



Original research article

# Women and nuclear energy: Examining the gender divide in opposition to nuclear power among swedish citizens and politicians

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## ABSTRACT

Whether or not there will be a renaissance of nuclear power in the near future may depend upon the nature of support for this energy source among citizens and elected officials. Continued examination of the predictors of opposition to nuclear power therefore remains quite policy relevant. While the existing literature finds modest but consistent gender differences in attitudes towards nuclear power in the general publics of several Western countries, the robustness of this relationship has seldom been investigated across time or among elected officials. This paper addresses both of these gaps. First, analyzing nationally representative data from the Swedish general public between 1986 and 2011, we confirm that the theoretically expected gender divide in opposition to nuclear power—whereby women report greater opposition than do men—is indeed robust over time. Second, examining data from three recent surveys of elected officials at the local, regional, and national levels in Sweden, we find that female elected officials at each polity level report greater opposition to nuclear power than their male counterparts. Our results are consistent with the health and safety concerns argument, whereby women are less supportive than are men of technologies with considerable perceived health and safety risks.

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## 1. Introduction

Even though public support for nuclear power remains lukewarm at best in many countries (e.g., Organization for Economic Cooperation and Development, 2010), recent years have witnessed renewed calls for reinvigorating the nuclear energy programs of many countries. Indeed, some environmental organizations (e.g., [34] and climate scientists (e.g., CNN Staff, 2013) are actively promoting nuclear power as a way to maintain or increase electricity generation while reducing our fossil fuels consumption that contributes to anthropogenic climate change. Whether or not a “renaissance” of nuclear power actually occurs may depend, at least in part, upon the nature of support for it among citizens and elected officials. This raises the premium on improving our understanding of the dynamics of opinion toward nuclear power among the general public and elected officials.

We focus here on one of the most well-known patterns in the literature: that women are significantly less supportive of nuclear power than are men (e.g., [1,6,7,9,10,20,26,28,36,50]). The global nuclear power industry has been so concerned about women's low

level of support for nuclear power that it formed in 1992 the interest group Women in Nuclear, which has since worked to increase support for nuclear power among women around the world [54].

While this gender divide occurs in many countries and on a range of nuclear power attitudes, scholars largely have been unable—because of lack of data availability—to examine the robustness of this gender divide over time and across levels of a country's polity (e.g., local government, state or regional government, and national government). Addressing both of these gaps is important. Examining the robustness of the gender divide on nuclear power attitudes over time will help us better understand the likelihood that policy changes, nuclear accidents, new scientific reports, and other noteworthy events may influence this gender divide. Further, examining the robustness of this gender divide across polity levels will help us better understand the likelihood that female elected officials at different levels of government are significantly less supportive of policies to promote nuclear power than their male counterparts. Finally, with this focus, we address recent calls for increased social science attention to gender in energy research [46]. Our study helps us better understand the way that perceptions of energy technology (specifically, nuclear power) is gendered over time and polity levels ([47], p. 15).

We use a long time-series of nationally representative survey data from the Swedish public and novel datasets of Swedish elected

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officials that recently have been publicly released to answer two research questions. First, is the gender difference on nuclear power attitudes in the general public stable over time? Second, is the gender difference on nuclear power attitudes robust across levels of the polity? Thus, our focus here is on the consistency of the gender divide over time and across polity levels. Data limitations prevent us from comparing theoretical arguments explaining the existence of the gender divide. Nevertheless, our results are largely consistent with the most prominent theoretical argument that scholars use to explain gender differences in environmental concern and risk perceptions, which we briefly describe in Section 2.4.

Sweden offers a theoretically interesting context, since it has a notably high level of gender equality [41,51] and Europe's highest percentage of female elected officials at the local level and one of the highest percentages of female legislators at the national level [49,25]. Thus, finding robust gender differences in this context suggests that they are likely to present in countries with much less gender equality. As such, the results of this study serve as a novel point of comparison for future research on gendered perceptions of energy technology in Europe and beyond.

## 2. Background

### 2.1. Earlier empirical studies of public opinion on nuclear power

Few studies of public attitudes about nuclear power prior to the early 1970s analyzed possible gender differences. In their review of empirical studies from the early 1970s to the mid-1990s that do examine the relationship between gender and attitudes toward nuclear power, Davidson and Freudenburg [9] find a striking pattern. In every one of the 17 studies about attitudes toward a certain nuclear power facility and 21 studies of attitudes toward nuclear power in general, women report stronger concern about the risks of nuclear power and/or waste than do men [9].

Research since the 1990s finds that adult women are less supportive of nuclear power than are adult men across a range of countries, including the United States (e.g., [1,20,21,50]), the United Kingdom (e.g., [6,7]), Switzerland (e.g., [28]), The Netherlands (e.g., [10]), Sweden (e.g., [42]), Turkey (e.g., [14]), Japan (e.g., [33]), China (e.g., [57]), and 27 European Union countries (e.g., [26,36]). Other studies also find this gender divide among college students (e.g., [12,30]) and high school students (e.g., [13,38]).

Further, this gender divide—where women report less support for nuclear power than men—is robust across a range of attitudes about nuclear power. Some studies find that women are less accepting than are men of nuclear power generation in general (e.g., [6,7,10,14,20,21,26,36,42,50]). Other studies report that women are more strongly opposed than are men to the construction of new nuclear power plants or the expanded operation of existing nuclear power plants near their community (e.g., [1,28,57]). Further, several studies find that women perceive greater risks than do men from nuclear power generation (e.g., [10,12,33,38]). Finally, a few additional studies document that women are more concerned than are men with the handling, transportation, and disposal of nuclear waste (e.g., [13,30,42]).

Most of these empirical studies rely upon a general theoretical explanation emphasizing that gender socialization, and the social roles that men and women are socialized into, results in women being more concerned than are men with the safety and concern of others. This “health and safety concerns” argument (e.g., [9]) has been the most common argument used to explain the gender divide on nuclear power attitudes in the general public (e.g., [16,45]) and among elected officials (e.g., [40]). While not the only argument explaining gender differences in environmental concern and risk perceptions, the health and safety concerns argument neverthe-

less has been employed widely and enjoys considerable empirical support (see, e.g., [3,32,44,55]).

Briefly, the processes of gender socialization in most Western societies tend to confer to boys a masculine identity that emphasizes competitiveness, detachment, and an affinity for the control and mastery over other people and things, while they tend to confer to girls a feminine identity that emphasizes cooperation, attachment, and an affinity for expressing empathy and caring for others (e.g., [29]). This feminine “ethic of care” [17] translates into heightened concern for the health, safety, and welfare of others and greater sensitivity to risk vulnerabilities. As Bord and O'Connor [3] point out, women perceive specific technologies as considerably riskier than do men when these technologies become characterized as having significant health and safety risks. Such is the case for nuclear power in recent decades. Thus, as applied to the issue of nuclear power, the health and safety concerns argument holds that women's heightened concern for the health and safety risks of nuclear power lead them to be less supportive of nuclear power than are men.

While the recently released datasets we use allow us to investigate the robustness of the gender divide on nuclear power attitudes over time and across polity levels, they—like the datasets used in most earlier studies—nevertheless do not contain high-quality measures of perceived health and safety risks from nuclear power. Thus, we are not able to definitively test this part of the argument; rather, we can only assess the extent to which our results are consistent with this explanation.

### 2.2. Views of elected officials

We should be cautious in assuming that the patterns of public opinion on any social issues are also found among elected officials. Elected officials are seldom representative of the general public, especially in terms of demographic and socio-economic characteristics (e.g., [4]). Indeed, those studies that examine how citizens and elected officials view the same issues find incongruity between the policy preferences of citizens and those of their political representatives (e.g., [8,53]). This is the case with the issue of nuclear power in Sweden, where members of the Swedish national parliament (the Riksdag) express greater opposition to nuclear power than is found in the Swedish public [23].

Because of the paucity of empirical studies [5,27,40,43], existing research provides no clear answer on the extent to which the gender divide on nuclear power in the general public is evident among elected officials. In their study of a 1988 national survey of state legislators in the United States, Carroll et al. [5] find that female state legislators are more likely to oppose the construction of nuclear power plants than their male counterparts. Analyzing data from a sample of members and deputy members of Environment and Health Protection Boards of 27 Swedish municipalities, Sjöberg and Drottz-Sjöberg [43] find that females report greater perceived risk of nuclear waste than their male counterparts. While Reingold [40] finds that females in the California state legislature more strongly favor further regulation of nuclear power than their male counterparts, there is no such pattern among state legislators in Arizona. Finally, in his study of Norwegian Parliament, Jensen [27] reports that the gender difference in concern about the risks of nuclear power disappears when controlling for legislators' party affiliation.

### 2.3. The Swedish context

While nuclear power supplies a notable share of the energy production in Sweden, it nevertheless has been the focus of much public debate. The future of nuclear power was intensely debated in Sweden in the 1970s; the issue became highly politicized, though

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