



AFRL

A MODEL OF MORAL INJURY ANTECEDENTS IN U.S. AIR FORCE RPA PERSONNEL

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Learning Objectives

1. Describe a model that explains how vicarious combat exposure and social support contribute to the development of moral injury in RPA personnel.
2. Analyze the distinct roles of social support as both a direct mitigator of moral injury and a buffer against the effects of vicarious combat exposure.
3. Discuss the application of this antecedent model for developing targeted, preventative interventions to improve the health and readiness of the RPA community.



Background

Introduction

- **Remotely Piloted Aircraft (RPA)** deliver critical national security capabilities across the globe.
- RPA's face unique psychological stressors that have been tied to elevated PTSD risk, anxiety, depression, suicidal ideation, sleep problems, role strain, burnout and associated work dysfunction (e.g., Armour & Ross, 2017; Bryant-Lees et al., 2021; Chappelle et al., 2018).
- Beyond standard work stressors, RPA personnel are exposed to highly graphic, disturbing, and potentially traumatizing combat operations, which give us the basis to consider the role Moral Injury (MI) as a consequence of the psychological impact from combat exposure.





Defining Moral Injury- “Nomen non facit rem”

- Richardson and colleagues (2020) completed a systematic review about how moral injury has been defined in research with military populations. Based on a thematic analysis, they identified the following definitional themes [4]:

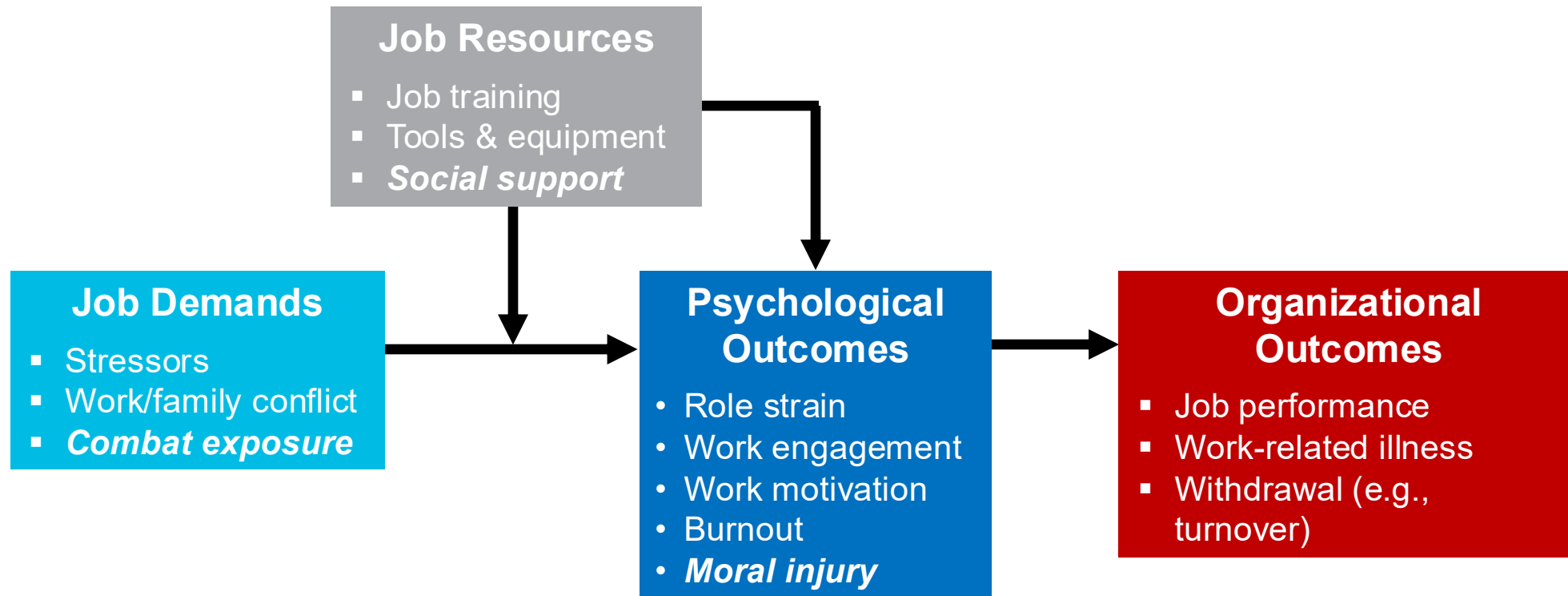
Theme	Operational Description
Ethics	Expectations of “right or wrong”:
Betrayal	Intrapersonal or Interpersonal level.
Orientation	MI as a result of our own perceptions or one’s encounter with a morally injurious event
Reconciliation	Restoring one’s own belief system after violations have occurred.
High-Stress Environment	MI tends to take place in a “high-stakes” environment.
Spiritual Wound	The harm caused at a deeper, existential level can create challenges for an individual in finding meaning or understanding the world surrounding them.
Psychobehavioral wound	Feelings of guilt, shame, meaninglessness, remorse, anger, self-handicapping, demoralization, and social and behavioral issues



- MI has been identified as both an outcome of combat and a predictor for more distal outcomes (e.g., Litz et al., 2009; Griffin et al., 2019; Hall et al., 2022; Williamson et al., 2018).
- Most of the previous research about MI has been focused on military personnel operating in the field, with little understanding of the linkages that combat-related MI have in RPA settings.
- To bridge the existing literature gap, this effort intends to quantify how the frequency and type of remote combat exposure drive three distinct facets of Moral Injury (Witnessing, Self-Related, and Betrayal) among active-duty RPA personnel.



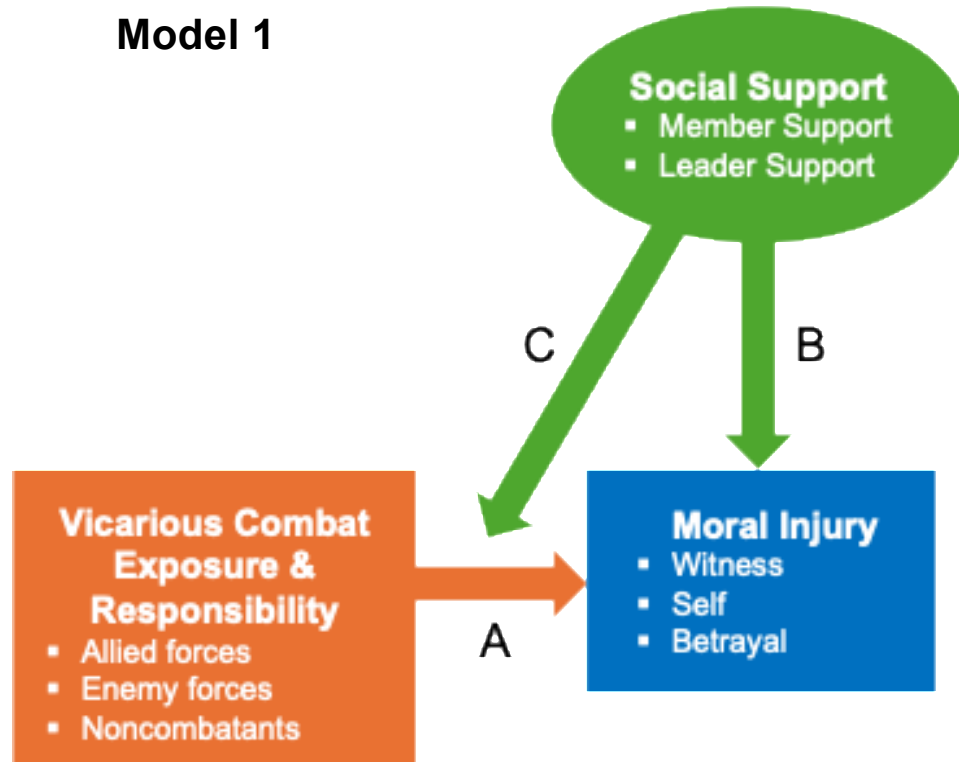
Framework: Job Demands-Resources (JD-R) theory



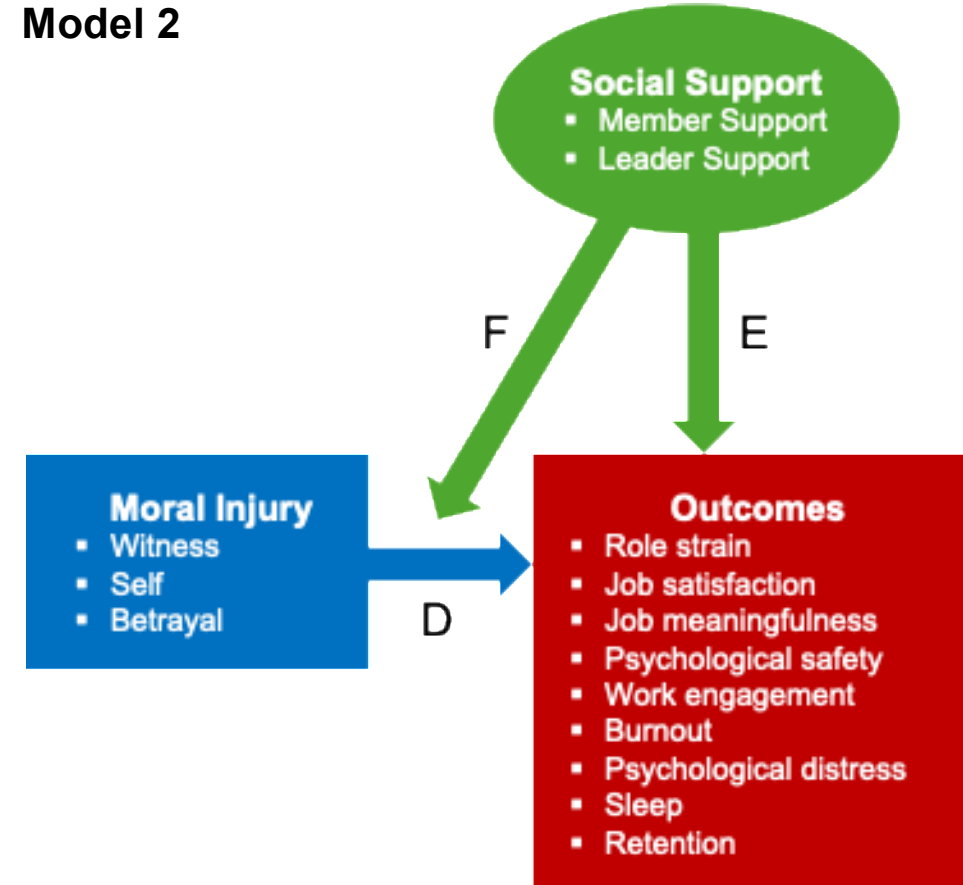
(Bakker & Demerouti, 2023)

Two Models as Parts of a Broader Investigation

Model 1



Model 2





Current Study



Aims:

1. Identify which types of vicarious combat events (VCE) are related to specific types of Moral injury
2. Assess the relative impact of VCEs and social support on Moral injury
3. Compare Member and Leader support as job resources in mitigating the impact of VCE on MI as
 - Main effects
 - Moderators of VCE → MI linkages

Better understanding of VCE → MI linkages and the roles of Social support is expected to promote interventions aimed at improving the psychological well-being and readiness of airmen increasingly exposed to combat events.

- **Overview**
- 16 types of VCE (see next slide)
- 2 types of social support: Member & Leader
- 4 Moral injury outcomes: Witnessing, Self-related, Betrayal, and Overall
- Total *N* analyses = $16 \times 2 \times 4 = 128$, each providing
 - a main effect for VCE
 - a main effect for social support, and
 - a VCE x social support interaction effect (moderation)



Study Methodology- Measures & Analysis

- **Key Measures:**

- Vicarious Combat Exposure (VCE): The *Vicarious Combat Exposure Scale (VCES)* was used to assess the frequency of exposure to 6 different types of remote combat events (e.g., involving noncombatants, enemy forces, use of weapons).
- Moral Injury (MI): The *Moral Injury Events Scale (MIES)* was used. Factor analysis identified three key facets of MI for this population.
- Social Support: The *Deployment Risk & Resilience Inventory-2 (DRRI-2)* measured perceived support from two sources: Unit Members (Peers) and Unit Leaders.

- **Analytical Approach:**

- Two-Way ANOVAs to test the relationships between variables.
- The analysis focused on identifying:
 - Main Effects: The direct impact of VCE and Social Support on Moral Injury.
 - Interaction Effects (The Buffer): How social support moderates, or "buffers," the relationship between VCE and MI.



Vicarious Combat Exposure Scale (VCES; Prince, 2011)

How many separate events of the following have you WITNESSED, either real-time or near-real-time?

Allied, friendly forces

VCES 1 ... taking fire from Enemy Forces

VCES 2 ... being injured or killed by Enemy Forces

VCES 3 ... being injured or killed by Friendly Forces (i.e., friendly fire)

Enemy forces

VCES 4 ... taking fire from Friendly Forces

VCES 5 ... being injured or killed by Friendly Forces

Noncombatants / civilian bystanders

VCES 6 ... being injured or killed by Enemy Forces

VCES 7 ... being injured or killed by Friendly Forces: risk KNOWN and ACCEPTED

VCES 8 ... being injured or killed by Friendly Forces: risk UNINTENDED or UNANTICIPATED

Graphically violent acts of inhumanity and torture

VCES 9 Enemy combatants engaging in ...

VCES 10 Allied or Friendly Forces engaging in ...

Weapons

How many times have you been a part of a crew that employed weapons during an operational mission?

Sense of responsibility

How many events have you felt a SENSE OF RESPONSIBILITY for ...

An injury or death of ...

Resp 1 U.S. or Allied Force member(s)

Resp 2 Enemy Force members(s)

Resp 3 Non-combatant civilian bystander: risk ANTICIPATED

Resp 4 Non-combatant civilian bystander: risk UNANTICIPATED

Resp 5 Tracking and Targeting of enemy then taking part in their elimination

Frequency response scale

0	1	2	3	4	5
0	1 to 5	6 to 10	11 to 20	21 to 50	51+



Principal axis pattern matrix of obliquely rotated factor score weights for MIES items (N = 375)

Factor label / MIES item	Factor		
	1	2	3
1 Self-related MI			
I acted in ways that violated my own moral code or values.	.89	-.03	.04
I am troubled by having acted in ways that violated my own morals or values.	.89	-.05	.05
I am troubled because I violated my morals by failing to do something I felt I should have done.	.87	.06	-.06
I violated my own morals by failing to do something that I felt I should have done.	.82	.06	-.01
2 Betrayal			
I feel betrayed by leaders who I once trusted.	-.06	.95	.00
I feel betrayed by fellow service members who I once trusted.	-.01	.86	-.01
I feel betrayed by others outside the U.S. military who I once trusted.	.16	.55	.06
3 Witness			
I saw things that were morally wrong.	-.05	.00	.84
I am troubled by having witnessed others' immoral acts.	.07	.02	.81
<i>Inter-factor correlations</i>			
Factor 1	1.00		
Factor 2	.59	1.00	
Factor 3	.51	.41	1.00



Demographics (N = 378-383)

Sex		Years in military		Operational role		
Male	87.2%	0-2 years	3.4%	Flight	88.1%	
Female	11.3%	3-4 years	18.7%	Support	11.9%	
Prefer not to say	1.6%	5-9 years	29.2%	Air Force career field		
Age range		10-14 years	19.7%			
		15-19 years	18.7%			
		20+ years	10.3%			
17-25 years	14.1%			Attack RPA pilot	53.1%	
26-35 years	51.2%			Flight engineer	12.8%	
36+ years	34.7%			Recon RPA pilot	5.0%	
Military affiliation		Military grade		Intel officer	2.1%	
		E4 and below	12.1%	Intel	4.2%	
		E5 - E6	14.4%	Targeting analyst	1.8%	
	Active duty	97.9%	E7 - E9	8.1%	Other	21.0%
	Reserve	1.8%	O1 - O3	50.1%		
	Contractor	0.3%	O4 - O5	14.7%		
			O6 and above	0.5%		



Two main output metrics

1. Partial eta-square = the ratio of targeted effect sums of squares (SS) to targeted effect SS + residual (error) SS after accounting for other variables in the model

- Typically, strong = .14, moderate = .06, and weak = .01
- Moderation effects tend to be underpowered (Aguinis & Stone-Romero, 1997), so the standards were softened slightly to .10 = strong and .05 = moderate
- Summarized by averaging across tests involving the targeted effect
 - e.g., for the set of 3 VCES items dealing with Friendly forces, 3 VCES x 2 Social support x 4 Moral injury = 24 tests
 - e.g., for each Moral injury subscale as an outcome, 16 VCES x 2 Social support = 32 tests

2. % significant hit rate: Under the null hypothesis, 5% of effects are expected to be statistically significant using $p < .05$

- Observed hit rates were compared to the 5% “random” hit rate
- e.g., if 12 of the 24 effects for the VCES Friendly forces items yield $p < .05$, hit rate = 50%, which is 10x the rate expected due to random error (i.e., chance)
- 5% of 24 = around 1



Main effect Partial h^2 s (orange-red) averaging over multiple tests and % significant (blue) for VC event type and Social support across 4 Moral injury outcomes ($N = 367-369$)

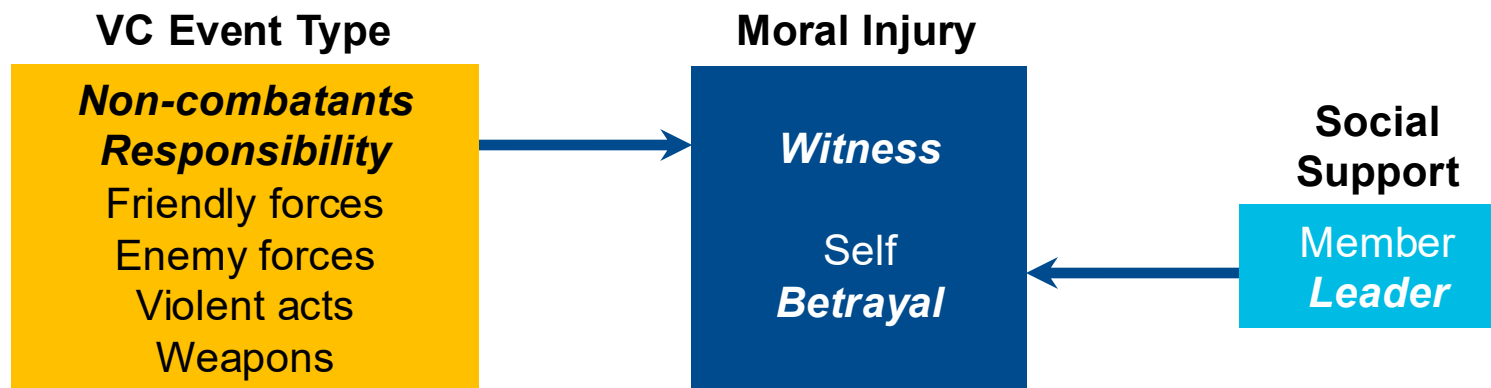
Predictor set	Moral Injury facets			Overall Mor Inj	Averaged across MI	N Eff ^a	N sig.	% sig.	Mean Partial η ² s	
	Witness	Self	Betrayal							
VC Event Type										
VC Friendly forces	.064	.013	.019	.040	.034	24	16	67%		
VC Enemy forces	.074	.016	.019	.040	.037	16	8	50%		
VC Non-combatants	.114	.020	.023	.059	.054	24	18	75%		
VC Violent acts	.082	.016	.015	.034	.037	16	11	69%		
Weapons	.045	.005	.024	.032	.027	8	5	63%		
Responsibility	.075	.027	.034	.063	.050	40	35	88%		
All VCES items	.079	.019	.024	.045	.042	128	93	73%		
N effects ^a	32	32	32	32	128					
N sig.	32	13	17	31	93					
% sig.	100%	41%	53%	97%	73%					
Social Support (SS)										
Member Support	.012	.014	.014	.027	.017	64	47	73%		
Leader Support	.002	.021	.032	.026	.020	64	44	69%		
All Social Support	.007	.018	.023	.027	.018	128	91	71%		
N effects ^a	32	32	32	32	128					
N sig.	7	27	26	31	91					
% sig.	22%	84%	81%	97%	71%					

^aTotal number of effects averaged

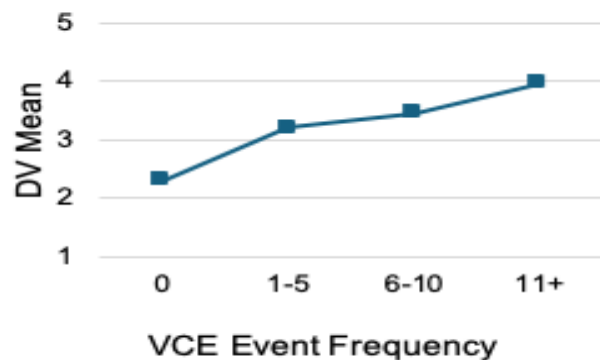
^aTotal number of
effects averaged



Key Findings: Main Effects

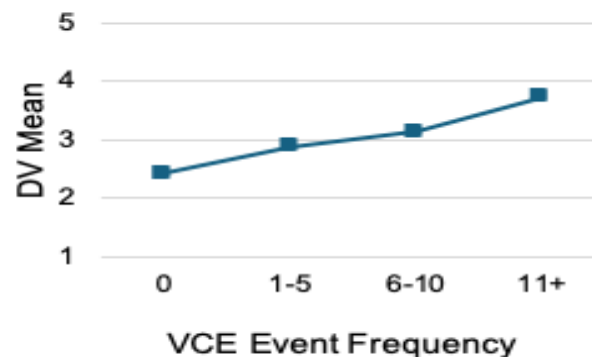


A
IV = VCES 6^a DV = MI-Witness



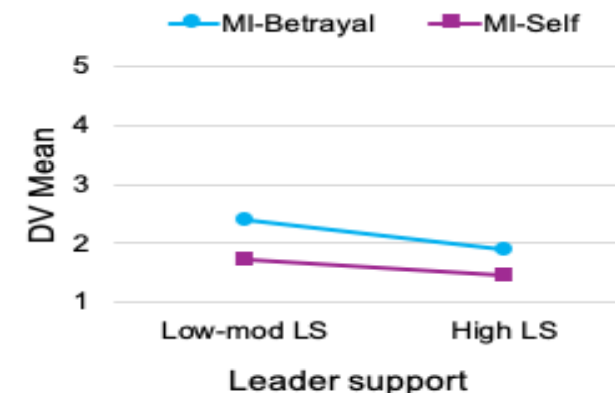
^aNoncombatant civilian bystanders being injured or killed by Enemy forces

B
IV = VCES Resp 5^b DV = MI-Witness



^bTracking and targeting of an enemy individual(s) for multiple hours/days and then taking part in the elimination of that target

C
IV = Leader support DV = MI





VCES x Social support interaction effect Partial h^2 s (orange-red) averaging over multiple tests and % significant (blue) across 4 Moral injury outcomes ($N = 367-369$)

Predictor set	Moral Injury facets			Overall Mor Inj	Averaged across MI	N Eff ^a	N sig.	% sig.
	Witness	Self	Betrayal					
Member Support (MS) as moderator								
MS x VC Friendly forces	.005	.008	.008	.009	.008	12	1	8%
MS x VC Enemy forces	.031	.018	.018	.022	.022	8	1	13%
MS x VC Non-combatants	.007	.006	.006	.004	.006	12	0	0%
MS x VC Violent acts	.002	.003	.003	.001	.002	8	0	0%
MS x Weapons	.015	.007	.007	.013	.011	4	0	0%
MS x Responsibility	.007	.014	.014	.016	.013	20	4	20%
MS x all VCES items	.010	.010	.010	.011	.010	64	6	9%
N effects ^a	16	16	16	16	64			
N sig.	1	1	1	3	6			
% sig.	6%	6%	6%	19%	9%			
Leader Support (LS) as moderator								
LS x VC Friendly forces	.004	.012	.015	.007	.009	12	3	25%
LS x VC Enemy forces	.017	.016	.030	.017	.020	8	1	13%
LS x VC Non-combatants	.006	.021	.013	.010	.012	12	4	33%
LS x VC Violent acts	.011	.015	.002	.007	.009	8	1	13%
LS x Weapons	.007	.005	.016	.005	.008	4	0	0%
LS x Responsibility	.003	.010	.010	.007	.008	20	2	10%
LS x all 16 VCES items	.007	.014	.013	.009	.011	64	11	17%
N effects ^a	16	16	16	16	64			
N sig.	0	6	4	1	11			
% sig.	0%	38%	25%	6%	17%			

^aTotal number of effects averaged

Mean
Partial
 η^2 s

.02

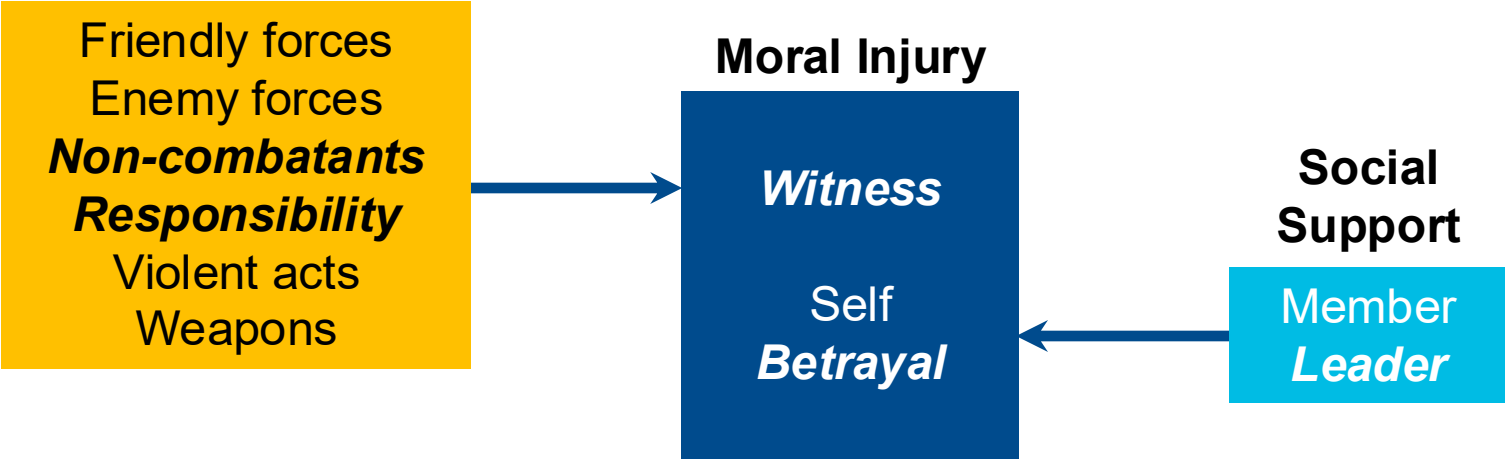
.03-.04

^aTotal number of
effects averaged

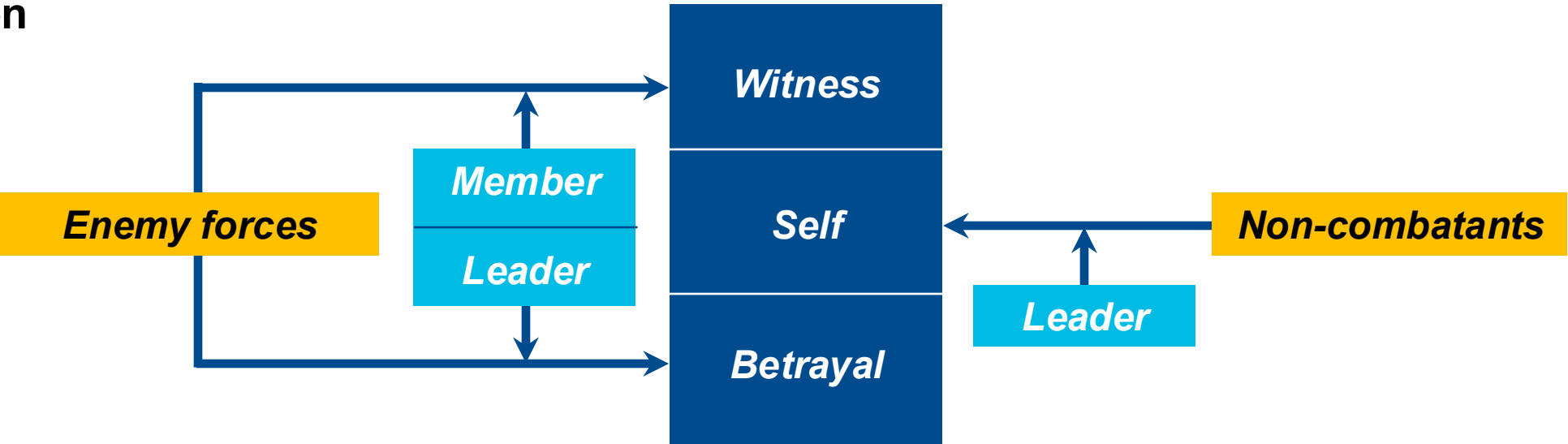


Key Findings

Main Effects

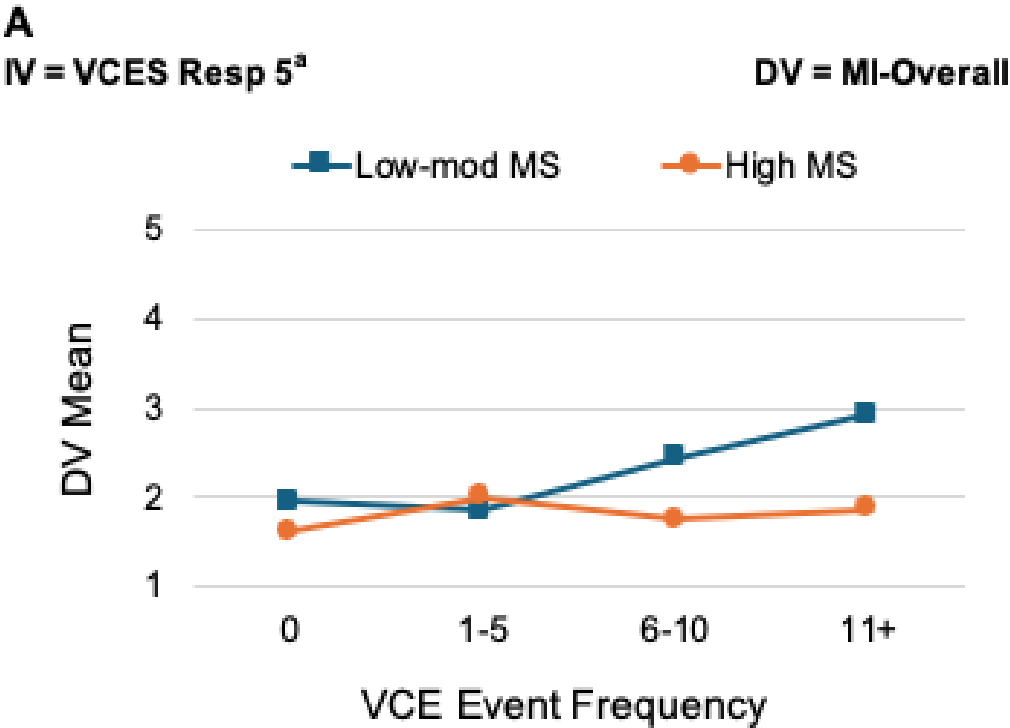


Moderation Effects

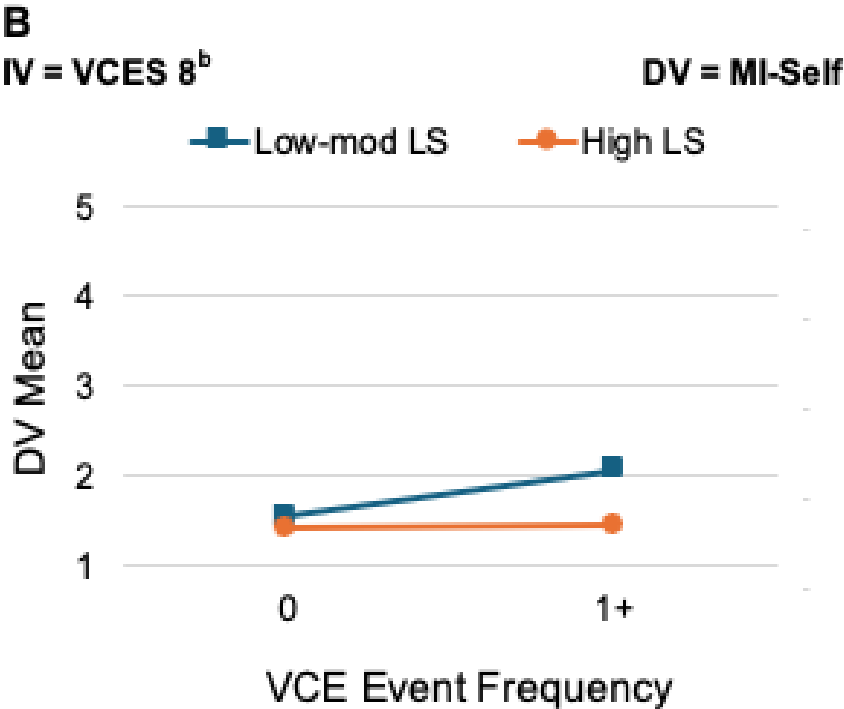




Social support moderation of VCES-Moral injury linkages *consistent with the buffer hypothesis*



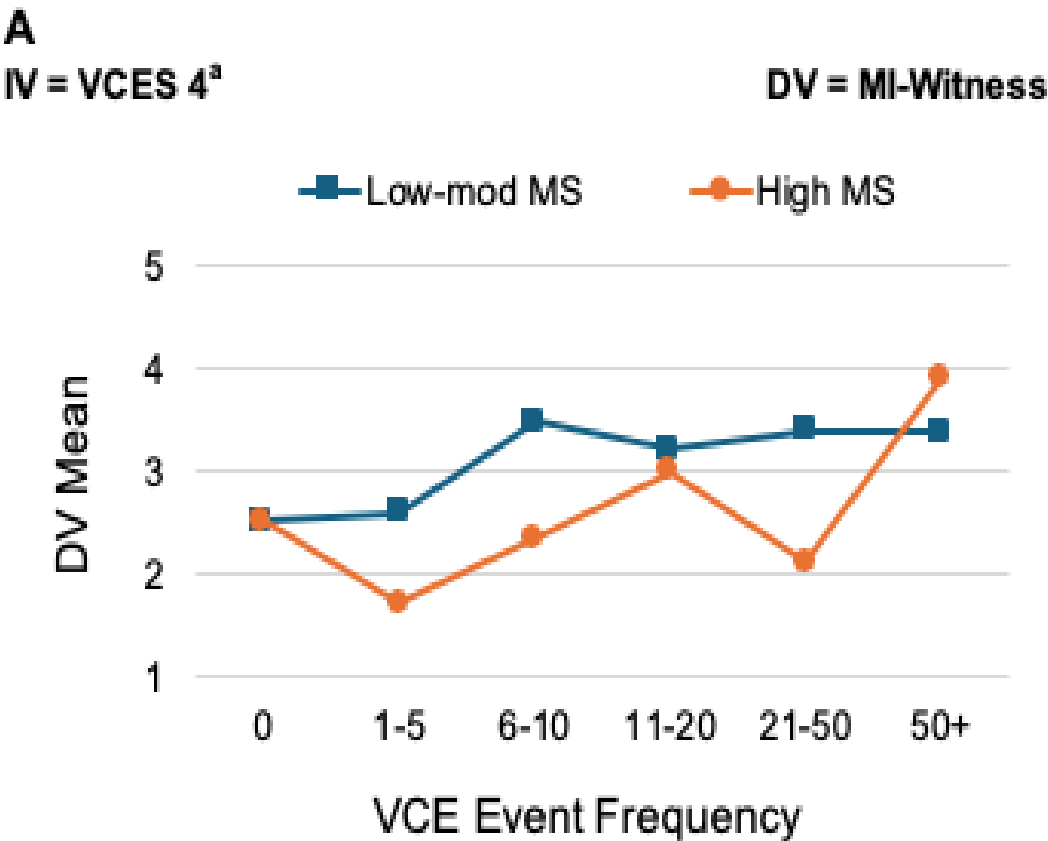
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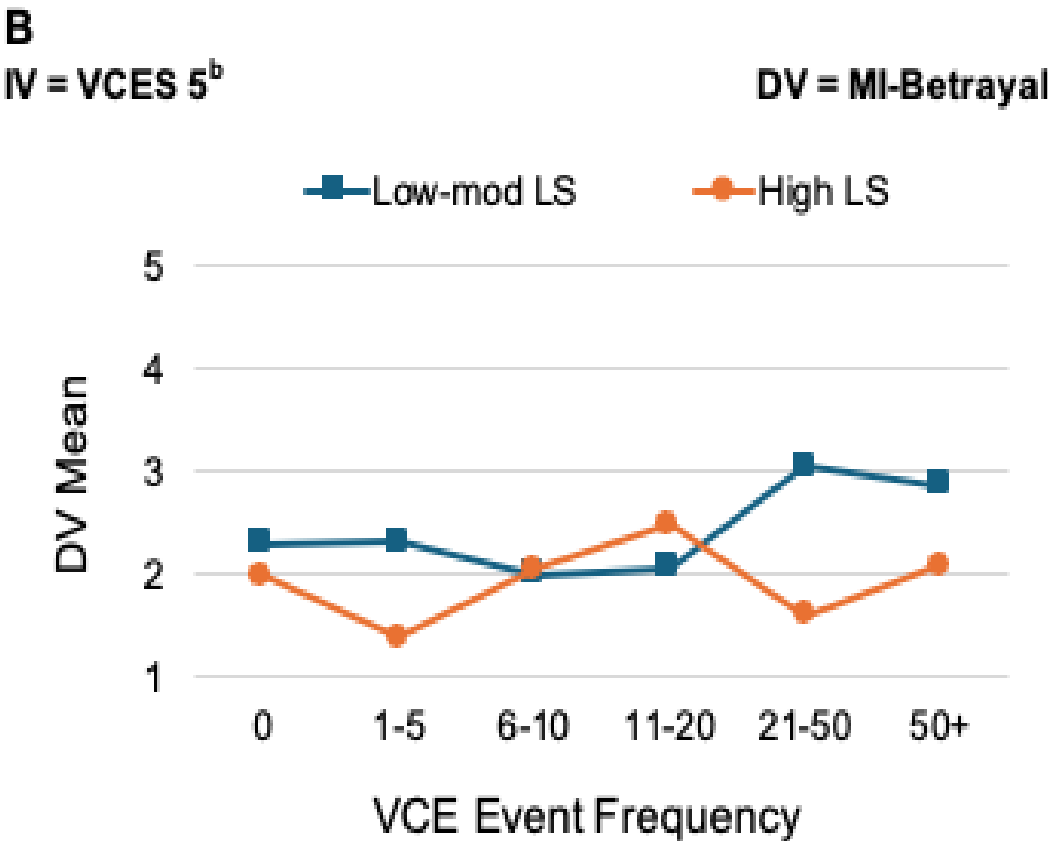
^aNoncombatant civilian bystanders being injured or killed by Friendly Forces when the risk of collateral damage was UNANTICIPATED or UNINTENDED



Social support moderation of VCES-Moral injury linkages *more complex than the buffer hypothesis*



^aEnemy Forces taking fire from Friendly Forces



^bEnemy Forces being injured or killed by Friendly Forces



Discussion



Summary

- **Main effects**

- VCES → Moral injury 2x as strongly as Social support
- VC-Noncombatants and Responsibility are especially impactful on MI, especially on MI-Witness
- Main effects of Social support, especially Leader support, tend to be on MI-Betrayal

- **Moderation effects**

- Social support moderates VC → MI linkages more weakly but at rates 2-3x expected due to chance
- Effects of VC-Non-combatants are moderated by Leader support
- Effects are complex
 - Sometimes, in support of the buffer hypothesis
 - Other times, effects vary across increasing VC exposure
- Possible mechanisms include
 - Buffer hypothesis
 - Reverse buffer
 - Resource depletion (e.g., relationship maintenance; expected reciprocation)
 - Increased expectations to not disappoint valued peers and/or leadership
 - Differential attrition relating to frequency of VC exposure
 - Those experiencing more Morally injurious VCEs may be more likely to leave



Implications for Intervention & Prevention

- Prioritize Support for High-Impact Events:
 - ✓ Vicarious Combat Exposure (VCE) is a powerful driver of Moral Injury, particularly when events involve **non-combatants** or evoke a sense of responsibility.
 - ✓ **Suggestion:** Targeted support, specialized debriefings, and proactive mental health resources should be prioritized for personnel exposed to these specific high-stress events.
- Leverage Leadership as a Primary Buffer:
 - ✓ Leader support is shown to be particularly effective in mitigating **feelings of betrayal**, a key facet of Moral Injury. It also helps moderate the negative effects of VCE, especially incidents involving **non-combatants**.
 - ✓ **Suggestion:** Investing in leadership training focused on providing effective social support, recognizing signs of MI, and fostering a climate of trust can be a highly effective preventative strategy.
- Develop Proactive, Not Just Reactive, Strategies:
 - By identifying the antecedents of Moral Injury (specific VCEs and the role of social support), the model provides a framework for proactive, preventative measures rather than only reacting after psychological distress has occurred.
 - **Suggestion:** Implement pre-deployment and ongoing training that prepares RPA personnel for the specific moral and ethical challenges they may face.



QUESTIONS?



References

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Backup Slides



Moral Injury Events Scale (MIES)

- The Moral Injury Events Scale (MIES) purports to measure nine potentially morally injurious events that might be experienced in the military context [5].
- The 9-item instrument was designed to identify an individual's exposure to perceived transgressions and betrayals which exceed their own threshold for morality.

Two Factor Model (Nash et al., 2013)

- Transgressions
- Betrayal

Three-Factor Model (Bryant et al., 2016)

- Transgression-other
- Transgressions-Self
- Betrayal

Two-factor Model (Richardson, 2020)

- Transgression-self
- Transgressions-others



Defining Moral Injury- “Nomen non facit rem”

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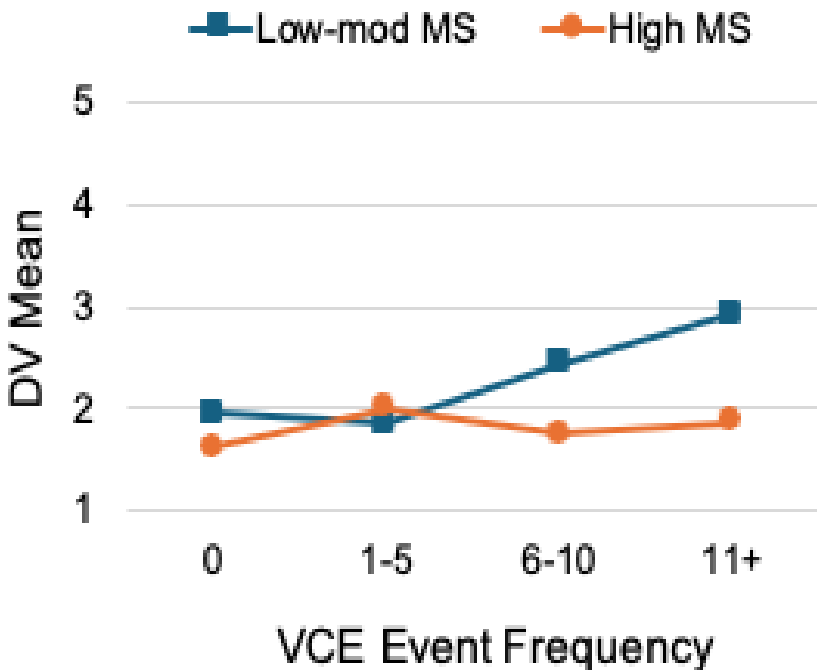
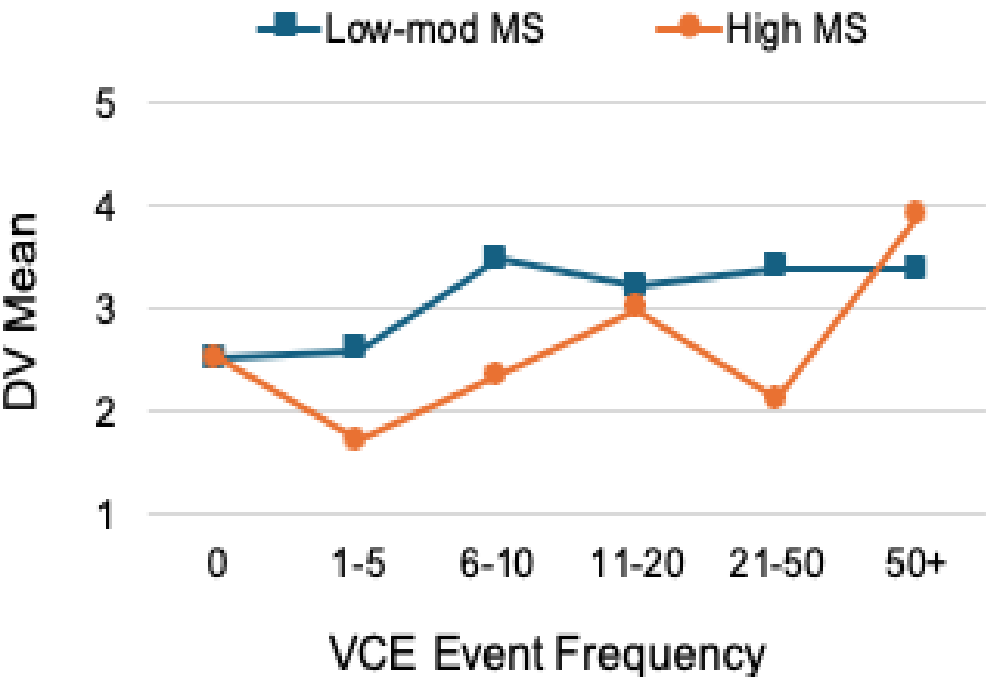
Sample Member support (MS) moderation of VCES-Moral injury linkages

IV = VCES 4^a

DV = MI-Witness

IV = VCES Resp 5^b

DV = MI-Overall

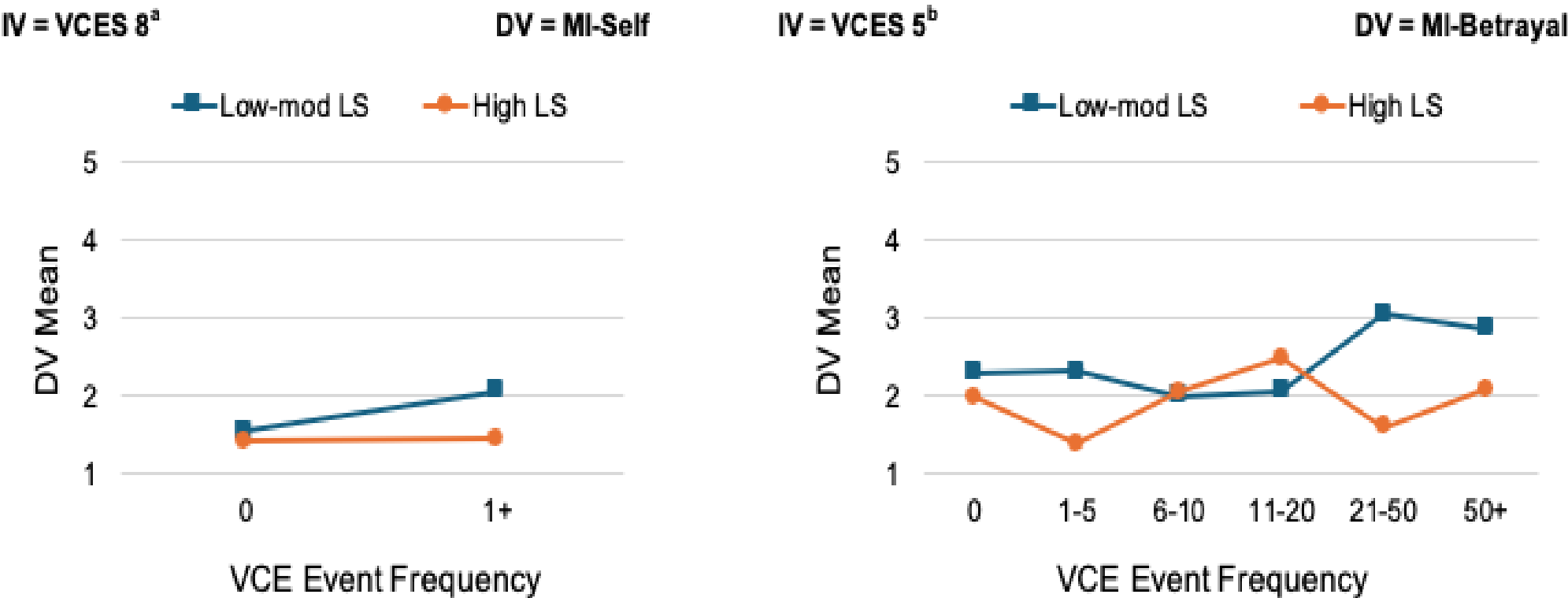


^aEnemy Forces taking fire from Friendly Forces

^bTracking and targeting of an enemy individual(s) for multiple hours/days and then taken part in the elimination of that target



Sample Leader support (LS) moderation of VCES-Moral injury linkages



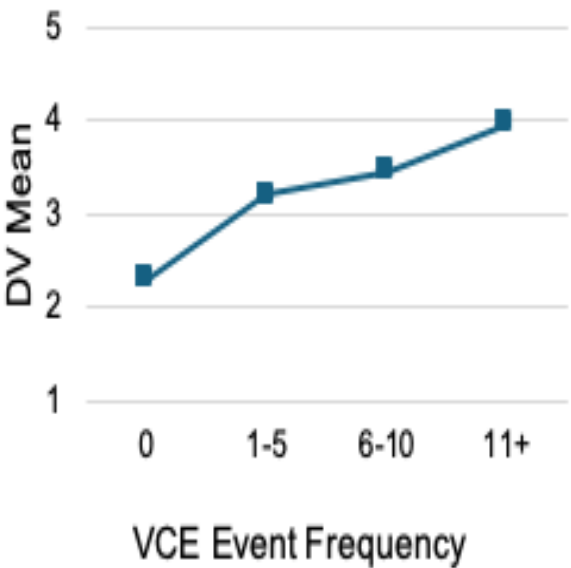
^aNoncombatant civilian bystanders being injured or killed by Friendly Forces when the risk of collateral damage was UNANTICIPATED or UNINTENDED

^bEnemy Forces being injured or killed by Friendly Forces



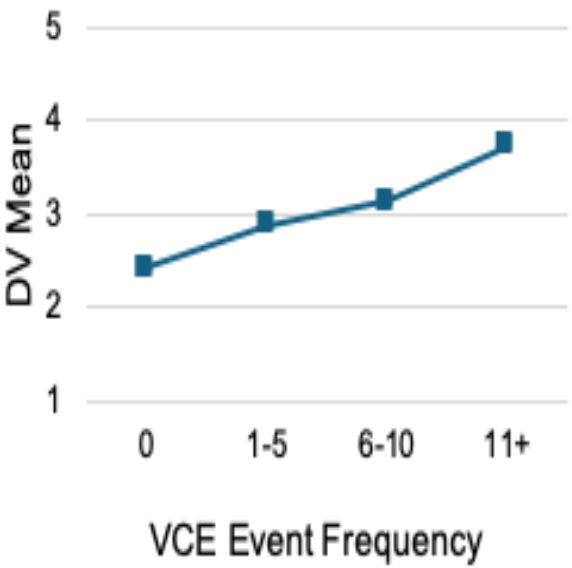
Sample main effects of VCEs (A & B) and Leader support (C) on Moral injury

A
IV = VCES 6^a DV = MI-Witness



^aNoncombatant civilian bystanders being injured or killed by Enemy forces

B
IV = VCES Resp 5^b DV = MI-Witness



^bTracking and targeting of an enemy individual(s) for multiple hours/days and then taking part in the elimination of that target

C
IV = Leader support DV = MI

