

## RESEARCH ARTICLE

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# Direct and imagined contact moderates the effect of need for cognitive closure on attitudes towards women managers

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## Abstract

This research investigated the relationship between individual preference for the need for cognitive closure (NCC) and attitudes towards women as managers and the moderating role of direct or imagined contact with women leaders. In two studies (total  $N = 369$ ) collected in different countries and with different methods (Study 1: Italy, correlational; Study 2: U.S., experimental), it was found that the positive relationship between NCC and *negative* attitudes towards women as managers was moderated by the quality, but not the quantity of current or past direct contact experiences with women managers. In Study 1, employees with higher scores on NCC had more positive attitudes towards women managers when they had more positive work experience with women managers. In Study 2, those with higher NCC scores had less negative attitudes towards women as managers when they merely imagined (positive) contact with them (vs. a control group). These results advance the literature on the interaction between NCC and positive intergroup contact; theoretical and practical implications of NCC and positive intergroup contact are presented.

## KEYWORDS

attitudes, intergroup contact theory, need for cognitive closure, women as managers

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## 1 | INTRODUCTION

There is little doubt in the literature that women can face backlash when they hold leadership positions, particularly in fields that are stereotypically dominated by men. They generally have problems in the hiring process (Rudman & Glick, 2001) and when it comes time to be evaluated (Eagly & Karau, 2002; Fiske et al., 1999), among other areas, and especially when they seek or hold leadership positions (Rudman et al., 2012). Women in these situations often face clear harm from stereotypes (e.g., Eagly & Karau, 2002), which are not just harmful beliefs but are also societal organizational principles that benefit some at the expense of others (Ridgeway & Correll, 2004)—in this case, women in the workplace are harmed in ways that benefit their men colleagues. Given the several implications of negative attitudes towards women as managers at the individual (von Hippel, Sekaquaptewa, & McFarlane, 2015) and organizational levels (Lyness & Heilman, 2006), it is important to investigate their potential antecedents as well as potential interventions. Accordingly, and in line with a general perspective on the person-based nature of prejudice (for comprehensive reviews see Dhont, Roets, & Van Hiel, 2011; Turner, Hodson, & Dhont, 2020), the present research, articulated in two studies, aimed to investigate the potential prejudice-reducing role of contact (actual or imagined) with women leaders in individuals characterized by a need for cognitive closure (NCC), or the desire for stable and certain knowledge (e.g., Kruglanski, 2004).

As Allport (1954) observed in his seminal work on prejudice-prone people, 'a person's prejudice is unlikely to be merely a specific attitude towards a specific group; it is more likely to be a reflection of his whole habit of thinking about the world' (p. 175). Thus expressions of prejudice are characteristic of how people think generally and can be understood in terms of generally motivated cognition (Dhont et al., 2011; Roets & Van Hiel, 2011). In line with this perspective, there are reasons to believe that NCC, an epistemic motivation closely associated with Allport's ideas of the prejudiced-prone cognitive style (see Dhont et al., 2011; Roets & Van Hiel, 2011), is related to the negative attitudes towards women as managers.

Furthermore, in line with the perspective that contact can be more effective for those higher on prejudice-prone individual-difference variables (for recent reviews see, Hodson, 2011; Turner et al., 2020), it also seems reasonable to suppose that individuals characterized by an NCC benefit more from experiencing positive contact—actual or imagined—with women leaders. In the sections that follow, the NCC, attitudes towards women managers, and Allport's (1954) intergroup contact theory are presented. We will then present the results of two studies, with data collected in Italy and the United States, which show that the expected negative effect of NCC on attitudes towards women managers can be reversed in conditions of high-quality contact.

## 2 | THE NCC AND THE EPISTEMIC VALUE OF STEREOTYPES

The NCC can be thought of as the desire for stable and certain knowledge (Kruglanski, 2004); individuals characterized by an NCC have the desire to arrive at solutions that promise stability and certainty (i.e., the urgency, or seizing, phase) and then to hold on to this knowledge even if better answers are available (i.e., the permanence, or freezing, phase). A key point is that individuals characterized by an NCC are attracted to sources of knowledge that promise stability and certainty, whatever their content. As Roets and Van Hiel (2011) have noted, these features are similar to the focus on finding, and preserving, definitive answers in Allport's (1954) prejudiced personality (see Roets & Van Hiel, 2011, Table 1 for further similarities). Furthermore, both the prejudiced personality and the NCC can be reflected in a state of closed-mindedness: once a piece of knowledge (e.g., about different social groups) is accepted, it is less likely to be subsequently questioned, as long as it can promise stability and certainty.

Accordingly, the NCC has been associated with an acceptance of outgroup stereotypes since the earliest research on the construct (Kruglanski & Freund, 1983)—a finding which has been supported in subsequent research (e.g., Baldner, Jaume, Pierro, & Kruglanski, 2019). Although there is nothing in the NCC that is specifically related to any form of stereotype content, stereotypes nonetheless present very strong epistemic properties, in that they

TABLE 1 Descriptive statistics and bivariate correlations (Study 1)

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	—	—	—										
2. Age	34.35	10.36	-.01	—									
3. Education	—	—	-.13	-.19**	—								
4. Job tenure	10.63	9.73	-.01	.84***	-.37***	—							
5. Political orientation	4.86	2.06	-.04	-.22**	.01	-.22***	—						
6. 'Never late' <sup>a</sup>	3.62	1.78	.18**	.18**	-.17*	.17*	-.18*	—					
7. 'Never hurt' <sup>a</sup>	2.92	1.51	.01	.18*	-.001	.11	-.05	.37***	—				
8. Quantity of contact	3.99	1.70	.09	-.14	.22**	-.19**	.02	-.02	.02	—			
9. Quality of contact	4.53	1.54	.19**	.11	.11	.10	-.05	.06	.03	.33***	—		
10. Need for closure	3.56	0.71	.06	.12	-.25***	.12	.09	.18**	.26***	-.10	-.15*	(.76)	
11. WAM	2.52	0.84	-.43***	.02	-.08	.01	.24***	-.12†	.04	-.07	-.34***	.24***	(.87)

Note: In bracket (Cronbach's alpha), N = 197; gender (0 male; 1 female).  
<sup>a</sup>The items from the social desirability measure.

\*\*\*p ≤ .001.  
\*\*p ≤ .01.  
\*p ≤ .05.  
†p ≤ .10.

represent perceived knowledge that applies to large groups of people that are difficult to quickly change. Beyond their epistemic properties, stereotypes are often ubiquitous in that individuals in a given time and place are aware of the content of stereotypes, even if they do not accept them. This research includes support for the NCC effect on stereotype-based discrimination towards women (Baldner & Pierro, 2019a, 2019b; Roets, Van Hiel, & Dhont, 2012). For instance, if I can be characterized by an NCC and would like to know if a woman manager will be good at her job, I can quickly accept stereotypes that women do not have the characteristics that are ideal for leadership roles (Eagly & Karau, 2002; Hoyt & Burnette, 2013). Holding, and preserving, this invalid information is very harmful to women, however, the foci of the NCC are the certainty that knowledge can provide and its duration, not its validity.

Given the findings of the NCC literature, it could seem very unlikely that it could also support women in leadership roles. However, this is a plausibility given the aforementioned point that NCC represents a desire for stable and certain knowledge, whatever its content. Effectively, positive contact with outgroups could replace negative knowledge derived from stereotypes with positive knowledge derived from their contact. Consequently, individuals who are characterized by an NCC could actually benefit from positive knowledge about women managers insofar as it is perceived to be stable and certain. Although there are many ways to promote this knowledge, in this work we will investigate the role of Allport's (1954) intergroup contact theory. This choice lies in the relevance of contact for prejudice reduction, also in the case of discrimination towards women (Pettigrew & Tropp, 2006), as well as in research showing that contact interacts with individual difference variables like NCC in predicting prejudice (Turner et al., 2020). In the following sections, we will summarize the relevant findings from this theory, the previous research on the interplay between NCC and intergroup contact, as well as how our research can advance this literature.

### 3 | THE EFFECT OF POSITIVE INTERGROUP CONTACT ON PREJUDICE REDUCTION

Allport (1954) made two contrasting conclusions about prejudice reduction: that intergroup contact can reduce prejudice but that prejudiced individuals would reject information that presented marginalized outgroups in a positive light. Both of these conclusions have been investigated, and we will discuss both of these points in turn. First, the foundation of Allport (1954)'s intergroup contact theory is that intergroup prejudice can be reduced by positive intergroup contact, for instance by reducing threat and anxiety and by increasing empathy (Hodson, 2011). Allport (1954) posited that intergroup contact would work given certain optimal conditions—when groups have equal status and goals in common, intergroup cooperation, and external support—and accordingly, this contact should occur within structured programs. These conditions represent major limitations: many groups do not have equal status and many people will not have the opportunity to join structured programs, which could also be very time-consuming. Fortunately, intergroup contact can reduce prejudice even without these conditions (Pettigrew & Tropp, 2006), and the quality of contact can be more important than the extent, or quantity, of contact (Barlow et al., 2012; Bhatnagar & Swamy, 1995; Vezzali & Stathi, 2021). Even so, many people might not have the opportunity, or simply the desire, to make direct contact with people from different social groups. However, recent research has found meaningful effects for other types of contact—for instance, extended contact (i.e., knowing someone who has contact with an outgroup; Wright, Aron, & McLaughlin-Volpe, 1997) and imagined contact (i.e., simply imagining having contact with an outgroup; Crisp & Turner, 2009, 2012). Thus, the various forms of intergroup contact could be a very cost- and time-efficient mode to reduce prejudice. Indeed, previous research has found that various types of contact with women leaders can reduce prejudice towards them (e.g., Bhatnagar & Swamy, 1995; Duehr & Bono, 2006; Stoker, Van der Velde, & Lammers, 2012).

Second, Allport (1954) claimed that prejudiced individuals, or those for whom prejudice is a stable character trait, would reject positive information towards marginalized outgroups. This point, however, has not been supported by recent research. Instead, Dhont et al. (2011) argued that individuals who are characterized by an NCC should benefit

from intergroup contact; the ‘new’ knowledge provided by intergroup contact could also create stable and certain knowledge. In support of this hypothesis, Dhont et al. (2011) found that NCC was associated with less ethnic prejudice when participants had either direct or extended contact—operationalized as the average between quality and quantity of contact—with these groups (see also Hodson, 2011; Turner et al., 2020), as this can reduce intergroup anxiety. Although the NCC and intergroup contact have each continued to receive attention from researchers, we do not know of any research that has continued the line on the interactive effects between these constructs—for instance, by extending this to different social groups or to investigate different types of contact. We will continue this research by studying (a) if the  $NCC \times$  Intergroup Contact effect generalizes to prejudice towards women leaders and if (b) we can retain these effects with purely imagined contact.

## 4 | THE PRESENT RESEARCH: NOVELTY AND HYPOTHESES

Although the current work shares similarities with that of Dhont et al. (2011), we have additionally investigated features that were not present in the former work. First, we separated quality from quantity of contact whereas their measures of contact combined these two types. As quality may be more important than quantity of contact (Barlow et al., 2012; Bhatnagar & Swamy, 1995; Brown & Hewstone, 2005; Davies, Tropp, Aron, Pettigrew, & Wright, 2011), it is critical to assess the interplay between NCC and these two types of contact. Second, Dhont et al. (2011) studied the interplay of NCC and contact with racism, it is also important to study these potential effects on other forms of prejudice—in our case, women managers. Third, Dhont et al. (2011) studied the effects of actual contact and extended contact (i.e., knowing others who have had contact) whereas we assessed the effects of actual as well as purely imagined contact. The latter is important as some individuals may have neither actual nor extended contact with various outgroups. Fourth, Dhont et al. (2011) assessed contact as the independent variable and NCC as the moderating variable whereas we switched the role of the variables. Although statistically, these approaches are equivalent, using NCC as the independent variable is also consistent with the argument that NCC is directly associated with stereotypes, which represent sources of a relatively stable and certain knowledge (e.g., Baldner & Pierro, 2019a, 2019b). Furthermore, in both studies, we also analysed this relationship with NCC as the moderator and contact as the independent variable.

The present research, articulated in two studies (total  $N = 369$ ) collected in both Italy (Study 1,  $N = 197$ ) and the United States (Study 2,  $N = 172$ ), aimed to investigate (a) the relationship between individual preference for the NCC and attitudes towards women as managers, and (b) the potential prejudice-reducing role of actual (Study 1) or imagined contact (Study 2) with women leaders.

Accordingly, and in line with a general perspective on the person-based nature of prejudice (Dhont et al., 2011), with previous studies supporting the NCC effect on stereotype-based discrimination towards women (Baldner & Pierro, 2019a, 2019b; Roets et al., 2012), and with previous research on the relative importance of quality of contact (Barlow et al., 2012; Bhatnagar & Swamy, 1995; Brown & Hewstone, 2005; Davies et al., 2011), we propose the following hypotheses:

**Hypothesis 1.** *Individuals with high (vs. low) NCC should have more negative attitudes towards women as managers.*

**Hypothesis 2.** *Individuals would have more positive (or less negative) attitudes towards women as managers when they experienced positive direct or imagined interactions with female managers.*

Finally, in line with the perspective that contact can be more effective for those higher on prejudice-prone individual-difference variables (Hodson, 2011) and with previous studies supporting the prejudice reduction function of contact in participants characterized by high NCC (Dhont et al., 2011), we formulated the following hypothesis:

**Hypothesis 3.** *The negative effect of NCC on attitudes towards women managers will be stronger when individuals have experienced (or imagined) positive (vs. poor) interactions with women managers.*

The studies conducted, the results obtained and the conclusions deriving from them are presented in what follows. All data can be found at [https://osf.io/vbc67/?view\\_only=2624a5b8a12f49869e953a9d0f3720b6](https://osf.io/vbc67/?view_only=2624a5b8a12f49869e953a9d0f3720b6) (anonymized link for peer review).

## 5 | STUDY 1: NCC AND DIRECT CONTACT AMONG EMPLOYEES

In order to investigate whether the NCC  $\times$  Intergroup Contact effect generalizes to prejudice towards women leaders, we recruited employees and surveyed them on their NCC and work-related interactions with women managers. The latter construct consisted of two dimensions: the quantity and quality of these interactions, both of which were entered as moderators. We included age, gender, educational level, political orientation, job tenure, and social desirability as control variables.

### 5.1 | Method

#### 5.1.1 | Procedure and participants

We collected a convenience sample of 197 employees (97 men and 100 women) from different public and private Italian organizations operating in the industrial and service (tourism, education, and transport) sectors. The questionnaires administered to participants were sent via email and included an introductory letter in which the purpose of the study was explained. Anonymity was guaranteed for all participants and their informed consent to participate in this research was appropriately obtained. Participants' mean age was 34.35 years ( $SD = 10.36$ ) and their mean job tenure was 10.63 years ( $SD = 9.72$ ). A plurality of participants (47.2%) had a high school education, 10.2% had a middle school education, and 42.6% had a college degree.

#### 5.1.2 | Measures

##### *Need for cognitive closure*

Participants responded to the Italian version of the Revised Need for Closure Scale (Pierro & Kruglanski, 2005). This scale constitutes a brief 14-item self-report instrument designed to assess stable individual differences in the NCC (e.g., 'Any solution to a problem is better than remaining in a state of uncertainty'). Participants responded to these items on six-point Likert scales ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*). A composite NCC score was computed by summing across responses to each item. Previous studies (Pierro & Kruglanski, 2005) have demonstrated satisfactory reliability ( $\alpha = .80$  in a US sample, and  $\alpha = .79$  in an Italian sample). In the present sample, reliability was adequate ( $\alpha = .76$ ).

Attitudes towards women as managers. Attitudes towards women in the role of a manager were measured with the Italian translation (with back translation) of the Women As Managers Scale (WAMS) developed by Peters, Terborg, and Taynor (1974). This scale consists of 21 items explaining the general (non)acceptance of women as managers and reflecting different stereotypes of women holding managerial positions (e.g., 'It is not acceptable that women assume leadership roles as often as men'; 'The possibility of pregnancy does not make women less desirable managers than men'-reversed item; 'Women are not ambitious enough to be successful in the business world'). Respondents were asked to indicate the extent to which they agreed with each statement on a seven-point Likert

scale, ranging from 1 (*Strong disagreement*) to 7 (*Strong agreement*). Although the scale's items represent different dimensions (i.e., general acceptance of women as managers, barriers to full-time permanent employment for women, personality traits usually ascribed to managers, Beere, 1990), support for the one-dimensionality of the scale is presented in different studies (see among others, Terborg, Peters, Ilgen, & Smith, 1977; Bhatnagar & Swamy, 1995). Therefore, following Terborg et al. (1977), we also considered WAMS as a one-dimensional scale. After reversing the positively worded items ratings were summed across items to create an overall score for attitudes towards women managers ( $\alpha = .87$ ). High scores indicated negative attitudes towards women managers.

#### *Direct contact with women managers*

Work-related Interaction with women managers was measured in terms of both the quantity of interaction and the quality (i.e., satisfaction) of the work experience (Bhatnagar & Swamy, 1995). The quantity of the contact was measured with two items on the frequency of (a) the current work-related interactions with women managers and their current employment and (b) the totality of their work-related interactions with women managers. Respondents used a seven-point Likert scale, ranging from 1 (*Never*) to 7 (*Always*). The two items were highly related between them ( $r = .83$ ;  $p < .001$ ) and thus created a unique index of the quantity of interaction. The quality of the work experience with the women managers was measured with a single item asking participants to indicate the extent to which their work experiences with women managers were perceived as satisfying (Aycan, Bayazit, Berkman, & Boratav, 2012; Bhatnagar & Swamy, 1995). Respondents used a seven-point Likert scale, ranging from 1 (*Extremely unsatisfactory*) to 7 (*Extremely satisfactory*).

#### *Control variables*

Gender (coded 0 = male; 1 = female), age, educational level, job tenure, political orientation, and social desirability were included as control variables. Participants were asked to indicate their political orientation, using a nine-point Likert scale from 1 (*Very left-wing*) to 9 (*Very right-wing*). The overall political orientation of this sample was  $M = 4.86$  ( $SD = 2.06$ ). Participants also answered two items ('I never been late for work or for an appointment' and 'I have never hurt another person's feelings') on six-point Likert scales ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*) that assessed social desirability (Crowne & Marlowe, 1964). The two items were only moderately related ( $r = .37$ ;  $p < .001$ ); given the correlation, we entered both as measures of social desirability.

## 5.2 | Results

Descriptive statistics and correlations between variables are presented in Table 1. NCC was positively and significantly related to the (negative) attitudes towards women as managers. The (negative) attitudes towards women as managers were negatively and significantly related to the quality (i.e., satisfaction) of direct contact with the women managers but were not related to the quantity of the work interactions. The (negative) attitudes towards women as managers were significantly related to gender (negatively) and to the political orientation (positively), such that men and right-wing participants had more negative attitudes towards women managers.

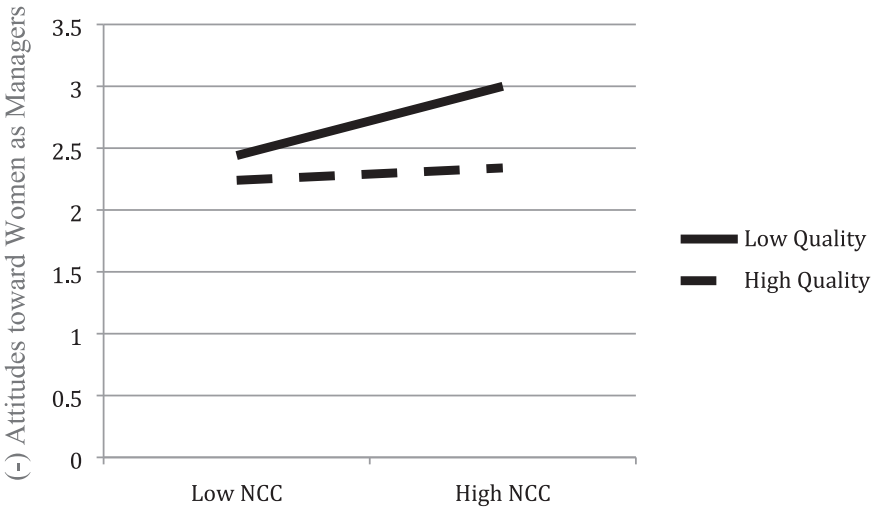
Predictions regarding the effects of the NCC and the two dimensions of work-related interaction with women managers were further tested by means of a moderated multiple regression analysis. Specifically, in this analysis, we regressed attitudes towards women as managers on the main effect of the NCC, the quantity of interaction, and the quality of interaction with female managers, and on the two two-way interactions between NCC and each of the work-related interaction dimensions (i.e.,  $NCC \times$  quality of interaction;  $NCC \times$  quantity of interaction). NCC and the two work-related interaction dimensions scores were mean-centered and the interaction terms were based on these centered scores. Participants' gender, age, education, job tenure, social desirability, and political orientation were entered as control variables. The analysis was performed using PROCESS macro (Hayes, 2018), model 2. Ninety-five percent CIs were employed and 5,000 bootstrapping re-samples were run.

The results of this analysis are summarized in Table 2. As can be seen, the regression yielded a significant and positive main effect of NCC on (negative) attitudes towards women as managers. Moreover, the quality of interaction with women managers revealed a significant main effect on negative attitudes towards women as managers; the main effect of quantity of interaction was not significant. Only the interaction effect between NCC and quality of interaction with female managers was significant and negative. When we decomposed the simple slopes, we observed a significant NCC effect among participants with low (i.e., 1 SD below the mean) quality interactions ( $b = .39$ ,  $SE = 0.11$ , 95% CI [0.17, 0.60],  $p < .001$ ) but not among participants with high (i.e., 1 SD above the mean) quality interactions ( $b = .07$ ,  $SE = 0.10$ , 95% CI [−0.13, 0.28],  $p = .37$ ). Results are displayed in Figure 1. These patterns suggest that individuals with high NCC and who experienced *poor* interactions with women managers also had

**TABLE 2** Attitude towards women managers regressed on need for cognitive closure (NCC) and work-related interactions (Study 1)

	<i>b</i>	<i>SE</i>	95% CI		<i>p</i>
			LL	UL	
Gender	−.663	0.103	−0.866	−0.460	<.001
Age	.009	0.009	−0.008	0.027	.281
Political orientation	.074	0.025	0.025	0.124	.003
Education	−.098	0.089	−0.273	0.077	.271
Job tenure	−.004	0.010	−0.024	0.015	.664
‘Never late’	−.042	0.031	−0.105	0.019	.179
‘Never hurt’	.023	0.036	−0.049	0.095	.529
NCC	.232	0.076	0.082	0.382	.002
Quality of interactions	−.140	0.035	−0.211	−0.069	<.001
Quantity of interactions	.046	0.032	−0.017	0.109	.156
NCC × quality	−.103	0.049	−0.199	−0.006	.036
NCC × quantity	.016	0.044	−0.071	0.104	.717

Note: Gender (0 male; 1 female).



**FIGURE 1** Attitudes towards women managers as a function of subordinates' need for cognitive closure (NCC) and quality of interaction with female leaders (Study 1)



more negative attitudes towards women as managers; instead, individuals with high NCC and who experienced good interactions with women managers also had *less* negative attitudes towards women as managers.

To further probe the nature of this interaction consistent with Dhont et al.'s (2011) analysis, we conducted additional analyses aimed at verifying the conditioned effects of quality of work interaction on attitudes towards women as managers across NCC (1 SD below and above the mean). Results indicated that quality of work interaction was negatively and significantly related to negative attitudes towards women as managers only at high levels of NCC ( $b = -.19$ ,  $SE = 0.04$ , 95% CI  $[-0.28, -0.09]$ ,  $p < .001$ ), but not at low levels of NCC ( $b = -.05$ ,  $SE = 0.04$ , 95% CI  $[-0.14, 0.03]$ ,  $p = .23$ ). This result is consistent with Dhont et al.'s (2011) findings on intergroup contact and NCC and with the general perspective that positive contact can be more effective for those higher on prejudice-prone individual-difference variables (Hodson, 2011).

### 5.3 | Discussion

These results are supportive of our hypotheses and provide us with some information about the importance of work experience and attitudes towards women managers in individuals with a high NCC. Indeed, in employees with higher NCC, attitudes were more negative when their interactions with women managers were more negative. On the other hand, when these individuals instead had more positive interactions, their attitudes were similar to participants with a lower NCC. Furthermore, we recruited asked participants about their experiences with their own women managers but were interested in their general attitudes towards women managers. This suggests that positive contact could positively influence their relationships with future women managers. It also seems that the benefits of contact were driven by the quality, and not the quantity, of interactions with women managers, in line with previous research (Barlow et al., 2012; Bhatnagar & Swamy, 1995).

These results were promising, and support the utility of positive contact to reduce prejudice among individuals who are characterized by an NCC and who have, or who have had, women managers. At the same time, however, it can serve as a warning, given that these individuals had more negative attitudes towards women managers when they instead had negative experiences. Of course, not everyone will have had a women manager, and consequently, the implications of this research are limited. With this in mind, we conducted a second study in which we investigated the effect of purely imagined contact.

## 6 | STUDY 2: NCC AND IMAGINED CONTACT

Study 1 supported our hypotheses that contact with women managers will reduce negative attitudes towards women managers among individuals with a high NCC. Study 2 aimed to replicate these findings with *imagined* contact with women managers in an American sample. Similar to Study 2, we hypothesized that imagined contact would moderate the relationship between NCC and attitudes towards women managers such that individuals with a high NCC would have more positive attitudes in the positive imagined contact (vs. control) condition. We included age, gender, political orientation, and education level as covariates.

### 6.1 | Method

#### 6.1.1 | Participants and procedure

172 participants (97 women and 75 men) recruited from Amazon Mechanical Turk participated in the study. U.S. citizenship was required for participation and enforced through platform options. In order to recruit participants

who were more likely to be currently employed, currently-enrolled university students were excluded from the analysis. Before data collection, participants read a brief introduction to the research and gave their informed consent. Participants' mean age was 39.86 ( $SD = 12.44$ ). 15.7% of participants had a Master's Degree, 44.2% of participants had a Bachelor's Degree, 28.5% of participants had an Associate's Degree, and 10.5% of participants had only a High School Diploma (or equivalent). Additionally, there was one participant each (0.6%) who either had a Doctoral-level Degree or who did not complete High School. The majority (80.8%) of participants were White, but also Black (3.5%), Hispanic/Latino (5.2%), Asian/Pacific Islander (7.0%); six participants (3.5%) identified their ethnicity as 'Other' or as some combination of the above categories.

## 6.1.2 | Measures

### *Need for cognitive closure*

Participants responded to the English version of the same Revised Need for Closure Scale (Rev NfCS, Pierro & Kruglanski, 2005) used in Study 1. In the present sample, the reliability of the Rev NfCS was  $\alpha = .87$ .

### *Attitudes towards women as managers*

Participants responded to the English original version of the same WAMS used in Study 1. As in the previous study, we considered WAMS as a one-dimensional scale. After reversing the positively worded items ratings were summed across items to create an overall score for attitudes towards women managers ( $\alpha = .90$ ). High scores indicated negative attitudes towards women managers.

### *Imagined contact manipulation*

Participants were randomly assigned to either the positive contact ( $N = 87$ ) or control ( $N = 85$ ) conditions. Participants had a 50% chance of being assigned to either condition. In the positive contact condition, participants were instructed to imagine speaking with a woman supervisor about a pleasant topic. In the control condition, participants were instead instructed to imagine viewing a pleasant landscape. In both conditions, participants were asked to briefly write about what they imagined.

### *Control variables*

As in the previous study, gender (coded 0 = male; 1 = female), age, education and political orientation were included as control variables. Participants were asked to indicate their political orientation on a scale from 1 (*very liberal*) to 7 (*very conservative*). This item was previously used by Koleva and colleagues (2012).

## 6.2 | Results

Descriptive statistics and correlations between variables are presented in Table 3. Supporting the results of Study 1, NCC was positively and significantly related to the (negative) attitudes towards women as managers. Likewise, (negative) attitudes towards women as managers were significantly related to gender (negatively) and to the political orientation (positively), such that men and conservatives have more negative attitudes towards women managers.

Predictions regarding the effect of the NCC at different levels of imagined contact with women managers on attitudes towards these managers were further tested by means of a moderated multiple regression analysis. We regressed attitudes towards women as managers on NCC, contact condition (positive vs. control, contrast coded 1 = positive;  $-1$  = control), age, gender, political orientation, and education, as well the two-way interaction between NCC and contact condition. NCC scores were mean-centered and the interaction term was based on these centered scores. The analysis was performed using PROCESS macro (Hayes, 2018), model 1, with 5,000 bootstrap

**TABLE 3** Descriptive and correlations between variables (Study 2)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Gender	—	—	—						
2. Age	39.8	12.4	.10	—					
3. Education	—	—	-.08	-.09	—				
4. Political orientation	3.52	1.62	-.06	.17*	-.10	—			
5. Contact condition	—	—	.02	-.07	-.02	.003	—		
6. Need for closure	3.43	0.82	.04	.01	-.06	.10	-.07	(.87)	
7. Attitudes towards women as managers	2.14	0.92	-.26***	-.19*	-.009	.25***	-.12 <sup>†</sup>	.26***	(.90)

Note: In bracket (Cronbach's alpha), *N* = 172; contact condition (contrast coded -1 = control group; 1 = positive contact); gender (0 male; 1 female).

\*\*\**p* ≤ .001.

\**p* ≤ .05.

<sup>†</sup>*p* ≤ .11.

**TABLE 4** Attitude towards women managers regressed on need for cognitive closure (NCC) and imagined contact condition (Study 2)

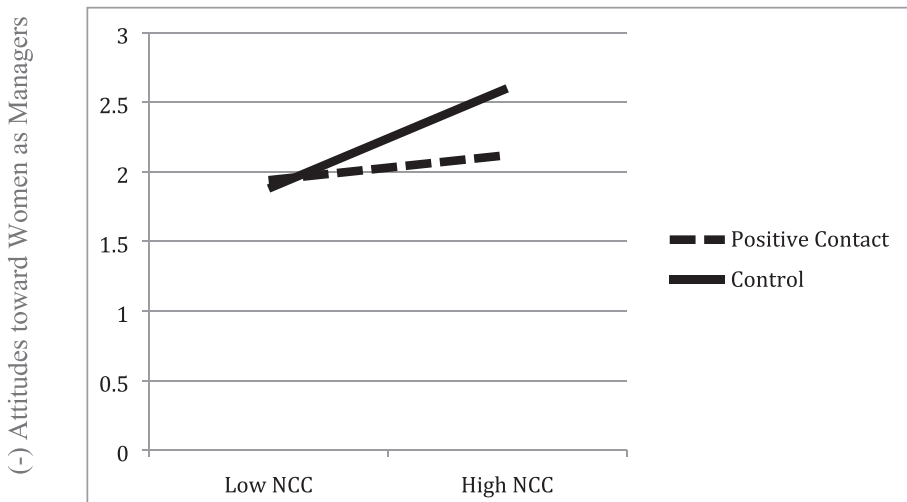
	<i>b</i>	<i>SE</i>	95% CI		<i>p</i>
			LL	UL	
Gender	-.428	0.125	-0.677	-0.180	<.001
Age	-.017	0.005	-0.027	-0.007	<.001
Political orientation (PO)	.139	0.039	0.062	0.216	<.001
Education	-.014	0.068	-0.150	0.121	.836
NCC	.271	0.075	0.122	0.419	<.001
Contact condition	-.106	0.061	-0.228	0.015	.087
NCC × contact	-.164	0.074	-0.312	-0.016	.029

Note: Gender (0 male; 1 female); contact (1 positive contact; -1 control).

samples. Ninety-five percent CIs were employed and 5,000 bootstrapping re-samples were run. Results are presented in Table 4. Supporting the results of Study 1, after controlling for other variables, the regression yielded a significant and positive main effect of NCC on (negative) attitudes towards women as managers. There was also a significant main effect for gender and a marginal effect for the contact condition. Most importantly, the interaction between NCC and contact conditions was significant.

As with Study 1, we then performed simple slope analyses. These analyses revealed that the relationship between NCC and (negative) attitudes towards women as managers was significant and positive only in the control condition (*b* = .43, *SE* = 0.10, 95% CI [0.22, 0.64], *p* < .001), whereas this relationship was non-significant in the positive contact condition (*b* = .10, *SE* = 0.10, 95% CI [-0.10, 0.31], *p* = .30) (see Figure 2). These patterns suggest that negative attitudes towards women managers among individuals with a high NCC were reduced in the positive contact condition.

As in Study 1, to further probe the nature of the obtained interaction effect, we conducted additional analyses aimed at verifying the conditioned effects of imagined contact on attitudes towards women as managers at the two levels of NCC (low vs. high, 1 *SD* below and above the mean). Results indicated that contact was negatively and



**FIGURE 2** Attitudes towards women as managers as a function of need for cognitive closure and imagined contact (Study 2)

significantly related to negative attitudes towards women as managers only at high levels of NCC ( $b = -.24$ ,  $SE = 0.08$ , 95% CI  $[-0.41, -0.06]$ ,  $p = .006$ ), but not at low levels of NCC ( $b = .02$ ,  $SE = 0.08$ , 95% CI  $[-0.14, 0.20]$ ,  $p = .73$ ). Once again, this result is consistent with the general perspective that positive contact can be more effective for those higher on prejudice-prone individual-difference variables (NCC in our case).

### 6.3 | Discussion

Study 2 represents the first attempt to investigate the interplay between NCC and imagined contact; from our results, it seems that imagined contact functions in the same way as to direct (actual) contact. As with Study 1, the results from this study support our hypotheses and suggest that individuals with a high NCC were more likely to have negative attitudes towards women managers. Further, we found that this effect only existed in the control condition; in the positive contact condition, the effect of NCC disappeared. Indeed, attitudes towards women managers among individuals with a high NCC in the positive contact condition were statistically indistinguishable from those with a low NCC. This is consistent with the epistemic role fulfilled by NCC; these individuals seize and freeze upon information in order to arrive at a stable answer. When individuals imagine positive encounters with women managers they simultaneously provide themselves with a new source of information. This information can consequentially influence their attitudes towards women managers. As a result, NCC can actually be a protective factor against prejudice—at least given these conditions.

## 7 | GENERAL DISCUSSION

Negative attitudes towards women as managers drive discrimination against women in leadership positions, which in turn imply a wide range of negative consequences for individuals and organizations. For instance, negative stereotypes of women leaders are a threat to women's identity and well-being in the workplace (von Hippel et al., 2015) and undermine promotion to managerial positions (Lyness & Heilman, 2006) as well as the good performance (Eagly & Karau, 2002) of women in leadership positions.

We investigated the interplay between two forces that typically would have contrasting effects on attitudes towards women in leadership roles: the NCC and positive intergroup contact. Individuals characterized by an NCC have the desire for stable and certain knowledge (e.g., Kruglanski, 2004). Although there is no direct relationship between these desires and the content of specific stereotypes, stereotypes nonetheless can satisfy these desires. Accordingly, NCC is associated with prejudice based on stereotypes towards diverse social groups, including women in leadership roles (Baldner & Pierro, 2019a, 2019b; Roets et al., 2012). On the other hand, positive intergroup contact can reduce prejudice, perhaps by decreasing threat and anxiety, and/or by increasing empathy (Hodson, 2011). Given that this research, as well as previous research on ethnic prejudice (Roets & Van Hiel, 2011), has found that positive intergroup contact is particularly helpful for individuals characterized by an NCC, we can also conclude that this contact could replace knowledge from harmful gender stereotypes with knowledge from positive contact, even if it is only imagined.

Our results, on one hand, enrich the theoretical background on individual-level antecedents of prejudice against women leaders; on the other hand, provide fruitful insight and practical implications for organizations. For example, during a period of organizational change—when individuals with high NCC are more prone to stress (Kruglanski, Pierro, Higgins, & Capozza, 2007)—the quality of interactions between woman managers and employees should be monitored in order to prevent a negative culture. In addition, the tendency of people with high NCC to adhere to prevalent situational norms (Festinger, 1954; Kruglanski & Webster, 1991; Pierro, De Grada, Mannetti, Livi, & Kruglanski, 2004) suggests that an organizational culture based on egalitarianism and valorization of women could decrease negative attitudes towards women as managers in individuals with high NCC.

Although previous research has investigated the interplay between the NCC and positive intergroup contact, there were interesting questions that were unresolved and for which we found support. First, previous research found that quality is more important than the quantity of contact; would this generalize to NCC, or would high NCC individuals be influenced more by long-lasting (e.g., stable) experience with women managers? Second, would the initial research (Dhont et al., 2011; Hodson, 2011), which focused on direct and extended contact with ethnic prejudice, generalize to attitudes towards women managers among working individuals? Third, would these findings generalize to a purely imagined form of contact. It seems that research lines on the differing effects of intergroup contact across different contexts have not received much, and we hope to shed more light on this area and on the need for continued research.

## 7.1 | Future directions and limitations

Given our findings, we can propose some interesting lines for future research. As we mentioned earlier, the NCC consists of two phases: the seizing, or urgency, phase, in which individuals arrive at a stable and certain knowledge and the freezing, or permanence, phase, in which they hold onto this knowledge, even if more valid knowledge is available. By combining these two phases into the same underlying process there is an assumption that they have equivalent effects; however, this might not necessarily be the case. For instance, it could be possible that individuals in the seizing phase would be more receptive to intergroup contact than those in the freezing phase; in the latter case, individuals might instead reject knowledge from intergroup contact if it goes against the knowledge that already provided the desired stability and certainty. However, this question has not yet been studied.

There are also interesting future lines of research that focus on the factors that influence the NCC effect on prejudice that are not tied to intergroup contact. For instance, high NCC individuals could be more likely to accept anti-prejudice information that comes from a trusted source (e.g., that is perceived to provide certainty and stability). Likewise, high individuals could be more likely to hold anti-prejudice views when these are also part of a (perceived) broad social consensus. Both of these possibilities refer to the epistemic function of shared social realities (e.g., Hardin & Higgins, 1996). Furthermore, both of these possibilities could be studied in experimental designs that separate the seizing and freezing phases.

Although these findings are encouraging, some limitations of the studies have to be highlighted. First, correlational data are uninformative about the causal direction of the relationship between variables. In future research, NCC could be manipulated by inducing appropriate situational conditions (e.g., see Kruglanski & Freund, 1983; Kruglanski & Webster, 1996; Roets, Kruglanski, Kossowska, Pierro, & Hong, 2015). Second, even if we controlled for social desirability, the dependent variable could be measured with implicit measures of attitudes (Cunningham, Preacher, & Banaji, 2001; Greenwald, Poehlman, Uhlmann, & Banaji, 2009) rather than self-report measures. Third, we argued that positive contact could replace negative knowledge with positive knowledge, insofar as this knowledge is also perceived to be stable and certain. However, there has not yet been research in the NCC literature that has studied the factors that influence the perceived certainty and stability of knowledge. If these factors were known then the effect of contact in conjunction with NCC could be strengthened. In summary, the present work contributes to showing that individual differences count not just for prejudice in general, but also for prejudice in work settings. This perspective offers a novel insight into the prejudice-reduction interventions that could be applied both at individual and organizational levels.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in OSF at [https://osf.io/vbc67/?view\\_only=2624a5b8a12f49869e953a9d0f3720b6](https://osf.io/vbc67/?view_only=2624a5b8a12f49869e953a9d0f3720b6).

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