Experiencer, Helper, or Observer: Online Fraud Intervention for Older Adults Through a Role-based Simulation Approach

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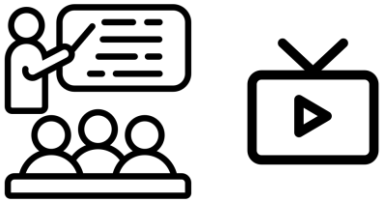
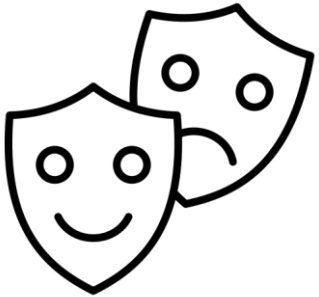
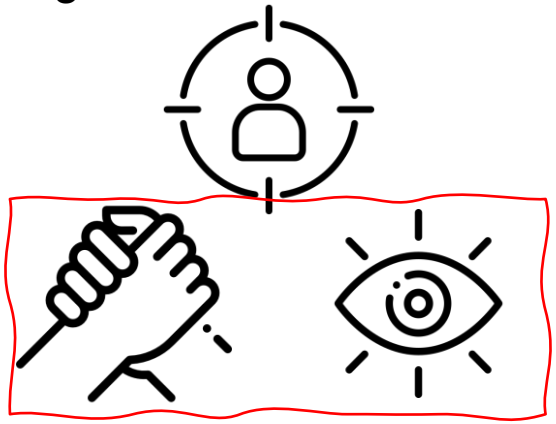
Online fraud is a critical global threat that disproportionately targets older adults



traditional one-way formats



role-based simulation

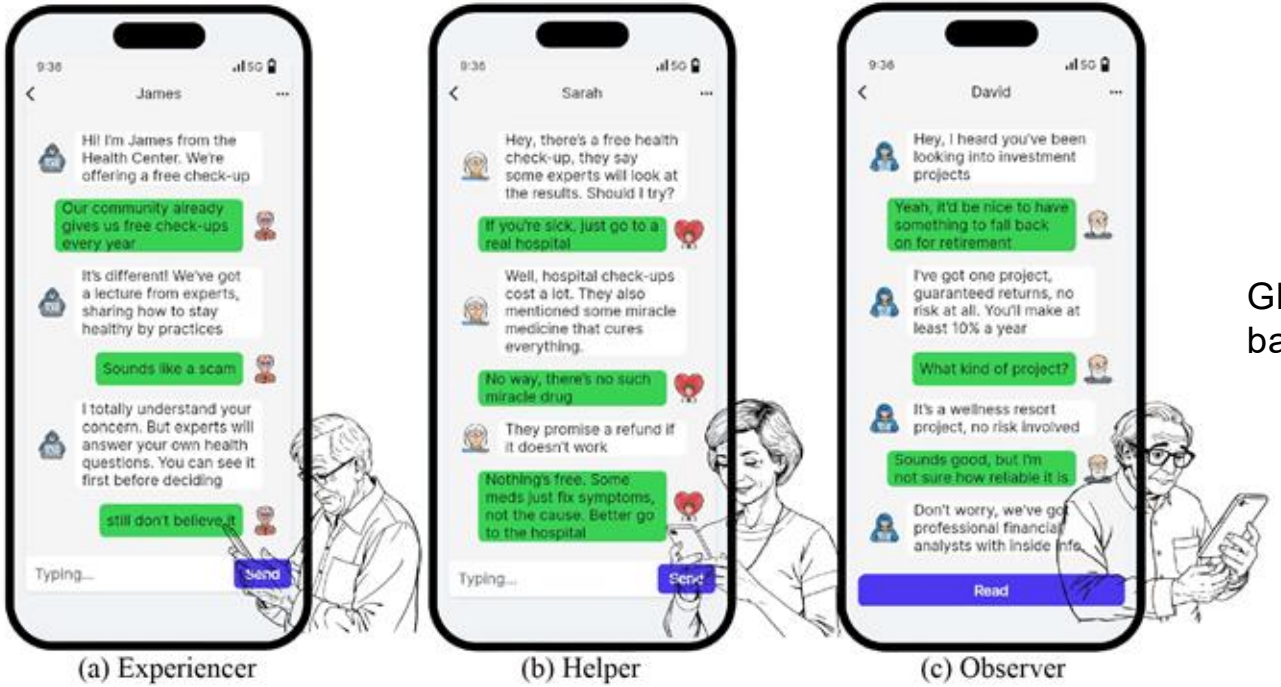


various interaction modes

Existing simulations have rarely been tailored to older adults, and most place participants in the role of the victims.

However, fraud involves complex social interaction, including not only scammers and victims, but also **bystanders who observe and helpers who provide support**.

ROLESafe: An Online Fraud Intervention for Older Adults



(a) Experiencer (b) Helper (c) Observer

GPT-4o as the backend model

Experiential Learning Theory	Learning by Teaching approach	Social Learning Theory

Research Questions

- **RQ1:** How does role-based simulation learning influence older adults' fraud awareness between the three treatment groups (Experiencer, Helper, Observer) and the control group (static learning material)?

- **RQ2:** How do different roles (Experiencer, Helper, Observer) within simulation learning influence older adults' online fraud awareness?

Design Materials

Online Fraud Discourses

keywords “older adults” AND “online” AND “fraud”

Online Fraud Contexts

Financial expectations

Health concerns

Online Fraud Channels

WeChat-style chat interface

103 online fraud cases targeting older adults

Design Materials

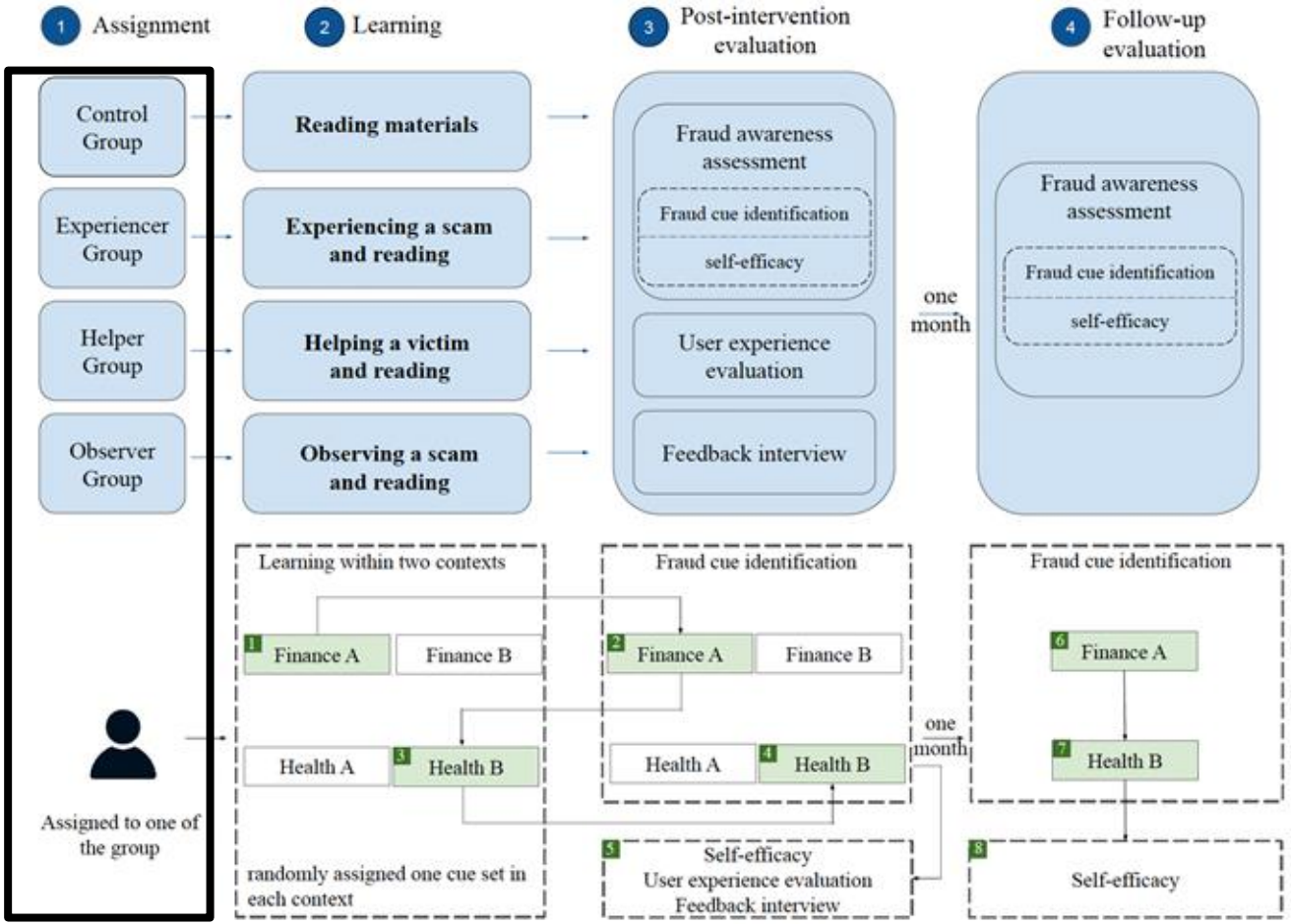
Although the concrete fraudulent content may differ, the underlying fraud cues leveraged, such as exaggerating illness to create anxiety, are largely the same

Table 1: Online fraud cues.

Context	Set	Cue
Finance	A	Cue 1: Promise high returns with low risk
		Cue 2: Claim to be financial experts
		Cue 3: Pitch senior-living investment schemes
	B	Cue 4: Leverage peer influence
		Cue 5: Invoke fake government investment schemes
		Cue 6: Promise dividends between shareholders
Health	A	Cue 1: Exaggerate illness to create anxiety
		Cue 2: Claim to be medical experts
		Cue 3: Advertise referrals to top doctors
	B	Cue 4: Frame products as miracle cures with refund guarantees
		Cue 5: Offer free services as bait
		Cue 6: Using cheap trials with steep follow-up charges

Study Procedure

Between-subjects experiment with 144 Chinese older adults



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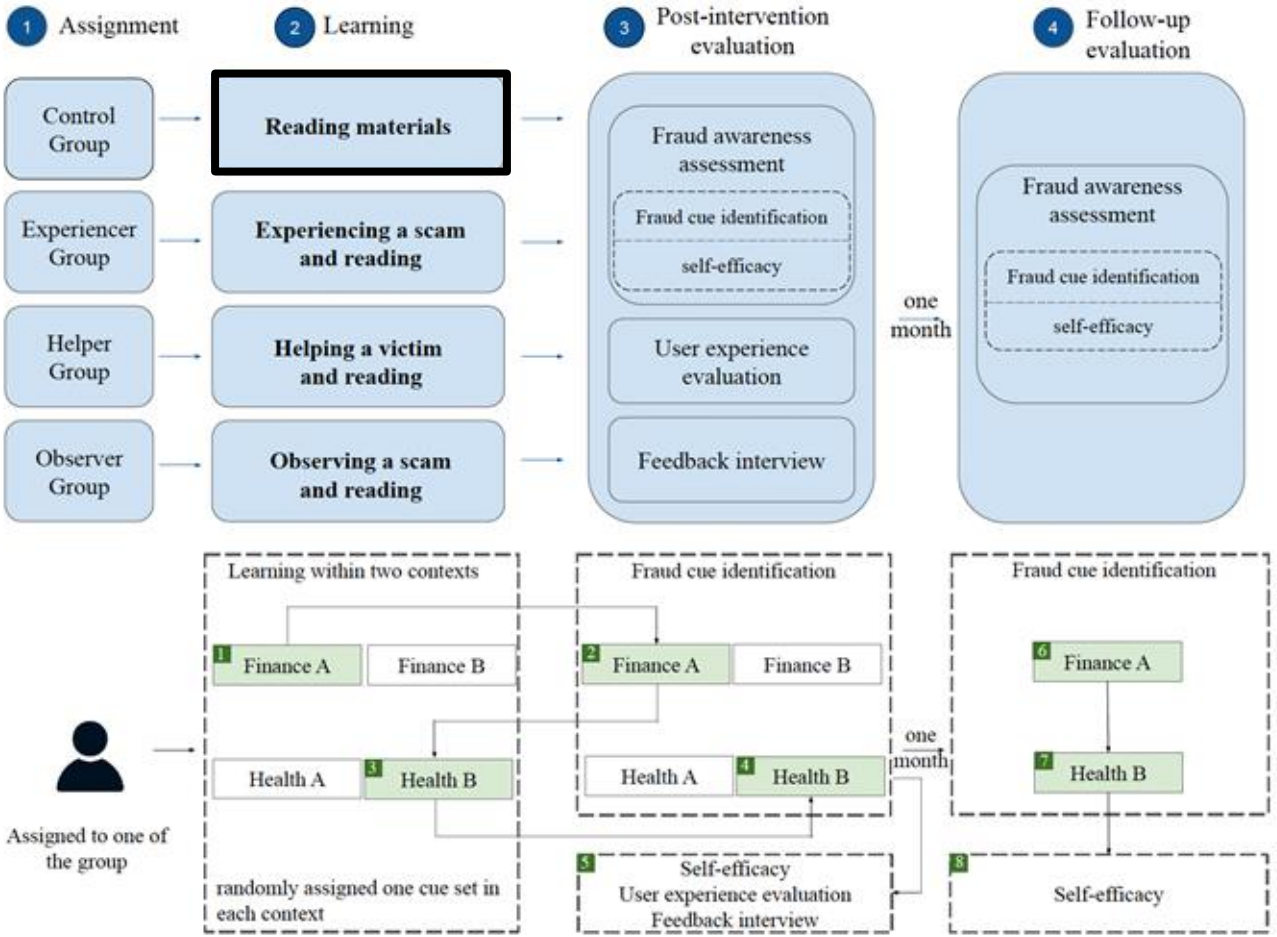

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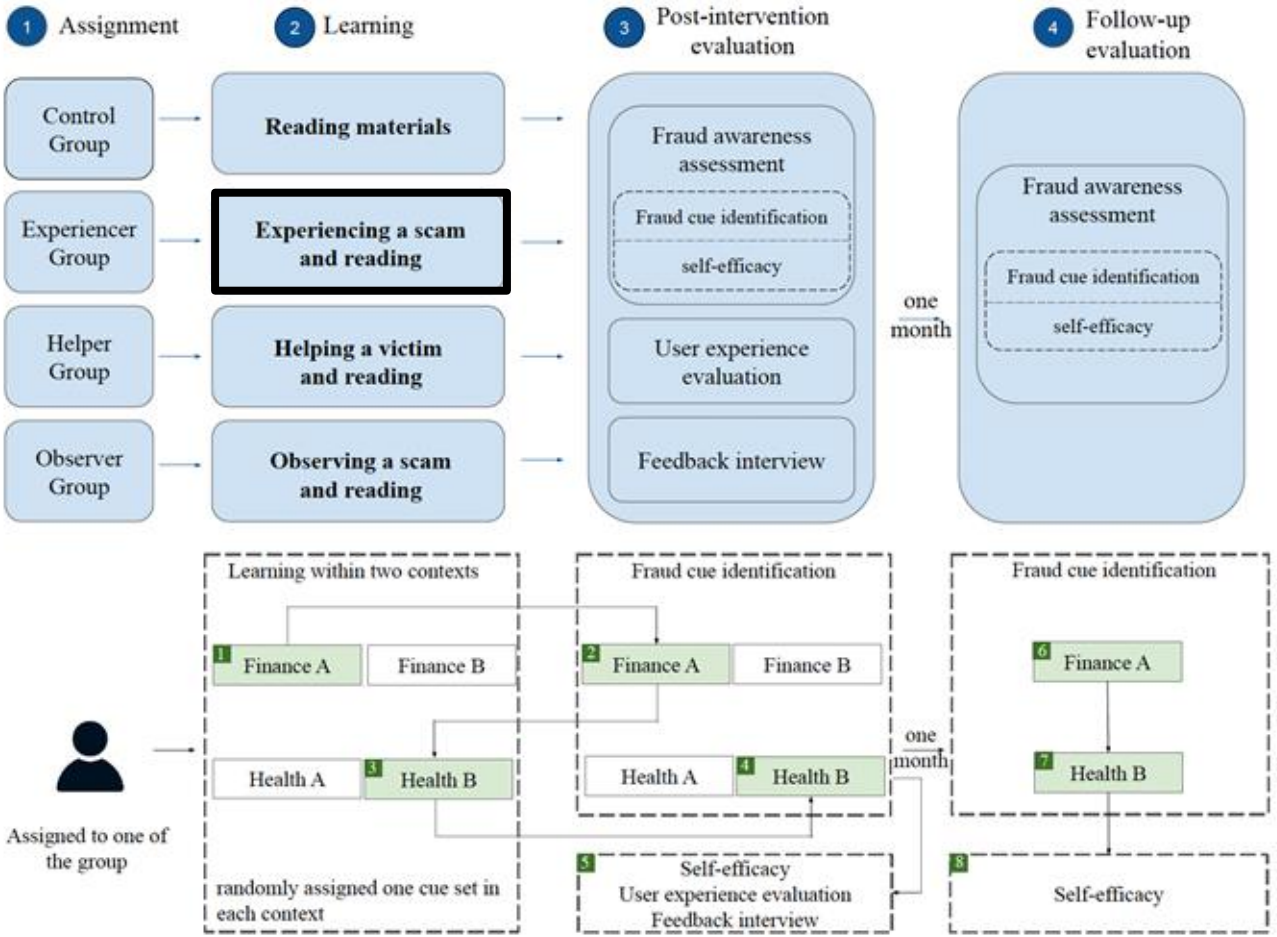
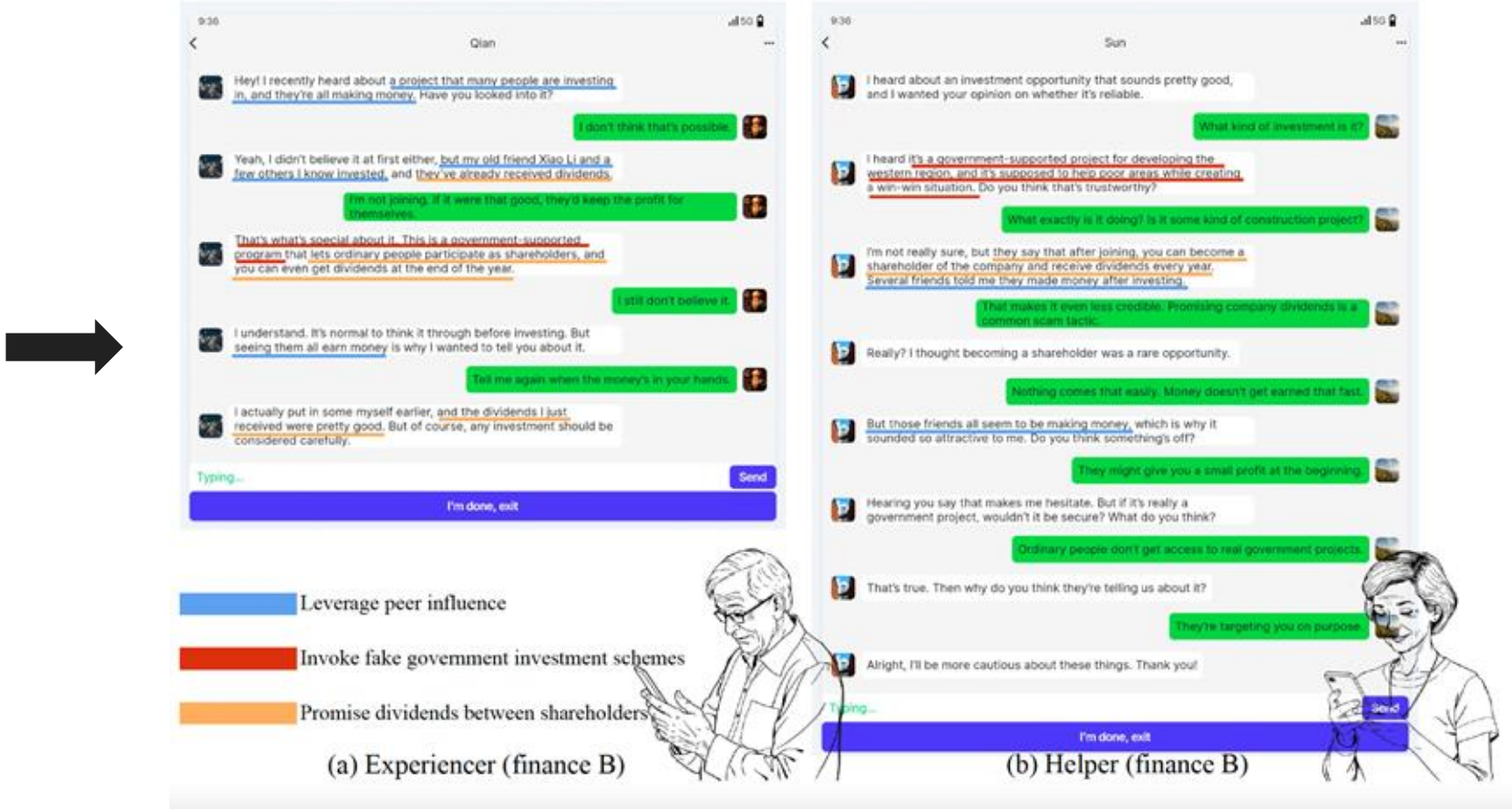


Learning Phase in Experiencer and Helper Mode



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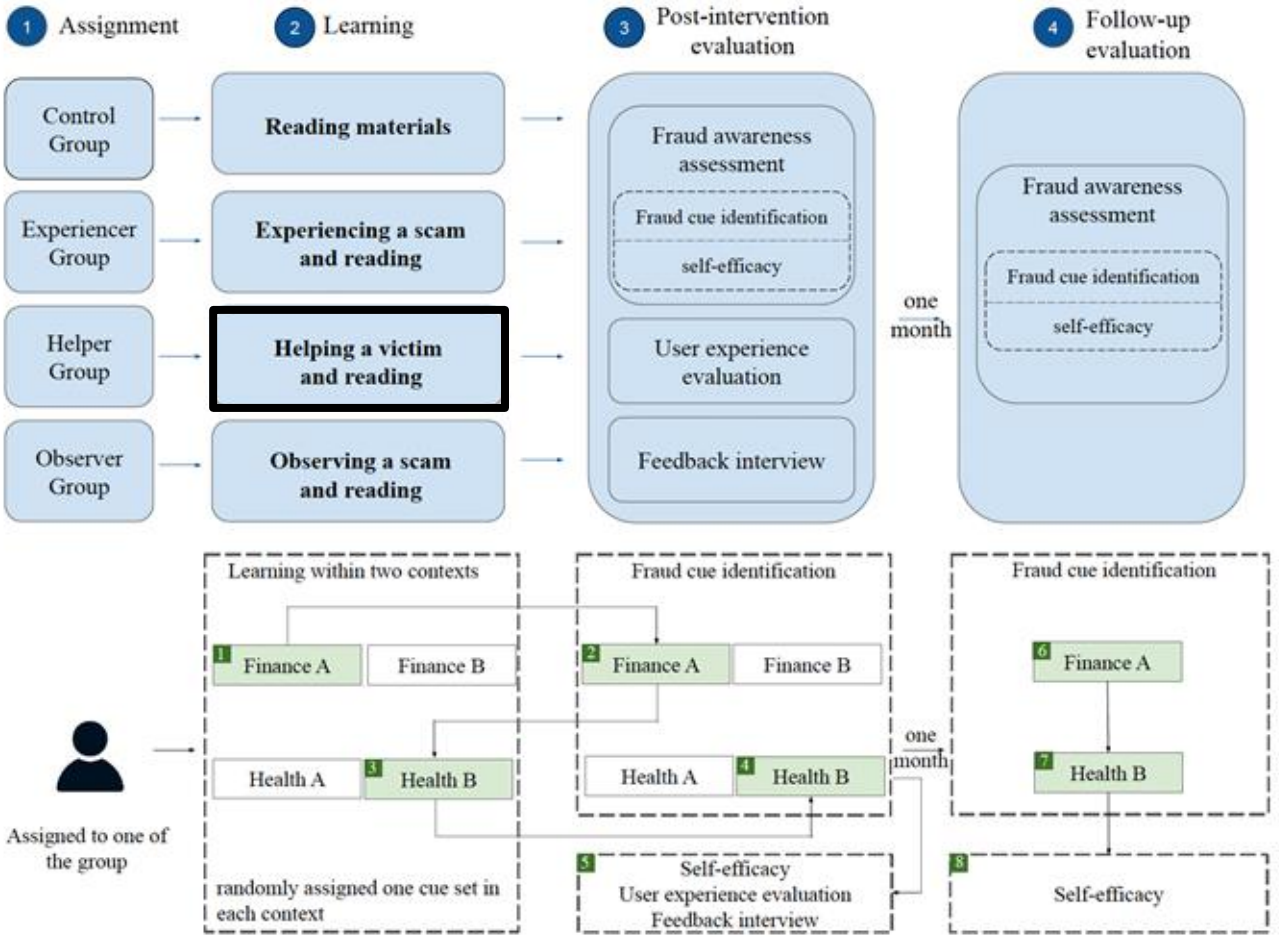

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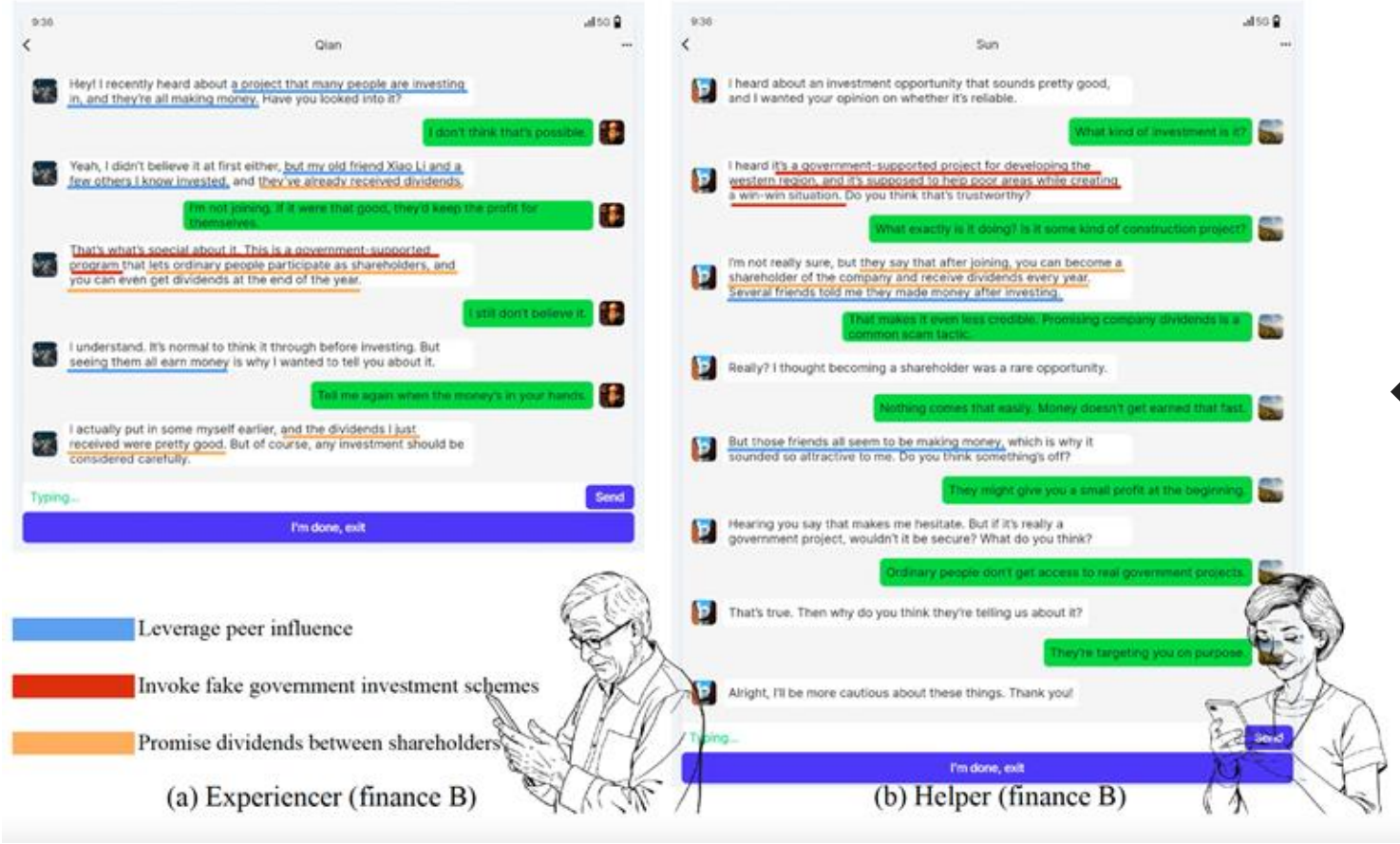

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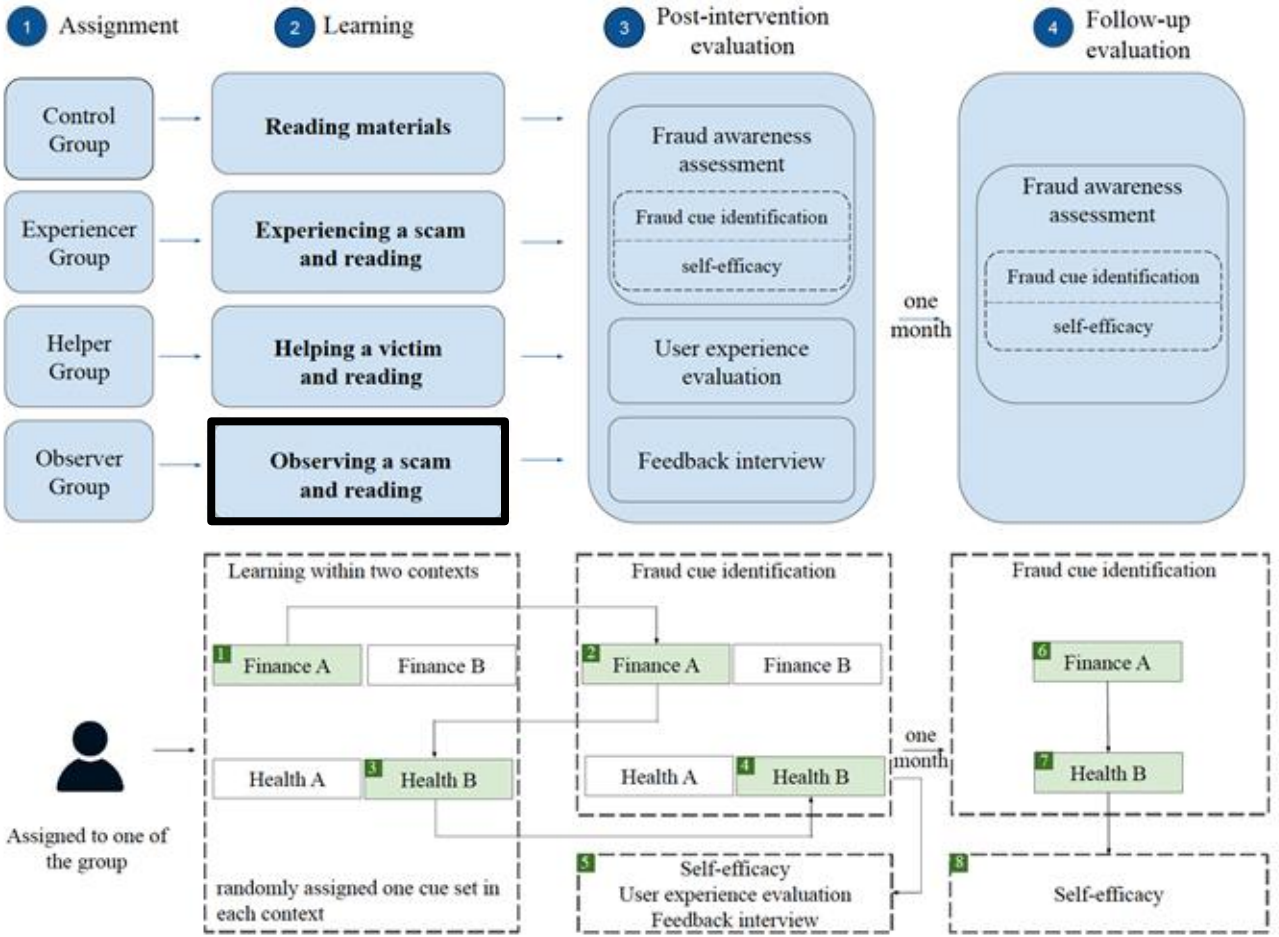
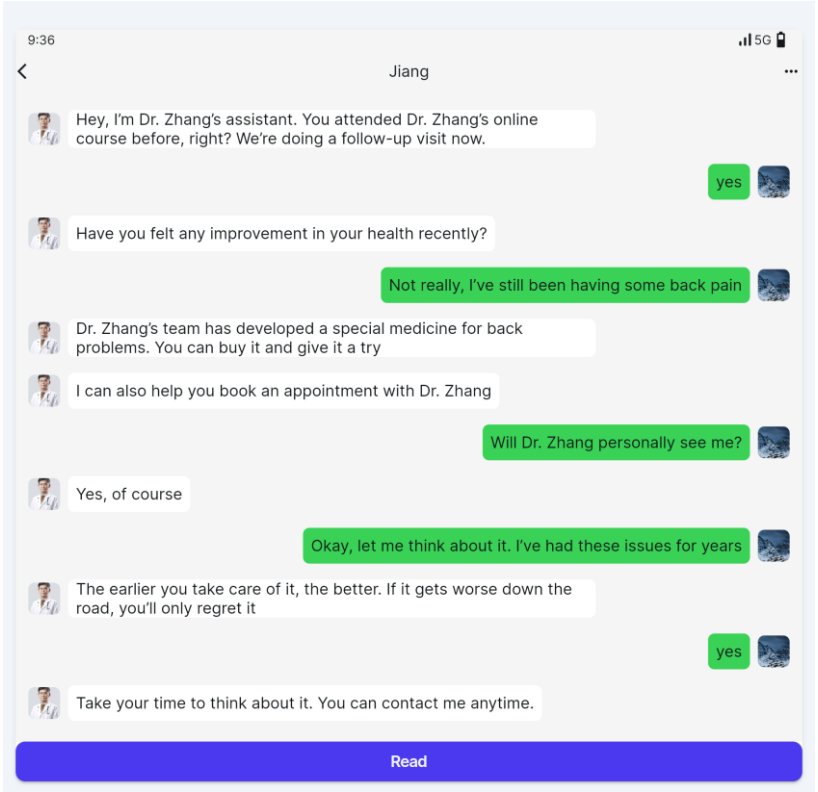


Learning Phase in Observer Mode



Observer (health A)

Study Procedure

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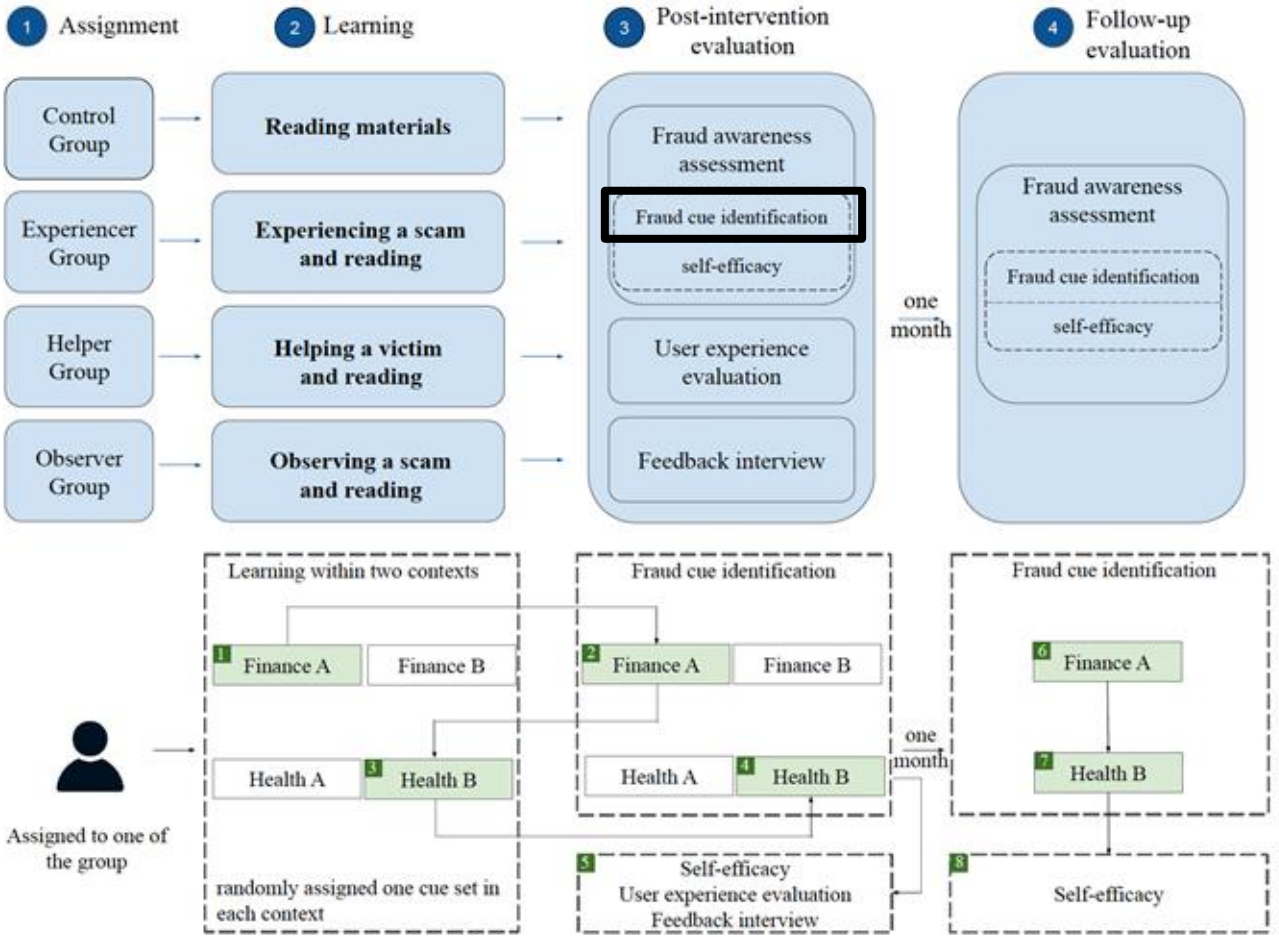


Fraud Cue Identification

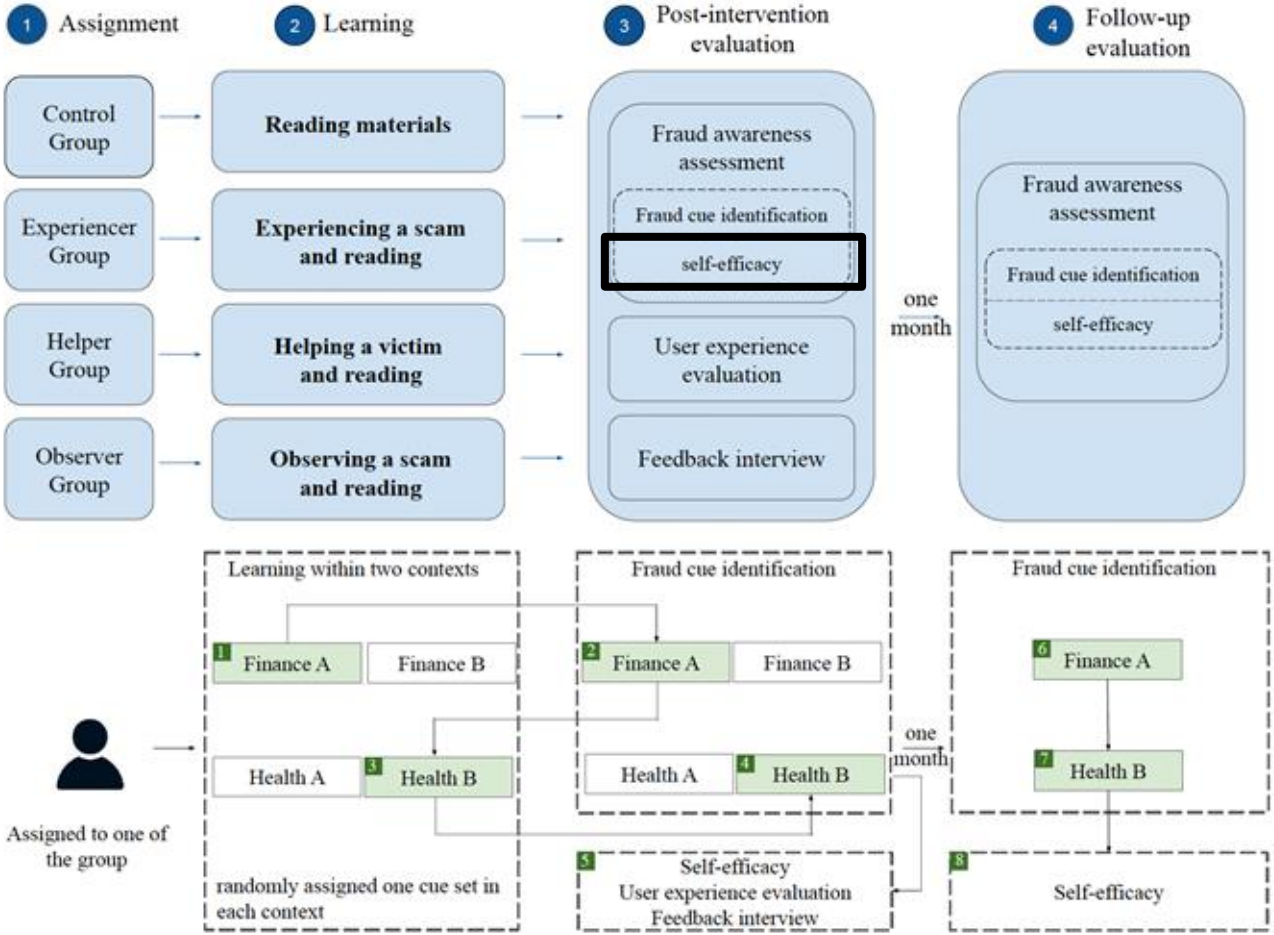
Task

Q: Please select the fraud cues below that you think are present in the above conversation

- Promise high returns with low risk
- Claim to be financial experts
- Leverage peer influence
- Pitch senior-living investment schemes
- Invoke fake government investment schemes
- Promise dividends between shareholders
- None of the above

Fraud Case

Study Procedure



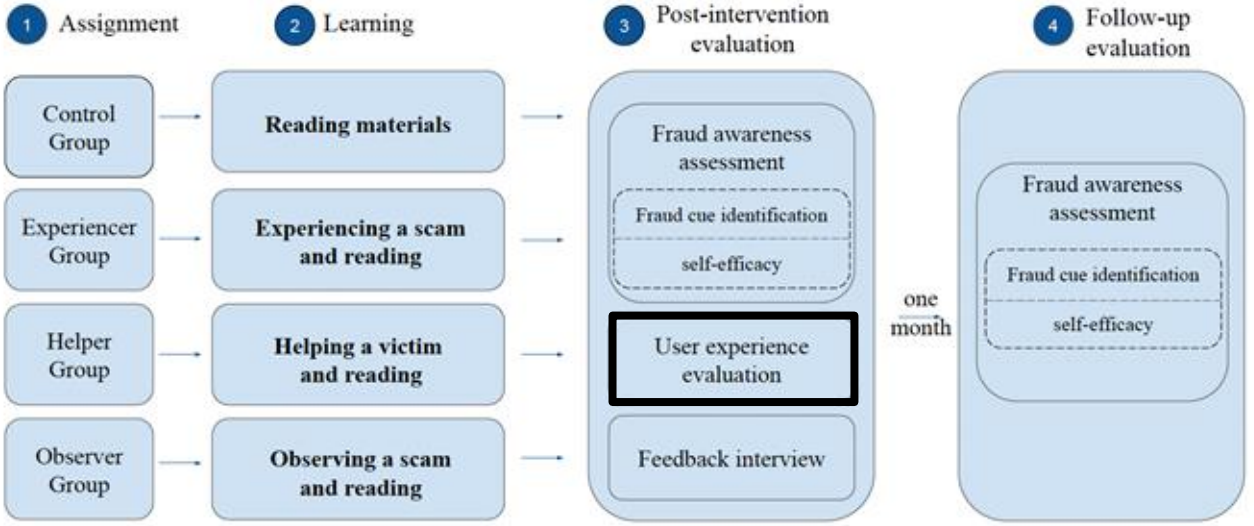
Between-subjects experiment with 144 Chinese older adults

Self-efficacy

Table 10: Measurement items used in the evaluation.

Construct	Items
self-efficacy [80]	I am confident I can detect online scams. I am able to detect online scams without much effort.
enjoyment [2]	I have fun interacting with the system. Using the system provides me with a lot of enjoyment. I enjoy using the system. Using the system bores me.
usability [41]	This learning system's capabilities meet my requirements. Using this learning system is a frustrating experience. This learning system is easy to use. I have to spend too much time correcting things with this learning system.
future behavioral intention [2]	I plan to use the system in the future. I intend to continue using the system in the future. I expect my use of the system to continue in the future.

Study Procedure



Between-subjects experiment with 144 Chinese older adults

User Experience

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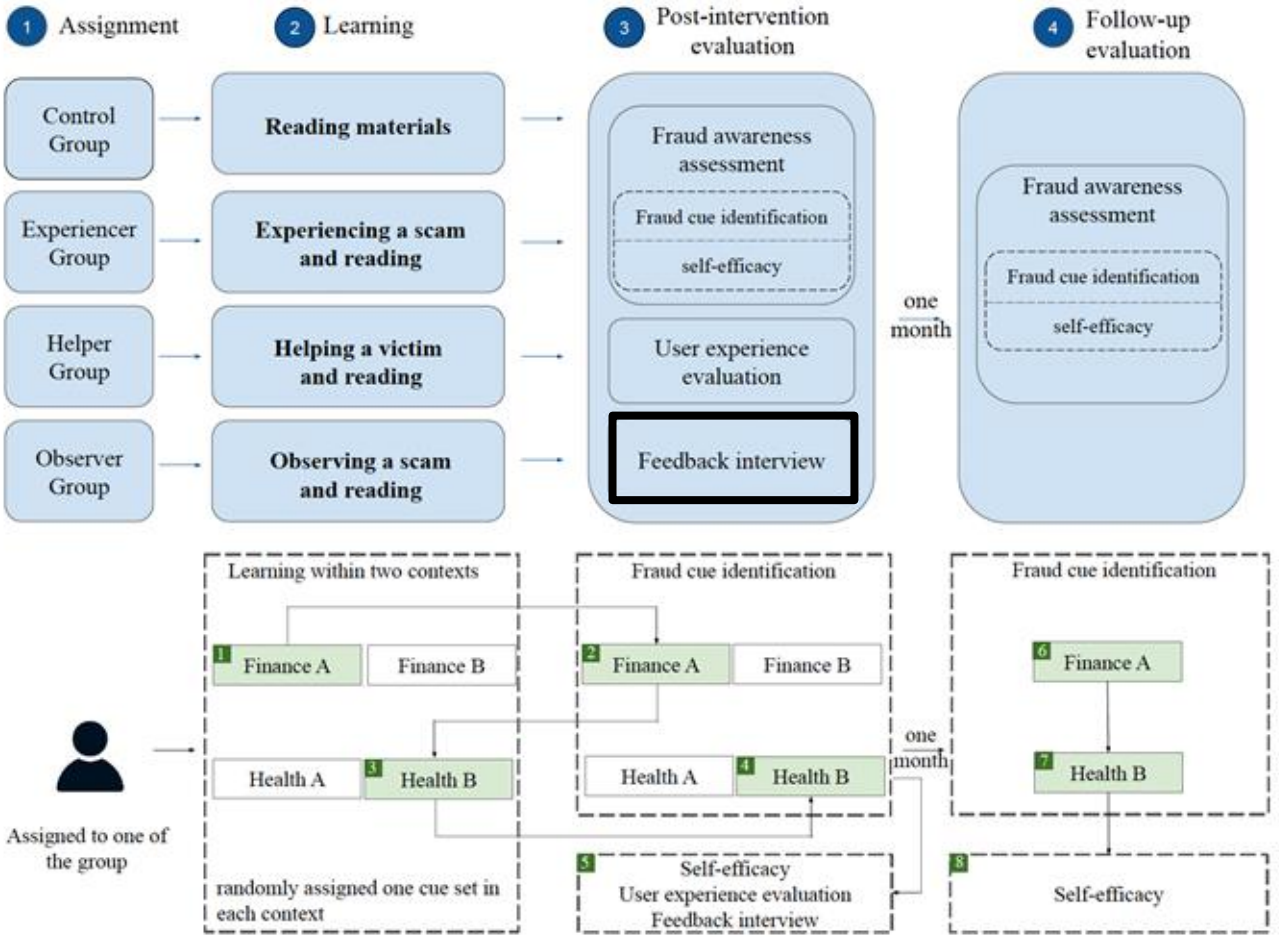

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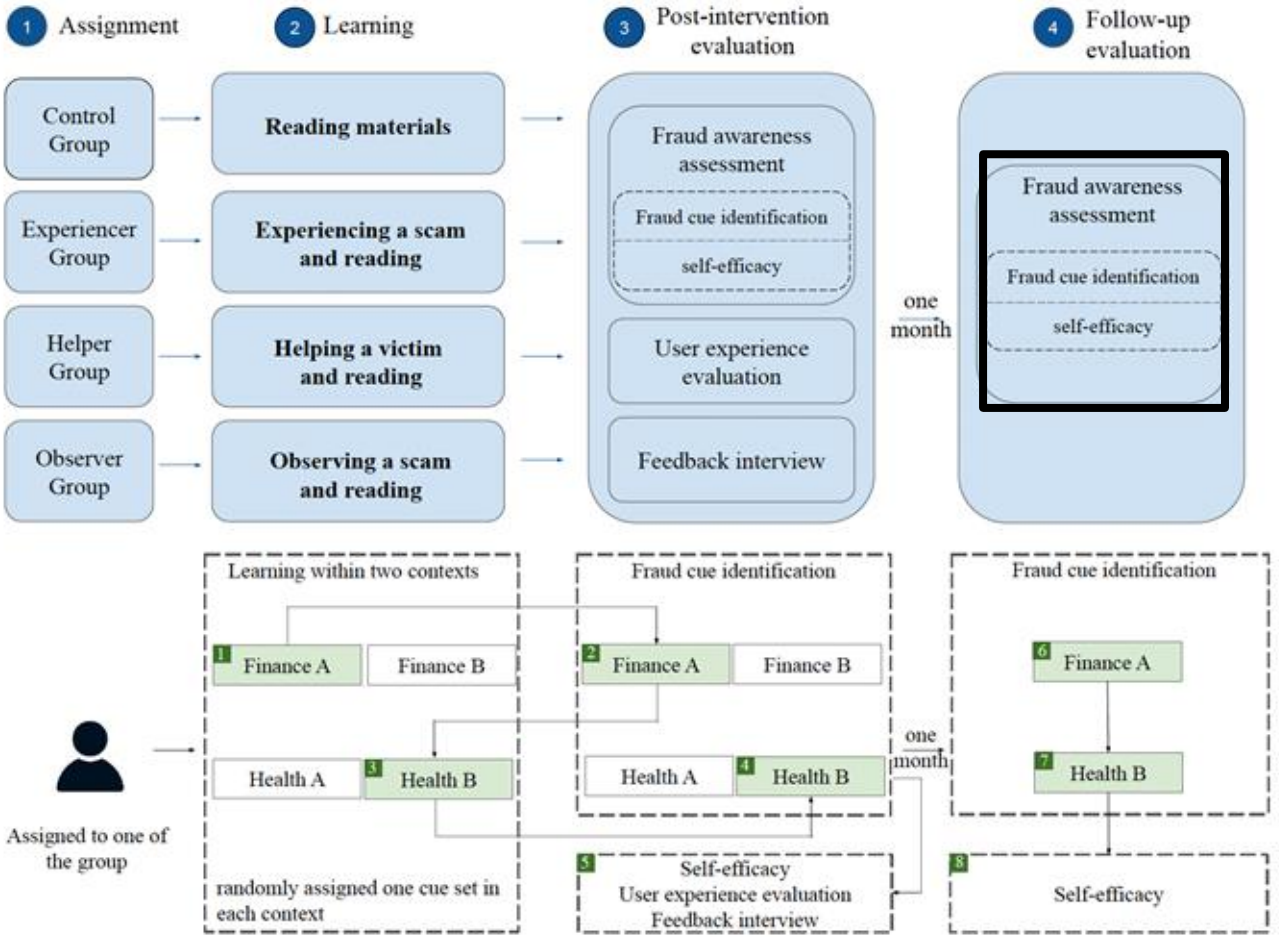
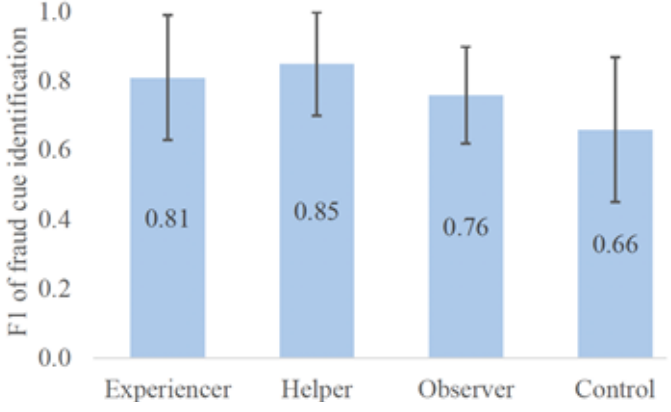


Effectiveness of Intervention – Online Fraud Cue Identification Comparison



(a) Fraud cue identification (mean ± SD)

Table 2: Results of the Kruskal–Wallis test comparing intervention effectiveness.

	Effectiveness Construct	Test Statistic	P-value
treatment vs. control	fraud cue identification	24.68	$< .001^{***}$
	self-efficacy	1.98	.576
among treatment	fraud cue identification	6.97	$.031^{*}$
	self-efficacy	1.09	.581

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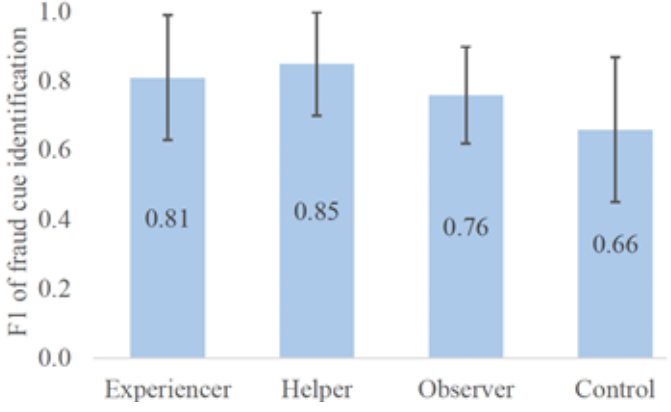

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Table 3: Pairwise comparisons across all groups on fraud cue identification using Dunn's test with Bonferroni correction

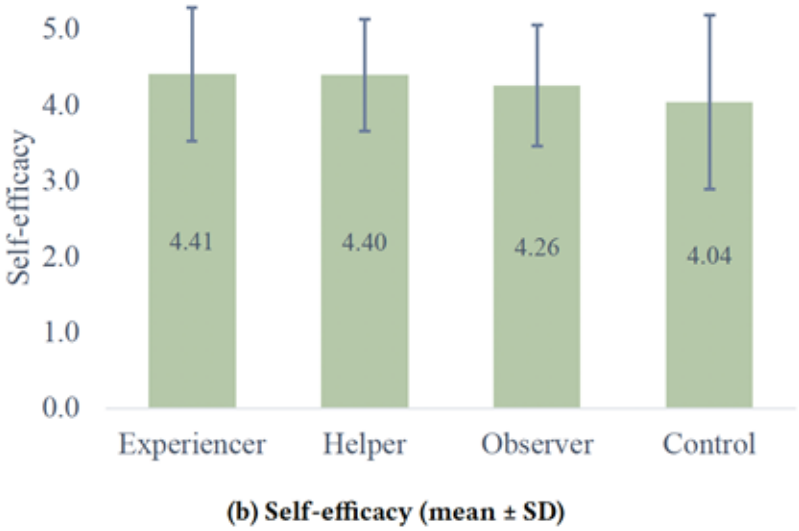
	Test Statistic	Adjusted P
control vs. helper	4.73	$<.001^{***}$
control vs. experiencer	3.53	$.002^{**}$
control vs. observer	2.21	.163
experiencer vs. helper	1.00	1.000
observer vs. experiencer	1.35	1.000
observer vs. helper	2.43	.090

Table 4: Pairwise comparisons among treatment groups on fraud cue identification using Dunn's test with Bonferroni correction.

Comparison	Test Statistic	Adjusted P
observer vs. helper	2.63	$.025^{*}$
observer vs. experiencer	1.50	.399
experiencer vs. helper	1.04	.891

Summary: engaging older adults in more active roles, particularly helping others, may provide stronger fraud cue recognition improvement

Effectiveness of Intervention – Self-efficacy of Online Fraud Identification



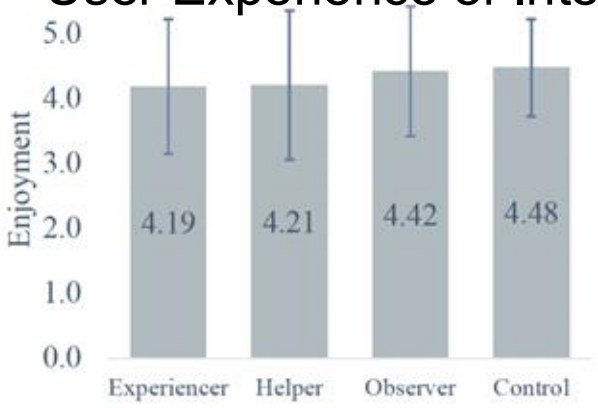
(b) Self-efficacy (mean ± SD)

Table 2: Results of the Kruskal–Wallis test comparing intervention effectiveness.

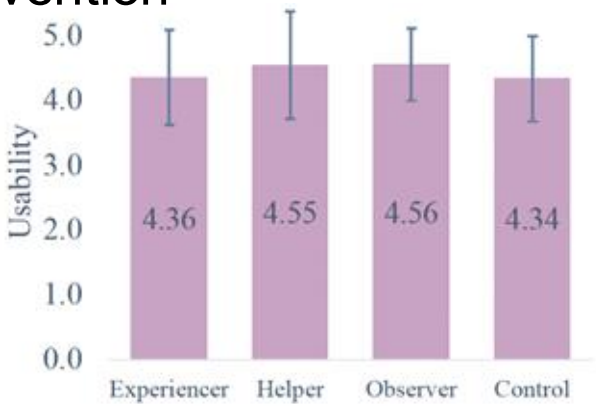
	Effectiveness Construct	Test Statistic	P-value
treatment vs. control	fraud cue identification	24.68	$< .001^{***}$
	self-efficacy	1.98	.576
among treatment	fraud cue identification	6.97	$.031^{*}$
	self-efficacy	1.09	.581

Summary: neither the presence of the role-based intervention nor the role assigned led to statistically significant improvements in self-efficacy

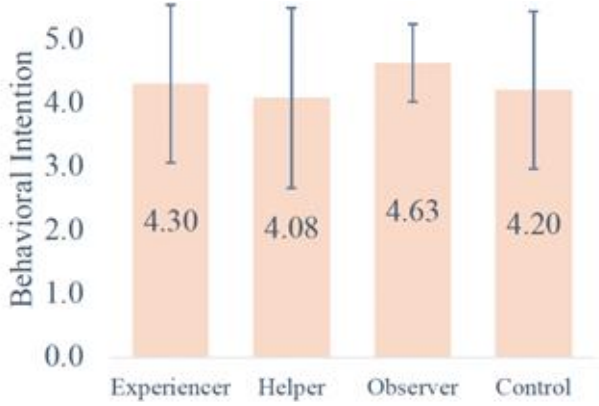
User Experience of Intervention



(a) Enjoyment (mean ± SD)



(b) Usability (mean ± SD)



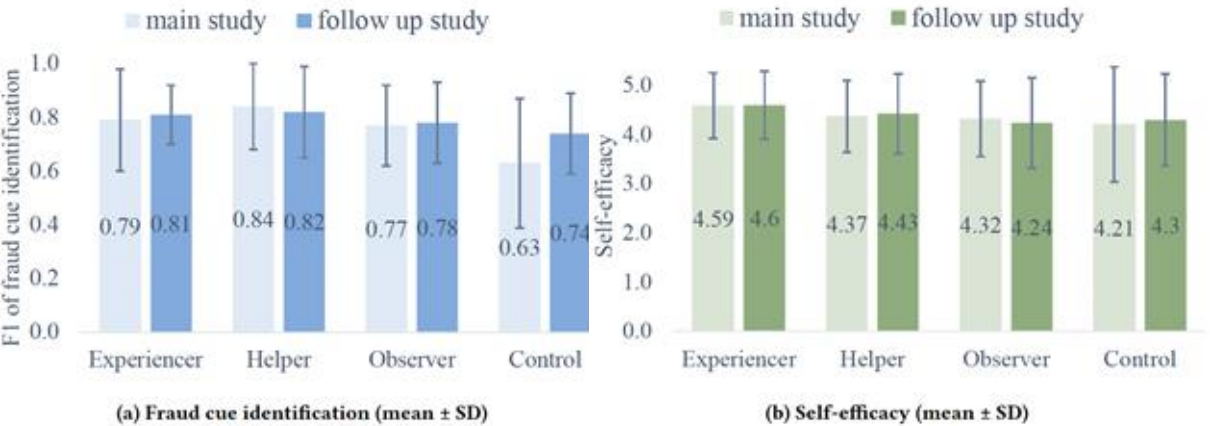
(c) Future Behavioral Intention (mean ± SD)

Table 5: Results of the Kruskal–Wallis test comparing user experience.

	User Experience Construct	Test Statistic	P-value
treatment vs. control	enjoyment	2.21	.529
	usability	5.30	.151
	future behavioral intention	1.49	.685
among treatment	enjoyment	1.80	.406
	usability	2.20	.332
	future behavioral intention	0.78	.675

Summary: role-based simulation interventions did not yield significant differences in user experience

One-month Follow-up Effects of Intervention



(a) Fraud cue identification (mean ± SD)

(b) Self-efficacy (mean ± SD)

Table 9: Results of the Kruskal–Wallis test comparing intervention effectiveness (follow-up study).

	Effectiveness Construct	Test Statistic	P-value
treatment vs. control	fraud cue identification	2.95	.399
	self-efficacy	2.07	.558
among treatment	fraud cue identification	0.98	.613
	self-efficacy	2.02	.364

Table 8: Within-group effectiveness differences between the main study and follow-up study.

	Group	Shapiro p-value	Test-used	Test Statistic	P-value
fraud cue identification	experiencer	0.022	Wilcoxon signed-rank	Z = -0.284	.798
	helper	0.412	Paired t-test	t = -0.582	.565
	observer	0.689	Paired t-test	t = 0.331	.745
	control	0.023	Wilcoxon signed-rank	Z = 1.660	.102
self-efficacy	experiencer	0.027	Wilcoxon signed-rank	Z = -0.280	.831
	helper	0.010	Wilcoxon signed-rank	Z = 0.560	.582
	observer	0.102	Paired t-test	t = -0.347	.733
	control	0.023	Wilcoxon signed-rank	Z = -0.118	.937

84 participants in the follow-up study

Summary: significant group differences for fraud cue identification were not observed at the follow-up

User Feedback of Intervention

Perceived Benefits of LLM-based Simulation

- concreteness and detail
- flexibility and authenticity
- practical relevance
- accessible for older adults
- future uses of AI in decision support

User Feedback of Intervention

Perceived Benefits of LLM-based Simulation

Benefits

- concreteness and detail
- flexibility and authenticity
- practical relevance
- accessible for older adults
- future uses of AI in decision support

Perceived Limitations of LLM-based Simulation

Limitations

- rigidity
- lack of warmth
- limited fraud sophistication

Experiencer Feedback

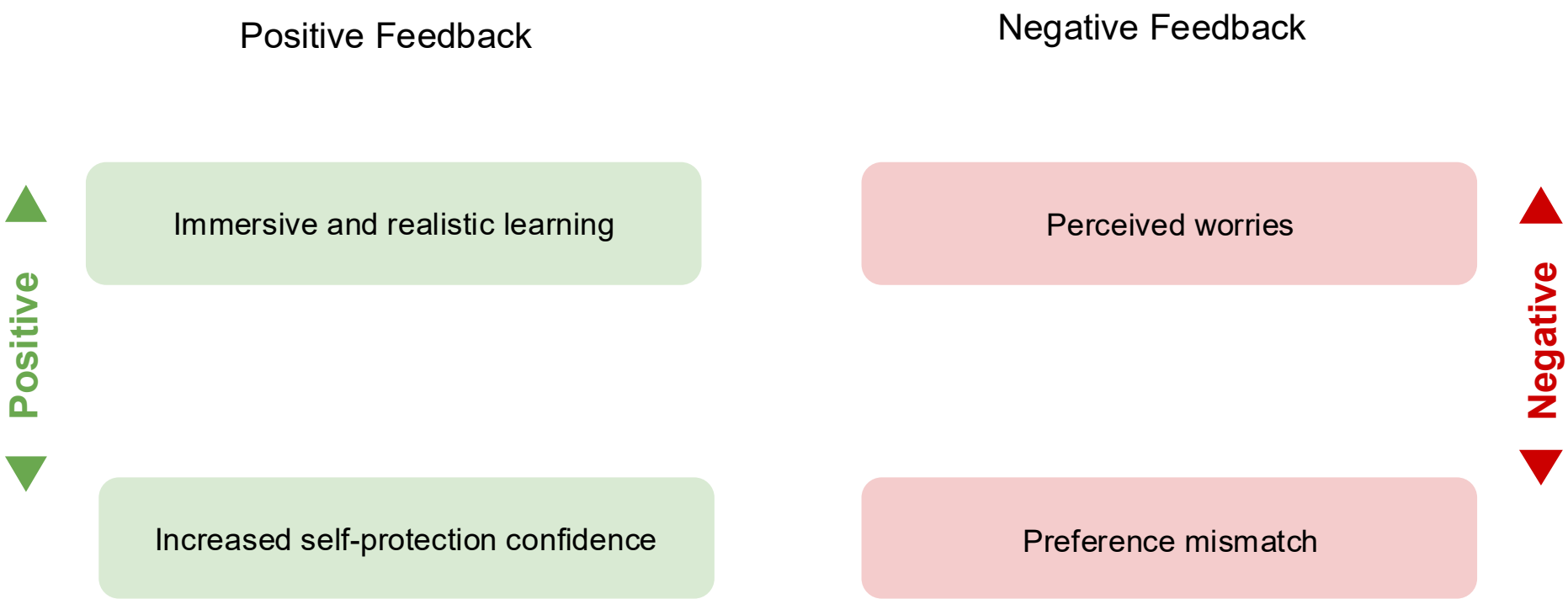
Positive Feedback

Positive

Immersive and realistic learning

Increased self-protection confidence

Experiencer Feedback



Helper Feedback

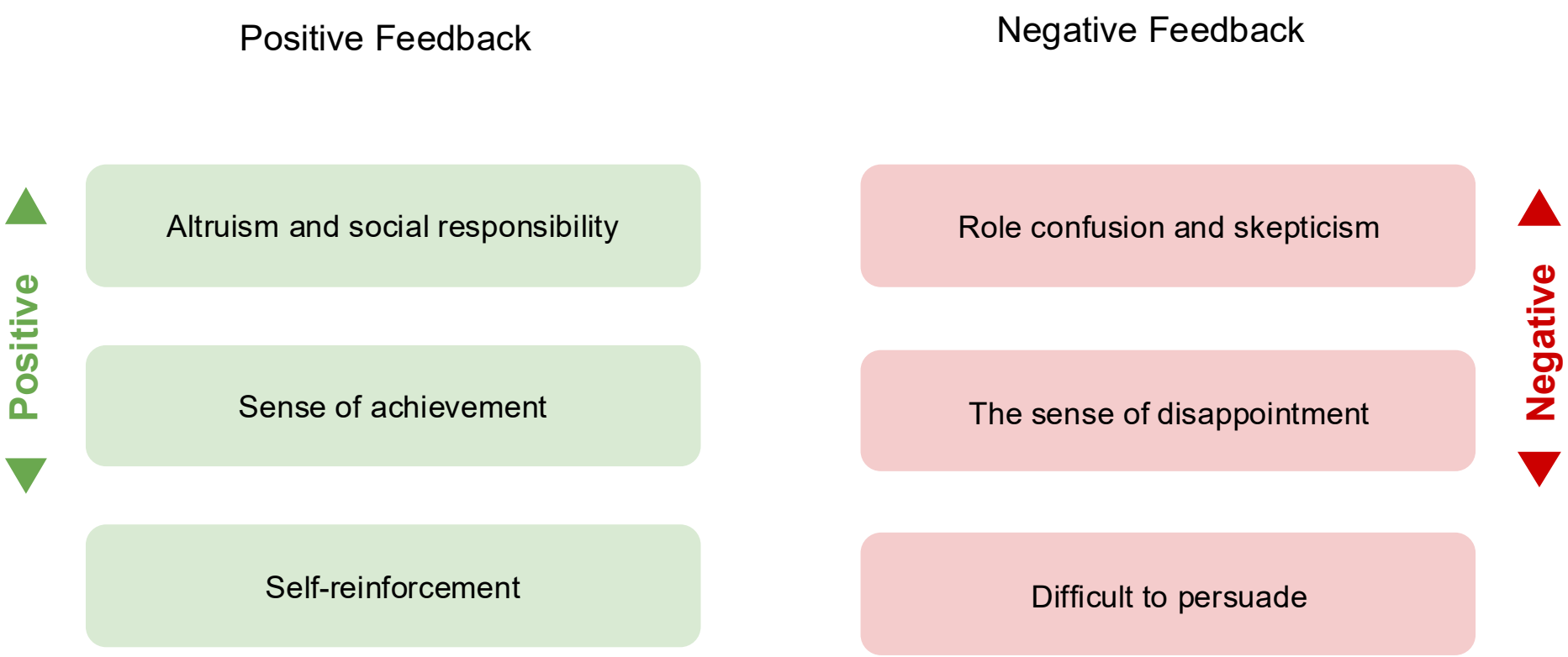
Positive Feedback

Altruism and social responsibility

Sense of achievement

Self-reinforcement

Helper Feedback



Observer Feedback

Positive Feedback

Positive

- Warning effect
- Empathy and reflection

Negative Feedback

Negative

- Low engagement

Discussion

- Reimagining Fraud Education for Older Adults through Role-based Simulation
  - Moving Beyond General Information: Fine-grained Fraud Education
  - Leveraging LLMs for Role-based Simulation: Opportunities and Challenges

- Broadening Fraud Education through Multi-Role Perspectives
  - Experiencer, Helper, Observer

Discussion

- ➢ Implications
  - Design Implications
    - Integrating different roles into one application
    - Mitigating confusion between simulation and reality
    - Scaling role-based interventions
  - Educational Implications
    - Embedding role-based simulation into existing fraud education
    - Advocating for the longitudinal effects

Experiencer, Helper, or Observer: Online Fraud Intervention for Older Adults Through a Role-based Simulation Approach

- We develop and evaluate an online fraud intervention tailored for older adults using role-based simulation
- We make the first attempt to educate older adults about online fraud with different roles (Experiencer, Helper, and Observer)
- We provide empirical evidence on the effectiveness of role-based simulation for online fraud intervention, and demonstrate how different roles shape both learning outcomes and nuanced perceptions

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