structured tasks and organization. The relationships between the types are represented by a hexagonal structure, which reflects similarities and differences between interests. The six types, collectively referred to as RIASEC, are arranged around the hexagon in the aforementioned order, with adjacent interests (e.g., RI and SE) being more similar than distant interests (e.g., R and S).

The proposed RIASEC structure has been supported in the US (e.g. Tracey & Rounds 1993) for both women and men (Anderson, Tracey & Rounds, 1997). Internationally, tests of the RIASEC model have yielded mixed results (e.g., Long & Tracey, 2006; Nagy, Trautwein, & Lüdtke, 2010; Rounds & Tracey, 1996; Šverko 2007). Nevertheless, the structural model of vocational interests has been supported in Iceland for both women and men in higher education using imported inventories (Einarsdóttir, Rounds, Ægisdóttir, & Gerstein, 2002). The fit of the RIASEC model for women and men separately has not been evaluated using indigenous interest inventories and some questions have been raised about the applicability of the RIASEC model for younger students in general (Scheving-Thorsteinsson, 2009).

According to Gottfredson's (2005) theory, orientation towards sex roles develops as early as 6–8 years old, which may narrow the horizon of possible self-concepts and vocational experiences that will be available during adolescence. Women and men have been found to have fewer career learning experiences in domains dominated by the opposite gender (Williams & Subich, 2006). According to social cognitive career theory, interests are influenced by self-efficacy beliefs (Lent, Brown, & Hackett, 1994), and self-efficacy beliefs tend to be gendered due to difference in experiences of men and women in society. For example, an international study indicates that although girls perform as well as boys in STEM fields (science, technology, engineering and math), they have less interest and lower self-efficacy beliefs in STEM, paradoxically more so in more gender-equal countries (Stoet & Geary, 2018). Su, Stoll and Rounds (2019) further suggest that interests develop through cognitive and affective reactions with external environments. Moreover, as young people perform different activities in educational programs and work experiences, their interests become an integral part of their identity, self-concept, and social roles.

The contextualization of interests (Su et al., 2019) makes them susceptible to gender differences since women and men are influenced by differential socialization processes, with girls and boys being exposed to different types of roles and therefore different environments and opportunities (Bussey & Bandura, 1999; Ceci, Williams & Barnett, 2009). In Bussey's and Bandura's (1999) theory of gender development and differentiation, cognitive appraisal of the positive value and meaning for self-concept or identity development is a key developmental process. For example, a young boy who enjoys fashion may evoke a negative reaction

from his parents and peers, sending the message that his interests are incompatible with his gender role. Conversely, a girl may be praised for her sense of style, reinforcing her interests. During adolescence, he may also shy away from choosing a design major due to social belongingness expectation (Tellhed, Bäckström, & Björklund, 2017). According to Wood and Eagly (2012), people internalize gender roles through pressure to conform in role modeling and experience. In most cultures, males are seen as agentic and women are viewed as communal. These gender norms are consistent with women's interest in people and men's interest in things (Su et al., 2009).

It is important to explore gender differences in the Icelandic context because socialization practices vary across cultures, and gender role socialization presumably exerts the least influence on interests in one of the most egalitarian cultures in the world. Holland (1997) assumes that both nature and nurture influence the development of interests. Wood and Eagly (2012) do not rule out biological (neurological, hormonal) processes in their social role theory of sex differences but emphasize that societies exert a lot of effort and time in socializing children. Despite ranking high on international indices of gender equality, differential sex-roles and beliefs of innate abilities are prevalent in the Nordic countries (Hustad, Bandholtz, Herlitz, & Dekthyr, 2020).

These theories (Bussey & Bandura, 1999; Gottfredson, 2005; Lent, et al., 1994; Su, et al., 2019; Wood & Eagly, 2012) share common elements, such as the circumscription of experience, social roles, and identity development, and these elements may be integral to the gendered development of vocational interests. Sociological analysis by Charles and Bradley (2009) provides an even broader perspective, with identity taking center stage again. They conclude that in post-industrialized societies, education systems and labor markets have developed under the influence of gender essentialist ideology. These gender essentialist cultural beliefs, coupled with an emphasis on self-expression and realization, has, in their view, created a perpetuating cycle of gender segregation because gender is central in human identity.

Gender Differences in Interests across Cultures and Age

In the USA where the most extensive studies on vocational interests have been conducted, gender differences have been consistently detected in four out of the six RIASEC interest types. Women are more interested in Social and Artistic occupations, while men are more interested in Realistic and Investigative occupations (Hansen, 1988; Morris, 2016; Su et al., 2009). Applying Prediger's (1982) two-dimensional interest model of people-things and data-ideas, the large differences in Social and Realistic interests reflect women's preference for working with people and men's preference for working with things (Su et al., 2009). A similar pattern of gender differences has been detected in Europe (e.g., Germany: Nagy et al., 2010; and Croatia: Šverko, 2007). No published studies focusing on gender differences in vocational interests in the Nordic countries were located, except a recent longitudinal study from Iceland showing large gender differences in Realistic, Social and Artistic interests (Hoff, Song, Einarsdóttir, Briley, & Rounds, 2020, see more below).

Together, these studies using both indigenous and adapted interest inventories from the USA indicate that gender differences in vocational interests are similar in North America and Europe with respect to the people and things dimensions. Although men tend to be higher in Enterprising interests and women tend to be higher in Conventional interests over the decades a trend towards smaller gender gap on Enterprising and Conventional interests has been detected. Apart from these changes, cohort studies generally indicate that gender differences in vocational interests have not reduced substantially since the 1930's in USA. (Hansen, 1988; Su et al., 2009).

Gendered vocational interests are not only persistent across adulthood, but also seem to emerge early in life and can be detected in elementary school children (Pässler & Hell, 2020; Tracey & Ward, 1998) and early adolescent girls and boys (Tracey, 2002; Tracey & Robbins, 2005). The early formation of gendered interests is concerning because vocational interests are conceptualized as traits and have been found to become stable during early adolescence (age 13–14) and very stable after age 18 (Low, Yoon, Roberts, & Rounds, 2005; Tracey & Robbins, 2005).

Vocational interests have become quite stable by age 15–16, when most youngsters in Iceland make their first career-related choice: selecting secondary education after completing compulsory schooling. A longitudinal study in Iceland (Hoff, et al., 2020) yielded rank order correlations of .49 between ages 16–18 and even higher estimates of .66 and .74 from ages 18–22 and 22–24, respectively. There is, however, still room for change. Despite large gender differences, especially in Social, Realistic and Artistic interests, women, and men show similar mean-level changes in vocational interests from age 16–27. In general, gender differences

on Social and Artistic interests decrease over time but gender differences in Realistic interests persist. Meta-analytic studies in the USA indicate that gender differences in vocational interests reach their peak in adolescence, and then slightly decrease in adulthood (Hoff, Briley, Wee, & Rounds, 2018; Morris, 2016; Su et al., 2009) mirroring the Icelandic results. This suggests that although interests are influenced by sex-role socialization from an early age, the effect of sex-role socialization may be offset by subsequent maturation and an expanding range of experiences.

Gender Segregated Labor Market and Educational Choices

Iceland represents an interesting case because despite favorable scores on international indices of gender equality (World Economic Forum, 2018), gender roles are still highly differentiated – as is the case in other Nordic countries (e.g. Nordic Council of Ministers, 2015). The theories outlined above, especially the social role theory of sex differences (Wood & Eagly, 2012) and the social cognitive theory of gender development and differentiation (Bussey & Bandura, 1999), suggest that children are socialized into sex roles that may differ between cultures. It is therefore important to take a closer look at the gendered features of Icelandic society, especially the labor market and educational systems, to understand how gender differences in interests may develop. One distinctive feature of relevance to vocational interests is Iceland's extensively gender-segregated labor markets. This trend started in the 1970's, when women entered the work force, mainly the expanding female-dominated occupations (Melkas & Anker, 2001) and educational programs (Charles & Bradley, 2009).

In recent times, women's participation in the labor market is almost equal to men's (Nordic council of ministers, 2015). The large, female-dominated public sector characterizes the labor market in the Nordic welfare societies and represents 25–30% of all jobs, compared to 15% in the USA (OECD, 2015). In Iceland, 45% of employed women work in public administration, education, health, and social services (Hagstofa Íslands, 2018a; Þingskjal 701/2015–2016). This statistic indicates that the traditional roles of women in the home have been moved into the public sector of care work (Melkas & Anker, 2001) and is one of the reasons the Nordic countries are above average on measures of labor market segregation.

More women complete tertiary and upper secondary education, whereas vocational training programs tend to be largely male dominated (Nordic Council of Ministers, 2015). In Iceland, girls prefer the social sciences and language, but both genders are equally represented in the natural science tracks of the academic fields offered in the upper secondary education system. At the tertiary level, women represent 70–80% of students in education, health, welfare, humanities, and arts, and two thirds of the social sciences, business, and law. Men are still in the majority in physical sciences, math computer science and engineering, even though women make up about two thirds of all higher education students in the country (Hagstofa Íslands, 2018a).

Given the contextualized nature of vocational interests (Su et al., 2019), research on gender differences in an egalitarian country, as measured by international indices, may offer some unique insights into the origin of employment differences between genders. Thus, it is important to chart gender differences in vocational interests in Iceland. The highly gender segregated labor markets and unequal distribution of men and women in educational programs indicate that young women and men are likely to develop gendered preferences that influence their career choices and outcomes.

The Present Study

The purpose of this study is to examine gender differences in vocational interests in Iceland, based on available studies and data sets. Given the centrality of Holland's theory to this study, it is important to examine the structure of interests before summarizing mean gender difference. Although the structure has been supported for both women and men in samples of university students using imported measures, it does not seem to fit the younger populations as well (Einarsdóttir et al., 2002, Scheving-Thorsteinsson, 2009). This raises the first research question: does Holland's theory apply equally well in describing the structure of interests for both men and women in Iceland?

Second, and most importantly, we investigate the patterns of gender differences in Iceland. Similar gender differences in the people-things dimension have been found in North America and Europe. A longitudinal study in also detected comparable differences in Iceland (Hoff et al., 2020). Considering the labor market's gendered segregation, we expect Icelandic women and men to show large differences in Social interests favoring women and differences in Realistic interests favoring men. Smaller differences in Artistic interests favoring women and in Investigative favoring men are also expected, but Enterprising and Conventional

interests should be close to gender-balanced. To evaluate this research question, we conduct a quantitative review of mean gender differences in Holland's six RIASEC interest scales.

Most interest inventories that have been used in Iceland are based on Holland's theory, but some are imported, and others are indigenous. In this study, we categorize the reviews by the origin of their interest inventories. They also differ because some of them also include basic interest scales. Basic interests are defined more narrowly than the general RIASEC interests and are often utilized for in-depth exploration of interests within the RIASEC types (e.g. Donnay, Morris, Schaubhut, & Thompson, 2005, Einarsdóttir & Rounds, 2013, 2019). The result of the few studies using basic interests will be presented to cast light on which specific fields within the broad and somewhat diverse general interest categories show gender differences. Finally, previous meta-analyses (e.g. Su et al., 2009; Hoff et al., 2018) indicate that gender differences may decrease with age. Therefore, we organize the studies by the age groups represented in the samples.

Method

Studies Included

Published studies and manuals of interest inventories in Iceland were mainly used to provide the quantitative review of gender differences. Three main sources of studies were identified: (1) studies using the Strong Interest Inventories (SII), based on the pioneering work by Sölvína Konráðs (1990); (2) the adaptation and standardization of the Self-Directed Search (SDS) led by the Brynhildur Scheving Thorsteinsson at the Educational Testing Institute; and (3) the development of an indigenous Icelandic Interest Inventory (III) conducted by Sif Einarsdóttir and colleagues (Einarsdóttir & Rounds, 2019). **Table 1** provides an overview of the studies and datasets included in this review. Most of these studies are related to the adaptation or standardization of established inventories for different age groups and populations, or else the development of indigenous ones that capture the RIASEC types. These studies were judged to include quality interest inventories and sampling strategies. These samples together represent the Icelandic population from age 13–60.

Participants

The SDS was administered to a sample of students enrolled at the University of Iceland (see Einarsdóttir et al., 2002). The samples used from Brynhildur Scheving Thorsteinsson (see 2009; Einarsdóttir, Scheving-Thorsteinsson, Rounds, & Su, 2009) are representative of the upper secondary and high school population. They were collected for and used in the standardization (development of norms) of the SDS and Career Explorer, latter was later abandoned due to lack of fit to Holland's theory. The samples used in the studies by Einarsdóttir et al., (2001, 2002) consist of prospective and enrolled students that sought career counseling

Table 1: Studies included: Interest inventories, sample size by gender, age and year data was collected.

Inventory	Reference	N			Age	Year collected
		Total	F	M		
<i>Imported Inventories</i>						
SII (94)	Einarsdóttir, 2001	1579	1101	478	23.5	1996–2000
SII (85)	Einarsdóttir et al., 2002	449	321	128	23.5	1993–1995
SDS	Einarsdóttir et al., 2002	438	311	127	24.0	1994
SDS	Scheving-Thorsteins, 2004	716	422	294	18.2	2003–2004
CE	Scheving-Thorsteins, 2009	1104	587	555	14,5	2003–2004
<i>Indigenous Inventories</i>						
Bendill-1	Einarsdóttir et al., 2007	485	228	257	15.3	2006
Bendill-2	Einarsdóttir et al., 2007	1368	699	669	17.9	2006
Bendill-3	Einarsdóttir et al., 2013	2218	1621	597	28,7	2008
Bendill-4*	Valsdóttir, 2009	317	193	124	38,0	2008
Bendill-4	Pétursdóttir et al., n.d.	820	453	367	41,6	2018

and guidance at the University of Iceland; they were administered the Strong in the process. All the samples used by the III research team (Einarsdóttir & Rounds, 2007, 2013; Pétursdóttir & Einarsdóttir, n.d.), except one sample (Valsdóttir, 2009), were used for standardization and therefore selected to be representative of the student and working adult populations. A special note is needed on the nature of the sample of working adults in the study by Valsdóttir (2009). The sample consists of working adults in skilled and low-skilled jobs. About 47% of the participants in her study had not completed any formal education after compulsory schooling, with 15,7% having completed vocational education and 7,3% having completed a university degree.

Measures

The studies used to summarize gender differences in Iceland involve three main interest inventories. All of them are designed to capture Holland's six RIASEC types and structure. Two of them, the Strong and Self-Directed Search were initially developed in the USA, but subsequently translated and adapted for use in Iceland and are therefore considered imported inventories. The Icelandic Interest Inventory (III) Bendill is indigenous because it was developed in Iceland with items designed to represent the Icelandic labor market and school system. All the interest inventories consist of a variety of items, mainly occupational titles (e.g. nurse, truck driver, software designer), work related activities (e.g. paint a house, show real estate to potential buyers, conduct studies on the genetic origin of diseases), and school subjects (e.g. history, math, tool use). The total number of items in each inventory range from 112–350 to represent the entire world of work and education (school subjects). All the inventories use response scales of likes and dislikes. Two-point scales are used in the SDS, three-point scales are used in the SII, and five-point scale in the Bendill (III). Each interest measure is described in more detail below, with regards to the quality of the adapted Icelandic version of the SDS and SII inventories.

Imported Interest Inventories

The *Strong Interest Inventory* (SII) has a long history in its various forms. The Strong Vocational Interest Blank (SVIB) was first translated and tested for use in Iceland by Sölvína Konráðs in her 1990 dissertation supporting the linguistic equivalence of the Icelandic and USA version. The mean stability of test-retest reliabilities of the GOT scales capturing Holland's RIASEC types in Iceland was .79 (Konráðs & Haraldsson, 1994).

The *Self-Directed-Search*, (Holland, Fritzsche, & Powell, 1997), a translated and adapted version, was administered to gymnasium students (Scheving-Thorsteinsson, 2009). Cronbach's Alpha ranged from .89–.91 in the sample. Only the sum of occupation and activity scales was used in this study—not the summary scales that include skill and self-estimates. The *Career Explorer* is an inventory that was developed as part of the SDS battery for adolescents. The translated and adapted version measuring the six RIASEC scales was administered to high-school students in grades 8 to 10. Reliabilities (Alpha) of the scales ranged from .89–.90 in the grade 8–10 sample, (Einarsdóttir et al., 2009).

Indigenous Interest Inventory

The III or Bendill interest assessment battery consists of four interest inventories, which were developed for different age groups facing normative transitions within the national educational system or facing challenges in the labor market (Einarsdóttir & Rounds, 2007, 2013, 2019; Pétursdóttir & Einarsdóttir, n.d.).

Bendill I was designed to capture six RIASEC interests and is used for career and educational exploration with 10th graders. At around age 15 Icelandic students prepare for their first transition from compulsory education to upper secondary education.

Bendill II was designed to capture RIASEC interests and 28 basic interests of upper secondary students that tend to drop – out and change educational tracks during their studies. They are eligible for tertiary education if they complete the matriculation exam (íce. stúdentspróf).

Bendill III was developed for use within the growing and diverse higher education student population of undergraduate and graduate students. It is also based on Holland's theory and includes up to 35 basic interest scales.

Bendill IV was developed for use with adults already in the labor market. It captures the RIASEC types and 35 basic interest scales.

The measure used in the Valsdóttir (2009) study is a predecessor of Bendill IV for working adults and contains somewhat different items in the RIASEC scales than Bendill II and III, which contain exactly the same

items. The reliability of the RIASEC scales in the five inventories and samples used in this summary range from .89–.95 (Cronbach's alpha). Alphas for the basic interest scales range from .82–.95. More detailed information on the design and psychometric quality of the Icelandic Interest Inventories is available in English in a recent publication by Einarsdóttir and Rounds (2019).

Results

Does Holland's RIASEC Structure Fit Women and Men Equally Well?

Few studies testing Holland's RIASEC hexagonal structure have been conducted in Iceland. All studies applied Hubert and Arabia's (1987) randomization test, which tests hypothesized order relations of the RIASEC types as proposed by Holland's structural hypothesis (e.g., R and I are closer than R and A, and R and S are furthest apart) for all the possible RIASEC pairs. The randomization test results in the Correspondence Index (CI), which can range from 0–1. A higher index indicates that larger numbers of order relations conform to Holland's theoretical prediction. Meta analytic results in the USA indicate that average RIASEC structural fit across U.S. samples and inventories using the CI index is .72, which is considered good fit (Rounds & Tracey, 1996). In Iceland, studies using both imported and indigenous interest inventories were conducted, sampling individuals across a wide age span. Only studies reporting CI for both men and women were included, with the results reported in **Table 2** and **Figures 1** and **2**.

Figures 1 and **2** shows that there is a general trend for CI indices to increase with age, indicating that Holland's structural model fits better as people get older. As can be seen in **Table 2**, an acceptable fit is detected in the youngest sample of 15–16 years old (CI = .65) using the Icelandic interest inventory (III-1). From age 18 and older, all gender combined samples and inventories show acceptable fit. Notably, the fit tends to be lower in samples of working adults (CI = .49–.60) than for students age 18–30 (CI = .63–.83). The hexagonal structure does not seem to hold up as well when tested for men and women separately using the randomization test. **Figure 1** shows the small trend for CI to be lower in female and male samples. **Figure 2**, representing the CI for III, gives an even more mixed picture. Women show better fit than men earlier (at end of compulsory education and in upper secondary school), but worse fit later (at university and in the labor market). For example, there is large disparity in fit between 15–16-year-old boys (CI = .32) and girls (CI = .67) using the III (see **Table 2**).

Table 2: Summary of the Results of Model-Data fit using Randomization Test across Gender, Age and Inventories.

Age – sample type	Correspondence Index (CI) and N					
	Females		Males		Combined	
<i>Career Explorer</i> (Einarsdóttir et al, 2009)						
13–14 Compulsory education	.11	303	.19	262	.24	565
15–16 Compulsory education	.25	284	.19	255	.14	539
<i>Self-Directed Search</i> (Thorsteinsson, 2004; Einarsdóttir et al., 2002)						
16–17 Upper secondary	.46	239	.39	224	.49	463
18–20+ Upper secondary	.75	316	.83	217	.85	533
20–30+ University	.69	311	.58	127	–	–
<i>Strong Interest Inventory</i> (Einarsdóttir et al., 2002)						
20–30 University	.72	321	.62	128	–	–
<i>Icelandic Interest Inventory</i> (Einarsdóttir & Rounds, 2013)						
15–16 Compulsory education	.67	228	.32	257	.65	485
16–17 Upper secondary	.44	370	.43	399	.53	769
18–20+ Upper secondary	.75	329	.64	270	.65	599
20–30+ University	.63	1621	.82	597	.72	2218
18–61 Working adults	.49	453	.60	367	.65	820
18–70 Working adults*	.84	193	.51	124	.84	317

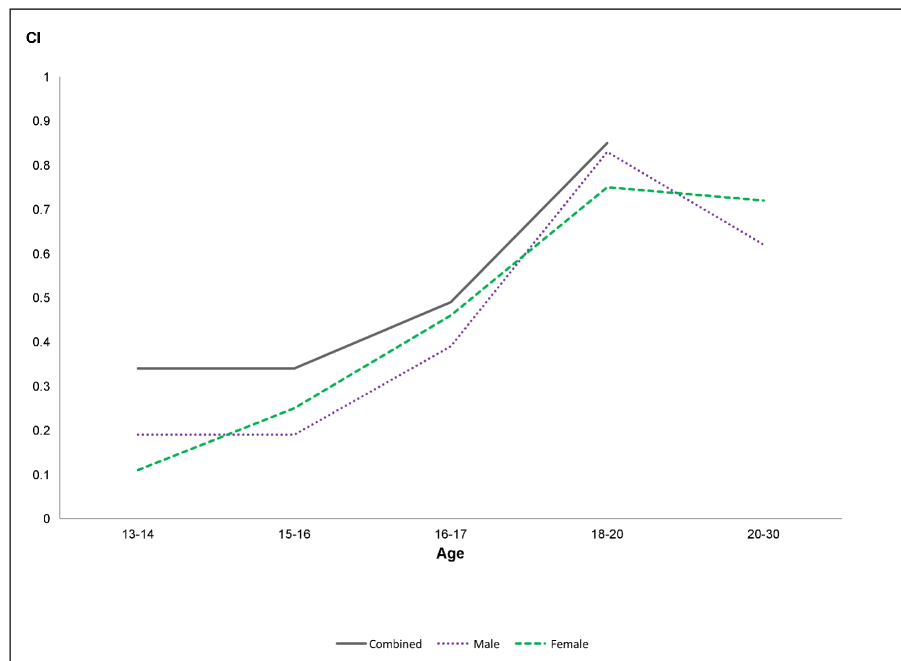


Figure 1: Change in fit across gender by age groups using imported interest inventories (CE, SDS).

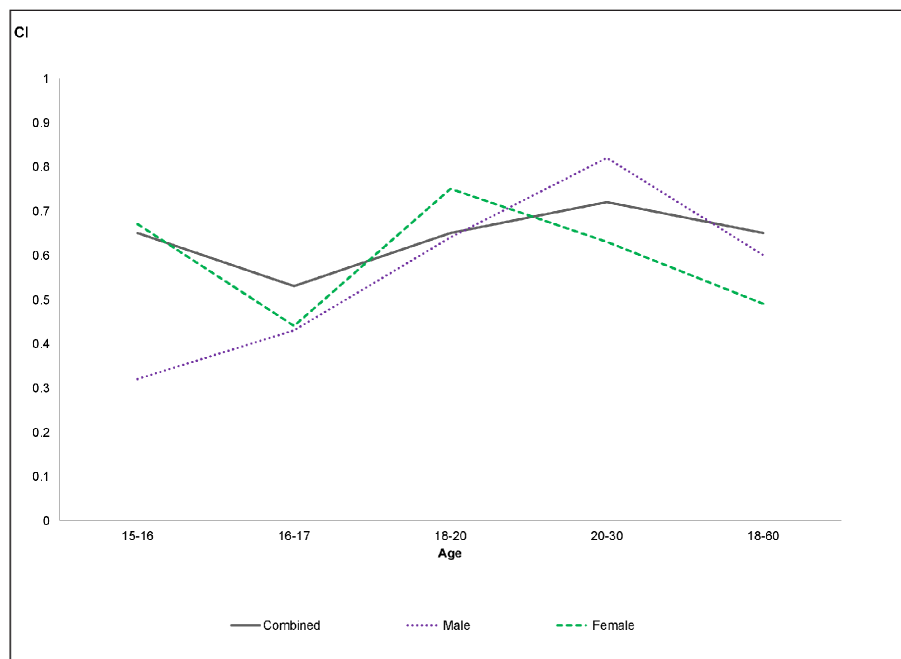


Figure 2: Change in fit across age groups by gender using Icelandic interest inventories (III).

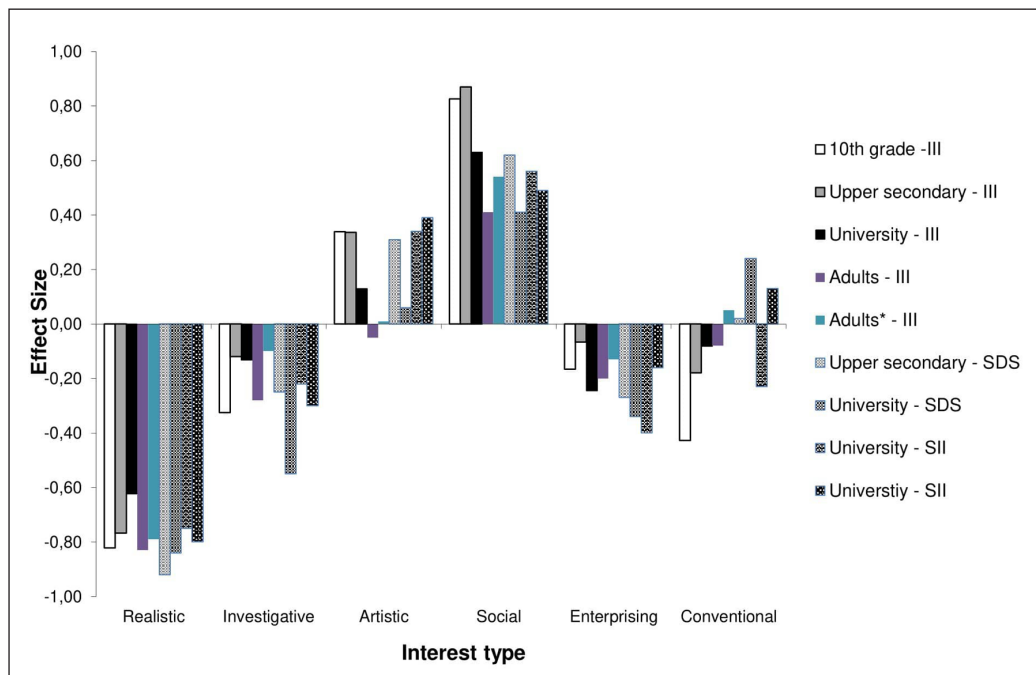
How Large are Mean Gender Differences in RIASEC and Basic Interest Scales?

To estimate gender differences in RIASEC and basic interest scales, we used Cohen's d effect sizes. Effect sizes are calculated by finding the difference between the means of the scales for women and men and dividing by the pooled standard deviation in the full sample. Effect sizes are standard deviation units that allow comparisons between the different scales used in the inventories. **Table 3** and **Figure 3** summarize the Icelandic studies by samples and age groups. The overall pattern of effect sizes in **Figure 3** shows that the largest differences are found for Realistic interests, which are skewed towards men, and Social interests, which are skewed towards women. The Artistic scale has the next largest effect sizes, favoring women. Interestingly, however, this difference seems to decrease with age: there are no differences in Artistic interests in the two working adult samples (Adults – III). Men tend to be somewhat higher on Enterprising and Conventional interests than women, although the results for Conventional are mixed and depend on the origin of inventories, age, and population.

Table 3: Effects sizes for gender differences in the RIASEC scales by sample and inventory.

Inventory – sample	R	I	A	S	E	C
<i>Imported inventories</i>						
SDS upper secondary	–.92	–.25	.31	.62	–.27	.02
SDS university	–.84	–.55	.06	.41	–.34	.24
SII (85) university	–.75	–.22	.34	.56	–.40	–.23
SII (94) university	–.80	–.30	.39	.49	–.16	.13
<i>Indigenous inventory</i>						
III-1 compulsory education	–.82	–.32	.34	.83	–.17	–.43
III-2 upper secondary	–.77	–.12	.34	.87	–.07	–.18
III-3 university	–.62	–.13	.13	.63	–.24	–.08
III-4 working adults	–.83	–.28	–.05	.41	–.20	–.08
III-4 working adults*	–.79	–.10	.01	.54	–.13	.05

* Adults who have completed compulsory education or skilled trades.

**Figure 3:** Gender differences in RIASEC scales by sample and inventory.

In **Table 4**, the effect sizes for gender differences are presented for basic interest scales. These results are based on the 1994 version of the Strong interest inventory and 35 indigenous basic interest scales from the Icelandic interest inventory in two samples of university students and one sample of working adults. The location of interest scales in relation to the broad RIASEC scales are based on the categorizations in the SII and the III (Donnay et al., 2005, Einarsdóttir & Rounds, 2013; 2019). As expected, almost all the basic interest scales on the spectrum of Realistic interests are higher for men than women. Farming and nature-related scales, along with manual services, are the only gender balanced ones. The scale names show that occupational fields that fall under Realistic interests are traditional male-dominated skilled trades. The results are also uniform for the basic interest scales in the Social categories, as all of them are higher for women. On the other hand, gender differences are more mixed for the basic interests under I, A, E, and C. Interestingly, medical, health and life sciences are the only basic interest scale for Investigative that are not higher for men, indicating that women have interest in those Investigative fields equal to men's. Similar results were found for human resource management under Enterprising interests. It is also notable that large gender differences favoring men are apparent in the computer-related scale within the Conventional type.

Table 4: Effects sizes for gender differences in Basic interest scales among university students and working adults by inventory.

BIS _Strong (94)		University students	Working adults	
		I-BIS 35	I-BIS 35	
Realistic				
Agriculture	−.31	Farming/husbandry	.06	−.29
Athletics	−.76	Sports/health	−.16	−.22
Mechanical Activity	−.85	Driving/operations	−.54	−.81
Nature	.18			
Military Activity	−.73			
		Electrics/mechanics	−.74	−.97
		Construction	−.51	−.78
		Carpentry/maintenance	−.17	−.58
		Fishing	−.54	−.80
		Fish processing	−.24	−.49
		Manual services	.15	−.03
		Protective/rescue	−.43	−.50
Investigative				
Science	−.45	Natural sciences	−.19	−.40
Mathematics	−.31	Mathematics	−.54	−.56
Medical Science	.00	Life/medical sciences	.08	−.05
		Engineering	−.74	−.82
Artistic				
Music/Dramatics	.34	Performing arts	.23	.07
Art	.54	Visual arts	.23	−.11
Applied Art	.16	Arts/crafts	1.19	.61
Writing	.05	Creative writing	.00	−.14
Culinary Arts	.56			
		Humanities	.24	.05
		Media	−.20	−.35
Social				
Teaching	.24	Teaching	.53	.29
Social Services	.60	Counseling/therapy	.60	.35
Medical Services	.39	Medical services	.52	.33
Religious Activity	.06			
		Social/educa. sciences	.57	.29
		Personal services	.87	.54
Enterprising				
Law/Politics	−.37	Law	−.21	−.19
Public Speaking	−.28	Politics	−.29	−.35
Merchandising	−.06	Business	−.44	−.30
Sales	−.37	Sales	−.33	−.42

(Contd.)

		University students	Working adults	
BIS _Strong (94)		I-BIS 35	I-BIS 35	
Organizational		Human resource man.	.14	.17
Management	-.20	Finances	-.54	.40
<i>Conventional</i>				
Data Management	-.27			
Computer Activities	-.28	Computers	-.67	-.66
Office Services	.41	Office work	.29	.27
		Service/retail	.18	.03
		Stocks/delivery	-.03	-.15

Although gender differences are extensive, especially in fields related to working with people and things, they seem to decline with age (see **Figure 3**). The largest gender differences in the Social scale were detected in the two youngest samples (10th grade and upper secondary) age 15–20. However, the gender differences in Realistic interests on the “things” pole is similar in all the samples, with one exception in a sample of university students responding to the III-3. Interestingly, gender differences in Artistic interests almost disappear in the two working adult samples. Comparison of basic interests scales between the university and working adult samples reveals the same decreasing trends on all the subscales belonging to Social and Artistic types (**Table 4**).

Discussion

The aim of this study was to summarize gender differences in vocational interests in Iceland and determine whether gender patterns in Iceland are similar to those reported in other countries. The results revealed three key findings. First, the measures showed reasonable fit to Holland's theory both for women and men, supporting mean level comparison. Secondly, the measures showed better fit in gender-combined samples than in male and female samples separately, especially for younger age groups. Lastly, and most importantly, mean level differences were highly consistent across measures and samples. Men are much higher than women on Realistic interests and women are much higher than men on Social scales. Women also show a more interest in Artistic fields and men show more interest in Investigative fields.

Gender Differences in Interests are Pervasive and Persistent

In Iceland, the pervasive differences in interests show women having preferences to work with people and men to work with things, reflecting the enduring and extensive gender segregation in the Nordic labor markets (Melkas & Anker, 2001). The results mirror gender differences in other countries, except for Enterprising and Conventional interests, where results are more mixed. In North America, for example, women's interests in enterprising jobs are more like men's ($d = .03$; Su et al. 2009). This is not the case in Iceland, where men show more interest than women in enterprising activities ($d = -.18$ and $-.24$ for indigenous and imported inventories, respectively). Women in U.S show more interest in conventional occupations than men ($d = 0.12$; Su et al, 2009), but this is the reverse in Iceland where men show more interest in conventional fields than women, using indigenous inventories ($d = -.13$).

The mean differences in basic interest scales help cast light on gender differences in specific fields within each RIASEC scale, as well as their relation to the labor market. In the Social field, women are more interested than men in all the basic interest scales e.g. teaching, counseling, medical, and welfare services. These basic interests all correspond to occupations that belong to the public sector, which is where almost half of women work (Hagstofa Íslands, 2018b). In contrast, the Realistic basic scales show large differences favoring men, including many of the traditional skilled trades (e.g. carpentry, mechanics, electronics). Still, there are a few fields within the Realistic domain that are more gender-balanced, especially those relating to nature, farming, and manual services (e.g. swimming pool attendant, cleaning). The skilled trades are an interesting case, as the scales reflect trades that have been extremely gendered in the Icelandic education system and labor market. Historically, skilled trades and vocational education in Iceland has been male-dominated and has had more formal legal frameworks for licensing and training than the very few female-dominated vocational education

programs (e.g. social and school assistants). Two exceptions are hairdressers and beauticians. The gendering of education is partly institutionalized in Icelandic society. Coeducation is the policy, but in some sense, there are still separate education systems for men and women, especially in vocational education (Jónasson, 1997).

The present review shows that gender differences in vocational interests are substantial at age 15–16 in Iceland, when the youngsters traditionally make their first educational or career related choice at the end of compulsory education. Their interests reflect the segregated labor market, as supported by a study indicating that the gender of the worker influences boys' and girls' interests in occupations (Hayes, Bigler, & Weisgram, 2018). Students seem to retain these experiences and early influences, as reflected in gendered educational choices in upper secondary school and tertiary education. There is, however, a slight tendency for the reduction of gender differences in the interest types of older samples, which was first noted among university students. Of course, it cannot be ruled out that this may be due to special characteristics of university students. This trend for gender differences, especially people-related interests, to decrease after adolescence is similar to what has been detected in prior longitudinal studies (Hoff et al., 2018, 2020).

Altogether, the ten samples of over 9000 participants are quite representative of the Icelandic population, and span large age ranges, educational levels, and occupations. A variety of vocational interest measures are used: both imported and indigenous. All are well established and have strong psychometric properties that support Holland's typology and structure for both women and men. However, this quantitative review of studies on gender differences has some limitations. First, because we focused on three well-known research programs in Iceland, we may have missed quality studies in our reviews, especially studies using other interest inventories not based on the RIASEC model. Second, samples that were not collected for standardization purposes, but as part of research projects, as well as samples of people seeking services, may not be representative due to self-selection and convenience. This mainly applies to two of the samples: university samples that responded to the SII and SDS; These samples showed larger gender differences on the Enterprising scale than the other samples. These are also the most dated samples presented in the review, although we do not have a reason to believe gender differences in interests have changed largely over the course of 25 years, as is the case in the USA (Hansen, 1988; Su et al., 2009). The number of women in people-oriented occupations has decreased in Sweden (Hustad et al., 2020). Whether there is a similar trend in Iceland remains to be studied. Third, it cannot be ruled out that the otherwise generally small variation in results between measures are due to differences in the items used to capture the RIASEC types, as defined by Holland (1997) (e.g. more ICT items in Conventional scales, favoring men in recent measures).

Although many Nordic countries have refrained from the use of psychological tests in guidance (Plant, 2003), interest assessment has been offered as a part of occupational information systems in Norway (NAV), Finland (AVO) and Sweden (TE Services) (Einarsdóttir, et al., 2020). Iceland, although high on equality indices, may have unique features in terms of gender segregation in the labor market. For example, basic production (e.g. fishing, energy) and tourism are large sources of income and may limit the diversity of jobs in the labor market. The educational system may also differ. For example, fewer students (especially women) enter skilled trades in Iceland than in other Nordic countries (Menntamálastofnun, n.d.). It would be interesting to see if similar gender differences are detected in other Nordic countries that also rank high on gender equality indices and have used Holland-based interest inventories in their public occupational information portals.

Development of Gendered Interest and Interventions in Equalitarian Context

As both career development theories (Gottfredson, 2005, Lent et al., 1994) and broader frameworks (Bussey & Bandura, 1999; Wood & Eagly, 2016) indicate, socialization probably plays the largest role in the process of creating gendered preferences. Even though Iceland is ranked highly on indices of gender equality, the differential influence of social context, permeated by essentialist ideology on women and men, is still dominant in Nordic countries (Hustad et al., 2020). This process has been described in few studies in Iceland. Women and men who have entered fields dominated by the other sex (e.g., women in engineering, men in nursing) experience internal barriers in the form of social gender roles and lack of role modeling (Kristinsson, 2003; Sigurjónsdóttir & Einarsdóttir, 2011). Moreover, they also describe pressures from family and friends to conform to gender typed roles, especially the men in female-dominated occupations (Kristinsson, 2003). Women in male-dominated majors, such as engineering and computer science, do not feel fully welcome and need to adapt to the male-dominant and somewhat hostile culture in these fields, or else leave them (Snæfríðar- og Gunnarsdóttir & Einarsdóttir, 2011; Ríkarðsdóttir & Jóhannesson, 2012). Because interests describe the individual's relationship with their environment and become an integral part of their identity (Su et al., 2019), these experiences may hinder the expression and development of interests. Nega-

tive reactions from parents and peers may discourage curiosity in “gender-inappropriate” activities. These studies were done with students, mainly 16–25 years old, in the upper secondary and higher education system. The current results show there are already large gender differences in interests at age 15–16 in Iceland, suggesting these processes start even earlier.

How these socialization processes influence interests in working with people for girls and working with things for boys has not been described in detail, but there are several studies that examine the timeline of the development of gendered activities. Boys age 6–11 years old already showed more interest in jobs allowing for more agentic goals than girls (Hayes, et al., 2018) and the lack of communal goal affordances in STEM careers seems to mediate gender differences in interests (Diekman, Clark, Johnston, Brown, & Steinberg, 2011). A study in preschools in Iceland indicates that children enact gender in their play and that the teachers have essentialist perspectives towards girls and boys (Harðardóttir & Pétursdóttir, 2014). The authors conclude that gender essentialist cultural beliefs are pervasive and influence children’s activity and identity from an early age in the day care system. How socialization processes influence the type of interests that children develop warrants further research.

Gendered interests have differential consequences for women and men because interests are known to influence career development, choice, life trajectories and other outcomes (Sinclair et al., 2019; Stoll et al., 2017). Although Iceland is considered equalitarian in international comparisons, gender role socialization forces are pervasive, even institutionalized (Harðardóttir & Pétursdóttir, 2014; Jónasson, 1997) and show up in large gender differences in interests during adolescence and through the lifespan. The Nordic countries are affluent and provide plenty of room for self-expression. Opportunity structure (e.g., free education) and highly individualistic cultural values (Schulstok & Wikstrand, 2020) may further perpetuate the cycle of gender segregation because of the central role of gender in human identity (Charles & Bradley, 2009).

Career and guidance counselors in Iceland are, by law, (Lög um jafna stöðu og rétt kvenna og karla 10/2008) required to take gender equality into account in their practice. Gender equality education is also mandated by laws on education (Lög um grunnskóla, 91/2008) and in the general curriculum (Mennta- og menningarmálaráðuneytið, 2011). This should be done by raising awareness among youngsters of the pervasive influence of gender in society, education, and labor market, in an effort to support non-traditional career choices. This is in line with Iceland’s gender equality policy goals that aim at reconstructing notions of career gender stereotypes (Schulstok & Wikstrand, 2020). Research is needed to understand how gender ideologies are deconstructed in guidance practices in Iceland. Counselors mainly provide career guidance and education to adolescents who have already undergone more than a decade of sex-role socialization. At this point, a large proportion of girls have already developed interest in people and boys in things, so this may be too little too late. However, this study and recent longitudinal results (Hoff et al., 2020) indicate that interests are also malleable and gender differences reduce slightly after adolescence. It is nevertheless important to advocate for early interventions, as well as more active gender equality policies and practices, to counteract the powerful forces of prevailing gender essentialist ideologies on vocational interests.

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Competing Interests

Part of the funding from sales of the Icelandic Interest Inventory are used to support continued research on interests. Sif Einarsdóttir is a copyright holder and recipient of royalties for the Icelandic Interest Inventory-Bendill.

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