Less is More in VR Empathy and Compassion Training: Suppression Mechanisms Explain Mode Effects, Variance Predicts Harm

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INTRO

- VR has been proposed as a tool to reduce outgroup bias (such as ethnic discrimination) by inducing perspective-taking and thereby increasing empathy and compassion.
- Previous studies have limitations such as small samples, lack of follow-up, absence of controls and failure to distinguish between VR modes.
- There is lack of clarity on why certain VR modes work or outperform others
- There is limited information on who will benefit most from VR, as well as how to detect potential harm during intervention development.

METHODS

1. Two preregistered RCTs; N = 1,080 adolescents (Nigeria, Kenya).
2. Conditions: Embody, Observe, Role Model, Control, NPT (Study 2 only). Outcomes: empathy (AMES, IRI-Fantasy) and compassion (SOCS), assessed at baseline, post-intervention, and follow-up.
3. Mixed-effects models; Benjamini-Hochberg FDR correction.

RESULTS

Primary Effects at Immediate Post-Intervention (T2)

Outcome	Comparison	d	p(FDR)	Study
AMES Composite	Observe vs Control	0.77*	< .001	1
Composite Empathy	Observe vs Control	0.62*	.016	2
Composite Empathy	Observe vs Embody	0.55*	.027	2
Motivation to Act	Role Model vs Control	-0.58*	.022	2

Note: Study 1 effects are for the low-baseline subgroup

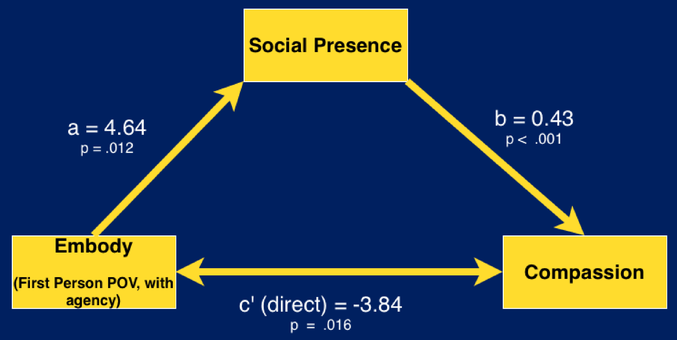
- Participants with the lowest baseline scores showed the **highest baseline variability** (r=-0.74, p=.009). They also showed the largest immediate gains but steepest decay by four-week follow-up.

DISCUSSION

- ***Finding 1:*** Path analysis revealed a **suppression mechanism**. Embodiment increases social presence (which helps compassion) but simultaneously triggers self-referential processing (which directly hurts it); the two cancel to a null total effect.

FINDINGS

1. Third-person Observe outperformed first-person Embody, producing significant empathy and compassion gains (d = 0.51–0.77); Path Analysis shows suppression effect which explains Embody's null total effect.



2. The Role Model condition backfired, reducing compassion (d = -0.58, p(FDR) = .022). Variance expansion predicted this harm, identifying variance as an early-warning diagnostic

Condition	Variance change (SD^2 ratio T2/T1)	Direction	Mean effect (d vs Control)
Observe	0.84	Compressed (9 of 9 outcomes)	+0.34
NPT	0.91	Compressed (7 of 9)	−0.02
Control	0.97	No systematic change	0.00
Embody+Observe	1.04	Expanded (3 of 9)	+0.02
Role Model	1.08	Expanded (4 of 9)	−0.12
Embody	1.10	Expanded (5 of 9)	−0.08

Note. Variance ratio = $SD^2(T2)/SD^2(T1)$ within condition; < 1 = compression, > 1 = expansion. Variance–efficacy correlation = Pearson r across the six Study 2 conditions, mean variance ratio vs mean Cohen's d vs Control, averaged over nine outcomes. Study 1 = Nigeria & Kenya (N = 703); Study 2 = Lagos, Nigeria (N = 377). u.ng

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DISCUSSION (cont'd)

- ***Finding 2:*** Variance change functions as a prospective diagnostic. Role Model **expanded variance** across three compassion outcomes, matching its reduced efficacy; Observe **compressed variance**, matching its benefit.
- This frames variance itself as a signal available during piloting, before outcome data even exists.

Theoretical Implications

- Psychological distance, not immersion, provides better emphatic outcomes in emotionally intense discriminatory content.

Practical Implications

- For emotionally intense intergroup VR content, third-person observation outperforms first-person immersion.
- Adding immersive complexity (e.g., role-model + observe) can backfire; simpler designs are safer.
- Pilot-test variance: response-variance expansion can flag harm before outcome data are collected.
- Observe mode's effectiveness supports low-cost, smartphone-based deployment (under $10).

Variance as Prospective Diagnostic for VR Intervention Outcomes

Finding	Value	p	Study
Baseline mean–SD correlation (lower baseline → greater variability)	r = −0.74	.009	1
Variance–efficacy correlation (expansion → harm, compression → benefit)	r = −0.82	.047	2

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