The practice and perceptions of RRI - a gender perspective
Susanne Bührer¹, Angela Wroblewski²

¹ Fraunhofer Institute for Systems and Innovation Research ISI, Breslauer Str. 48, 76139 Karlsruhe, Germany; susanne.buehrer@isi.fraunhofer.de
² Institute for Advanced Studies IHS, Austria

Abstract

Little is known to date about the practice and perceptions of RRI among researchers in Europe as well as the integration of the gender dimension into everyday RRI practices. This lack was addressed by two large-scale surveys that were launched in the course of the EU-funded MoRRI project (Monitoring the evolution and benefits of RRI, Contract number RTD-B6-PP-00964-2013, Duration 09/2013-03/2018). The analysis shows that the institutional environment positively influences the degree of RRI activities and the general attitudes towards more responsible research and innovation: researchers working in an institutional environment that systematically supports the practice of RRI are more active in RRI practices than researchers who do not rely on such structures. For the gender equality dimension, this means that institutions with a gender equality plan (GEP) in place are more inclined to support female researchers than institutions without such institutional incentives. Furthermore, researchers with experiences in EU-funded projects are more likely to be engaged in RRI activities. Even if female researchers have a stronger inclination to engage with society than their male counterparts, gender competence proves to be the relevant distinguishing criterion. Gender competent researchers are more often involved in other RRI activities.

Keywords: Responsible Research and Innovation, Gender Equality, Gender Competence, Governance, European research and innovation policy

1 Introduction

For many years, the EU’s Directorate-General for Research and Innovation has supported the objective of bringing research and society closer together with the help of its central financial instrument, the Framework Programmes (FPs). The science-and-society pillar within these FPs has changed both terminologically and conceptually over the years - from “science and society” in the 6th Framework Programme (2002-2007), “science in society” in the 7th Framework Programme (2007-2013) to the current “science with and for society” in Horizon 2020 (2014-2020). During the 7th Framework Programme, the new concept of RRI (Responsible Research and Innovation) also entered the scene and plays an important role in Horizon 2020 (H2020). In operational terms, the European Commission divides the umbrella term RRI into six “key areas”: gender equality (GE),
science literacy and science education (SLSE), public engagement (PE), open access (OA), ethics (E) and governance (GOV).

According to the European Commission’s most recent definition\(^1\), “Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation”. The hope is that, in the Commission’s words, “societal actors (researchers, citizens, policy-makers, business, third-sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society”. Doing research and innovation in a “responsible” way shall improve research and innovation processes and outcomes by so-called RRI keys, i.e. open access, science literacy and science education, public engagement, ethics/governance and gender equality.

The introduction of the concept of RRI within the European Research Area (ERA) was critically discussed by gender experts, who worried that the gender dimension would lose significance in a comprehensive concept consisting of five dimensions which are based differing extents on an agreed theoretical concept and experiences with specific implementation measures. In the field of gender equality, a common definition of the concept developed over time and is currently formulated in priority 4 of the ERA strategy (Council of the European Union, 2012). Here, gender equality is defined as a three-dimensional construct which aims to (1) increase female participation in all fields and at all hierarchical levels of science and research, (2) abolish structural career barriers for female researchers and (3) strengthen the gender dimension in research and innovation content as well as in teaching. In addition, numerous structural change projects have been implemented to pursue gender equality in science and research (Wroblewski et al., 2015).\(^2\)

Furthermore, following a gender mainstreaming approach, it is argued that gender has to be considered in the other keys as well (Wroblewski et al., 2015). However, to date, little is known about the practice and perceptions of RRI among researchers in Europe as well as the integration of the gender dimension into everyday research practices. This lack was addressed by two large-scale surveys that were launched in the course of the EU-funded MoRRI project (Monitoring the evolution and benefits of RRI, Contract number RTD-B6-PP-00964-2013, Duration 09/2013-03/2018).


In these surveys, researchers were asked about their views on the relevance, benefits, barriers and hindrances of RRI in their daily research activities. Based on the data obtained from these surveys, we were able to investigate whether institutional frameworks support the implementation of RRI activities and which socio-demographic characteristics have an impact on RRI activities and the perception of their benefits. The surveys addressed not only questions on the relevance of the RRI key “gender equality” in the daily routines of European scientists but also differences between male and female researchers regarding the other RRI keys (public engagement, ethics, open access and science education).

2 Aims & Objectives

This article focuses on an unexplored topic and is therefore of descriptive nature. It pursues a threefold goal: (1) To explore the main features of gender equality as one of the five RRI keys compared to the other RRI dimensions. We are interested here in questions relating to the degree of institutionalisation, the inhibiting and promoting factors as well as the perceived benefits of gender equality for research practice. (2) To examine whether – and controlling for other important variables such as scientific discipline, scientific age and country of origin – male and female researchers differ systematically in their perceptions of RRI. (3) To investigate the links between the RRI key “gender equality” and other RRI keys. In that context we differentiate between men and women on the one hand and gender competence on the other hand.

3 State-of-the-Art

With regard to our initial questions, and in contrast to the well-researched area of gender equality, little is known about the relationship between gender and RRI practice. This is partly because the term RRI is relatively new but also because it is often unclear what exactly it subsumes. As the MoRRI survey shows (Bühler et al., 2017), RRI often does not mean just the five RRI keys ethics, public engagement, science education, open access and gender equality but also concepts like sustainability, transparency and corporate social responsibility (CSR). Several studies now show a relationship between female participation and the respective “social” or “ethical” activities. Researchers confirm that the number of women in (top positions in) companies influences CSR strategies (Bernardi & Threadgill, 2010; Soares, Marquis, & Lee, 2011; Vilké, Raišienè, & Simanavičienè, 2014). Bernardi and Threadgill (2010) demonstrate that companies with a higher share of women on their boards are more socially responsible, measuring responsibility as a multi-dimensional construct consisting of charitable giving, community involvement and outside recognition of employees’ benefits. They also find that companies with a higher
share of women on their boards implement more policies targeted at female employees. Such companies are also more likely to sponsor or create charity organisations, have a formal employee volunteer programme and demonstrate a stronger commitment towards charitable giving (Bernardi & Threadgill, 2010, p. 20).

Numerous studies identify a relationship between a high share of female leaders and the promotion of sustainability and environmental issues. Kassinis et al. (2016) and Glass, Cook and Ingersoll (2016) show that gender diversity is an important driver for a firm's environmental sustainability initiatives and the promotion of sustainability in general. Other studies demonstrate that gender diversity on boards is correlated to higher environmental ratings (Post, Noushi, & Rubow, 2011; Webb, 2004).

A recent German study (Horbach & Jacob, 2017) demonstrates that a high share of highly qualified women and a mixed gender composition of the management board are positively correlated with eco-innovation activities. The basis for this study is data from an employer-employee database produced by the Institute for Employment Research for 2010 and 2012. Potential explanatory factors for these results are that female leaders seem to be less concerned with short-term economic goals (Brush, 1992) and that female personnel can bring in their particular competencies to cope with the necessary changes induced by eco-innovations (shifts in organisational goals, practices and routines due to their complexity and systemic character; de Marchi, 2012; Horbach, Oltra, & Belin, 2013) by fostering teamwork and cohesion. Studies also show that female entrepreneurs are more interested than men in the attainment of non-economic goals (Terjesen, Bosma, & Stam, 2016; Estrin, Mickiewicz, & Stephan, 2013).

Outside the corporate context, gender and education are more important predictors for sustainable behaviour than income (de Silva & Pownall, 2014). The fact that environmental consciousness is higher among women than men is also demonstrated by Davidson and Freudenberg (1996) or Zeleznay, Chua and Aldrich (2000).

The influence of gender on climate change was also studied in the EIGE report (2012). According to this report, gender has a strong influence on sustainable consumption (OECD, 2008a, 2008b). It provides several examples of how social roles shape behaviour: “women are more likely to have a higher recognition of health issues and more highly developed risk perceptions, often acting on their internalised health and environment orientation; men tend to be more strongly oriented towards convenience and a ‘consumption-is-annoying’ attitude (Schultz & Stiess, 2009); women’s decisions on consumption are to a larger extent based on aspects of ethics and fairness; women feel a stronger need to adhere to social norms (e.g. slenderness) and control their eating habits more strictly, while men are able to follow their personal tastes and preferences and not
follow strict gender body ideals. Ideal images of masculinity or femininity are strongly associated with patterns of consumption and types of products consumed (e.g. meat and fast cars are associated with masculinity and virility; mild, light, sweet products are associated with weakness and femininity)” (EIGE, 2012, p. 21). Further studies cited in the EIGE report show that women typically have a higher inclination to change their consumer behaviour in favour of the environment, for example by buying products from companies which offer organic products or support climate change initiatives (EIGE, 2012, p. 22). The variety of links between gender and socially responsible behaviour suggest the relevance of investigating how gender is mainstreamed in RRI.

The available literature on gender in RRI differentiates between women and men regarding their perceptions and RRI practices. This implies that increasing female participation will lead to changing practices in R&I. Childs and Krook (2008) problematize that by differentiating between descriptive and substantive representation in their research on links between the presence of women in political institutions and the passage of “women-friendly” policy outcomes. E.g. increasing female participation in decision making does not automatically bring about change of structural barriers, decision making criteria, or the dominant institutional culture. Wroblewski (2019) shows that an increasing share of women in higher education management does not lead to cultural change in higher education institutions if gender competence is missing. Consequently we assume that changing practices in R&I will be caused by gender competence and not by an increasing number of women in R&I.

4 Methods

The following results are based on two online surveys conducted in the course of the MoRRI project. In a first step, we surveyed researchers listed in the EC CORDA database, which was provided to the study team by the Commission Services. This dataset contained contact details of researchers funded by the Horizon 2020 framework programme (including the European Research Council and Marie Skłodowska-Curie Actions). In a second step, the Fraunhofer ISI generated a control group based on selected main characteristics of EU researchers, namely country of work, gender and scientific discipline. Unlike the first group, this group of researchers had not received any EU research funding within the last five years. This was controlled by matching the EU database with the list of control group addresses but also by integrating a control variable at the beginning of the questionnaire. We used the Scopus Author IDs to compile the control group. The control group approach aimed to analyse whether the EU funding context exerts an influence on the perceptions and concrete activities of researchers through its promotion of RRI.
The first survey (of EU-funded researchers) was launched on 17 November 2016, with reminders sent out in late November and mid-December of the same year. In total, 22,947 persons were contacted by e-mail, 673 of whom could not be reached. Of the remaining 22,274 persons, 3,117 responded actively to the survey request, which corresponds to a response rate of 14.0%. In total, 2,755 participants completed the survey (completion rate: 12.4%). The average processing time for the survey was 15.57 minutes. The second survey (of the control group) was launched on 14 March 2017. 25,968 identified researchers were contacted by e-mail, 8,245 of whom could not be reached due to absence, retirement or invalid/ outdated e-mail addresses, thus resulting in a net sample of 17,723 persons. 1,264 researchers responded to the survey request, constituting a gross response rate of 7.1%. Of these, 945 participants answered at least half the questions in the survey, a net response rate of 5.3%. In total, 723 participants completed the survey (completion rate: 4.1%). As with the survey of EU-funded researchers, a filter question was included at the beginning of the control group survey in order to ensure that participants had not received any financial research support from the EU over the previous five years. 417 respondents indicated that they had either received funding from an EU Framework Programme (FP7 or H2020), ERC grants, EUREKA, COST or other EU research programmes. Consequently, this group was excluded from the further analysis, leading to an adjusted de facto control group of 528 participants who had not received EU funding.

**Design of the questionnaire**

The concrete formulation of the survey questions was based on several considerations. Since RRI is a relatively new policy concept that only emerged on the scene about eight years ago, we first asked whether the respondents were familiar with this concept or not; and if so, what key terms they associate with the acronym RRI. We used categories that are included in the five RRI keys but also added further terms from relevant literature like open innovation and CSR (e.g. Lindner et al., 2016, pp. 75-140; Iatridis & Schröder, 2016). We then asked the respondents whether they had already conducted concrete RRI activities, were currently doing so, or intended to do so in the future. The core thinking behind this question was that even if respondents were not familiar with the umbrella term RRI, they might nevertheless already be performing activities related to one of the five

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3 When considering the relatively low response rates, the following should be noted: In general, we observe a certain “fatigue” with regard to responding to online questionnaires. This applies above all to voluntary participation as opposed to an obligation to take part in an evaluation of surveys as a funding recipient. Secondly, we cannot assume any one-sided self-selectivity in our data sets, i.e. the selectivity applies to both data sets to the same extent. Thirdly, it should be stressed that our study was explorative in character and that the conclusion of the respondents on the population is therefore less critical than that of hypothesis-testing approaches. And finally, the number of cases seems to be large enough to make reliable statements in the given explorative context.
RRI pillars, i.e. gender equality, science education, open access, public engagement or ethics. When including types of “de facto RRI” (Randles et al., 2016), it is important to also capture those activities that constitute but are not labelled as RRI. Furthermore, we were convinced that concrete activities would allow a more reliable assessment of the diffusion of RRI than a purely subjective assessment. We likewise asked about the benefits and risks but also any supporting and impeding factors as well as the main drivers of and institutional support for RRI. These questions were targeted at the necessary framework conditions that might promote or hinder the dissemination of RRI among European researchers and are thus important when deducing tailored policy recommendations. The majority of the questions mentioned above served as dependent variables (with the exception of familiarity with RRI and institutional incentives).

We added a number of independent variables to our questionnaire that we assumed would shape the perception of RRI benefits and influence the extent to which the respondents perform research and innovation responsibly. These variables characterise (1) the research itself and (2) the background of the researchers. As regards the research itself, we asked whether it was driven primarily by curiosity or challenge, which community was the main recipient/user of the results and how it was funded (e.g. basic funding, third-party funding through science funds etc., contract research).

The following table summarises the main characteristics of the respondents, distinguishing thereby between the EU-funded survey group and the control group.

Table 1: Socio-demographic background of the respondents

<table>
<thead>
<tr>
<th>Criterion</th>
<th>EU-Funded Researchers</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>68.5%</td>
<td>75.2%</td>
</tr>
<tr>
<td>Female</td>
<td>31.5%</td>
<td>24.8%</td>
</tr>
<tr>
<td>Institutional Background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education Institutions (HEIs)</td>
<td>46%</td>
<td>71.9%</td>
</tr>
<tr>
<td>Research Performing Organisations (RPOs)</td>
<td>15.3%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Companies</td>
<td>26%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Civil Society Organisations (CSOs)</td>
<td>5.9%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Public Authorities</td>
<td>3.3%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Scientific Disciplines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Sciences</td>
<td>34.4%</td>
<td>33.0%</td>
</tr>
<tr>
<td>Engineering Sciences</td>
<td>29.4%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Social Sciences/Economics</td>
<td>11.4%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Humanities</td>
<td>6.7%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Medicine</td>
<td>6.3%</td>
<td>13.8%</td>
</tr>
</tbody>
</table>
Results

In the following sections, we begin by analysing the status and acceptance of gender equality from the point of view of the researchers surveyed. In a second step, we examine whether and to what degree RRI practice and perceptions differ between male and female researchers. Finally, we investigate whether gender awareness has an impact on RRI practice and perceptions. For the last two issues, we limit the analysis to the dataset of EU-funded researchers because (a) the number of responses there is higher and (b) it has been shown that EU researchers are actually more familiar with the RRI concept and more meaningful conclusions can therefore be expected.

5.1 Gender equality as one of the five RRI keys

Overall, two items dominate the gender equality activities reported by respondents, namely the encouragement of gender-balanced teams and provision of specific support for women within teams. The results underline that the first dimension of gender equality (“increasing female participation”) has the highest relevance among respondents. In contrast, the third dimension (“integrating the gender dimension in research and innovation content”) is not very widespread, especially the explicit integration of gender issues into research projects.
It is worth mentioning, however, that the two human capital related gender equality items are among the most frequently mentioned activities for RRI as operationalised for this survey and following the distinction between the five RRI keys defined by the European Commission. Only the use of open access publications (78 %) or publicly available data (76 %) are mentioned more often.

Substantial differences emerge when we look at the main motives for conducting different kinds of RRI activities. In general, we can see from Figure 2 that the perception that the respective activity is a quality criterion of good research dominates all five RRI dimensions. However, this link is strongest for public engagement followed by ethics and open access (at least three quarters of respondents), whereas roughly two thirds confirm this link for the gender equality and science education dimensions.

Two other main drivers for practising research and innovation responsibly are the support given by the institute’s policy and the prospect of obtaining better access to funding. The latter is especially important for ethics and open access, whereas institutional support plays a crucial role for ethics in particular. In addition, legal requirements are again most important for ethics but also show a high share for gender equality.
Figure 2: Main motives for conducting RRI activities (EU-funded researchers)

If we look at Figure 3, we can see that about half the respondents indicate the existence of some form of institutionalised support for each of the RRI activities they conduct. This support can take the form of institutional funding, institutionalised units like committees or offices or concrete overall strategies. However, it is worth mentioning that many respondents do not know whether such institutionalised support exists or not. When asked about the existence of a gender equality plan, 20% of respondents did not know if such a plan existed. However, almost half of those surveyed affirmed the existence of a gender equality plan, while only 32% explicitly stated that there was no such plan in place.
The existence of an institutional strategy generally exerts a positive influence on RRI activities for each of the five RRI pillars but to a varying extent: the effect of institutional support is strongest for gender equality and ethics (see Figure 4).

Within the gender equality dimension, the biggest differences can be seen for the use of gender-sensitive language in publications. However the other activities (encouragement of gender-balanced teams, support for female colleagues, consideration of gender aspects within research design, addressing gender issues in research projects) are also positively influenced by the existence of an institutional strategy.
Our data also provides strong support for the assumption that institutional incentives change mindsets and behaviours: researchers who receive EU funding are far better informed about the RRI concept than those without such funding. Furthermore, there is a marked difference with regard to gender equality: whereas around three quarters of the EU-funded respondents indicate that they support female colleagues, only 60% (without a GEP) or 67% (with a GEP) of the control group report such behaviour. In addition, consideration of gender aspects in research design is much lower for the control group than for the EU-funded researchers. The reason for these differences might be that twice as many EU-funded respondents indicate that gender equality is a requirement of their research funders. There are also large differences for public engagement: EU-funded researchers far more frequently indicate an activity like involving citizens in discussing the consequences of research, communicating and disseminating results or engaging with industry. They also indicate more frequently that this activity can be attributed to the requirements of research funders. The differences between the two survey groups regarding open access are not as distinct; the only remarkable difference here relates to the implementation of data management plans, which again is required by the European Commission.
In summary, our use of multivariate statistics identified the following activities with the largest, statistically significant differences between the EU-funded and control groups:

- two out of seven science education activities (appearances on TV/radio; science cafés, science festivals, researcher's nights);
- three out of five gender equality activities (I encourage gender-balanced teams in my work environment; I actively support female colleagues within my teams; I consider gender aspects in my research design);
- one out of five ethical activities (I submit my projects to ethical reviews); seven out of eight public engagement activities (involvement of citizens in determining what research should be performed; discussing the consequences of research/its application (including technology); communicating and disseminating the results of the project; commercialisation/exploitation of results; I actively consider how my research and innovation results will be perceived; I work with people who specialise in holding dialogues with citizens and civil society; I engage with industry in my research);
- one out of six open access activities (implementation of research data management plans).

This leads us to the conclusion that public engagement, gender equality and science education are strongly shaped by the EU framework and its incentives.

The control group is also less likely than EU-funded researchers to indicate concrete benefits of RRI. This is in line with the former’s degree of familiarity with and reduced practice of RRI: even if over half of the control group indicate an observed or expected benefit in most cases, the share of control group respondents who do not expect any benefits is substantially higher than for their EU-funded counterparts. This holds true for all four benefit categories, i.e. scientific, economic, democratic and social benefits, with the largest differences seen for scientific and economic benefits.

Finally, even if the overall distribution of observed barriers is more or less the same in terms of yes/no responses, concrete barriers are mentioned much more frequently by the control group than by the EU-funded researchers. Task overload plays a particularly decisive role for the researchers in the control group.

4 Control variables were country, scientific age, scientific discipline, organisational background, target group of research, type of research and gender.
5.2 Differences between male and female researchers regarding RRI

Our data show that female and male researchers differ with regard to the concrete practice of the RRI keys. Particularly obvious differences emerge for concrete gender equality activities, where female researchers mention a respective behaviour more frequently than male scientists.

Figure 5: Gender equality activities by gender (EU-funded researchers)

This first impression based on a descriptive analysis is also supported by our multivariate analyses (see also Bührer & Iferd, 2017), which show that female respondents indicate much more frequently than men that they support female colleagues and consider gender aspects in their research. The differences between the use of gender-sensitive language by women and men are not statistically significant. However, we do find important differences regarding research experience: respondents with longer research experience (11+ years) are more inclined to support female colleagues and promote gender-balanced teams than less experienced respondents. Finally, scientific discipline also influences the responses insofar as researchers from the medical, social sciences and humanities fields mention that they deal with gender issues in research projects or consider gender aspects in their research designs much more frequently than those from the structural sciences. The use of gender-sensitive language in publications is most common in the humanities
and social sciences. Finally, researchers from the field of medicine most frequently indicate that they encourage gender-balanced teams.

With regard to the four remaining RRI keys, men and women differ in their engagement in public engagement and science education, while no differences can be found for open access and ethics (Bührer & Berghäuser, 2017; Bührer & Iferd, 2017).

Concerning science education and literacy, Figure 6 shows that female researchers engage more frequently than men in science cafes, science festivals, researchers' nights and public lectures. They also work with pupils, develop science education material, appear in TV/radio broadcasts or write popular science books/newspaper articles and/or blogs slightly more frequently than their male counterparts. In contrast, male researcher have a stronger tendency to work in partnership with schools.

Figure 6: Science education activities by gender (EU-funded researchers)

Again, our findings show that not all descriptive results can be supported by means of multivariate analysis – only the fact that women engage more frequently than men in science cafes, science festivals and researchers nights. Furthermore, the multivariate analysis supports the fact that male researchers engage more frequently in partnerships with school than their female counterparts. Aside from the gender aspects, we can clearly show a significant relationship for years spent in research and science education activities: the longer a researcher has worked in a research capacity, the more likely she/he is to participate in such activities. Scientific discipline also plays a certain role in this regard:
researchers in the fields of medicine, social sciences and humanities participate more frequently in public lectures than their colleagues in the structural sciences, while medical researchers work most frequently with pupils.

If we look at public engagement activities, we find substantial differences regarding links with industry and commercialisation activities: men engage here much more frequently than women. In contrast, women seem to be more engaged with society in terms of involving citizens in their research processes.

Figure 7: Public engagement activities by gender (EU-funded researchers)

The results of our multivariate analysis again only few items here with a gender bias: female researchers (but also researchers with longer research experience and researchers working in the fields of medicine or the social sciences) communicate their research results more frequently, whereas men are more strongly engaged with industry (as are engineers; in contrast, a negative effect is found for researchers from the humanities). The consequences of their research are mainly discussed by researchers in the medical and social sciences fields, while anticipation of risks is a major issue for medical, social sciences and humanities researchers. Finally, working with people who specialise in dialogue with citizens is also shaped by research experience and scientific discipline, with such collaborations primarily encountered in the social sciences and the humanities.
5.3 Differences between gender-competent and less gender-competent researchers regarding RRI

To investigate the differences by different degrees of gender competence, we constructed a new variable in which we indicate whether the respondents mention at least two of the aforementioned gender equality activities. We understand gender competence as a basic competence that all researchers should have, and which comprises a basic understanding of gender equality goals and gendered aspects in science and research. Gender competence has to be distinguished from gender expertise. The latter requires sound theoretical knowledge of gender theories and/or experiences with the implementation of gender mainstreaming in research and innovation in addition to gender competence.

Figure 8 shows the results for science education activities, where gender-competent respondents more frequently mention the respective activity and the differences are much stronger than between female and male scientists. Thus, the explanatory factor is not gender but rather gender competence.

Figure 8: Science education activities by gender competence (EU-funded researchers)

A similar picture emerges for public engagement activities (see Figure 9). Again, the differences between gender-sensitive and less gender-sensitive researchers are larger than between female and male researchers.
Finally, while we could not find any significant differences between male and female researchers with regard to ethics, the new perspective does deliver such differences:

**Figure 9:** Public engagement activities by gender competence (EU-funded researchers)

![Graph showing public engagement activities by gender competence](image)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Gender competent</th>
<th>Less gender competent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I involve citizens when determining what research should be performed</td>
<td>26%</td>
<td>16%</td>
</tr>
<tr>
<td>I involve citizens when conducting the research</td>
<td>39%</td>
<td>25%</td>
</tr>
<tr>
<td>I involve citizens when discussing the consequences of research</td>
<td>48%</td>
<td>32%</td>
</tr>
<tr>
<td>I involve citizens when communicating and disseminating the results of the project</td>
<td>77%</td>
<td>70%</td>
</tr>
<tr>
<td>I involve citizens when commercialising and exploiting the results</td>
<td>60%</td>
<td>45%</td>
</tr>
<tr>
<td>I involve citizens when communicating the results of the project</td>
<td>45%</td>
<td>39%</td>
</tr>
<tr>
<td>I actively consider how my R&amp;I results will be perceived and used</td>
<td>72%</td>
<td>56%</td>
</tr>
<tr>
<td>I work with people who specialise in dialogue with citizens and civil society</td>
<td>56%</td>
<td>40%</td>
</tr>
<tr>
<td>I engage with industry in my research work</td>
<td>64%</td>
<td>61%</td>
</tr>
</tbody>
</table>

**Figure 10:** Ethics by gender competence (EU-funded researchers)

![Graph showing ethics by gender competence](image)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Gender competent</th>
<th>Less gender competent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I submit my projects to ethical reviews</td>
<td>46%</td>
<td>28%</td>
</tr>
<tr>
<td>I conduct ethical reviews of projects</td>
<td>29%</td>
<td>16%</td>
</tr>
<tr>
<td>I consider ethical issues when designing my research</td>
<td>55%</td>
<td>24%</td>
</tr>
<tr>
<td>I contribute to the development of ethical standards</td>
<td>55%</td>
<td>24%</td>
</tr>
<tr>
<td>I contribute to training on ethical issues</td>
<td>21%</td>
<td>9%</td>
</tr>
</tbody>
</table>

N=2193-2250

N=2269-2317

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

Gender competent

Less gender competent
6 Conclusion and Discussion

Our analysis reveals significant differences between female and male researchers regarding their practice and perceptions of RRI, i.e. women support female colleagues, encourage gender-balanced teams and consider gender aspects in their research design more frequently than men. Additionally, female researchers engage more frequently in science cafes, science festivals and researchers' nights. They also communicate and disseminate their research results more frequently than male researchers but are less engaged with industry in their research work (Bührer & Berghäuser, 2017). This effect remains even if we control for scientific discipline.

Our analysis also shows that the institutional environment positively influences the degree of RRI activities and the general attitudes towards more responsible research and innovation: researchers working in an institutional environment that systematically supports the practice of RRI are more active in RRI than researchers who do not rely on such structures. For the gender equality dimension, this means that institutions with a gender equality plan (GEP) in place are more inclined to support female researchers than those without such institutional incentives. Furthermore, researchers with experiences in EU-funded projects are more likely to be engaged in RRI activities. Although female researchers have a stronger tendency to engage with society than their male counterparts, gender competence proves to be the relevant distinguishing criterion.

The survey data deliver evidence on different research practices between female and male researchers when practicing RRI and thus further arguments as to why gender diversity positively influences European science systems. Furthermore, the survey illustrates the central role of the European Commission and EU-funded projects in enhancing gender equality standards in research and innovation.

Even if significant differences between female and male researchers regarding RRI practices exist, differences due to gender competence are even more pronounced. Gender-competent researchers are more frequently involved in other RRI activities. These results underline the importance of future activities to strengthen the gender dimension in science and research and point to the potential leverage effects of the gender dimension for other RRI keys.

The survey results also provide evidence that research and innovation practices can change if commitment is required. This is the case, for instance, if an institution commits itself to gender equality when releasing a GEP or when a funding institution requires gender equality activities in the research it funds. However, experiences show that such self-commitment has to be supported by external initiatives like the research-oriented gender equality standards formulated by the German Research Foundation (DFG) or the
performance contracts concluded between Austrian universities and the Federal Ministry for Education, Science and Research. Such instruments link the funding of a research performing organisation to the development and implementation of gender equality policies (Wroblewski & Striedinger, 2018; DFG, 2017). The presented results should also inform further development of gender equality policies. It seems necessary to strengthen the goal to develop gender competence among all stakeholders in R&I.

Although gender equality policies are widely implemented in Europe, they are still far from becoming a matter of course. Hence, a continuation of existing effective policies is needed to support gender equality. A further development of gender equality policies should also address the potential leverage effect for the other RRI dimensions, e.g. by explicitly combining the goals of different RRI keys. Contrariwise, gender competence should be included in the development of measures and policies addressing the other RRI keys, since gender-competent researchers seem to be more open to adopting innovative practices in research and innovation.

Even if our data does show a correlation between gender competence and the adoption of RRI practices, we have no sound evidence of the underlying mechanisms. We assume that gender-competent researchers are more critical towards the traditional perception of “good research” or “the ideal scientist” as formulated by Max Weber (1919). This may be due to the fact that reflexivity forms a central aspect of gender competence (Hochschulkonferenz, 2018). We likewise assume that researchers who are willing to reflect on their everyday practices in science and research will also be more willing to develop and implement alternative practices if traditional ones conflict with the idea of responsible science or science for society. However, these remain simply assumptions and will have to be addressed in future research on RRI practices.

7 References


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