E-WIRING

Funded by the European Union

How Can We Reduce Gendered Educational Choices?

Four Stepping Stones for Future Interventions

Authors

Dr. Alexandra Lux
Postdoctoral Researcher,
KU Leuven, Belgium

Dr. Jenny Veldman
Assistant Professor, Utrecht University, The Netherlands

Dr. Ruth Van Veelen
Senior Scientist, Netherlands Organisation for Applied Scientific Research (TNO), The Netherlands

Prof. Colette Van Laar
Professor of Psychology,
KU Leuven, Belgium

Please cite as:

Lux, A., Veldman, J., Van Veelen, R., & Van Laar, C. (2024). *How can we reduce gendered educational choices? Four stepping stones for future interventions [White paper]*. The RE-WIRING project. https://re-wiring.eu/

Contact information:

Website: re-wiring.eu E-Mail: alexandra.lux@kuleuven.be; colette.vanlaar@kuleuven.be

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

How Can We Reduce Gendered Educational Choices? Four Stepping Stones for Future Interventions

This paper is for anyone interested in helping to de-bias students' educational choices in the ages of 12-20 years – this includes (but is not limited to) teachers, career counselors, policy-makers and researchers. The paper illustrates what future interventions could focus on to become even more powerful.

Authors: Dr. Alexandra Lux, Dr. Jenny Veldman, Dr. Ruth Van Veelen, Prof. Dr. Colette Van Laar.

SUMMARY

- Gendered educational choices (GEC) are education-related decisions that align with stereotypes and expectations about how boys and girls should feel, think and act
- GEC limit students' potential and contribute to gender imbalances in work fields. Reducing GEC can lead to more fulfilling careers, a more diverse workforce, more inclusive innovation, and more sustainable labor markets.
- Based on two literature reviews (1. root causes of GEC; 2. interventions that aim to reduce GEC), we suggest four stepping stones for future interventions:
  1. Interventions to reduce GEC need to be **tailored** to the local context to be most effective.
  2. Targeting also **teachers and parents** is crucial.
  3. An **intersectional approach** can strengthen interventions.
  4. There is a critical need for interventions that target **boys' GEC**.

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

This White Paper is based on work conducted as part of the Horizon Europe RE-WIRING project (Realizing girls' and women's inclusion, representation, and empowerment) that aims to identify key factors that create power differences between men and women in society, and to make lasting changes to eliminate and reverse gender inequality. More specifically, this White Paper distills key insights from two deliverables from this project. The first one is a scoping review of root causes of gendered educational choices that included 96 academic and practically oriented knowledge sources with samples from 196 countries. The second deliverable is a scoping review of existing interventional approaches to reduce gendered educational choices that included 67 academic and practically oriented knowledge sources with samples from 29 countries. For both deliverables, we focused on students between 12 and 20 years of age. We paid special attention to including sources from WEIRD (western, educated, industrialized, rich, democratic) / Global North as well as non-WEIRD / Global South contexts.

This White Paper will point out **why efforts to reduce gendered educational choices are needed and explore blind spots in current interventional approaches** brought to light by two scoping reviews. These can serve as **stepping stones towards less gender-biased educational choices in the future**.

Gendered educational choices are still present and troublesome

Gendered educational choices are education-related decisions that align with stereotypes and expectations about how boys and girls should feel, think and act.[1,2,3,4] For example, choosing between an elective course in educational science or computer science can show gendered choices: if boys mostly pick computer science and girls mostly pick educational science, their educational choices tend to be gendered.

Gendered educational choices contribute to educational **gender segregation** (see Box 1) which can occur across two separate axes, best captured by the terms *vertical gender segregation* and *horizontal gender segregation*.[5,6,7]

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Box 1. Definition of Vertical and Horizontal Gender Segregation in Education.

Vertical Gender Segregation The unequal distribution of girls and boys across educational hierarchies and career levels, with boys having better access to education and/or dominating higher educational levels and positions in occupational hierarchies later on.
Horizontal Gender Segregation The concentration of boys and girls in gender-typical fields of study, leading to the clustering of men and women in different labor market sectors, jobs and tasks.

With regard to educational choices, vertical gender segregation tends to be predominant in non-WEIRD/Global South contexts whilst horizontal gender segregation tends to dominate WEIRD/Global North contexts.[8,9] While horizontal and vertical gender segregation can never be fully understood in isolation of each other (because male-dominated fields of work typically have higher status and better financial compensation compared to female-dominated fields of work[10]), **this White Paper primarily focuses on gendered educational choices related to the horizontal axis – this segregation tends to take place once general access to education is achieved**.

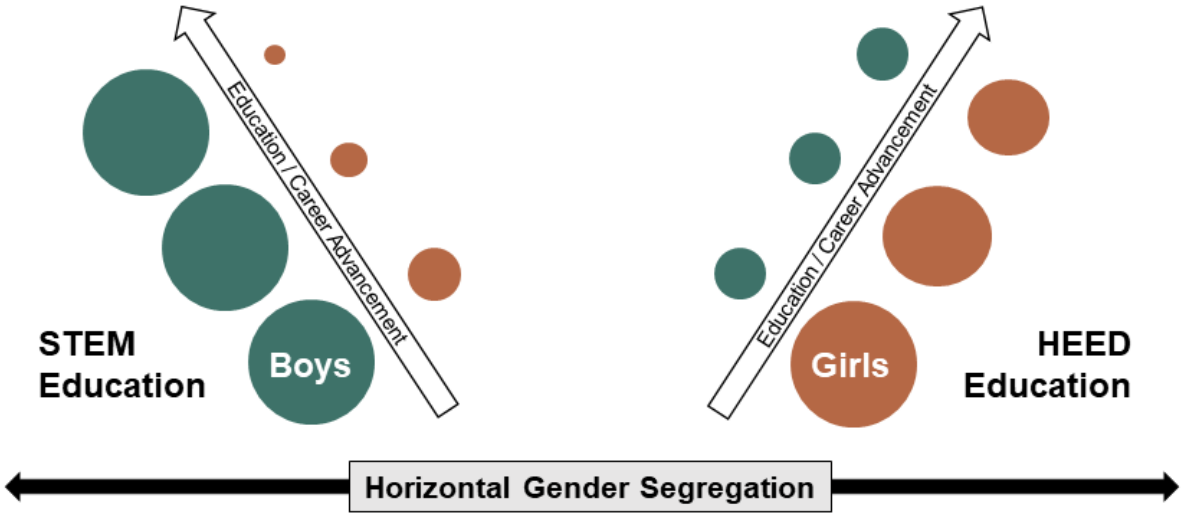
On average, vertical gender segregation in educational attainment has been minimized in OECD countries or has even begun to reverse to the advantage of girls.[11,*] Yet, boys and girls tend to flock to different, gender-typical fields which makes horizontal gender segregation the predominant type of gender segregation in many OECD countries. At the individual level, these gendered educational choices can hinder students from fulfilling their full potential and following their true passions.[12]
At the societal level, gendered educational choices result in an underrepresentation of women in domains of STEM (science, technology, engineering, mathematics)[13] and an underrepresentation of men in domains of HEED (healthcare, early education, domestic work)[14], as illustrated in Figure 1.

[*] In some (WEIRD) OECD countries women on average have higher educational attainment compared to boys. Note however that there are sharp contrasts between countries, and that non-WEIRD countries still deal with large gender gaps in access to education and in achieved level of education.

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Figure 1. Illustration of Horizontal Gender Segregation in Educational Contexts.



Note: STEM refers to the fields of science, technology, engineering, and mathematics. HEED refers to the fields of healthcare, early education, and domestic work. The size of the circles represents the numerical representation of girls (in orange) and boys (in green). The figure demonstrates that boys are overrepresented in STEM and underrepresented in HEED, but once they enter HEED fields their representation remains stable; girls are overrepresented in HEED and underrepresented in STEM, and they are less represented in higher career ranks in STEM.

STEM and HEED fields are both characterized by labor shortages that could be improved if educational and occupational choices were less influenced by gender.[15,16,17,18,19] Moreover, at the organizational level a more diverse gender representation brings a broader range of knowledge together and thereby drives innovation and growth, and can also help create more sustainable labor markets for the future.[20,21,22] In addition, it might also help improve women's more precarious financial prospects compared to men's, as gender differences in representation in occupations and industries now constitute the largest measured factor accounting for global socio-economic gender gaps.[10]

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Gendered educational choices are largely due to gender bias and stereotypes

Where do these gendered educational choices come from? The strong horizontal gender segregation in many OECD countries is not rooted in innate or biological differences between women and men, but rather in the persistent belief that these differences exist, and the gendered expectations that stem from that belief. The ostensible freedom of choice in education in these countries acts as a breeding ground for existing gender bias and stereotypes to steer students towards typically male and female occupational fields.[23,24]

These biases and stereotypes come to the foreground in the institutions in which students are embedded, the experiences they have there, and the symbolical cues they pick up. Throughout our first scoping review, we identified root causes that can serve as leverage points to reduce gendered educational choices.

The results of our first scoping review indeed demonstrate that gender stereotypes and gendered expectations that exist at home, in the classroom, and in society contribute to major horizontal gender segregation in fields of study and career expectations. The context surrounding students plays a key role, see Box 2 for examples of how root causes of gendered educational choices can manifest in students' daily lives.

It is important that efforts to reduce gendered educational choices try to tap into the main drivers causing them. Researchers and institutions have developed interventions to address these causes. Interventions are intentional actions to improve a situation or to prevent it from getting worse. As part of our scoping review of the vast variety of existing interventions, we created a mapping of existing approaches (see Figure 2). These interventions target students either directly (e.g., by trying to change their perception of the field) or indirectly by targeting socializing agents surrounding the students (e.g., teachers or parents). Our analysis of existing approaches to reduce horizontal gender segregation identified four blind spots that can serve as stepping stones for future interventional approaches.

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Box 2. Examples for Manifestations of Root Causes of Gendered Educational Choices.

What can make gendered educational choices more likely?

Some examples are:

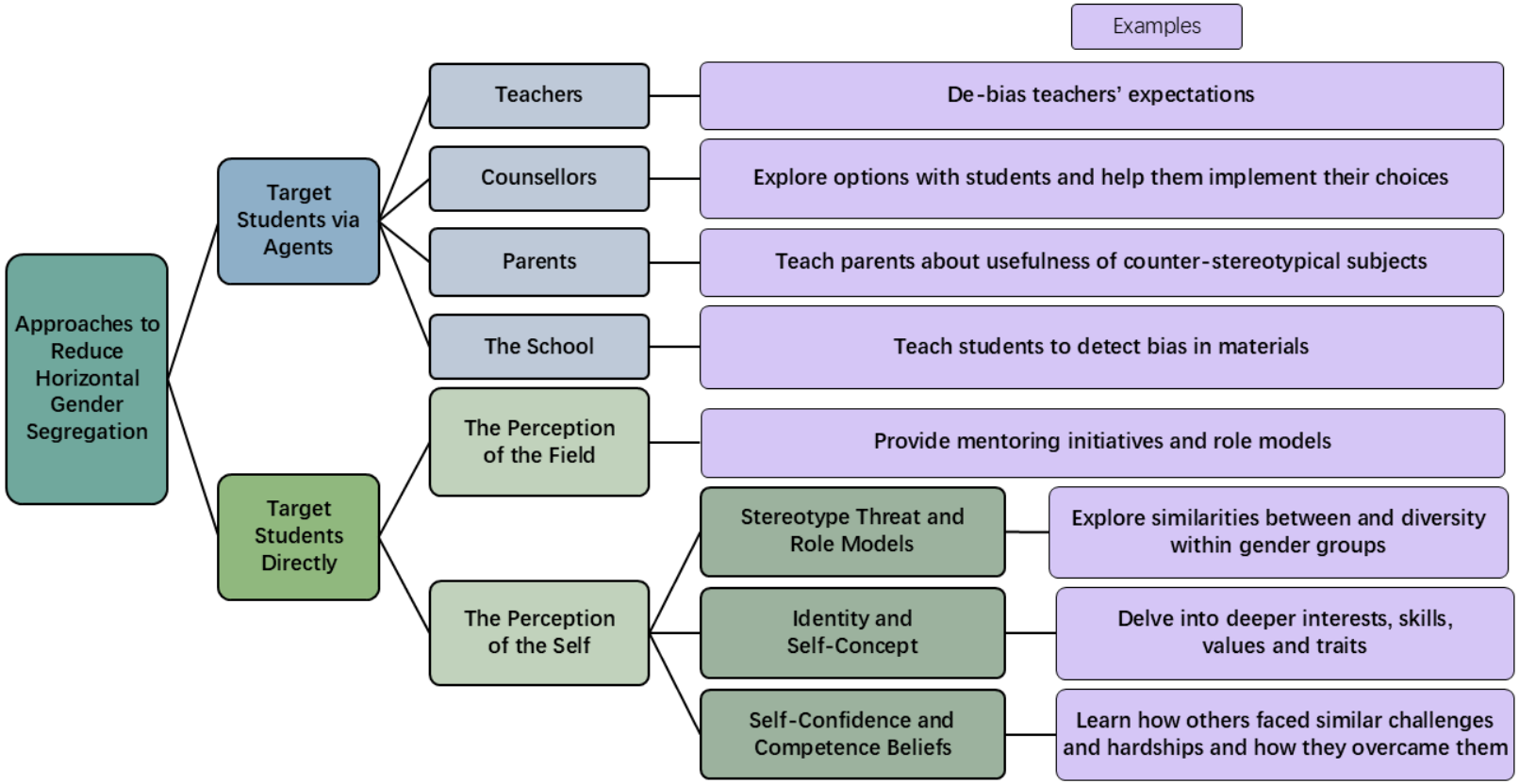
- **Restricting reading materials**. Boys tend to underperform in reading when teachers discourage them from reading materials in line with personal interests, e.g., comic books.[25]
- **Assigning students to educational tracks at an early age**. Differences in how well girls and boys do in school tend to be larger when they are sorted into different academic tracks or programs at a young age.[26]
- **Fearing discrimination or backlash in counter-stereotypical work fields**. Students avoid study and work fields in which they expect to face unequal treatment and bias based on their gender.[27]
- **Encountering biased expectations of teachers and parents**. Educational expectations can differ depending on the gender of a student or child. Teachers and parents tend to assume that certain study fields and careers are a better match for boys or girls in particular. These expectations can heavily distort students' study and career choices.[25,28,29,30,31]
- **Using gendered language for job titles and descriptions**. Using masculine or feminine generics† (e.g., fireman or midwife) communicates to students that one gender is particularly suited for a job. The wording of job advertisements (mainly masculine words such as *competitive* or *dominant*, or mainly feminine words such as *support* or *understand*), also influences how appealing and welcoming girls and boys find these jobs and domains.[32,33,34]
- **Perceiving strong gender norms in (social) media.** Social media, TV shows, and video games can convey strong beliefs about what it means to be a man or a woman. This enhances girls' traditional gender role beliefs and interest in typically feminine occupations and endorses masculinity norms in boys.[29,35,36,37,38,39]

† Masculine or feminine generics use the masculine or feminine version of a word (pronouns, nouns) to refer to every gender group. However, such generics exclude unmentioned gender groups.[32]

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Figure 2. A Mapping of Interventional Approaches.



Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

Four stepping stones towards less gendered educational choices

1. Interventions should be tailored solutions

With varying contexts - for instance WEIRD versus non-WEIRD countries or students situated in the Global North or Global South - root causes of gendered educational choices vary as well. Many different approaches exist to reduce gendered educational choices (see Figure 2), and interventions are most effective when they address the specific root causes of gendered educational choices in a given context. In the complex web of factors influencing gendered choices and the interventions designed to reduce them, there are many ways to untangle the problem. However, pulling the wrong threads in a specific context can risk tightening the knot instead of loosening it. Our review has shown that many existing interventions focus on intervening in perceptions of the self (e.g., by trying to increase girls' confidence). However, it is crucial to carefully assess the cause of gendered educational choices in a specific context. For example, if a root cause is strongly gendered language in textbooks accompanied by gender-stereotypical visualizations of men and women, then drawing on girls' confidence would not be the most effective leverage for change. Instead, in that case textbooks should be revised, as the cause is not within girls but in the system in which they are embedded.

When choosing an interventional approach, two important questions to ask are:
1) At what level(s) can we identify root causes for gendered educational choices?
2) Who might be key socializing agents to involve (e.g., teachers, peers, or parents)?

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

2. Interventions should also target teachers and parents

Our scoping review showed that most existing approaches target students directly (the lower half of Figure 2). Yet students' social networks are a powerful resource when they make important choices. The impact of interventions could be much greater if we expand efforts to include peers, teachers, the school system, and parents (the upper half of Figure 2). With this approach, we shift from "*fixing the student*" towards "*fixing the system*". Teachers are keystone figures who act as crucial signposts for students on their educational paths, heavily influencing the directions students take at key decision points. There is untapped potential in focusing interventions on teachers to reduce students' gendered educational choices by leveraging teachers' influence. Parents, who shape their children's gendered views of potential study and career fields, represent another area where interventions can have a significant effect. **By including teachers and parents in interventional efforts, we expect a much higher return on investment in terms of impact.**

3. An intersectional lens can make interventions more potent

An intersectional lens can be a powerful catalyst for enhancing interventions. The concept of intersectionality takes into account how different social identities (i.e., class, ethnicity, or gender) overlap and cause different and unique kinds of experiences of inequalities.[40]

Our review showed that - contrary to the idea of intersectionality - most existing interventions only focus on a single characteristic, namely gender. **Adapting interventions to students' complex, lived realities can significantly increase their effectiveness.** For example, if a role model intervention that aims to motivate girls to consider a career in STEM presents them with one potential role model that happens to be a White, middle-class woman, then girls with other ethnic or social class backgrounds might have a harder time identifying with her. This would make the intervention less successful for these girls. Role model interventions could be made more impactful by

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

selecting diverse role models who embody a combination of identities—such as gender, race, culture, ability, and socioeconomic background. This approach can make it easier for students to relate more deeply to the role models and offers a less “one size fits all” example of occupations, thereby strengthening an intervention's overall impact.

4. We must not leave boys behind

To address boys’ choices and the shortage of workers in healthcare, education, and domestic fields (HEED), we need more interventions aimed at preventing boys from being steered away from these areas. Our review showed that most interventions mapped in Figure 2 focus on encouraging girls into STEM fields, while only a few focus on attracting boys to HEED. This lack of focus not only perpetuates gender segregation in HEED, but reinforces the idea that STEM is more valued, and also exacerbates staffing shortages in crucial sectors.[41] Boys deserve to choose careers based on interest and meaning, just as much as girls do, rather than being limited by gendered beliefs. **We should leverage existing strategies designed to increase girls' participation in traditionally male-dominated fields as a model for creating interventions that encourage boys to explore and enter HEED careers**.

The bottom line

Gendered educational choices, shaped by stereotypes, hinder individual potential and create workforce imbalances. Scoping existing interventional approaches showed blind spots that are best targeted with future approaches. More attention should be paid to taking the context into account when choosing interventions, involving parents and teachers as well, applying an intersectional approach, and also supporting boys to make less gendered educational choices.

Funded by the European Union

This publication has been produced with the financial support of the European Union’s Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission

REFERENCES

1 Brownhill et al., 2015
2 Eagly & Wood, 2012
3 Ellemers, 2018
4 Eccles & Wigfield, 2020
5 Bettio & Verashchagina, 2009
6 Charles & Bradley, 2002
7 Charles & Bradley, 2009
8 Charles, 2003
9 Rafnsdóttir & Weight, 2019
10 Blau & Kahn, 2017
11 OECD, 2024
12 DiDonato & Strough, 2013
13 Belanger et al., 2020
14 Croft et al., 2015
15 Cushman, 2007
16 Iammartino et al., 2016
17 McKenna et al., 2016
18 Menches et al., 2007
19 Quigley et al., 2024
20 Ain et al., 2021
21 Nielsen et al., 2018
22 Ruiz-Jiménez et al., 2014
23 Breda et al., 2020
24 Soylu Yalcinkaya & Adams, 2020
25 OECD, 2015
26 Van den Werfhorst, 2019
27 Van Praag et al., 2021
28 Gunderson et al., 2012
29 Commonwealth of Learning, 2017
30 Jackson et al., 2021
31 Kane, 2006
32 Braun et al., 2005
33 Formanowicz & Hansen, 2022
34 Gaucher et al., 2011
35 Chaffee et al., 2019
36 Davies et al., 2002
37 Ward & Harrison, 2005
38 Scharrer & Warren, 2022
39 Galdi et al., 2014
40 Crenshaw, 1989
41 Block et al., 2019

Funded by the European Union

This publication has been produced with the financial support of the European Union's Horizon Europe research and innovation program under Grant Agreement n° 101094497. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Commission