RESEARCH ARTICLE

The limited impact of reference groups' symbolic gender representation on willingness to coproduce

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Abstract

Previous literature presents a strong rationale for the positive impact of symbolic representation in coproduction contexts. However, empirical studies yield inconclusive findings indicating that meaningful effects are limited if citizens face high levels of uncertainty. This article combines symbolic representation with signaling theory, suggesting that the representativeness of central reference groups might reduce uncertainty. The theoretical framework suggests that the representation of supervisors and existing coproducers might positively affect citizens' willingness to coproduce. Contrary to the theoretical expectations, the empirical results from two preregistered factorial survey experiments ($n = 2979$), situated in prisoner rehabilitation and refugee integration, indicate that the symbolic gender representation of these reference groups has a limited impact. Only a balanced representation of coproducers exhibits a positive treatment effect on citizens' willingness to coproduce. The results oppose central arguments in the representative bureaucracy literature. At least for gender categories, symbolic representation is less important than expected.

Evidence for practice

- Increased representation of female coproducers and supervisors does not generally increase citizens' willingness to coproduce.
- Coproduction practitioners should not expect positive effects based solely on displaying an increased representation of these groups.
- If any, a balanced representation of coproducers may be desirable to increase willingness to coproduce.
- More importantly, public organizations should try to make citizens feel comfortable by reducing the uncertainty related to coproduction processes.

Citizens' perceptions of public organizations profoundly impact citizen-state interactions (Jakobsen et al., 2019). In essence, how citizens experience public organizations and public encounters shapes their attitudes toward the organizations and employees. Attitudes such as legitimacy should affect citizens' behavior within citizen-state interactions (Headley et al., 2021; Riccucci & van Ryzin, 2017). Furthermore, citizens with favorable attitudes toward public organizations should be more willing to coproduce (Riccucci et al., 2016), referring to service delivery "not only (…) by professional and managerial staff in public agencies but also (…) by citizens and

communities" (Brandsen & Honingh, 2016, 427). This proposition is relevant because public organizations often depend on coproduction (Uzochukwu & Thomas, 2018).

A pressing question following these elaborations is whether delimitable factors can positively affect citizens. Scholars suggest coproduction initiatives might benefit if an organization represents the society it serves, so-called "passive representation" (Riccucci & van Ryzin, 2017). The theoretical arguments indicate that passive representation might positively affect citizens' attitudes through symbolic effects (Theobald & Haider-Markel, 2009). This symbolic representation originates from the salience of

passive representation related to social categories, such as gender, among bureaucrats (Riccucci & van Ryzin, 2017). For instance, representation increases if women make up a relevant share of the organizations' employees (Riccucci et al., 2016; van Ryzin et al., 2017). Still, empirical research remains inconclusive. Previous studies on gender representation provide mixed findings, with some supporting the hypothesized claims about symbolic effects (Meier & Nicholson-Crotty, 2006; Riccucci et al., 2016; Schuck et al., 2021; Xu & Meier, 2022). Still, others present findings that disregard them (Miller et al., 2022; Sievert, 2021; van Ryzin et al., 2017).

Recently, Sievert (2021) suggested that the effects of symbolic representation are context-dependent. Positive effects might decrease in uncertain coproduction contexts due to information asymmetries. In these settings, uncertainty includes a lack of knowledge about coproduction processes and activities. Simultaneously, a lack of predictability regarding the bureaucracies' actions constitutes uncertainty. Citizens often cannot anticipate how bureaucrats react in public encounters (Headley et al., 2021). Thus, generic information about aggregated levels of an organization's representativeness seems ineffective in reducing information asymmetries. Thus, decreasing uncertainty and the resulting information asymmetries seems necessary. This article combines symbolic representation and signaling theory (Connelly et al., 2011), aiming to reduce citizens' uncertainty. Instead of focusing on abstract representativeness on an aggregated level, this article focuses on the symbolic representation of identifiable reference groups. First, as coproduction requires citizens' active participation, coproduction initiatives exhibit a pool of existing coproducers. Second, the participation of citizens requires professional staff that supervises and guides the coproducers. Information about the representativeness of these groups should help citizens develop salient expectations regarding the procedures (Headley et al., 2021) because they better understand with whom they will work. Two factorial survey experiments test these expectations. Study 1 ($n = 1510$) is set in the policy context of prisoner rehabilitation, while Study 2 ($n = 1469$) applies refugee integration. The research designs manipulated the gender distribution of supervisors and coproducers (Study 1: 3×3 factorial design; Study 2: 6×6 factorial design). Afterward, participants indicated willingness to coproduce.

This article complements the empirical literature addressing symbolic representation and coproduction (Riccucci et al., 2016; Sievert, 2021; van Ryzin et al., 2017). The theoretical framework combines representative bureaucracy theory (Riccucci & van Ryzin, 2017) with signaling theory (Connelly et al., 2011), suggesting that representation signals must reduce information asymmetries. Contrary to the theoretical expectations, the empirical results indicate that the symbolic representation of coproduction supervisors did not matter. Furthermore, only a balanced gender distribution of existing coproducers had a positive treatment effect. Overall, symbolic representation of these reference groups had a limited causal impact. The discussion indicates that coproduction contexts deviate from other public encounters, which may explain the limited relevance of both interventions. For instance, citizens cannot observe bureaucratic behavior and lack contextual information. Overall, symbolic representation seems to play a minor role in coproduction. Still, practitioners should foster representation in public organizations. However, the primary rationale should be to increase active representation since the symbolic effects of representation seem to constitute a costly yet, overall, weak signal.

THEORETICAL FRAMEWORK

Theory of representative bureaucracy

Representative bureaucracy is at the core of public administration research because it addresses mechanisms shaping citizen-state interactions. This includes focusing on employees responsible for service delivery and policy implementation (Meier, 2019). In addition, representative bureaucracy focuses on citizens facing public organizations and employees (Headley et al., 2021; Jakobsen et al., 2019). The theory of representative bureaucracy has seen considerable development throughout the last decades (Ding et al., 2021). Based on a descriptive perspective, scholars outlined the assumption that public organizations' staff should resemble society, that is, those the organization is supposed to serve (Bishu & Kennedy, 2020). This passive representation indicates whether a public organization's workforce mirrors the characteristics of the citizenry based on an analysis of the demographic composition of employees (Meier & Bohte, 2001; Selden, 1997). Still, scholars suggest that passive representation alone cannot change how well an organization serves its citizens. Instead, it requires tangible decisions and the behavior of public employees. This active representation entails policy decisions and discretion when bureaucrats "press for the interests and desires of those whom he is presumed to represent" (Mosher, 1968, p. 12).

Recently, attention shifted to symbolic representation (Riccucci & van Ryzin, 2017; Theobald & Haider-Markel, 2009), suggesting that public employees' demographics are relevant. In particular, citizens' attitudes may change if they encounter representative public organizations (Headley et al., 2021; Miller & Keiser, 2021). This reasoning originates from the need to explain earlier findings. For instance, some studies showed congruence effects in schools, where girls perform better in the presence of female teachers (Keiser et al., 2002). Apart from the teacher's behavior, a "potential response to what female teachers represent for female students" may drive these results (Theobald & Haider-Markel, 2009, p. 412). Similarly, other findings attributed to active representation may instead result from clients' behavior (Meier et al., 1999; Meier & Nicholson-Crotty, 2006). Early

scholarship hinted at symbolic representation by indicating that categorical congruence affects constituents' expectations (e.g., Mann, 1974). Following these elaborations, the literature increasingly focused on the perspective of citizens (Theobald & Haider-Markel, 2009). Headley, Wright, and Meier (2021, p. 1034) succinctly put it: "The benefits of passive representation were in essence symbolic, a reassurance that the process of government was open to all people." The proposed mechanism fueling symbolic representation refers to an attitudinal shift. If representativeness is apparent (e.g., the workforce resembles society), citizens should perceive that organization as more legitimate and aligned with social norms. This should positively affect their behavior (Riccucci & van Ryzin, 2017).

Several empirical studies addressed the proposed theoretical reasoning. Initially, Theobald and Haider-Markel (2009) showed that the racial representativeness of police officers positively affects legitimacy. Recent empirical studies confirm this positive influence in the policing context (Riccucci et al., 2014; Riccucci et al., 2018). Furthermore, Gade and Wilkins (2013) found that clients respond to less salient identities when facing bureaucrats. Their study shows that veterans were more satisfied during rehabilitation services if the bureaucrat was also believed to be a veteran. Further studies suggest role-model effects in educational settings (e.g., Roch et al., 2018; Xu & Meier, 2022). Contrasting these insights, several studies could not confirm the effects of symbolic representation (Choi, 2019; Doornkamp et al., 2019; Schuck et al., 2021).

More recent studies primarily focused on behavioral intentions in different coproduction domains. Riccucci et al. (2016) describe a positive causal effect for symbolic gender representation. They used a survey experiment with results indicating that a higher share of female officials increased women's willingness to recycle. However, two empirical replications provide contradictory findings. van Ryzin et al. (2017) could not confirm these initial findings in an emergency preparation context. Moreover, Sievert (2021) conducted a wide replication in a different policy (justice system), providing null findings.

A signaling perspective on symbolic representation

The inconclusive findings pose a theoretical and empirical challenge. van Ryzin et al. (2017) suggest that policy contexts matter, while Sievert (2021) points to perceived uncertainty as a boundary condition. Their arguments are not mutually exclusive. Both studies suggest that some policy contexts may be more suited to foster behavioral changes through symbolic representation. For instance, Riccucci et al. (2016) tested recycling initiatives, which are very straightforward and do not require interacting with public employees. Here, uncertainty is low; thus, symbolic representation may fulfill an informational need. This

differs from other studies, such as van Ryzin et al. (2017), where citizens likely face interactions with public employees, increasing uncertainty (Sievert, 2021). In such cases, symbolic representation did not seem effective.

The inconsistencies may result from a lack of theorizing about how citizens interpret information about symbolic representation. In essence, citizens may not always see information about representation as valuable. Such variations can be understood by conceptualizing symbolic representation as information signals (Schuck et al., 2021) and incorporating signaling theory (Connelly et al., 2011). Although symbolic representation theory (Riccucci & van Ryzin, 2017) takes for granted that citizens can interpret an organization's level of representation (and that this information matters), signaling theory helps explain the underlying mechanisms (e.g., Keppeler & Papenfuß, 2021; Paruchuri et al., 2021). Signaling theory focuses on a narrower problem than symbolic representation because it tries to explain how individuals can approach information asymmetries (Spence, 1973), that is, if "two parties have access to different information" (Connelly et al., 2011, p. 39). Symbolic representation research implicitly assumes that citizens will face such information asymmetries and that representation would serve as an informational signal (Riccucci & van Ryzin, 2017; Schuck et al., 2021). However, incorporating the arguments presented in signaling research might provide an understanding of when such signals matter.

Accordingly, signaling theory seems helpful in understanding the mechanisms behind symbolic representation effects. Incorporating signaling theory (e.g., Connelly et al., 2011; Drover et al., 2018), this research argues that representation signals might lead to positive outcomes only if they reduce information asymmetries. Signaling theory indicates that individuals need such information cues to reduce information asymmetries (Keppeler & Papenfuß, 2021; Sievert et al., 2022). For instance, announcements, government websites, and job advertisements contain relevant information that gives an impression of the organization (Celani & Singh, 2011; Connelly et al., 2011; Walker et al., 2013). Hence, individuals judge organizations by drawing from available information cues, including information about (gender) representation. Signaling theory builds on contract theory research (Coase, 1937; Fama, 1980), indicating that information asymmetries cause agency problems between actors. Although the latter focuses on these agency problems, signaling theory proposes that individuals actively search and interpret available information cues to reduce information asymmetries (Celani & Singh, 2011; de Cooman & Pepermans, 2012; Spence, 1973). In the context of symbolic representation, signaling theory also suggests that representation signals need to have certain qualities to reduce information asymmetries. Given uncertainty about processes and individual treatment (Headley et al., 2021; Sievert, 2021), they should help infer whom one will interact with because this constitutes crucial information

(Zhang et al., 2020). Such an information cue will likely be more accessible than other information.

Symbolic representation of supervising employees and existing coproducers

Participating in supervised coproduction procedures constitutes uncertainty regarding interactions with others. This uncertainty occurs partly because citizens are often unaware of whom they will work with. Furthermore, citizens will likely face ambiguity regarding how they will be treated (Headley et al., 2021). Citizens cannot infer any expectations about behavior in the interactions if it remains unclear whom they will interact with. Although uncertainties vary across contexts and public encounters, they constitute a hurdle in most contexts. Thus, symbolic representation does not function as a meaningful signal if it does not reduce these information asymmetries. This seems to be the case in previous studies manipulating abstract representation on the collective level of the organization (van Ryzin et al., 2017). Given that coproduction elicits specific ambiguities, information cues presenting more relevant signals seem more likely to result in the proposed effects of symbolic representation.

This research proposes the relevance of two separate groups and their representativeness in reducing information asymmetries: coproduction supervisors and coproducers. First, citizens may interpret the representativeness of coproduction supervisors. In general, coproduction initiatives elicit uncertainty because citizens lack knowledge about specific procedures (Zhang et al., 2020). Coproduction supervisors are street-level bureaucrats trained to interact and cooperate with non-expert citizens. Supervision through professional staff is the regular case for many coproduction initiatives involving groups of individuals and collective benefits (Nabatchi et al., 2017). For instance, if school administrators offer a working group to improve educational services, they supervise the coproduction process and interact with involved parents (Sicilia et al., 2016). Following the theoretical arguments underlying symbolic representation, it should be beneficial if the coproduction supervisors exhibit specific demographics (Riccucci & van Ryzin, 2017). If citizens receive salient information about this group of employees, they can reduce central information asymmetries, such as the central character of the coproduction procedures. This argument poses that citizens interpret this information as a predictor of interactional quality. This includes, among others, how well supervising staff treats them (Headley et al., 2021). Hence, disclosing the gender distribution of this reference group should constitute a relevant signal (Riccucci et al., 2016). Women should positively respond to a higher share of female coproduction supervisors leading to an increased willingness to coproduce (Riccucci et al., 2016). This effect would result from reduced uncertainty, potentially more positive expectations about the

process, and a higher perceived legitimacy of the organization (Riccucci & van Ryzin, 2017). In contrast, the expectation for men is less certain, as indicated by Riccucci et al. (2016). The representative bureaucracy literature speculates that presumably positive effects for one demographic group (i.e., women) will not lead to negative outcomes for others (i.e., men). In this case, men should not be more willing to coproduce when encountering a higher share of female supervisors. Still, this information should also not deter them because men will likely not expect a less desirable treatment when encountering a higher share of women (Headley et al., 2021):

> **H1a.** Higher representation of women among the coproduction supervisors will increase women's willingness to coproduce.

> **H2a.** Higher representation of women officials among the coproduction supervisors will not alter men's willingness to coproduce.

Second, citizens may also interpret the representativeness of previous coproducers. Again, it should matter what citizens expect regarding whom they will work and interact with. Willingness to coproduce will likely depend on the previous coproducers (Sievert, 2021) because it constitutes a viable signal when judging the procedures and interactions. Coproduction often elicits collaborative work with other citizens, for instance, if community councils work with residents (Nabatchi et al., 2017). The representativeness of previous or current coproducers should send a strong positive signal (Riccucci & van Ryzin, 2017). Even though coproducers are not at the core of a public organization, they still embody a relevant reference point. If an organization hosts coproducers, their gender representation marks a relevant cue regarding the standing and acceptance of social groups. For instance, coproduction initiatives hosting primarily men likely deter women because they might not perceive such an environment as desirable or even safe. Thus, the symbolic representation of coproducers sends a strong signal about the coproduction processes to other citizens. This argument aligns with the previous theorizing, indicating that symbolic effects should depend on bureaucracies' past behavior toward citizens (Headley et al., 2021). Following the previous arguments, women should positively respond to a higher share of female coproducers, while lower levels of representation might deter them. The expectations regarding male participants are less pronounced. Given that men will likely not change expectation if existing coproducers are primarily female, they should be unaffected by the level of female representation:

> **H1b.** Higher representation of women among the existing coproducers will increase women's willingness to coproduce.

H2b. Higher representation of women among the existing coproducers will not alter men's willingness to coproduce.

METHODOLOGY

This study applies two survey-based factorial survey experiments that manipulate the salient gender distribution for supervising employees and existing coproducers. Study 1 was carried out in June 2021, and Study 2 was implemented in July 2022. Both experiments were conducted by "respondi," a private market research company based in Germany.

Study 1

Coproduction in the justice system

Study 1 applies coproduction in the justice system, allowing realistic survey vignettes. The German justice system depends on various coproduction initiatives related to prisoner rehabilitation and judicial procedures. Three settings necessitate coproduction by citizens. First, the penal system primarily requires citizen coproduction in prison facilities. This includes visits and support for prisoners to foster reintegration. Second, citizens can coproduce probation services required for those on parole. Probation service includes counseling and supporting the client in various situations depending on individual needs. Third, legal proceedings in the justice system require coproduction, primarily referring to lay judges. The three coproduction domains constitute core processes that require preparation through professional training and ongoing supervision. This means that citizens provide service delivery in cooperation with employees who act as supervisors. This approach is reasonable to ensure adherence to legal standards and necessary protocols. The context allows varying gender representation for both reference groups.

Procedure

Following a short introduction, including informed consent, participants indicated their gender identity, age, and place of residence. After briefly describing the ministry of justice, the randomization mechanism allocated participants into nine experimental groups. Each group received a vignette, introduced as a brief announcement. The vignettes appeal to the population to participate in the different coproduction initiatives of the justice system (penal system, probation service, legal proceedings) and refer to the supervising employees and existing coproducers. The vignettes include a brief mention in the text and visualizations indicating the gender distributions.

Both manipulations included three conditions resulting in a 3 × 3 factorial design. The first condition outlined a male-dominated group with only 20% women. The second condition was balanced with 50% women and men. Last, the third condition presented a female-dominated group with 80% women. Afterward, participants indicated willingness to coproduce with three items (one for each coproduction activity). Following the main questionnaire, participants had to indicate the percentage of women displayed in each group (0%–100% with iterations of 10%). These manipulation checks were complemented by an attention check. Last, participants indicated their sociodemographic information: educational level, employment sector, political orientation, and public service motivation. Appendix A lists the complete wording for all variables, and supplementary appendix C summarizes the experimental design. The study was preregistered: https://doi.org/10.17605/OSF.IO/SFNXH

Sample

Study 1 was conducted with a citizen sample from Germany. The market research company ("respondi") recruited citizens residing in the federated state of the experimental vignettes. Participants were recruited via e-mail using the company's extensive database. The goal was to recruit a representative sample familiar with the study context. Participation was limited to individuals aged 18–69. The final sample consisted of 1510 participants who successfully answered an attention check following the vignettes. The survey software excluded participants who failed the attention check. Redirect links for pre-defined sample quotas ensured that the final sample was representative. The final sample fulfills the preregistered expectations, which resulted from a power analysis ($\alpha = .05$; power $= 0.90$; analysis of variance, fixed effects, special, main effects, and interactions), with predicted effect sizes of $f = 0.15$. Table 1 outlines the sample characteristics.

Results

First, the randomization was assessed. ANOVAs and χ^2 tests identify potential differences across the nine treatment groups for central demographic variables. The groups did not differ regarding age, gender, education, work, and political orientation, indicating successful randomization. Furthermore, linear regression models with ordinary least squares (OLS) were used to analyze the manipulation's effectiveness. Supplementary appendix H presents two regression models indicating whether the two treatment manipulations affected participants' perceptions of the gender distribution. The analysis includes both manipulation checks asking participants about the

T A B L E 1 Sample characteristics.

	Study 1 (n = 1510)	Study 2 (n = 1469)
Gender		
Male	749 (49.6%)	723 (49.2%)
Female	761 (50.4%)	746 (50.8%)
Age		
Mean (SD)	44.4 (14.6)	45.9 (14.2)
Age groups		
18–29	274 (18.1%)	219 (14.9%)
30–39	325 (21.5%)	308 (21.0%)
40–49	270 (17.9%)	264 (18.0%)
50–59	350 (23.2%)	364 (24.8%)
60–69	291 (19.3%)	314 (21.4%)
Employment		
Private	0.450 (0.498)	0.430 (0.495)
Public	0.172 (0.378)	0.155 (0.362)
NPO	0.0344 (0.182)	0.0470 (0.212)
Unemployed	0.343 (0.475)	0.314 (0.464)
Self-employed	–	0.0538 (0.226)
Education		
No degree		0.00136 (0.0369)
Degree not finished		0.00204 (0.0452)
Less than 7 years	0.00464 (0.0680)	–
CSE	0.110 (0.313)	0.0592 (0.236)
GCSE	0.287 (0.452)	0.182 (0.386)
High school (FH Reife)	0.132 (0.338)	–
High school (Abitur)	0.467 (0.499)	0.216 (0.412)
College degree	–	0.250 (0.433)
Professional qualification	–	0.272 (0.445)
Promotion/habilitation	–	0.0129 (0.113)
Other	–	0.00408 (0.0638)
Political orientation		
Mean (SD)	5.68 (1.86)	5.64 (1.73)

perceived share of women among supervising employees and coproducers. First, participants perceived a higher share of women among the supervising employees ("Balanced" treatment: $b = 1.39$, $SE = 0.13$, $p < .001$; "Female-dominated" treatment $b = 2.19$, $SE = 0.13$, $p < .001$). Second, participants also identified the higher number of female coproducers in the respective treatment groups ("Balanced" treatment: $b = 1.64$, $SE = 0.13$, $p < .001$; "Female-dominated" treatment $b = 2.72$, $SE = 0.13$, $p < .001$). Hence, participants were aware of the increased number of female officials and female coproducers presented in the announcements.

The hypothesis testing follows the preregistered analytical steps. First, Table 2 shows the regression coefficients for the two different treatments. In particular, the coefficients indicate the expected change in the dependent variables compared to the reference group. To ensure a consistent interpretation, the male-dominated treatment group (20% women and 80% men) serves as the reference group in all regression models. Given that participants indicated the willingness to coproduce with three separate items, Table 2 outlines three regression models. In addition to regular OLS regression models, logistic regression models were calculated using dichotomized dependent variables. The cut-off value of 3 marks an adequate basis for the dichotomization in this context (Sievert, 2021). The regression coefficients are very small and close to zero. Furthermore, none of the effects are statistically significant.

As the hypotheses addressed separate effects for women and men, the following analysis is based on interaction terms (models 1–3), presented in Table 3. Additional visualizations for gender subgroups are presented in Figure 1 (supervising employees) and Figure 2 (existing coproducer). Like the analysis of the entire sample, the regression coefficients are small and not statistically significant. This indicates that women do not react favorably in the case of balanced or high gender representation. Regardless of gender identity, participants did not change the indicated willingness to coproduce because of the treatment manipulation. These findings point to null findings. Additional two one-sided tests (TOST) indicate the absence of meaningful treatment effects (supplementary appendix).

Study 2

Coproduction in refugee integration

Study 2 applies vignettes featuring coproduction in the context of refugee integration. Like the justice system, policymakers facing refugee immigration rely on coproduction for practical and financial reasons. For instance, several European countries face an increased refugee influx due to the Russian invasion of Ukraine. The temporary yet short-run needs require citizen coproduction in several domains. First, refugees arriving at final destinations and stopovers need guidance and orientation. Second, after the arrival, citizens will coproduce by supporting refugees with bureaucratic procedures and other necessary processes. Third, refugees might need to learn the host country's language once settled in. This is particularly crucial for children because they must participate in the educational system. These coproduction activities, like those covered in Study 1, require preparation through training and ongoing supervision.

Procedure

Study 2 resembles the procedures and measurements applied in Study 1. Participants were randomized into

TABLE 2 OLS and logistic regressions – Study 1.

	Dependent variable: willingness to coproduce					
	Penal system OLS (1)	Penal system (>3) Logistic (2)	Probation service OLS (3)	Probation service (>3) Logistic (4)	Legal proceedings OLS (5)	Legal proceedings (>3) Logistic (6)
Balanced (Staff)	−0.04 (0.08)	−0.01 (0.03)	−0.01 (0.08)	−0.01 (0.03)	0.003 (0.08)	0.02 (0.03)
Female-dominated (Staff)	0.01 (0.08)	0.01 (0.03)	0.04 (0.08)	0.02 (0.03)	0.01 (0.08)	0.005 (0.03)
Balanced (Co-Producer)	0.05 (0.08)	0.02 (0.03)	0.02 (0.08)	0.01 (0.03)	0.05 (0.08)	0.03 (0.03)
Female-dominated (Co-Producer)	−0.05 (0.08)	−0.02 (0.03)	−0.07 (0.08)	−0.02 (0.03)	−0.04 (0.08)	−0.03 (0.03)
Constant	2.58*** (0.07)	0.27*** (0.03)	2.56*** (0.07)	0.27*** (0.03)	2.96*** (0.08)	0.41*** (0.03)
Observations	1510	1510	1510	1510	1510	1510
R^2	.001		.001		.001	
Adjusted R^2	−.001		−.001		−.002	
Log likelihood		−917.82		−915.38		−1074.76
Akaike Inf. Crit.		1845.64		1840.75		2159.52

Note: Standard errors in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 3 OLS regressions with interactions – Study 1.

	Dependent variable: willingness to coproduce		
	Penal system (1)	Probation service (2)	Legal proceedings (3)
Balanced (Staff)	−0.11 (0.12)	−0.13 (0.12)	−0.06 (0.12)
Female-dominated (Staff)	−0.06 (0.12)	−0.09 (0.12)	0.01 (0.12)
Balanced (Co-Producer)	0.09 (0.11)	0.03 (0.11)	0.07 (0.12)
Female-dominated (Co-Producer)	−0.03 (0.11)	−0.08 (0.11)	−0.12 (0.12)
Gender (Female)	−0.01 (0.15)	−0.10 (0.15)	−0.07 (0.16)
Balanced (Staff) × Gender (Female)	0.14 (0.16)	0.23 (0.16)	0.12 (0.17)
Female-dominated (Staff) × Gender (Female)	0.13 (0.16)	0.25 (0.16)	−0.002 (0.17)
Balanced (Co-Producer) × Gender (Female)	−0.08 (0.16)	−0.02 (0.16)	−0.04 (0.17)
Female-dominated (Co-Producer) × Gender (Female)	−0.04 (0.16)	0.01 (0.16)	0.16 (0.17)
Constant	2.59*** (0.11)	2.62*** (0.11)	2.99*** (0.11)
Observations	1510	1510	1510
R^2	.002	.004	.002
Adjusted R^2	−.004	−.002	−.004
Residual Std. Error	1.27 (df = 1500)	1.27 (df = 1500)	1.33 (df = 1500)

Note: Standard errors in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$.

36 experimental groups, each receiving an announcement vignette. The vignettes appeal to the population to participate in the three coproduction activities. The announcements included the same textual and visual treatments used in Study 1. However, to account for additional variation, each treatment factor included six conditions (6 × 6 factorial design). The first condition now serves as a control by omitting textual and visual information. Furthermore, the other conditions apply increments of 25% ranging from 0% female/100% male to 100% female/0% male. Thus, Study 2 accounts for the absence of representation of both treatment factors. Participants indicated willingness to coproduce with three items referring to one of the coproduction activities. The other measurements, including demographics, resembled the ones used in Study 1. Appendix A lists the complete wording for all variables, and supplementary appendix D summarizes the experimental design. The study was preregistered: https://doi.org/10.17605/OSF.IO/3QBVX.
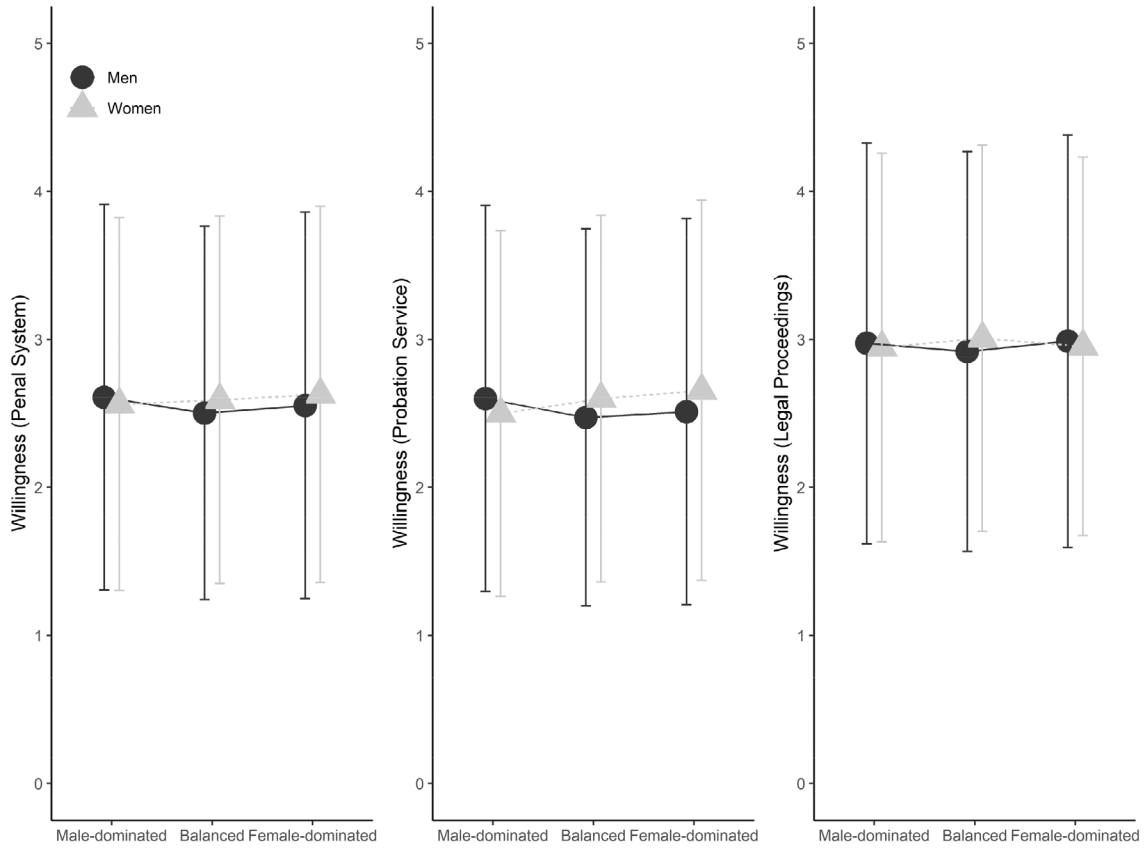
FIGURE 1 Treatment effects symbolic representation (supervising employees) – Study 1.
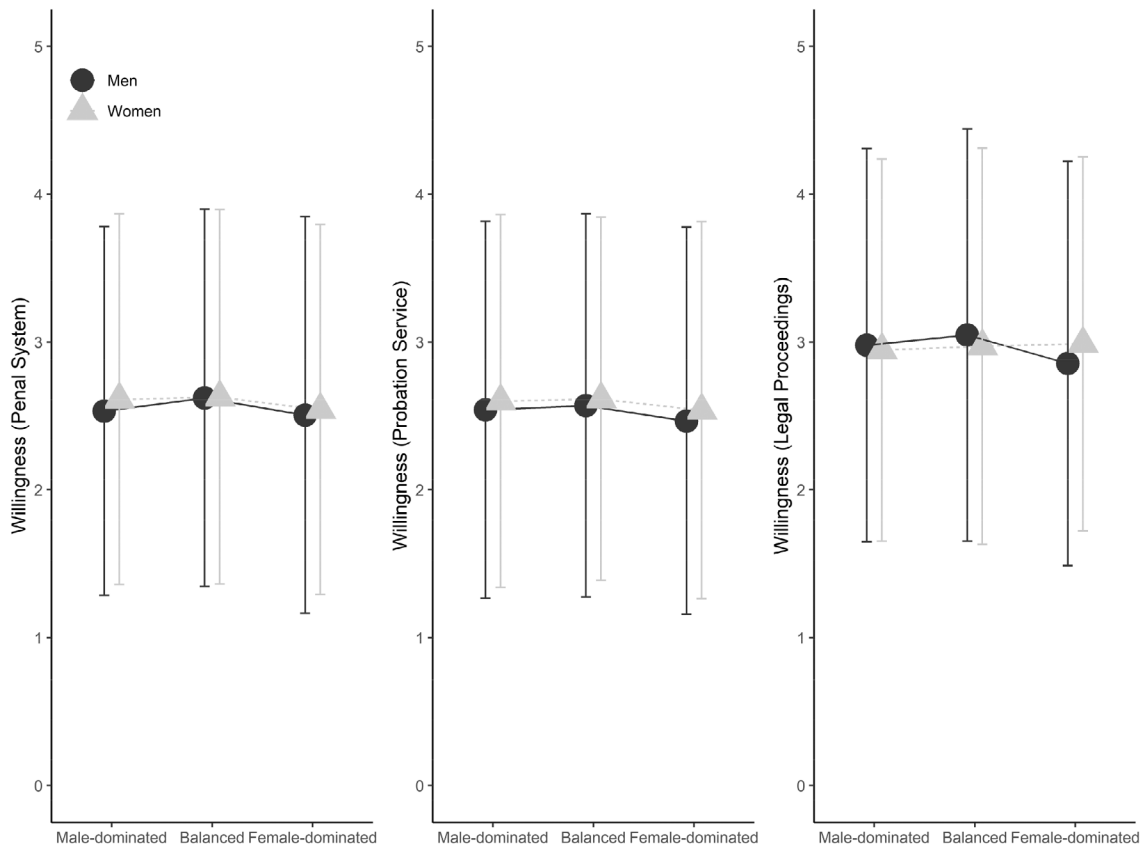

FIGURE 2 Treatment effects symbolic representation (coproducers) – Study 1.

Sample

Study 2 was also conducted with a citizen sample from Germany. The market research company ("respondi") recruited citizens residing in the federated state of the experimental vignettes. The sampling approach and recruitment were the same used for Study 1. The final sample consisted of 1469 participants, fulfilling the preregistered power analysis (α = .05; power = 0.90; analysis of variance, fixed effects, special, main effects, and interactions), with predicted effect sizes of f = 0.15. Table 1 outlines the sample characteristics.

Results

Randomization checks indicate statistical equivalence of the experimental groups. Supplementary appendix I outlines regression models testing the manipulations' effectiveness. The analysis includes the perceived share of women among supervising employees and coproducers as the dependent variable. The regression coefficients indicate that all treatment manipulations worked as intended. First, an increase in female representation positively affects the perceived gender distribution for both treatment factors ("Supervisor" treatment: b = 0.52, SE = 0.02, $p < .001$; "Coproducer" treatment b = 0.66, SE = 0.02, $p < .001$). Second, participants also identified whether information about gender representation was present ("Supervisor" treatment: b = 0.42, SE = 0.03, $p < .001$; "Coproducer" treatment b = 0.32, SE = 0.02, $p < .001$). Hence, participants could identify the representation of female officials, female coproducers, and the information's absence in the control treatments.

The analysis includes the procedures applied in Study 1, complemented by regression models that separate both treatment factors, accounting for the control conditions. Two regression models outline the separate treatment effects for each dependent variable, and one displays a combined analysis.[1] The regression coefficients in Table 4 indicate the absence of treatment effects for most coefficients. Solely, the gender representation of supervising staff negatively affects participants' willingness to provide language support (b = -0.06, SE = 0.03, $p < .05$) in model 9. Again, logistic regression models were calculated using dichotomized dependent variables, outlined in Table 5. The regression coefficients indicate no statistically significant treatment effects. Table 5 also includes OLS regression models applying the treatment/control dummy, comparing whether receiving a control condition without any treatment had a distinct effect. The coefficients indicate that participants' willingness to coproduce in the control conditions was not different.

Table 6 accounts for gendered effects. Models 1–3 include interaction terms, and Figures 3 (supervising employees) and 4 (existing coproducer) visualize the treatments and dependent variables for men and women

TABLE 4 OLS regressions – Study 2.

	Dependent variable: willingness to coproduce								
	Orientation			Support			Language		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female representation (Staff)	−0.01 (0.02)		−0.01 (0.03)	−0.03 (0.03)		−0.03 (0.03)	−0.05 (0.03)		−0.06* (0.03)
Female representation (Coproducer)		−0.04 (0.02)	−0.04 (0.03)		−0.02 (0.03)	−0.02 (0.03)		−0.01 (0.03)	−0.01 (0.03)
Constant	2.80*** (0.06)	2.86*** (0.06)	2.86*** (0.08)	2.80*** (0.06)	2.80*** (0.06)	2.83*** (0.09)	2.89*** (0.06)	2.82*** (0.06)	2.90*** (0.09)
Observations	1231	1230	1024	1231	1230	1024	1231	1230	1024
R^2	.0003	.002	.002	.001	.0004	.001	.003	.0001	.004
Adjusted R^2	−.001	.001	.0000	.0003	−.0004	−.001	.002	−.001	.002
Residual Std. Error	1.21	1.22	1.22	1.25	1.25	1.24	1.27	1.25	1.25
	(df = 1229)	(df = 1228)	(df = 1021)	(df = 1229)	(df = 1228)	(df = 1021)	(df = 1229)	(df = 1228)	(df = 1021)

Note: Standard errors in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 5 Regressions for binary DV & control group – Study 2.

	Dependent variable:					
	Orientation (>3) Logistic (1)	Orientation OLS (2)	Support (>3) Logistic (3)	Support OLS (4)	Language (>3) Logistic (5)	Language OLS (6)
Female representation (Staff)	0.01 (0.01)		0.005 (0.01)		−0.004 (0.01)	
Female representation (Coproducer)	−0.01 (0.01)		0.001 (0.01)		−0.01 (0.01)	
Control group (Staff)		0.09 (0.09)		0.10 (0.09)		0.10 (0.09)
Control group (Coproducer)		−0.03 (0.09)		−0.04 (0.09)		0.07 (0.09)
Constant	0.32*** (0.03)	2.78*** (0.04)	0.34*** (0.03)	2.75*** (0.04)	0.30*** (0.03)	2.78*** (0.04)
Observations	1024	1469	1024	1469	1024	1469
R^2		.001		.001		.001
Adjusted R^2		−.001		−.0003		−.0002
Log likelihood	−668.14		−675.75		−678.28	
Akaike Inf. Crit.	1342.27		1357.49		1362.55	
Residual Std. Error (df = 1466)		1.22		1.25		1.27

Note: Standard errors in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 6 OLS regressions with interactions – Study 2.

	Dependent variable: willingness to coproduce		
	Orientation (1)	Support (2)	Language (3)
Female representation (Staff)	−0.05 (0.04)	−0.09* (0.04)	−0.08* (0.04)
Female representation (Coproducer)	−0.08* (0.04)	−0.03 (0.04)	−0.04 (0.04)
Gender (Female)	−0.24 (0.17)	−0.30 (0.17)	0.01 (0.17)
Female representation (Staff) × Gender (Female)	0.09 (0.05)	0.02 (0.05)	0.06 (0.05)
Female representation (Coproducer) × Gender (Female)	0.08 (0.05)	0.12* (0.06)	0.04 (0.06)
Constant	2.45*** (0.12)	2.51*** (0.12)	2.43*** (0.13)
Observations	1024	1024	1024
R^2	.01	.01	.01
Adjusted R^2	.004	.001	.01
Residual Std. Error	1.21 (df = 1018)	1.24 (df = 1018)	1.25 (df = 1018)

Note: Standard errors in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$.

separately. Although most coefficients remain statistically insignificant, some exceptions require attention. An increased representation of female supervisors reduces the willingness to coproduce in models 2 and 3 ("Support": $b = -0.09$, SE = 0.04, $p < .05$; "Language" $b = -0.08$, SE = 0.04, $p < .05$), while more female coproducers has a negative effect in model 1 ("Orientation" $b = -0.08$, SE = 0.04, $p < .05$). Moreover, model 2 indicates a moderation effect for the coproducer treatment and gender ($b = 0.12$, SE = 0.06, $p < .05$). This coefficient indicates that women react more positively to increased female representation among coproducers than men.

Figure 4 and the additional TOST analyses (supplementary appendix) merit attention to assess how the individual treatment factors affected participants' willingness to participate. Indeed, women seem to react positively to a balanced representation of existing coproducers. Compared to all other treatment factors, willingness to coproduce was highest when women encountered the vignette, with 50% men and 50% women in the coproducer group. The TOST results confirm this impression, indicating that this treatment factor resulted in a significantly higher willingness to coproduce compared to the lower and higher representation treatments (supplementary appendix L). Still, the observed differences are comparatively small and limited to the balanced coproducer treatment.
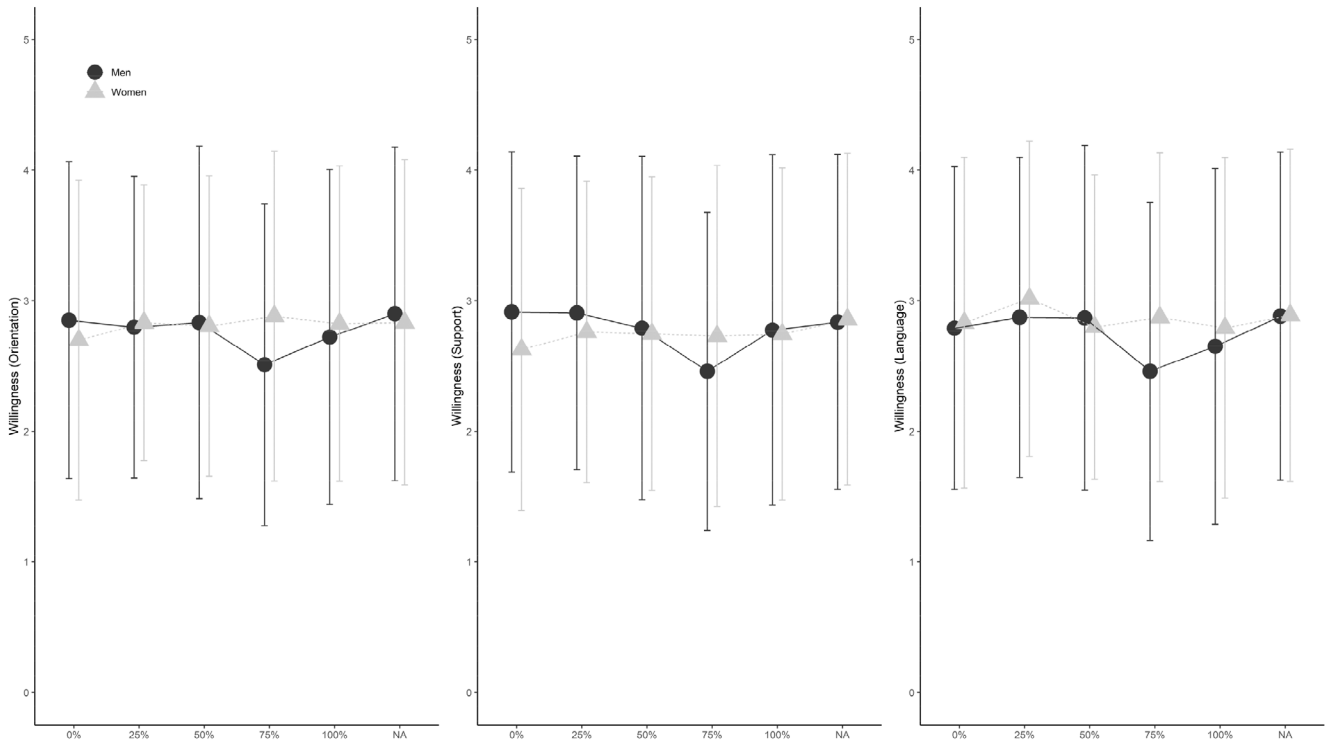
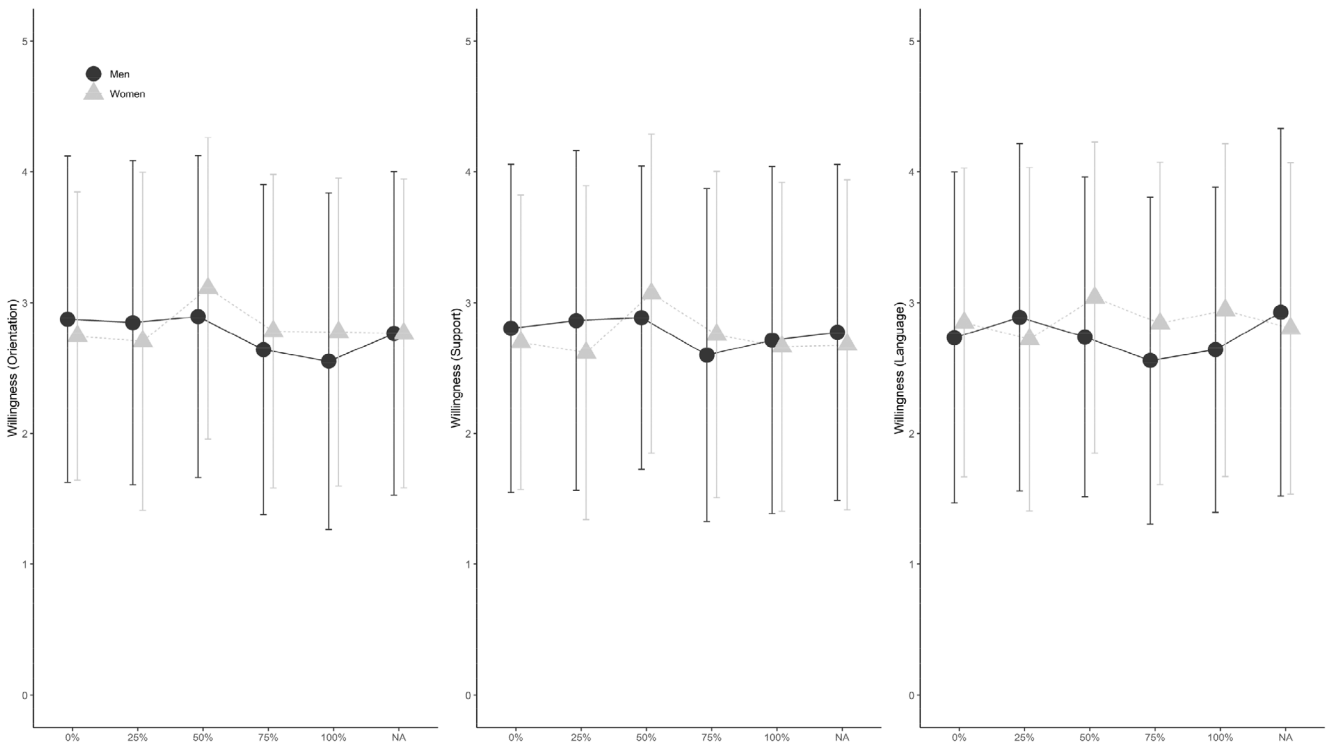**FIGURE 3** Treatment effects symbolic representation (supervising employees) – Study 2.

FIGURE 4 Treatment effects symbolic representation (coproducers) – Study 2.

DISCUSSION

This article focuses on the relevance of uncertainty (Sievert, 2021) and complements symbolic representation with signaling theory. The design applies representation signals aiming to reduce citizens' uncertainty regarding coproduction. The theoretical framework suggests that displaying specific reference groups as more or less representative should affect women's willingness to coproduce. This expectation builds on signaling theory, suggesting the need to reduce information asymmetries in citizen-state interactions. The study shifts the focus from abstract representativeness (Riccucci et al., 2016; van Ryzin et al., 2017) to that of tangible groups present in the coproduction setting. The empirical studies provide fine-grained results indicating a limited impact of symbolic representation. Although women were aware of the symbolic representation signals, only a balanced representation of pre-existing coproducers had a minimal effect on their willingness to coproduce. Overall, the results indicate that increasing the representation of both reference groups did not exhibit a linear and consistent impact on willingness to coproduce. The findings emphasize that the premise of symbolic representation might be overstated in the coproduction domain.

The findings require further discussion. While providing some interesting results about the relevance of reference group signals, the principal results contradict a central claim of representative bureaucracy literature, namely that increasing passive representation may generally invoke positive outcomes in citizen-state interactions through citizens' behavior (Bishu & Kennedy, 2020; Riccucci & van Ryzin, 2017). The results indicate that most representation signals did not directly impact citizens' behavioral intentions in the coproduction domain. The lack of empirical support for this theoretical proposition indicates the need to refine the theoretical arguments. Although recent studies propose the uncertainty related to coproduction situations (Sievert, 2021), the present findings do not unequivocally support this claim either. The applied manipulations were explicitly targeted to reduce uncertainty, a presumably successful endeavor as evidenced by the analysis of the manipulation checks. Apparently, symbolic representation can reduce uncertainty only to a limited extent. The findings indicate that the representation of public officials (i.e., the supervisors) did not affect willingness to coproduce. Only the representation of coproducers exhibits some treatment effects, but these are limited to balanced representation. This effect indicates that not all representation signals will succeed, suggesting practitioners should foster balanced coproduction participation.

These findings offer distinct theoretical implications. Given that coproduction entails varying levels of uncertainty for citizens (Sievert, 2021), symbolic representation has limited relevance for reducing information asymmetries owing to their complexity (Connelly et al., 2011).

Citizens may experience various aspects of information asymmetries when encountering a coproduction initiative. Interactions with supervisors or other coproducers may constitute one information asymmetry. However, citizens seem to encounter more important uncertainties unrelated to the organization's representativeness. This includes varying degrees of pre-existing knowledge (Zhang et al., 2020), the occurrence of potential psychological costs (Thomsen et al., 2020), or anticipated benefits and need-fulfillment (Uzochukwu & Thomas, 2018). In the literature applying signaling theory, primarily recruitment, scholars suggest that potential applicants search for signals relevant to their assessment of fit (de Cooman & Pepermans, 2012; Sievert et al., 2022). Although coproduction may not qualify for exactly these arguments, it seems likely that citizens will differ in which signals they seek. Instead of incorporating only symbolic representation signals, reducing information asymmetries in coproduction likely requires approaches building on the causes of different uncertainties. Information asymmetries exist regarding, among others, the behavior of bureaucrats, the required effort for coproduction, or outcomes and benefits (Headley et al., 2021). To foster coproduction, public organizations should account for these uncertainties by sending signals related to the respective cause of uncertainties. Research on signaling theory provides valuable insights fostering this approach, suggesting that multiple signals affect individuals' attention (Drover et al., 2018). For instance, indicating which behavior citizens can expect from a civil servant will likely benefit public encounters (Headley et al., 2021). However, this signal competes with other information (Drover et al., 2018).

Symbolic representation may produce meaningful effects in specific settings, but these do not generalize to coproduction more broadly. These insights become clear considering the research design by Riccucci et al. (2016), the only study confirming an influence on coproduction intentions. The survey experiment applied recycling as a coproduction context. The activities occur in the domestic environment and include unsupervised procedures. Furthermore, the benefits for the individual are comparatively tangible, and psychological costs are low. Uncertainty is extremely low in this setting, and citizens likely do not face any pressing questions or even information asymmetries. Thus, the organization's representativeness can be interpreted as a viable signal indicating whether the organization is legitimate. Signaling theory helps to understand this aspect. If citizens have no informational need crucial to their decision (e.g., costs of specific behavior) and no competing signals are present (Drover et al., 2018), they may be more prone to turning to available signals entailing a more symbolic character (Carpentier et al., 2019). Furthermore, the results support the proposition that symbolic representation has limited relevance in public encounters without tangible outcomes (Headley et al., 2021). Women seem to favor a balanced representation of coproducers but remain unaffected by the

representativeness of supervisors. Thus, other aspects related to this reference group may be relevant. Previous research suggests that positive or equitable treatments are key for symbolic representation. This argument focuses on the type of public encounter and suggests identifying bureaucrats' behavior in response to or toward citizens (Headley et al., 2021; Theobald & Haider-Markel, 2009). Indeed, contexts that exhibit unjust behaviors are less likely to profit from salient representation. In that sense, symbolic representation might often fail to evoke a meaningful information signal. In coproduction settings, citizens often do not have information about the systematic behavior of public employees. Hence, neither positive nor negative feedback cycles are likely. Citizens remain unresponsive because the representativeness of supervisors does not reveal past behavior within interactions. Coproduction contexts deviate from classical public encounters because they are less transparent. Thus, the bureaucratic behavior for most coproduction procedures (especially those characterized as highly uncertain) remains unknown to citizens. For instance, supervisors' behavior in legal proceedings and refugee integration is barely disclosed. Overall, these arguments suggest that symbolic representation, regardless of its explicit manifestation, plays a minor role in coproduction.

LIMITATIONS AND RESEARCH AGENDA

While survey experiments help ensure internal validity, they lack external validity. This study applies two specific settings; thus, the empirical findings might not be generalizable. The contexts are also limited regarding their relevance for representative bureaucracy theory in general. Coproduction initiatives constitute a specific sub-type of citizen-state interactions, and several studies could not confirm symbolic effects for these settings. Thus, future research should focus on other public encounters. For instance, additional studies could examine citizen participation processes or counseling services, including more tangible benefits. Similarly, the national context of this study was limited to Germany. The relevance of gender representation may vary based on various country-level factors. Even though Germany and the United States share similar gender-related attitudes (Sievert, 2021), research on symbolic representation would benefit from comparative studies (An et al., 2022).

Second, the vignette experiments are limited regarding the general information provided to participants (e.g., about coproduction and coproduction activities in general) and the manipulated constructs. For instance, an announcement about coproduction activities does not ensure that participants develop an extensive comprehension of the contexts. Moreover, the announcements explicate the groups' gender distributions as a percentage instead of presenting the group itself. This approach deviates from the previous experimental studies attempting to manipulate symbolic representation (e.g., Riccucci

et al., 2016). While the manipulation worked as intended, this approach may not actually change individual attitudes. Furthermore, the survey experiments manipulated only gender categories. This approach is limited, and other social and demographic categories require attention. Further studies should manipulate other dimensions of representation, such as ethnicity (van Ryzin, 2021), social class (Harrits, 2019), or religion (Choi, 2019). Moreover, the research designs resemble those used in previous studies. Consequently, the survey experiments exhibit the same strengths and weaknesses as most prior studies. Hence, future research should broaden the methodological approaches to ensure a more holistic understanding of the proposed theoretical mechanism (Riccucci & van Ryzin, 2017). For instance, additional research should apply longitudinal designs such as diary intervention studies (Ohly et al., 2010) or apply mixed-methods designs (Hendren et al., 2023). They would allow examining how symbolic representation signals affect attitudes and behavior in the short and long run.

Third, the experimental approaches require artificial settings deviating from real citizen-state interactions. Although this simplification is justified in examining causal effects (Mullinix et al., 2015), the ecological validity is limited. Moreover, representative bureaucracy theory refers to identities and lived experiences that shape citizen-state interactions (Merritt et al., 2020). An experiment design does not allow inferences about the construction of individual meaning and, thus, prevents capturing the deeper meaning of such concepts. To account for the limitations of survey experiments, future studies should apply qualitative research approaches, allowing participants to share their in-depth experiences of citizen-state interactions (Headley et al., 2021). Based on the necessary simplifications, the experiments were also limited in manipulating reference groups in both settings. Both designs varied the gender composition solely of supervisors and coproducers. However, beneficiaries of the coproduction activities (i.e., prisoners and refugees) may also be relevant. Thus, especially in coproduction settings, future research should also account for the representativeness of beneficiaries.

CONCLUSION

The results and discussion indicate that the proposed effects of symbolic gender representation are limited. Symbolic representation of supervising staff does not reduce central information asymmetries and, thus, does not affect willingness to coproduce. Although the balanced representation of coproducers exhibits treatment effect, other gender distributions did not. The main reason may be that coproduction marks a sub-type of citizen-state interaction with specific characteristics. Citizens are generally unaware of outcomes, benefits, and bureaucrats' prior behavior. Thus, citizens can only make limited inferences about the implications of symbolic representation.

Consequently, they often will not include these signals in contemplations regarding coproduction initiatives. Contrary to the theoretical propositions, symbolic representation does not constitute a promising mechanism to improve participation in coproduction. Instead, citizens seem to interpret such information as "window-dressing." Thus, practitioners should not overstate the effects of symbolic representation.

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CONFLICT OF INTEREST STATEMENT

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ENDNOTE

[1] Missing values in the treatment dummies occur for participants in the control groups. Thus, these participants cannot be included in the regression analysis. Assigning them a value without any treatment intervention would undermine the analytical rigor. Instead, an additional dummy was created to account for whether participants were assigned to a control condition for a given treatment factor.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

APPENDIX A: MEASURES

Variable	Study	Operationalization (5-point Likert scales if not stated differently)
Willingness to coproduce	Study 1	Having read this information, I would be willing to participate…: • … in the penal system. • … in the probation service. • … in legal proceedings.
Willingness to coproduce	Study 2	Having read this information, I would be willing to coproduce by…: • … helping refugees with the initial orientation. • … helping refugees to navigate bureaucratic procedures. • … helping refugees to learn the new language.
Manipulation check	Both	How many of the coproducers in the initiative were women? (Selection from percentage categories, ranging from 0% to 100% with iterations of 10%) • No information was displayed (only Study 2) How many of the supervising staff members in the initiative were women? (Selection from percentage categories, ranging from 0% to 100% with iterations of 10%) • No information was displayed (only Study 2)
Attention check	Both	Which program was displayed in the announcement? • Professional training in infrastructure provision • Coproduction in the judicial system (Study 1) • Coproduction related to refugee integration (Study 2) • Environment-related petition
Age	Both	How old are you? (Numerical Input)
Gender	Both	Please indicate your gender. (2, = Diverse; 1 = Female; 0 = Male)
Educational level	Both	What is the highest degree or level of school you have completed? • School attendance up to 7 years. • Secondary modern school qualification. • High school diploma. • Entrance qualification for a technical college. • General qualification for university.
Employment	Both	Which of the following groups do you belong to? • Employed in a private organization. • Employed in a nonprofit organization. • Employed in a public organization. • Unemployed. • Self-Employed (Study 2)
Public service motivation (Study 1: $\alpha = .89$) (Study 2: $\alpha = .88$)	Both	• I am very motivated to contribute to society. • I find it very motivating to be able to contribute to society. • Making a difference in society, no matter how small, is very important to me. • Defending the public interest is very important to me.
Political orientation	Both	In politics, people sometimes talk about "left" and "right." Where would you place yourself on a scale from 0 to 10? (0 = extreme left; 10 = extreme right)

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