Impacts of Female Homophily in Military Residential SUD Treatment

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"Understandably, female veterans may feel uncomfortable discussing traumatic experiences in a male-dominated treatment setting … It is important for providers to remain conscious of women's minority status with the military and the VA … Female veterans are likely to benefit from specialized SUD treatment and gender-tailored treatment, which may increase treatment utilization, attendance, and comfort." (Teeters et al., 2017, p. 73)

Introduction

- Substance use disorder (SUD) erodes personal readiness (Dept of the Army, 2020)
- Department of Defense (DoD) Instruction 1010.04, 2014:
  - Problematic substance use is incompatible with readiness, maintaining high standards of performance, and military discipline
  - Goal is to return DoD personnel to full duty following substance use disorder treatment whenever consistent with mission requirements

Residential Treatment Facility (RTF)

- Month-long inpatient SUD treatment program, select military treatment facilities (MTF)
- Only military personnel are in RTF programs
- Patients are roomed together, separated by gender in 2 and 4 person rooms
- Group therapy model with emphasis on recreation and leisure

Literature review

Homophily facilitates the circulation of cultural, behavioral, or informational elements within similar groups; fosters communication and group dynamics (McPherson et al., 2001)

- Peers are important to treatment adherence and outcomes (Harrison et al., 2017; Zemore & Kaskutas, 2008; Jimenez et al., 2024)
- Females are often underrepresented or dropped from analysis (Ilgen et al., 2015; Decker et al., 2014)
- Only one prior study on military RTF programs, descriptive only (Mooney et al., 2014)
- Female homophily literature:
  - Education: female cohort members raised the likelihood of timely graduation for female PhD students (Bostwick & Weinberg, 2022)
  - U.S. Military Academy: 1) female cadets with high homophily were likely to progress to the next year (Huntington-Klein & Rose, 2018); 2) female cadets with female role models were likely to choose the role model's job type in the military (Kofoed & McGovney, 2019)

Research Questions

Does female homophily increase the probability that:

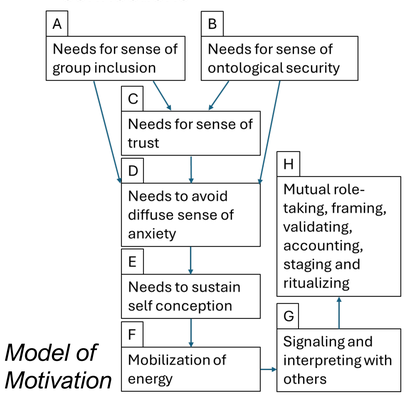
RQ 1: a female will **remain in treatment** for the full course of RTF therapy?

RQ 2: a female will have **fewer ED and urgent care encounters for SUD and mental health concerns** within six-months and one-year of discharge?

RQ 3: a female will **remain on active-duty** at one-year following discharge from the RTF?

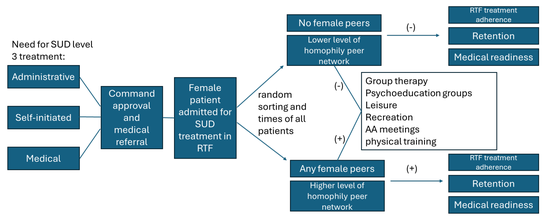
Theoretical Framework

- Rooted in *Social Interaction Theory*, developed by Turner (1988)
- *Model of Motivation:* Individuals interact more effectively, exchange higher quality information, and experience a strong sense of group membership when they are with others who are like themselves, fostering a sense of solidarity
  - Often goes unnoticed unless it is unmet
  - Does not require permanent mutual feelings of solidarity or enduring emotional connections



Model of Motivation

Conceptual Framework



Methods

Data: MHS Data Repository (MDR) and the Defense Enrollment Eligibility Reporting System (DEERS): 2010 – 2022

Levels of homophily peer networks (plausibly random assignment of peers):

1. Any female peer:

$$Female\_Peer_i = \begin{cases} 1 & \text{if } \exists\ j \neq i \text{ such that:} \\ & (1)\ \text{gender}_j = \text{Female}, \\ & (2)\ \text{hospital}_j = \text{hospital}_i \\ & (3)\ \text{admission}_j \leq \text{admission}_i \\ & (4)\ \text{discharge}_j \geq \text{discharge}_i \\ 0 & \text{otherwise} \end{cases}$$

2. Number of female peers:

$$Num\_Female\_Peers_i = \sum_{j \neq i} \begin{cases} 1 & (\\ & (1)\ \text{gender}_j = \text{Female}, \\ & (2)\ \text{hospital}_j = \text{hospital}_i \\ & (3)\ \text{admission}_j \leq \text{admission}_i \\ & (4)\ \text{discharge}_j \geq \text{discharge}_i \\ &) \end{cases}$$

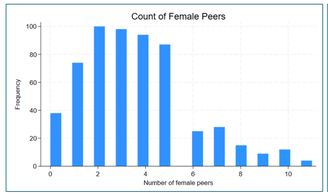
3. Cohort start (and number in cohort start)

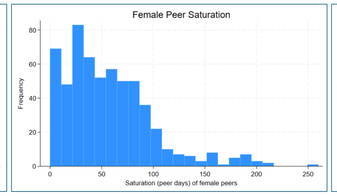
$$Cohort\_Start_i = \begin{cases} 1 & \text{if } \exists\ j \neq i \text{ such that:} \\ & (1)\ \text{gender}_j = \text{Female}, \\ & (2)\ \text{hospital}_j = \text{hospital}_i \\ & (3)\ \text{admission}_j = \text{admission}_i \\ 0 & \text{otherwise} \end{cases}$$

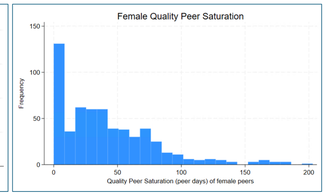
4. Peer saturation and quality* saturation (peer days)

$$Peer\_Saturation_i = \sum_{j \neq i} \max\left(0, \min\left(\text{discharge}_i, discharge_j\right) - \max\left(admission_i, admission_j\right) + 1\right)$$

Summary Statistics: Peer types and experience	Male n = 4,511 88.5%	Female n = 584 11.5%	p-value (two tailed)
With same gender peer(s)	0.999	0.935	**0.000**
Number of gender peers	28.2	3.7	**0.000**
Started treatment with a peer	0.652	0.267	**0.000**
Number of peers beginning treatment on same day	3.1	0.6	**0.000**
Peer saturation (peer days)	433	56	**0.000**
Quality peer saturation (leaving out inconsistent peers)	331	42	**0.000**







* Quality peers are those who were in treatment for the LOS +/- 2 days indicating that they were compliant with the full course of treatment

Estimating equations: **Probit model**: $P\ (Y_{i(t+j)} = 1) = \Phi(\alpha + \beta_1 FP_{ith} + \boldsymbol{X'}_i \beta + \delta_{ht} + \epsilon_{it})$ **Kaplan-Meier survival estimate**: $\hat{S}(t) = \prod_{t_i \leq t} \left(1 - \frac{d_i}{n_i}\right)$

Results

RQ1: Evidence that a peer increases likelihood of remaining in treatment; **RQ2**: Number of peers reduces the likelihood of subsequent ED visit; **RQ3**: Suggestive evidence that peer saturation and quality peer saturation increase the likelihood of remaining on active duty; **K-M** failure analysis supports RQ3 findings in simple model.

TABLE 3.3
Results: Remaining for the full LOS in the RTF treatment program (27 - 29 days)

	[1] Marginal effect [95% CI]	p-value	[2] Marginal effect [95% CI]	p-value
A) Any female peer	0.133 [-0.022, 0.289]	0.093*	0.142 [-0.020, 0.304]	0.085*
B) Started treatment with a female peer	0.007 [-0.085, 0.098]	0.886	-0.005 [-0.103, 0.094]	0.927
C) Cohort start peers (num of peers with same day 1)	-0.003 [-0.031, 0.026]	0.862	-0.006 [-0.034, 0.023]	0.709
Covariates included in the model	no		yes	
Hospital by year fixed effects	yes		yes	

Notes: All models have standard errors clustered at the hospital x year. Only the main independent variable is shown in the results table for each model specification. Results are reported as marginal effects of probit models.
Statistically significant results: *** (p < 0.01) ** (p < 0.05) * (p < 0.1)

TABLE 3.4
Results: ED Encounter at Six Months and One Year

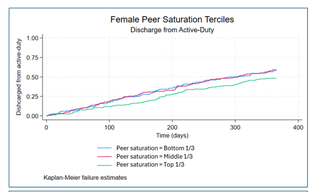
	Six Months post discharge [1] Marginal effect [95% CI]	p-value	[2] Marginal effect [95% CI]	p-value	One Year post discharge [3] Marginal effect [95% CI]	p-value	[4] Marginal effect [95% CI]	p-value
A) Any female peer	-0.076 [-0.268, 0.115]	0.432	-0.110 [-0.307, 0.087]	0.275	-0.129 [-0.315, 0.058]	0.176	-0.135 [-0.333, 0.063]	0.182
B) Number of female peers	-0.026 [-0.044, -0.008]	0.005**	-0.025 [-0.046, -0.004]	0.018**	-0.029 [-0.045, -0.013]	0.000***	-0.027 [-0.045, -0.009]	0.003**
C) Female peer saturation	0.000 [-0.002, 0.001]	0.457	0.000 [-0.002, 0.001]	0.479	-0.001 [-0.002, 0.000]	0.250	0.000 [-0.001, 0.001]	0.445
D) Quality female peer saturation	-0.001 [-0.002, 0.000]	0.191	-0.001 [-0.002, 0.000]	0.195	-0.001 [-.002, 0.000]	0.102	-0.001 [-0.002, 0.000]	0.167
Covariates included in the model	no		yes		no		yes	
Hospital by year fixed effects	yes		yes		yes		yes	

Notes: All models have standard errors clustered at the hospital x year. Only the main independent variable is shown in the results table for each model specification. Results are reported as marginal effects of probit models.
Statistically significant results: *** (p < 0.01) ** (p < 0.05) * (p < 0.1)

TABLE 3.5
Results: Remaining on Active-Duty at One Year Post Discharge

	[1] Marginal effect [95% CI]	p-value	[2] Marginal effect [95% CI]	p-value
A) Any female peer	-0.060 [-0.274, 0.155]	0.585	-0.086 [-0.305, 0.132]	0.439
B) Number of female peers	0.012 [-0.008, 0.032]	0.229	0.008 [-0.012, 0.027]	0.442
C) Female peer saturation	0.001 [-0.000, 0.002]	0.060*	0.000 [-0.000, 0.001]	0.325
D) Quality female peer saturation	0.001 [-0.000, 0.002]	0.059*	0.001 [-0.000, 0.002]	0.223
Covariates included in the model	no		yes	
Hospital by year fixed effects	yes		yes	

Notes: All models have standard errors clustered at the hospital x year. Only the main independent variable is shown in the results table for each model specification. Results are reported as marginal effects of probit models. Statistically significant results: *** (p < 0.01) ** (p < 0.05) * (p < 0.1)



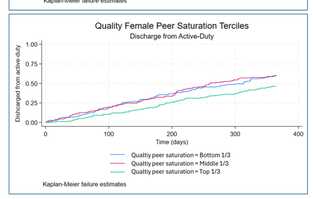


TABLE 3.6
Failure Analyses:
Remaining on Acitve-Duty at One-Year Post-Discharge

		Observed events	Expected events
A) Peer saturation terciles	Bottom 1/3	90	81.3
	Middle 1/3	96	86.58
	Top 1/3	77	95.11
	Total	263	263
		chi(2)	5.42
		Pr>chi2	0.0665
B) Quality peer saturation terciles	Bottom 1/3	91	80.55
	Middle 1/3	96	82.08
	Top 1/3	76	100.37
	Total	263	263
		chi(2)	9.67
		Pr>chi2	0.008

Notes: Failure event is leaving active duty within one year.
Time period is in days

Conclusion

- Females have significantly lower levels of homophily experience compared to male service members
- There is evidence that higher levels of female homophily in military RTF programs may positively impact treatment adherence and treatment outcomes for female SUD patients

Policy Implications

- Results indicate there may be value in gender-specific peer dynamics which could foster resilience and long-term stability for female service members, though not enough to definitively promote policy changes
- Recommend future qualitative research evaluating the female patient experience in treatment.

Selected references

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