Attitudes toward gender equality among Italian 8th-grade students.

A zero inflated modelling approach.

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https://github.com/dacarras/invalsi_2022_opd

Topic

Attitudes towards gender equality

Attitudes towards gender equality

Key political attitude

Citizenship framework

- Future citizens must know about civic institutions, and participate, but they also must be able to answer confront discrimination (Kennedy, 2019)
- The formation of attitudes about political issues such as poverty, equality, and the meaning of citizenship are at the core of development of citizenship embedded with knowledge and behaviors (Allen, Bogard, and Yanish, 2016)

Why are attitudes toward gender equality are key?

- These can foster more egalitarian living conditions. Attitudes that oppose to equal rights between men and women are negatively related to gender equality (Brandt, 2011; Dotti Sani & Quaranta, 2017).

The endorsement of stereotypes among adolescents

- Stereotypes about gender, which imply evaluative representations such as “boys are violent”, can lead to significant approval of gender violence and violent behavior (Varela et al., 2022), and can also foster lower academic achievement and aspirations among young women (Davis & Greenstein, 2009; Logel et al., 2009).

How gender equality endorsement is measured

“Students' attitudes toward gender rights”

ICCS 2016

Attitudes toward gender rights

ICCS 2016

Q24 There are different views about the roles of women and men in society.

How much do you agree or disagree with the following statements?

(Please tick only one box in each row.)

				Strongly agree	Agree	Disagree	Strongly disagree	
	IS3G24A	a)	Men and women should have equal opportunities to take part in government.	☐ 1	☐ 2	☐ 3	☐ 4	ge01
	IS3G24B	b)	Men and women should have the same rights in every way.	☐ 1	☐ 2	☐ 3	☐ 4	ge02
	IS3G24C	c)	Women should stay out of politics.	☐ 1	☐ 2	☐ 3	☐ 4	ge03
[R]	IS3G24D	d)	When there are not many jobs available, men should have more right to a job than women.	☐ 1	☐ 2	☐ 3	☐ 4	ge04
[R]	IS3G24E	e)	Men and women should get equal pay when they are doing the same jobs.	☐ 1	☐ 2	☐ 3	☐ 4	ge05
[R]	IS3G24F	f)	Men are better qualified to be political leaders than women.	☐ 1	☐ 2	☐ 3	☐ 4	ge06
	IS3G24G	g)	Women's first priority should be raising children.	☐ 1	☐ 2	☐ 3	☐ 4	

Facets

ge01, ge02, ge03

Supports for Gender Equality (Sandoval-Hernández et al., 2018)

ge04, ge05, ge06

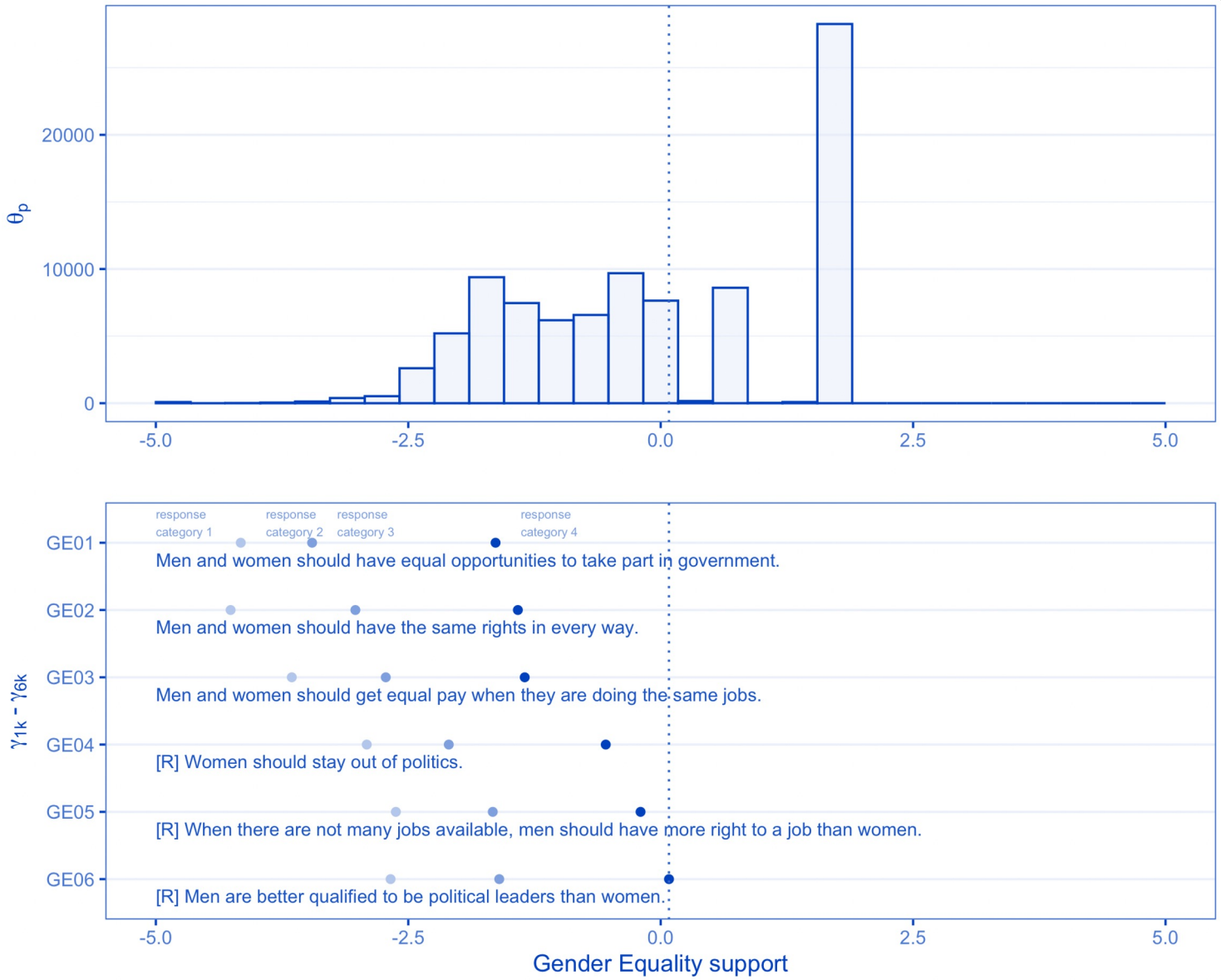
hostile sexism (Brandt, 2011, Napier et al., 2010)

attitudes towards woman capabilities (Castillo, Miranda, Bonilla, 2021)

https://github.com/dacarras/invalsi_2022_nhl

Attitudes toward gender rights

ICCS 2016



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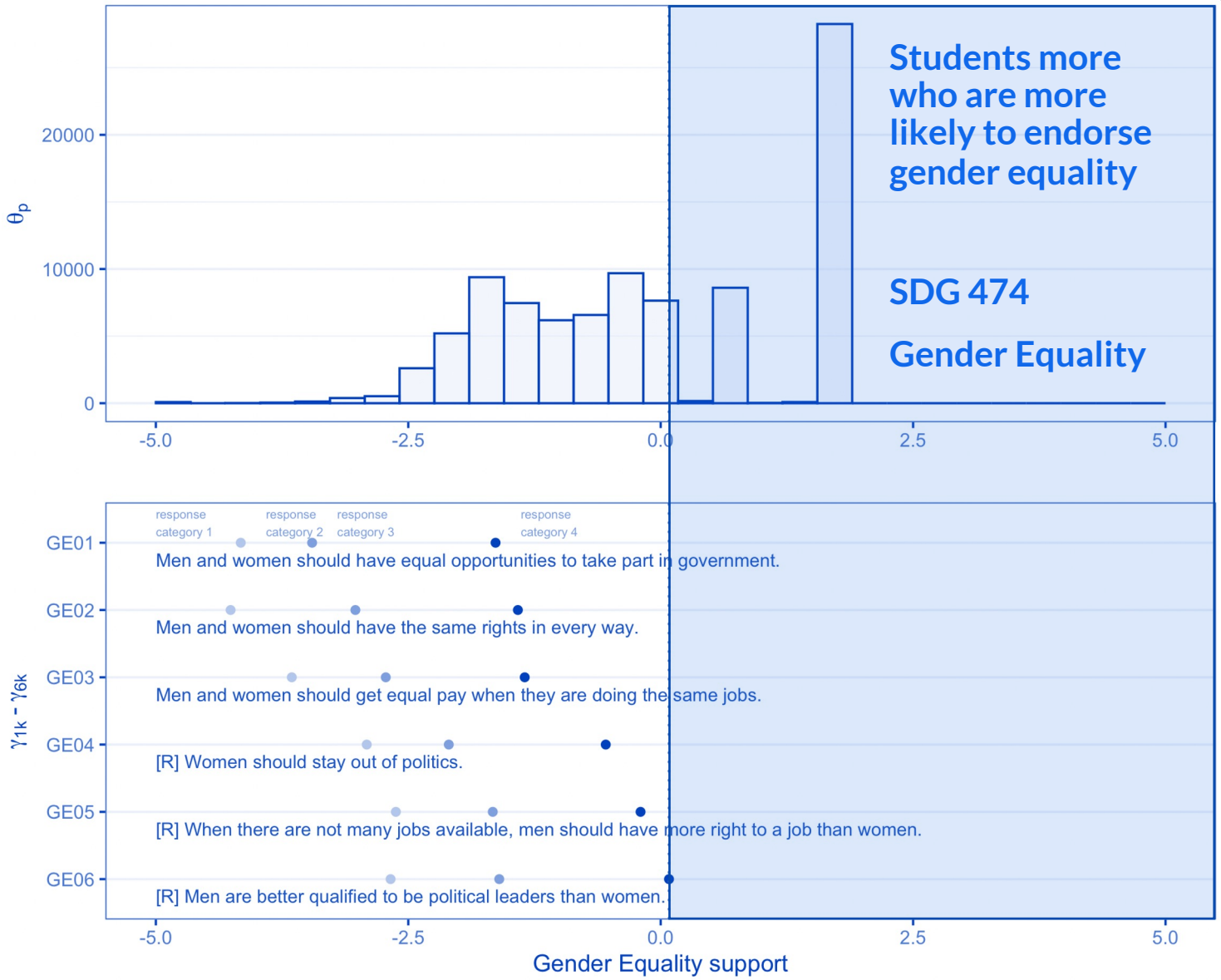
Sandoval-Hernández & Carrasco (2020)

Attitudes toward gender rights

ICCS 2016



https://github.com/dacarras/invalsi_2022_nhl

Sandoval-Hernández & Carrasco (2020)

Attitudes toward gender rights

ICCS 2016

Country or Region	Percentage	Lower Limit	Upper Limit
Dominican Republic	0.16	0.14	0.18
Russian Federation	0.16	0.14	0.18
Mexico	0.17	0.16	0.19
Latvia	0.25	0.23	0.27
Bulgaria	0.26	0.24	0.28
Peru	0.36	0.34	0.39
Lithuania	0.37	0.34	0.39
Colombia	0.41	0.38	0.44
Hong Kong SAR	0.45	0.42	0.48
Estonia	0.47	0.44	0.51
Chile	0.52	0.50	0.54
Netherlands	0.53	0.50	0.56
Korea, Republic of	0.55	0.52	0.57
Slovenia	0.56	0.54	0.59
Malta	0.57	0.55	0.59
Croatia	0.58	0.55	0.60
Italy	0.59	0.56	0.61
Belgium (Flemish)	0.62	0.59	0.65
Finland	0.63	0.61	0.66
North Rhine-Westphalia	0.67	0.64	0.70
Chinese Taipei	0.69	0.67	0.71
Denmark	0.71	0.69	0.73
Norway	0.72	0.71	0.74
Sweden	0.74	0.71	0.76

Who are the students who endorse gender equality the most?

Alternative ways to study students and socialization factors

Problem

How to produce the information we are after

What we want to know?

- What are the factors systematically associated with students who endorse gender equality the most?

Inferential model selection

- Regression models and mixed models can be thought of a conditional means models. These are informative regarding a mean of reference. But may struggle with variables with skewed distributions.
- Zero inflated models might be a good tool

Measurement model selection

- Students gender equality endorsement is represented with partial credit model realizations (e.g., IRT scores), a continuous measure.
- Alternative measurement models, closer to the categorical side of the spectrum (Masyn et al, 2020), such as located latent class and unordered latent class could be an option as well.
  - Factor Mixture IRT, located Latent class (Carrasco, et al., forthcoming)
  - Unordered Latent Class models (Inostroza, 2021)

Measurement Model Selection

Rethinking the left side of the equation before modelling

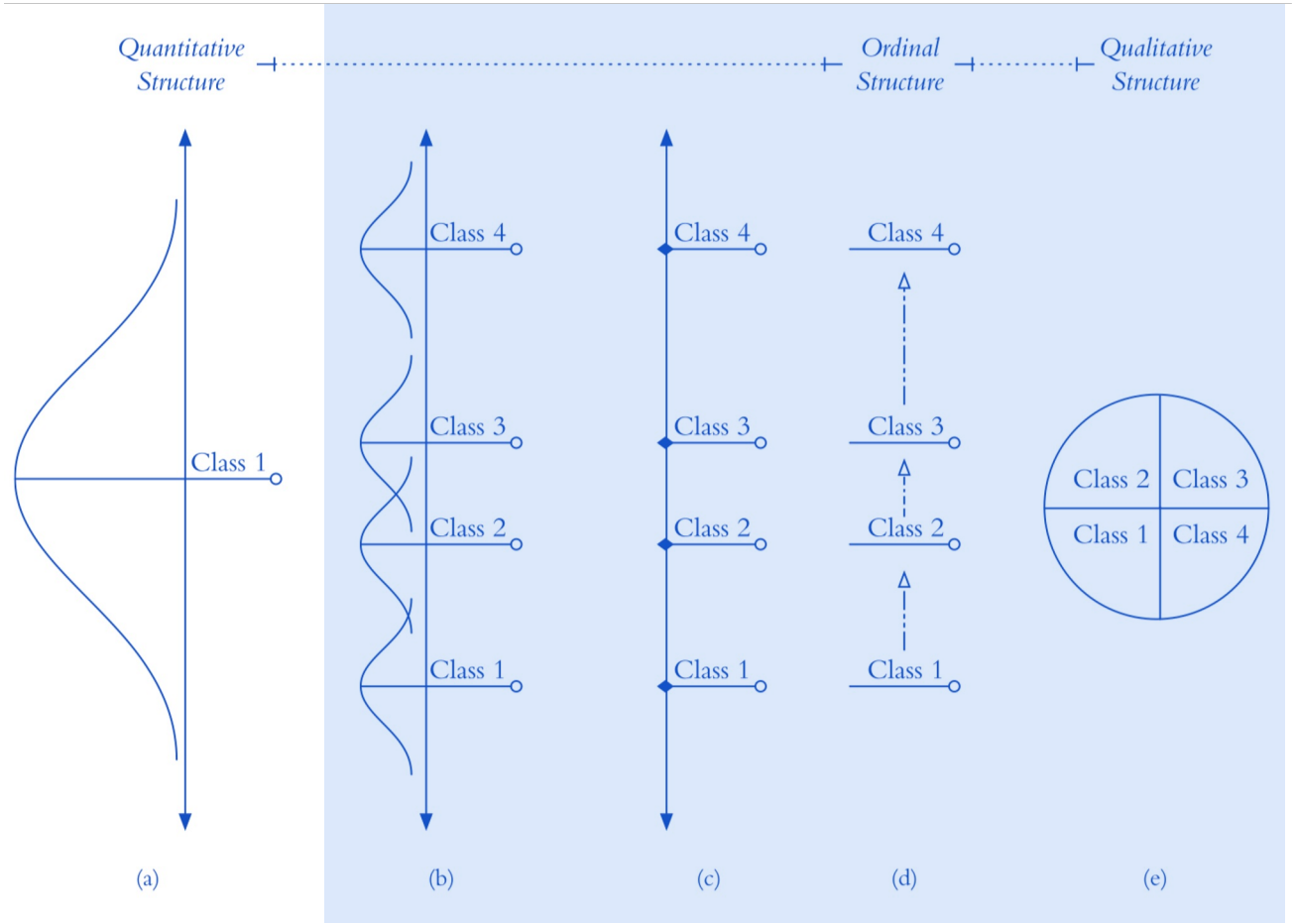


Fig. 2.6 Alternative models of a latent variable. (**a**) Continuous quantitative variable. (**b**) Located heterogeneous classes. (**c**) Located homogeneous classes. (**d**) Ordered classes. (**e**) Qualitative classes

Torres Irribarra (2021)

A different alternative

Using monotonicity as a short cut

Monotonicity

- Sum scores of responses from polytomous ordered response scale, preserved the relative ordered from a partial credit model
- This property is referred in the literature as **monotonicty** (Kang et al, 2018).

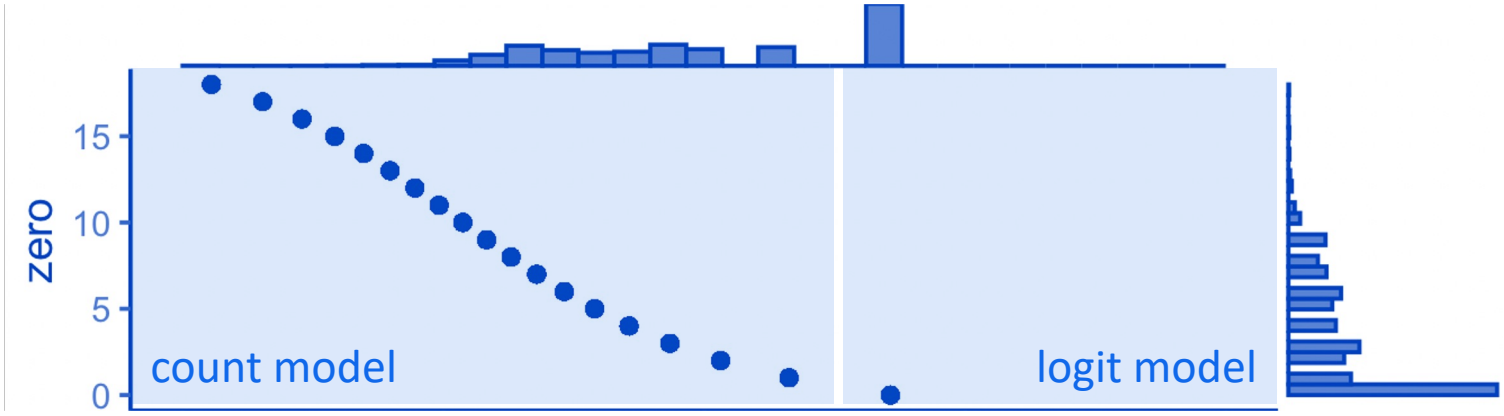
Taking advantage of the IRT scores monotonicity

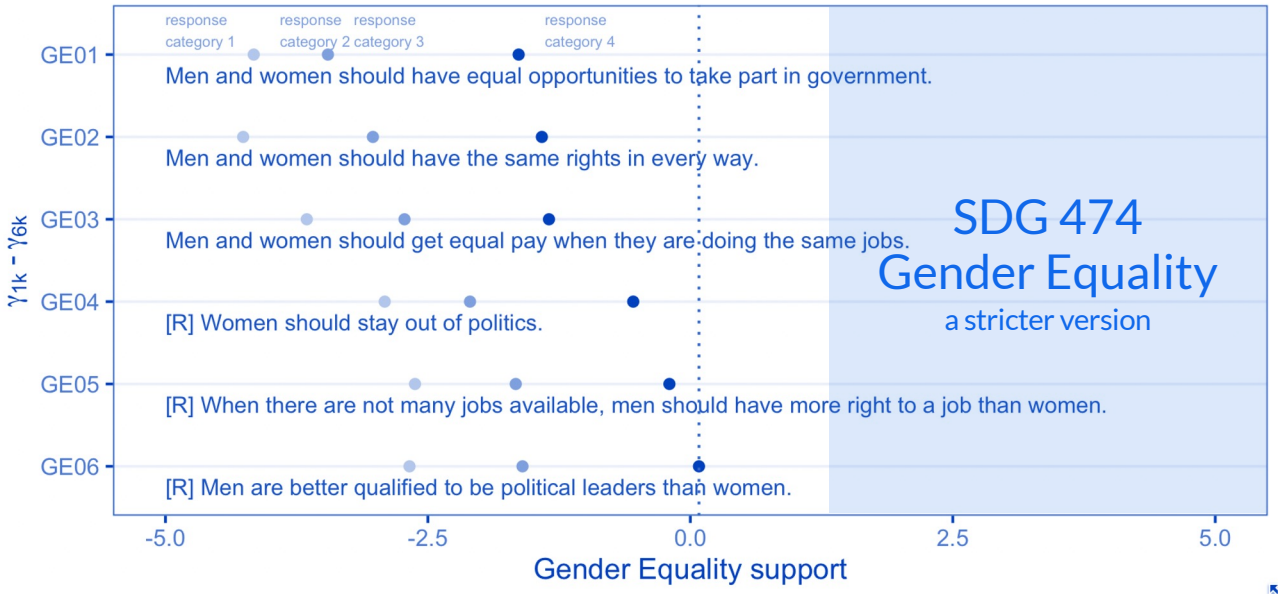
- Given the monotonicity property, we could create sum scores with the students' responses, reverse these scores in such a way that zero's will be our point of interest. In this score, zeroes are the student who endorse gender equality the most.
- While the remainder of the scores, the counts, will be a relative measure of "sexism" within a zero inflated model.
- On top of it, we can keep the interpretation of the original response model.

- Very cool, ha! Let's see the response model, under this rationale!

Taking advantage of Monotonicity

Using monotonicity as a short cut





The generated zero scores , allows a more nuance interpretation.

The zeros are the students at the highest endorsement of gender quality, given the gender equality items,

The count side, is a measure of ”sexism”, which can be modelled with a generalized model.

https://github.com/dacarras/invalsi_2022_nhl

Let’s see an illustration

sex, mother education, and classroom discussion conditioning SDG 474 gender equality index

Italy, ICCS 2016

Methods

Variables and inference model

Data

- ICCS 2016, Italy. Representative sample of 8th graders. Two stage sampling design with probabilistic design for schools, and intact classroom participation.

Outcome

- Reverse sum score of students' responses to the items from the attitudes towards gender equality; where zeros are the highest level of gender equality endorsement, and counts are a rank order measure of relative sexism.

Covariates

- Students sex (1 = girl, 0 = boy) (sex)
- Mothers Education (1 = tertiary, 0 = non-tertiary) (edm)
- Open classroom discussion. PCM scores, standardize measure at the national level, and partitioned as within school students' deviations (opd_w), and between school scores (opd_b)

Model

- Zero inflated model (logit for zero, and negative binomial for rank order), with survey complex sample design. Errors corrected by Taylor Series Linearization.

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Students Gender Equality

Italy (ICCS, 2016)

Table 1: zero inflated negative binomial unstandardized estimates on zero scores of gender equality endorsement (Italia, ICCS 2016)

		Count			Zero			
		E	SE	P	E	SE	P	OR
SEX	girl	-0.47	0.05	***	0.97	0.12	***	2.60
EDM	Mother education (tertiary)	-0.20	0.06	***	0.40	0.15	**	1.49
OPD_W	Open Classroom discussion (w)	-0.10	0.02	***	0.40	0.06	***	1.48
OPD_B	Open Classroom discussion (b)	-0.21	0.07	**	0.31	0.14	*	1.36
	intercept	1.41	0.03	***	-1.77	0.00	***	
	dispersion	0.38	0.04	***				

Note: Count is sexism zero scores (higher values are more sexist attitudes). Zero is highest gender equality endorsement (positive estimates are factors positively associated with the highest endorsement of gender equality across GENEQL scores).

Conclusions

Main results and discussion

Summary

Attitudes towards gender equality

Conclusion

- Girls are more likely to endorse the highest level of gender equality, and also to present lest sexist attitudes than their boys counterparts.

- Students with mothers with tertiary education are more likely to highly endorse gender equality, and also to be less sexiest than the rest of the students.

- Open classroom discussion (OPD) is a positive factor for gender equality endorsement. Students expose to higher than average OPD (+1SD) are more likely to endorse gender equality at highest level. Complementary, students exposed to higher levels of OPD are less sexist than the rest of the students. Students who perceived higher levels of OPD at their school, present a similar pattern.

Discussion

Attitudes towards gender equality

Discussion

- **The presented method as precedents in the literature**. Rutwkowski et al (2016) used a multilevel zero inflated poisson model, to conditioned bullying responses represented by a sum score. The novelty of the presented approach, is the used of reverse sum score, so the top score is used as a zero indicator.
- A limitation of the present approach, is it **cannot handle missing values in the outcome variable** (only 64 cases where in this category). In the present study, we produce estimates with the subpopulation of students with complete responses in the attitudes towards gender equality items. Missing values could be imputed using a response model (e.g., pcm, grm, crm), while also allowing to account for measurement error.
- Ceiling and Floor effects in scores are quite common among these measures (i.e., egalitarian attitudes scales). The inflation of cases at the extremes of the distribution can compromise the evaluation of protective factors, and program intervention effects. **The present approach is a potential solution for such problem, where the presence of highly skewed distributions in the outcome can lead to underestimation of interventions.** Monte Carlo studies are needed to better describe the properties of the presented approach.

Grazie mille!

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