She's Worth IT: Challenges for Female CIOs in Ensuring IT Security Compliance

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- Background and Motivation
- Theory and Research Question
- Experiment Design
- Results
- Implications

- Bansal, G and Axelton, Z. (2024) She’s worth IT: challenges for female CIOs in ensuring IT security compliance, Information Technology & People.

Background and Motivation

Cyber Risks are a Top Concern

Weakest Link

Leadership Matters

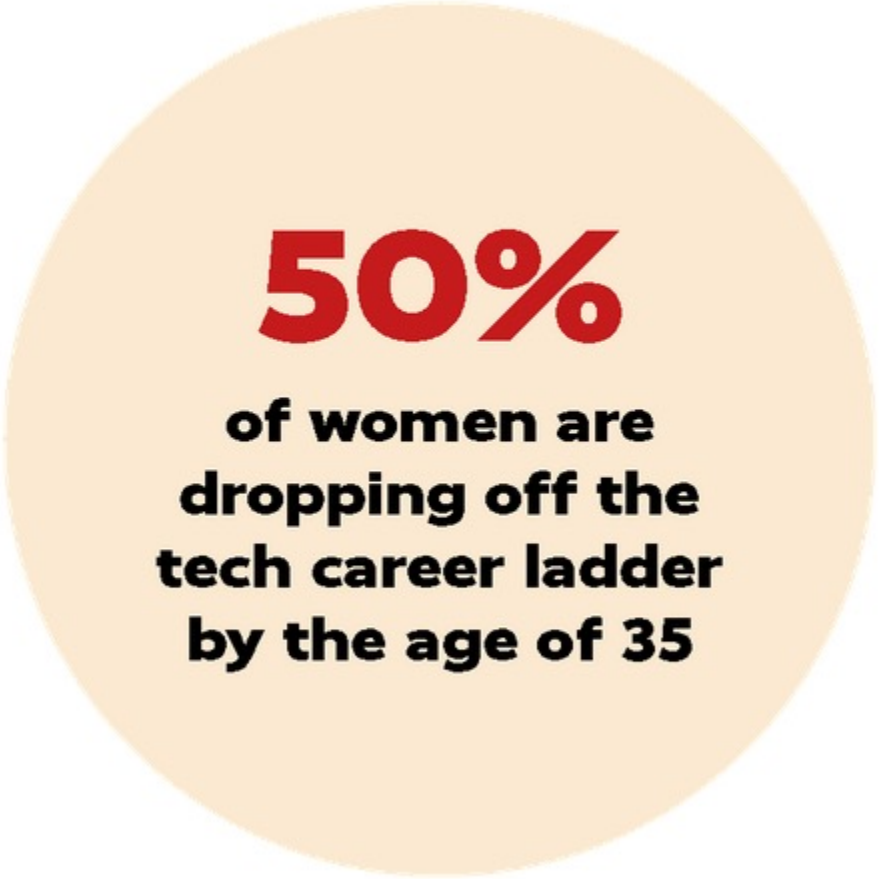
- Organizational leadership, particularly IT leadership and the CIO role, is vital in influencing employees' compliance with security policy (e.g., Guhr et al., 2019).

Leadership and Gender Roles

- Men are often believed to be more competent and agentic than women (Koenig and Eagly, 2014), especially in IT (Reid et al., 2010).

Unconscious Gender biases in Modern Day Organizations (Heilman, 2012)

https://www.revolentgroup.com/insights/cio-gender-diversity-report/



We Need More Women in Tech

Trivia

- So, where are these missing Tech Women?
- I can help spot 3 for now

Elon Musk with Twitter employees at the company's HQ | Photo: Twitter/ Elon Musk

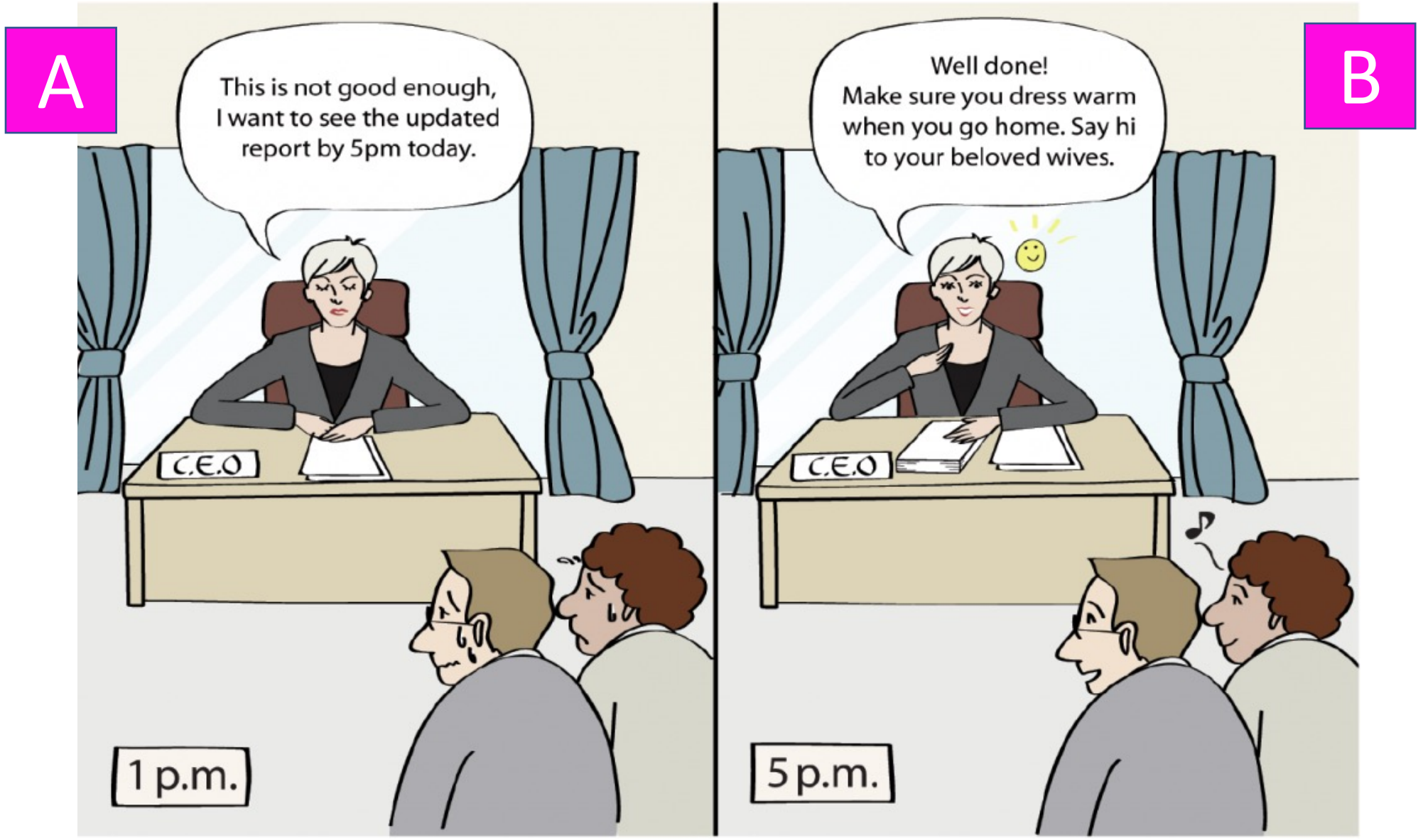
The internalization process starts in childhood when humans learn to behave in gender-appropriate and stereotype-congruent ways from their immediate environment (Bem, 1974).

Gender Role Internalization

Gender role internalization

- Hentschel *et al.* (2019) report that women tend to characterize themselves in more stereotypic terms (i.e., less assertive and less competent in leadership) than they characterize other women.
- However, men characterize themselves in less stereotypic terms.

Gender Roles & Expectations: Communal & Agentic



Gender Roles & Expectations

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Polling Question 1

- Do you expect your leaders to be more like:
  - A (rely solely on rewards and punishments)
  - B (coach & mentor)
  - Not sure

Polling Question 2

- Do you expect your Women Tech leaders to be more like:
  - A (rely solely on rewards and punishments)
  - B (rely on coaching & mentoring)
  - Not sure

Theory and Research Question

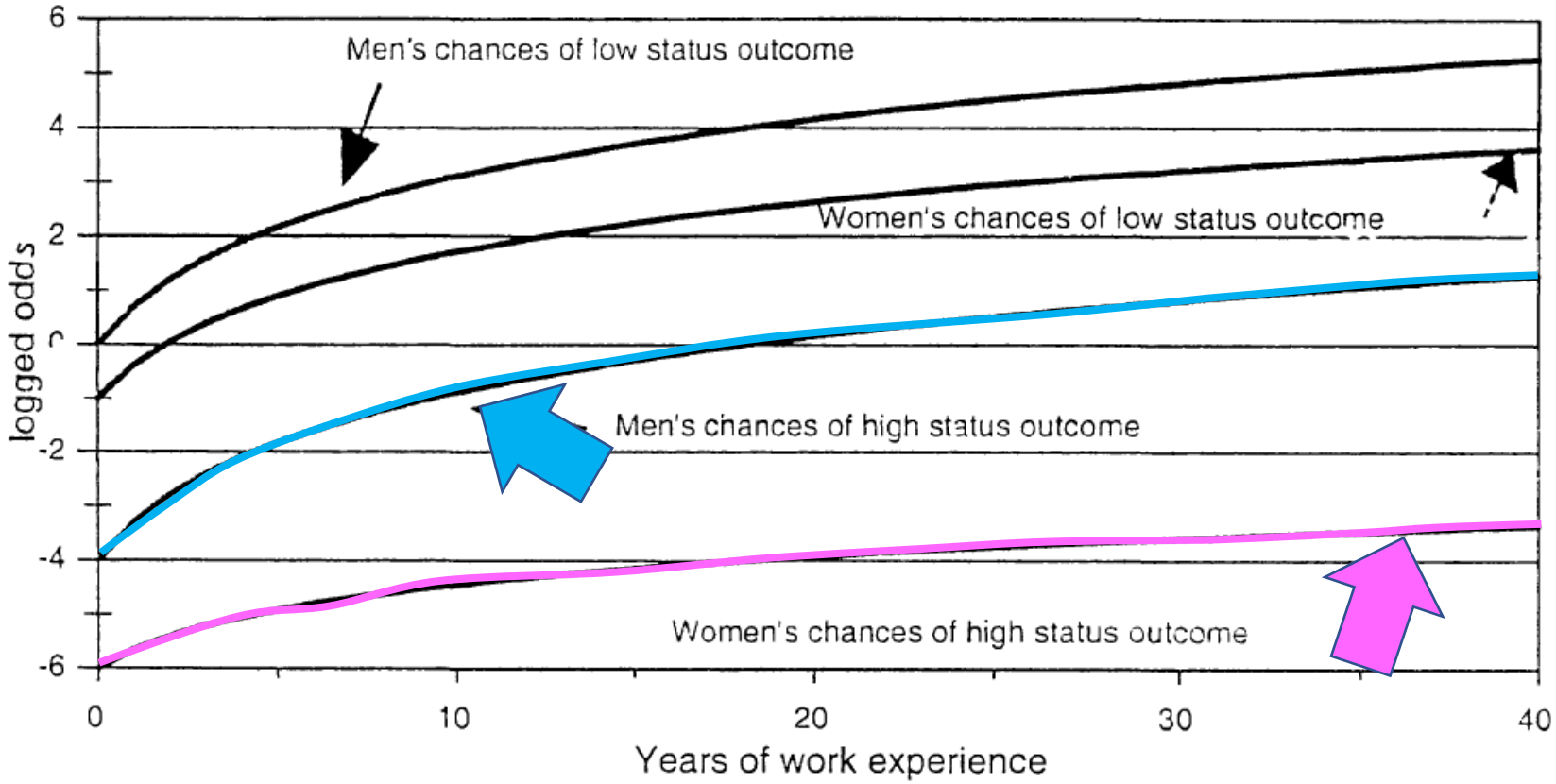
Theory: Stereotype Biases

- Findings from stereotype literature suggest that any incongruence in expected gender roles could lead to prejudice (Eagly and Karau, 2002).

Theory: Glass Ceiling

- The glass ceiling is defined as a barrier of prejudice and discrimination that excludes women from higher-level leadership positions (Eagly and Karau, 2002).

FIGURE 1C: Gender Inequality Growing Over Career, More for High Status



The Glass Ceiling Effect
Author(s): David A. Cotter, Joan M. Hermsen, Seth Ovadia and Reeve Vanneman
Source: *Social Forces*, Dec., 2001, Vol. 80, No. 2 (Dec., 2001), pp. 655-681
Published by: Oxford University Press
Stable URL: https://www.jstor.org/stable/2675593

Polling Question 3

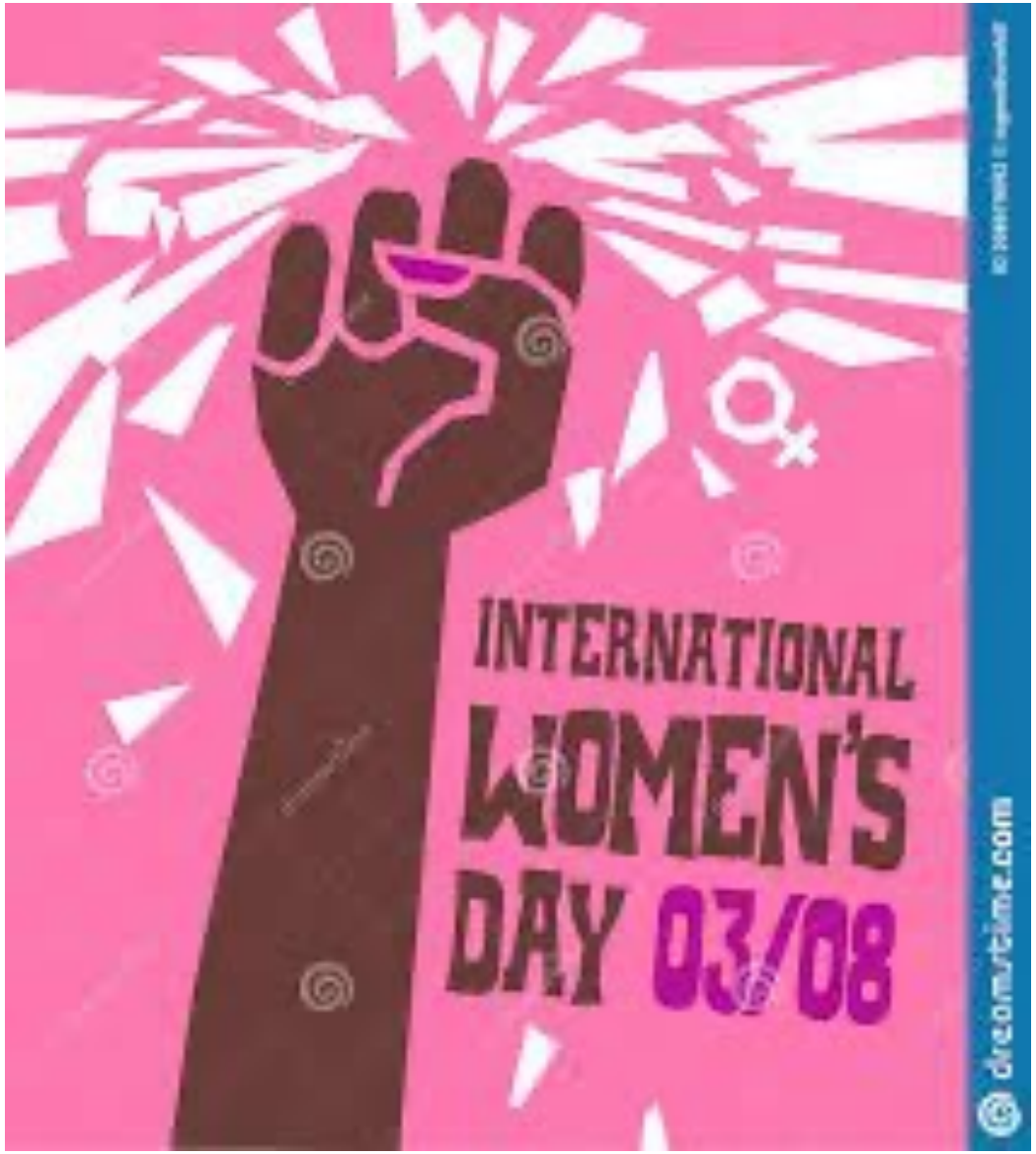
- Do you believe that Women Tech leaders face a glass ceiling?
  - Agree
  - Disagree
  - Not sure

Polling Question 4

- Do you believe that Women Tech leaders enjoy reduced influence from their subordinates?
  - Agree
  - Disagree
  - Not sure

Research Question

- How do CIOs' non-conforming social roles due to stereotyping and gender bias impact intention to comply with the CIO's security message among employees?
- Is the female CIO's perceived IT expertise valued at par with male CIO's when impacting employees' compliance intentions?
- How does the employee's gender moderate these relationships?



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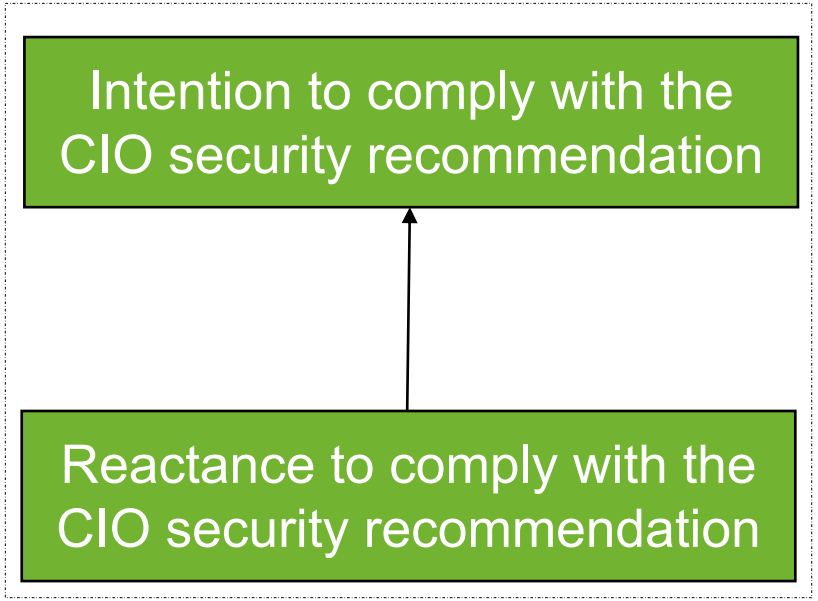
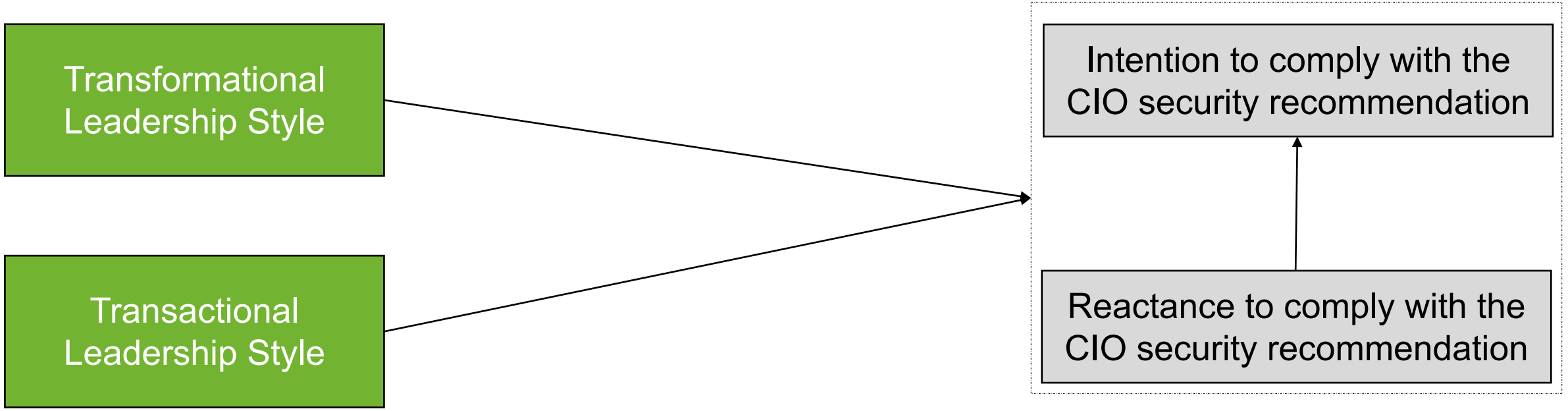


Research Model



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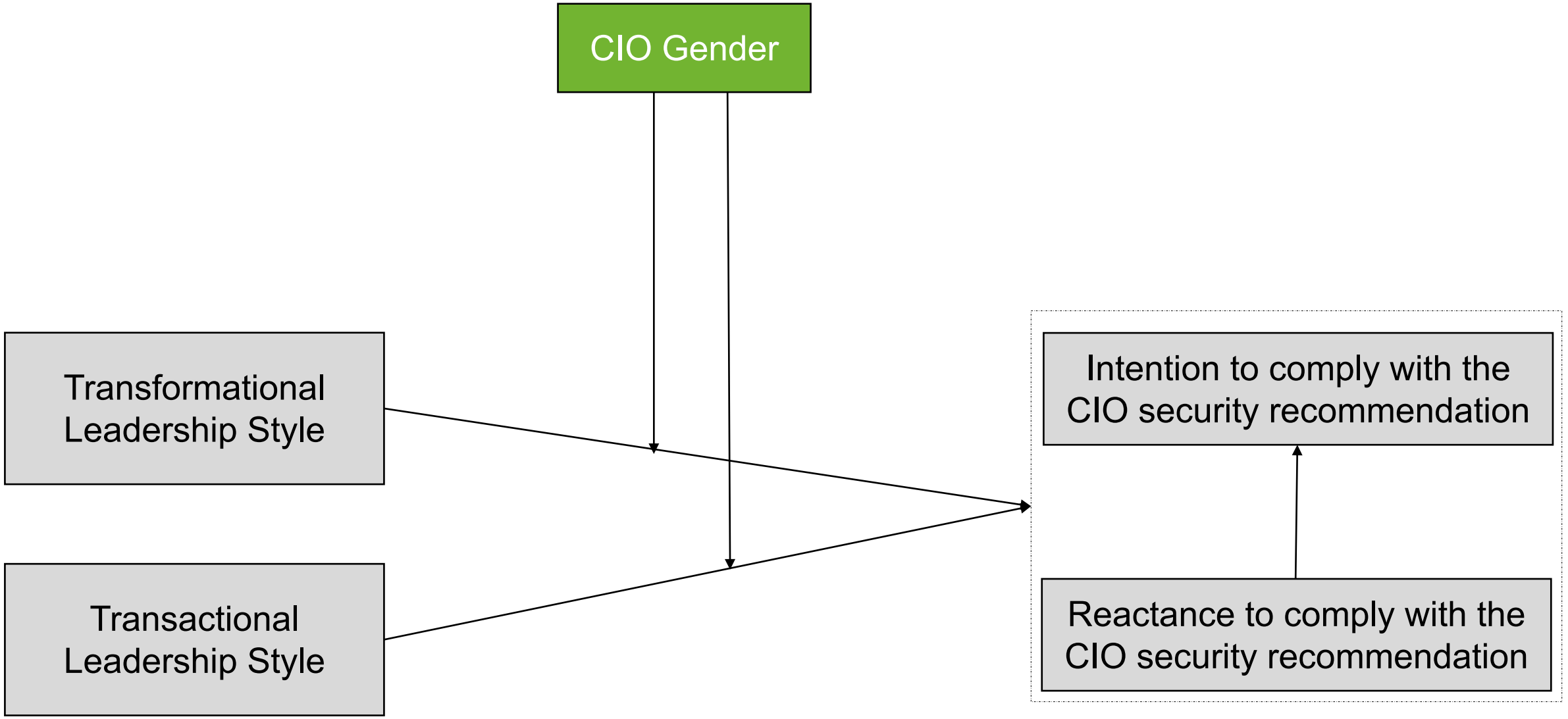

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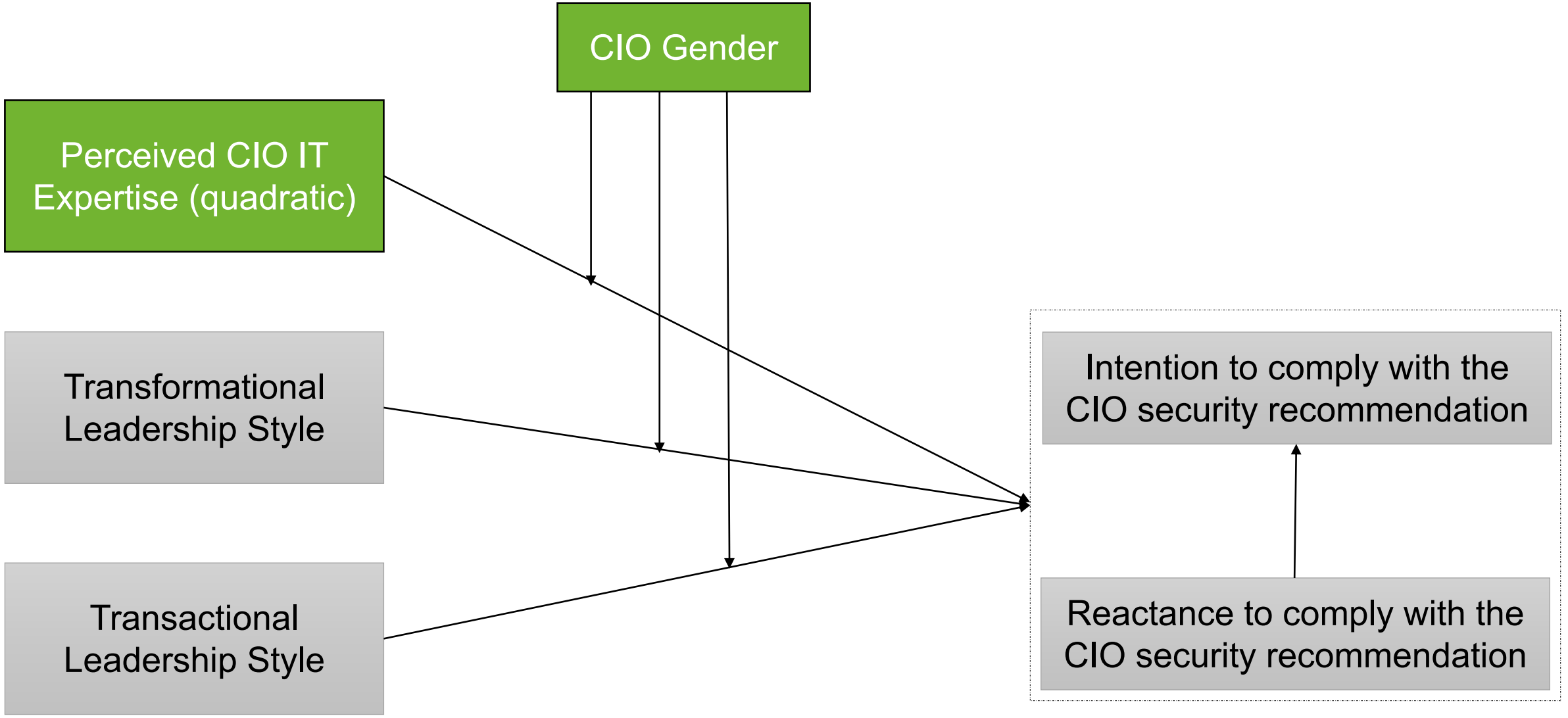

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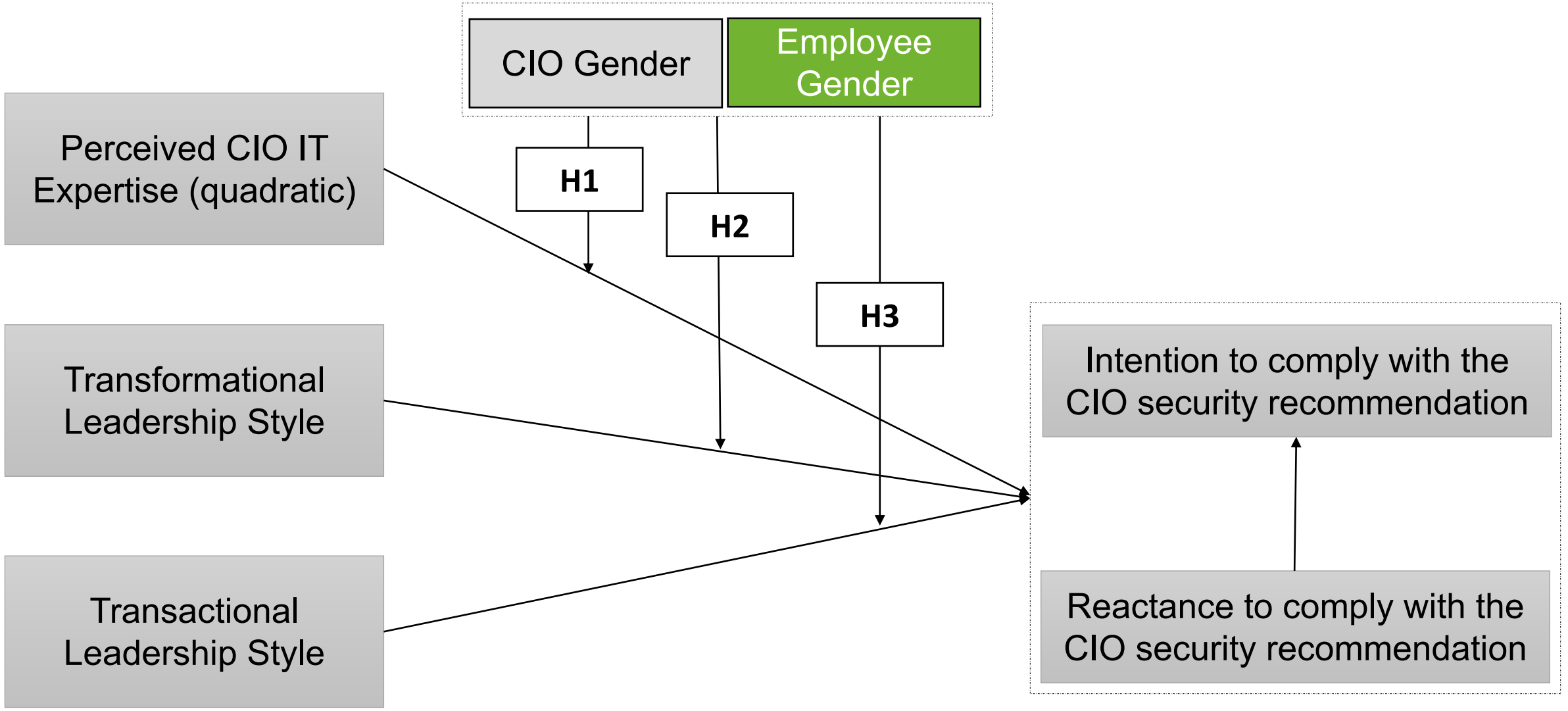
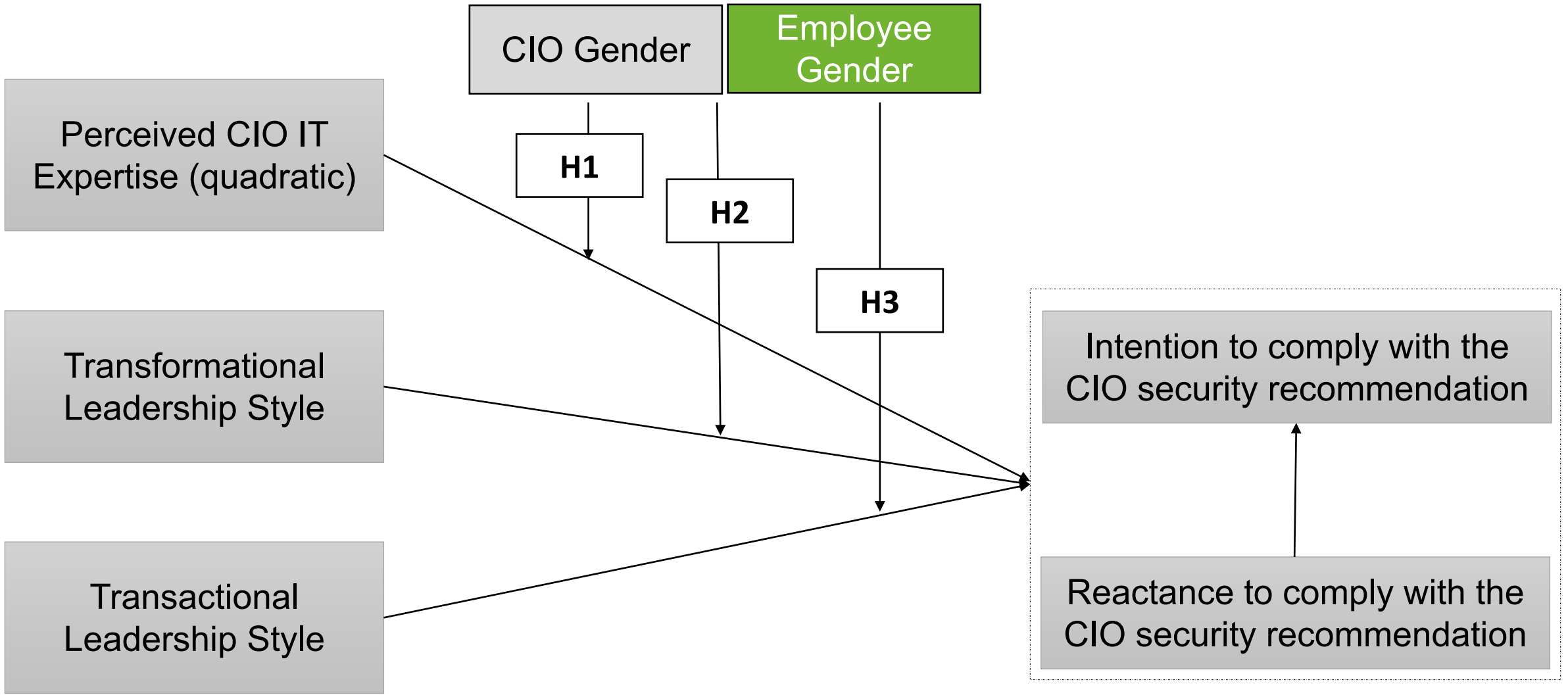


Research Model



Research Model

Research Experiment

- Read and agree to the IRB consent form
- Read the two CIO vignettes - one out of four related to expertise (M/F; High/Low) and one out of four related to leadership style (M/F; Transformational/Transactional)
- Attention check and manipulation questions
- Measured expertise, leadership style, intention, reactance
- Attention check questions
- Measured demographic variables
- Survey end

Experiment Design

The study manipulated:

CIO gender (male/ female)

IT expertise (low/ high)

Leadership style (transactional/ transformational)

•2 x 2 x 2 design

CIO high expertise	Please read the following conversation between Kyle, who works for ABC Corporation, and Ben, his friend from college. **Kyle:** Hi Ben, I got news from my company to share with you! **Ben:** Go ahead! **Kyle:** Recently, our company hired a new CIO – **Mary Jane (Michael Smith)**. The new CIO comes with 15 years of **strong** experience as a director of IT, including cyber security in a reputed Fortune 500 company, and has a master's degree in Information Technology from an Ivy League institution. **Ben**: Great! It seems your new CIO has quite some experience in the IT area. **Kyle**: Yes, the new CIO gave a recent presentation to all of us and shared that being cyber-alert and cyber-safe is very important to our company as it helps keep our customer information and intellectual property safe. **Ben**: I think the CIO wants to protect the company's IT infrastructure and information.

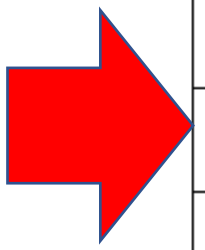
CIO low expertise	Please read the following conversation between Kyle, who works for ABC Corporation, and Ben, his friend from college. **Kyle:** Hi Ben, I got news from my company to share with you! **Ben:** Go ahead! **Kyle:** Recently, our company hired a new CIO – **Mary Jane (Michael Smith)**. The new CIO has 7 years of experience in project management but **little** experience in IT and cyber security. The new CIO implemented IT security policies and guidelines for employees to protect customer information and intellectual property. **Ben:** I think a CIO's job is to protect a company's IT infrastructure and information.

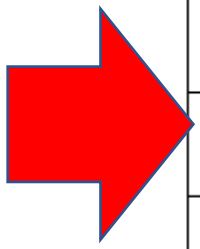
Transformational style	Please read the continued conversation between Kyle and Ben about Kyle's new CIO: **Kyle:** The new CIO instills confidence in us about our IT security performance. The CIO suggests that cyberattacks are on the rise. The effect of such an attack could be devastating to our company. We cannot afford to lose customer data or risk a ransomware attack. The CIO, in a meeting, mentioned that phishing scams are a major reason for ransomware and other major data breaches. To keep our information secured, CIO always motivates employees and recommends always being careful when clicking on links in any email. **Ben**: The CIOs worldwide are worried about their organization's cybersecurity; that's so true. **Kyle:** However, another day, one of my colleagues accidentally clicked on a phishing email. It was fortunate that the phishing email didn't do much damage to our network security. Our new CIO reached out to my colleague to discuss if anything can be done to prevent such incidents from happening to my colleague and others in the organization. After the conversation, the new CIO arranged for my colleague to undergo a short training on staying cyber-safe and avoiding getting scammed by phishing emails and messages. **Ben:** Well, I am glad your new CIO offered your colleague a chance to learn from this lesson. Your new CIO went the extra mile to **earn the respect** of the employees while also ensuring that IT security is not compromised.

Transactional style	Please read the continued conversation between Kyle and Ben about Kyle's new CIO: **Kyle:** The CIO further said that cyberattacks are on the rise. The effect of such an attack could be devastating to our company. We cannot afford to lose customer data or risk a ransomware attack. The CIO mentioned that phishing scams are a major reason for ransomware and other major data breaches. Our new CIO always seems to emphasize the importance of complying with security policies. To keep our information secured, CIO requires we always be careful when clicking on links in any email. **Ben:** The CIOs worldwide are worried about their organization's cybersecurity; that's so true. **Kyle:** However, another day, one of my colleagues accidentally clicked on a phishing email. It was fortunate that the phishing email didn't do much damage to our network security. However, our new CIO got my colleague fined two weeks of a **pay cut** and a carelessness note attached to the personnel file. **Ben:** I am very sorry to hear that. It is unfortunate that it happened to your colleague who has to face this **penalty**. Your new CIO is a leader who uses **penalties and rewards** rather than inspiring employees to strive beyond required expectations. Leaders like your new CIO are more focused on task attainment and **less concerned** about earning the respect of their employees. **Kyle**: Seems you are right.

Appendix C: Items Sources

Intention	Bansal et al. (2020)
Expertise	Bhattacherjee and Sanford (2006)
Reactance	Lowry and Moody (2015)
Leadership style Leadership style	(Eberlin and Tatum, 2008) Ismail et al. (2010)
AWS	(Spence and Hahn, 1997)
Threat relevance	Kim and Kim (2018)
Phishing Susceptibility	Johnston et al. (2015)
Social Desirability Bias	Kwak et al. (2019)
Marker (marker4)	Davis (1983)





	CIO Male N (Age years, Std dev)	**CIO Female** N (Age years, Std dev)	Total
User Gender Male	280 (33.49, 9.11)	175 (34.82, 10.41)	455 (34, 9.64)
User Gender Female	108 (36.63, 10.52)	141 (36.94, 10.72)	249 (36.81, 10.61)
Total	388 (34.36, 9.62)	316 (35.77, 10.58)	704 (35, 10.08)

Table 2. Demographics

Demographics

Results

Expertise^2 benefits male CIOs more, particularly from female employees

- H1a: The quadratic effect of perceived CIO IT expertise is positively associated with the employees' intention to comply with the CIO security recommendation, such that
- (i) the effect is stronger for male CIOs (M) than female CIOs (F) and
- ii) the effect is stronger for male CIOs–female employees (MF), as opposed to male CIOs–male employees (MM),
- and the effect is weaker for female CIOs-male employee (FM), as opposed to female CIOs-female employees (FF).

Hyp	Path	CIO / Employee gender		Coef.	T-stat	Sig.		Coeff.	T-stat	Sig.	Remarks (consistent bootstrapping MGA, two tails)
				Male CIO (M)				Female CIO (F)			
H1a(i)	Expertise^2 -> Int	CIO gender (∑)	M	0.077	2.936	0.003	F	0.063	1.468	0.143	**Supported.** Supported Structurally and also by MGA (**M**>F, Δ=0.106, p-value = 0.049).
H1a(ii)		CIO-Employee gender	MM	0.064	2.043	0.042	FM	0.079	1.243	0.215	**Supported.** MGA comparing MM and MF found **MF**>MM, Δ=.135, p-value = .000. MGA comparing FM and FF found **FM**<FF, Δ=.160, p-value =.000.
			MF	0.107	1.871	0.062	FF	0.027	0.613	0.540	

Transactional Leadership Style: Female employees prefer transactional male leaders more; male employees prefer transactional female leaders less

H3a(i)	Transactional -> Intention	CIO gender (∑)	M	0.310	5.418	0.000	F	0.344	3.934	0.000	**Reverse Support**. Structurally not supported. MGA found reverse support: F>M, Δ=.938, p-value=.031.
H3a(ii)		CIO-Employee gender	MM	0.276	5.312	0.000	FM	0.276	1.810	0.071	**Supported.** MGA comparing MF and MM found **MF**>MM, Δ=.125, p-value=.000. MGA comparing FM and FF found **FM**<FF, Δ=1.399, p-value=.000.
			MF	0.382	3.515	0.000	FF	0.423	4.479	0.000	

Transformational Leadership Style: Female employees have more reactance to transformational male leaders; male employees have less reactance to transformational female leaders

H2b(i)	Transformational -> Reactance	CIO gender (∑)	M	0.185	3.019	0.003	F	0.072	1.154	0.249	**Weak Support.** Structurally supported, **M** is significant and positive, but F is not. MGA not supported (Δ=1.697, p-value=0.324).
H2b(ii)		CIO-Employee gender	MM	0.208	2.791	0.005	FM	0.015	0.270	0.787	**Supported.** MGA comparing MF and MM found **MF**>MM, Δ=.330, p-value=.000. MGA comparing FM and FF found **FM**<FF, Δ=10.917, p-value=.000.
			MF	0.113	0.974	0.330	FF	0.107	0.990	0.322	

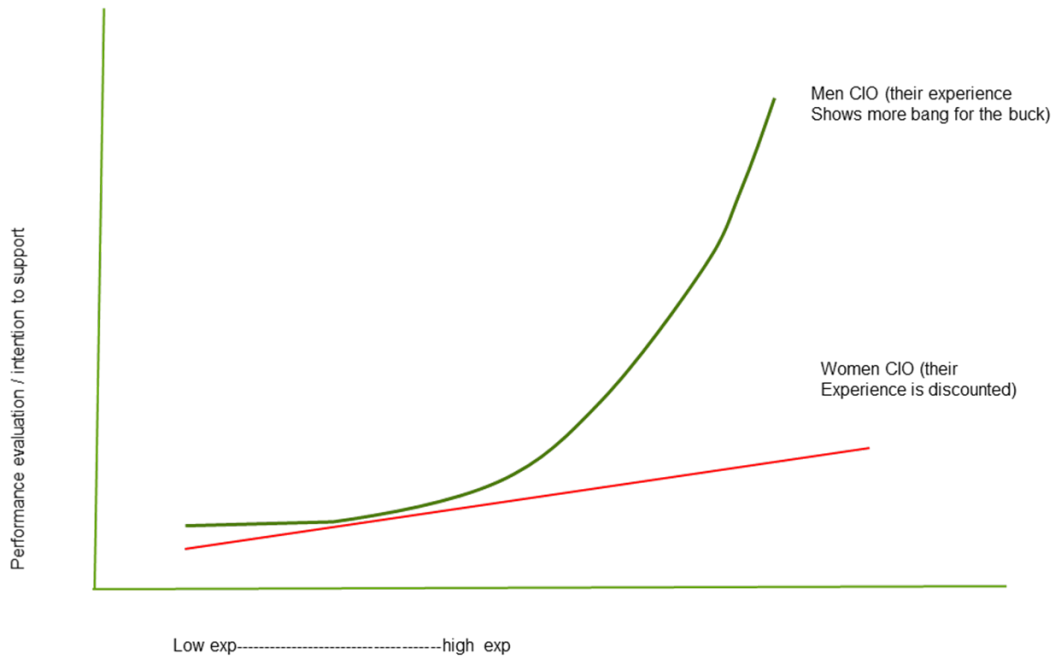
Implications

Discounting expertise for female CIOs

- Our results reveal that male employees adhere "vigorously" (Hentschel *et al.*, 2019, p. 4) to the stereotypes that benefit them and lower reactance to the expertise (in quadratic form) of male CIOs while undervaluing female CIOs' expertise and showing less compliance intention.

- In contrast, female employees are more willing to comply with male CIOs' expertise but less so with female CIOs' expertise due to self-doubt and internalized stereotypes.

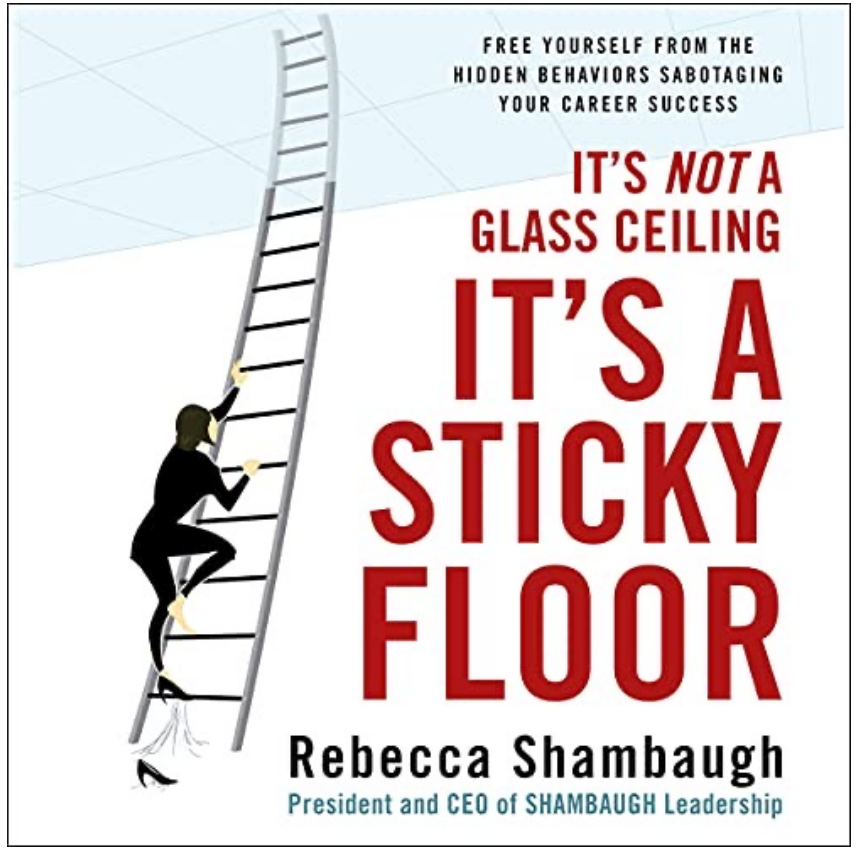
- Our work shows that the stereotypes are more evident at the quadratic level of expertise, as predicted by the glass ceiling theory (Cotter *et al.*, 2001).



Glass ceilings and sticky floors

- Our findings help explain that the obstacles to the career progression of female leaders and CIOs, termed the Glass Ceiling, could be related to undervaluing their influence by their colleagues and subordinates, a phenomenon we describe as *sticky floors*.

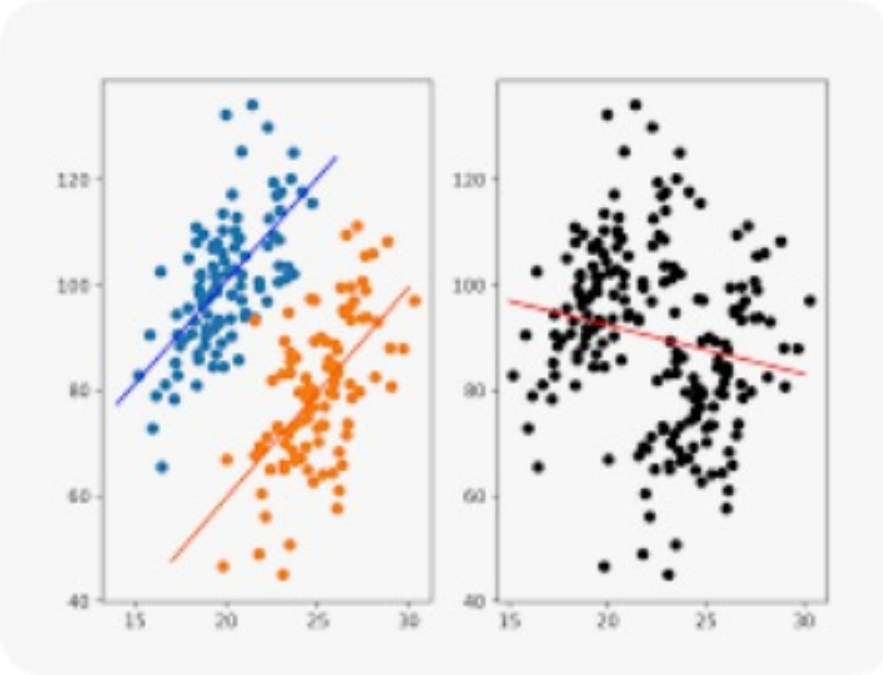
- We define "sticky floors" as: *the challenges women leaders face in reaching higher positions, where their expertise and influence are discounted and undervalued by peers and subordinates*.



Theoretical Implications – Simpson's Paradox

- Employee gender is important in the CIO gender dynamics.

- We thus report a Simpson's paradox related to employee gender, which adds to the literature where such effects are found, for example, Albers (2015) and Solórzano et al. (2002).



Social implications – Role of Age

- We find some positive signs that older individuals, who may hold more traditional gender role stereotypes, favor male CIOs more than younger individuals (i.e., a positive association between age and intentions within MM and MF groups), suggesting that younger generations are witnessing a change in these stereotypes.

Social implications – Double bind

- Our findings reveal that female CIOs exhibiting either transactional or transformational leadership may encounter lower compliance intentions from male employees, which underscores the workplace double bind women often face.

Practical Implications: Recognition

- Firstly, our research demonstrates that female leaders receive insufficient recognition from their team members.

- To overcome this, organizations must empower their female leaders by acknowledging their expertise openly and celebrating their accomplishments publicly.

- Female leaders getting diminished recognition for their expertise also provides another perspective to help explain a question raised in Forbes magazine by Chamorro-Premuzic (2021), “If Women Are Better Leaders, Then Why Are They Not In Charge?”

Both Styles Matter!

Our research underscores the significance of championing various leadership approaches to create awareness that transformational leadership revolves around inspiration and motivation, which isn't exclusive to women.

Both men and women need to be educated

The findings underscore the need to educate both men and women about the broader social consequences of internalizing gender roles that go beyond the organizational setting.

Polling Question 5

- It will help to educate ____ on the social consequences of internalizing gender stereotype roles:
  - Men only
  - Women only
  - Both men and women
  - Not sure

Questions!

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