Associations between Depressive Symptoms and Relationship Satisfaction among Military Couples after Deployments

A Thesis SUBMITTED TO THE FACULTY OF THE UNIVERSITY OF MINNESOTA

BY

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Abstract

Research traditionally has focused on associations between Post-Traumatic Stress Disorder (PTSD) symptoms and couple relationship satisfaction in military populations. Less research has been conducted on other mental health problems, particularly depression, given the high comorbidity between depression and PTSD. The purpose of the present study was to understand the associations between depressive symptoms and couple relationship satisfaction among post-deployed military couples, after controlling for combat exposure and life event stress. The actor-partner interdependence model (APIM) was used to measure inter and intra-spousal associations among 228 couples. Men had experienced at least one deployment to recent conflicts in the Middle East. The results show both actor effects and partner effects for negative associations between depressive symptoms and relationship satisfaction. Moreover, consistent with the Military Family Stress model, the results show that depressive symptoms are uniquely associated with relationship satisfaction. The results of the current study highlight the importance of focusing on depressive symptoms in both intervention and prevention programs for military families, especially for members of the National Guard and Reserves (NG/R).

*Keywords*: depression, relationship satisfaction, couple, military
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**Note.** ***p < .001, **p < .01, *p < .05.

Figure 1. The Military Family Stress Model (Gewirtz, DeGarmo, & Zamir, 2017).
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Figure 2. APIM model of the Actor and Partner Associations of Depressive Symptoms and Relationship Quality.

Note. *p < .05, **p < .01, ***p < .001.
Associations between Depressive Symptoms and Relationship Satisfaction among Military Couples after Deployments

**Introduction**

Since 2001, more than two million service members have been deployed overseas in support of Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND) (Department of Defense, 2015). These military conflicts in Iraq and Afghanistan led to the highest rate of United States troop mobilization and deployment, in terms of prolonged deployment duration and number of deployments, since the Vietnam War. Another result of these conflicts is higher involvement of National Guard/Reserve (NG/R) service members being deployed overseas. Research shows that overseas deployment for NG/R service members is potentially more stressful than it is for active duty service members. This is because active duty service members are less likely to be married and have children, and are more prepared for prolonged separations than NG/R service members (Browne et al., 2007). Among all service members deployed, more than half of all service members were parents (Defense Manpower Data Center, 2015). Broader literature shows the negative impact of overseas deployment on family relationships and couple relationships (Allen, Rhoades, Stanley, & Markman, 2010; Paley, Lester, & Mogil, 2013). This creates an opportunity to extend the focus of research to understand how both service members and their non-deployed significant others experience the post-deployment period.

Researchers have identified unique stages that occur for families during reintegration after a deployment. Reintegration is an important stage when NG/R
service members return from overseas deployments and transition back into
civilian life. The transition can cause adjustment issues for both service members
and their spouses, which can impact different aspects of service members’
functioning, such as mental health, and relationships (Basham, 2008; Bommarito,
Sherman, Rudi, Mikal, & Borden, 2017; Pincus, S. H., House, R., Christenson, J.,

Upon reintegration from deployments, deployed service members are at risk
of suffering from mental health issues, which include depression, PTSD, and
anxiety (Allen et al., 2010; Hoge et al., 2004). Research suggests that about
35.5% of NG/R service members who returned from deployments from the
Middle East within the last three to six months indicated overall mental health
risk, and about 13% of NG/R post-deployed service members reported depressive
symptoms (Milliken, Auchterlonie, & Hoge, 2007). High levels of emotional
distress among military spouses have also been reported. Multiple studies show
elevated risk of depression among military spouses (Eaton et al., 2008; Gorman,
Blow, Ames, & Reed, 2011; Lester et al., 2010); more than the estimated
prevalence of Major Depressive Episode (MDE) in the general population
(Verdeli et al., 2011). Thus, deployment and reintegration may have a negative
influence on both deployed service members and their non-deployed spouses in
terms of mental health conditions.

In part to address the challenges of a descriptive diagnostic system in which
multiple disorders feature overlapping symptoms (i.e. the Diagnostic and
Statistical Manual of Mental Disorders/DSM), a trans-diagnostic approach has
emerged (Cuthbert, 2014). This is an integrative approach that identifies systems
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underlying core constructs of psychopathology. For example, the ‘negative valence system’ which underlies depression and anxiety constructs (i.e. fear, anxiety, loss, sadness, motivation) is assessed by measures and methods at multiple levels from cellular to behavioral and self-report. Researchers have suggested clustering PTSD, depression, and anxiety symptoms as emotional responses to the post-deployment periods or war trauma (Pietrzak et al., 2015). However, given much prior research on PTSD, the goal of the current study is to investigate the associations of depressive symptoms with couple relationships.

In the present study, the rationale for studying depressive symptoms among service members and their non-deployed spouses after deployment of the male partner to the wars in the Middle-East is provided. Previous research on this topic is reviewed, including theoretical models and findings centered on relationship satisfaction and depressive symptoms among military couples. I then provide justification for applying the Military Family Stress Model to guide the current study (Gewirtz, DeGarmo, & Zamir, 2017), identify literature gaps and present the primary research question. I also explain the use of variables and sub-samples to fit with my research question. Finally, the analytical method, data analysis, discussions, and implications of the current study are covered.

Literature Review

Deployment and Depression

A broad literature has examined the association between depression and post-deployment adjustment. Although the primary disorder of interest in military populations is PTSD, depression is a growing topic of interest to better understand service member adjustment. First, depression and PTSD are highly related;
comorbidity between these two mental health disorders is about 50% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Currently, the prevalence rate for PTSD among veterans ranges from 10% to 20% (Dursa, Reinhard, Barth, & Schneiderman, 2014), which indicates that there likely is a substantial number of veterans who could have been diagnosed with depression. Different hypotheses have been proposed regarding whether PTSD and depression both fit within a larger spectrum of a post-traumatic stress syndrome (Stander, Thomsen, & Highfill-McRoy, 2014). Other hypotheses have been proposed regarding whether such comorbidity should be attributed to the symptoms overlapping in the DSM diagnostic criteria (Simms, Watson, & Doebbeling, 2002; Spitzer, First, & Wakfield, 2007). Research suggests that eliminating symptoms overlapping with mood disorders has no statistically significant impact on comorbidity rates (Grubaugh, Long, Elhai, Frueh, & Magruder, 2010). In addition, research has also shown that depression tends to surface after onset of PTSD (Erickson et al., 2001; Polusny et al., 2011; Stander, Thomsen, & Highfill-McRoy, 2014). There is a general consensus that service members dually diagnosed with both PTSD and depression display more severe impairments, symptom chronicity, or symptom severity, compared to those who are diagnosed with PTSD only (Aversa et al., 2012; Ginzburg et al. 2010; Koenen, Stellman, et al., 2003). The potentially unique influence of depressive symptoms provides a rationale for studying depressive symptoms among military populations.

A small number of research studies shows that there is a substantial proportion of post-deployed service members who suffer from depressive symptoms. Studies show that about 2.6 million U.S. service members served in
Iraq or Afghanistan from 2001 through 2014. In a systematic review of the literature, Cohen and colleagues (2015) reported that the rate of depression (i.e. those who screened positive among troops returning from deployment) ranged from 5% to 37%, depending on the study. Despite the high upper limit in the aforementioned study, there is a lack of epidemiological data on depression from official military sources. The prevalence range indicates higher potential vulnerability to depression among post-deployed service members compared to civilians, and this requires further study.

Depressive symptoms, including fatigue, energy loss, irritability, or thoughts of suicide have been found to be reported by a substantial portion of service members (Milliken, Auchterlonie, & Hoge, 2007; Goff, Crow, Reisbig, & Hamilton, 2007; Renshaw, Rodrigues, & Jones, 2008). Conceptually speaking, Beck (2002) defined the core features of depression as hopelessness, helplessness, and worthlessness, which may alter a person’s view toward the self, the world, and the future. Report of depressive symptoms among service members provided another justification to study depression in the military population.

Focus on Non-Deployed Spouses

It is also important to understand depressive symptoms in service members’ non-deployed spouses. Verdeli and her colleagues (2011) pointed out that studies have showed that non-deployed wives tend to experience depression during their significant others’ deployment, and during the post-deployment period. During the deployment phase, wives tend to experience stressors due to changes in family dynamics and family roles, such as increases in financial concerns, parenting demands, or loneliness (Drummet et al., 2003; Riggs, & Riggs, 2011; Verdeli et
During the reunion phase, civilian wives may experience another adjustment period when it comes to redefining family roles and routines (Faber, Willerton, Clymer, MacDermid, & Weiss, 2008; Pincus et al., 2005; Riggs, & Riggs, 2011; Verdeli et al., 2011). In a previous study, Gorman and his colleagues (2011) found that the prevalence rate of screening positive for depression among NG/R service members’ civilian wives was about 22%.

**Depressive Symptoms and Relationship Satisfaction**

Although research leading to the development of conceptual frameworks for better understanding military families has only emerged in the last two decades, there have been several conceptual frameworks developed seek to explain the mechanisms underlying the influence of mental health symptomology on relationship satisfaction in the military population. First, Goff and Smith (2005) proposed the Couple Adaptation to Traumatic Stress Model to explain the inter- and intra-spousal effects of trauma stress on couple relationship from a Family Systems Theory perspective. The model predicts that post-deployed service members’ individual trauma-related symptoms would stir up a systematic response which would result in secondary traumatic stress symptoms in their partners, moderated by predisposing factors (e.g. history of trauma). The model posits a bi-directional influence of emotional distress within couples; partners’ trauma-related symptoms would intensify service members’ symptoms (Bramsen, Van der Ploeg, & Twisk, 2002), which would impair couple functioning (e.g. relationship satisfaction, or communication) within the couple subsystem (Goff, & Smith, 2005). Nevertheless, the model has yet to explain the specific mechanism of mental health symptoms transmission, nor the role of parent-child
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subsystem (Dekel, & Monson, 2010).

Knobloch and Theiss (2011) proposed the Relational Turbulence Model to explain the inter- and intra-spousal effects of service members’ depressive symptoms on relationship satisfaction during the post-deployment phase. The model emphasizes couples’ cognitions regarding their own participation in the relationship, their spouses’ participation, and how the state of their relationship would affect relationship satisfaction. During the transition period (i.e. the post-deployment or reintegration phase) these three kinds of relational uncertainty, i.e., self, partner, and relationship sources of ambiguity would lead to relational turbulence (Knobloch, & Theiss, 2011; 2012). Knobloch and Theiss (2011; 2012) theorized that relational turbulence would negatively impact relationship satisfaction. Cognitive bias may exacerbate negative thinking about relationships among military couples who are vulnerable to depression, (Knobloch, & Theiss, 2011). There has been extensive literature linking depression with the quality of couple relationships in the general population (Beach, Sandeen, & O'Leary, 1990). The Relational Turbulence Model seeks to apply findings from the general population to the military population (Knobloch, & Theiss, 2012).

**Combat Exposure**

In this study, combat exposure refers to service members’ combat experiences, and battle aftermath experiences. The present study also included deployment-related variables, including the length and number of deployments, and time since return. Higher intensity combat experiences were associated with poorer post-deployment adjustment and relationship satisfaction in military families (Karney, & Crown, 2007). In spite of some inconsistent associations
between months of deployment and post-deployment adjustment in military families (Lester et al., 2010; Mansfield et al., 2010; Paley, B., Lester, & Mogil, 2013), longer deployment duration may be associated with worse service members’ (Buckman et al, 2011), and their non-deployed spouses’ post-deployment adjustment (De Burgh, White, Fear, & Iversen, 2011). In addition, multiple studies show the presence of a “honeymoon” period for service members upon reintegration, which lasts for about 1 month before post-deployment issues start to emerge (Bliese, Wright, Adler, Thomas, & Hoge, 2007; Knobloch, & Theiss, 2012; Stander, Thomsen, & Highfill-McRoy, 2014). Thus, combat exposure variables were entered as covariates to partial out the influence of combat exposure on relationship satisfaction in the current study.

Life events

Life events stress may also be associated with depression and poorer relationship satisfaction; life events experienced prior to and after the marker traumatic event(s) also are associated with PTSD in the military population (Brewin et al., 2000; King, King, Fairbank, Keane, & Adams, 1998; King, King, Foy, Keane, & Fairbank, 1999). Stress piles up and cumulative adversity affects adjustment (Turner, Wheaton, & Lloyd, 1995); negative life events are associated with poorer relationship satisfaction in general populations (Karney, & Bradbury, 1995; Randall, & Bodenmann, 2009). Hence, I controlled for associations between negative life events and relationship satisfaction in order to examine the unique association between depressive symptoms and relationship satisfaction.

Theoretical Framework

Military Family Stress Model
The present study is guided by a Military Family Stress Model. The Family Stress Model depicts how external stressors, including marital poverty, or psychopathology affects family functioning (Barnett, 2008; Elder, Nguyen, & Caspi, 1985). The model also considers how the impact of these external stressors affect the behaviors of parents and children. The original Family Stress Model sought to understand the influence of economic disadvantage on fathers’ behaviors and child outcomes during the Great Depression period (Elder, Nguyen, & Caspi, 1985). Compared to the Military Family Stress Model, the underlying assumption of the Relational Turbulence Model was to explain couples’ behavior during the transition period from civilian population to military population, whereas the Military Family Stress model sought to account for family adjustments in the wake of external stressors. Also, the Relational Turbulence Model emphasizes cognitions, which are not measured explicitly in the current secondary data analysis. Hence, the Military Family Stress Model is more suitable to guide the study.

To fit the model for the military population, the Military Family Stress Model conceptualizes combat deployments and their consequences (i.e. PTSD symptoms) as family stressors due to the lengthy separations of a family member from his/her spouse and children; it describes how combat deployments and its consequences affect family functioning (Gewirtz, DeGarmo, & Zamir, 2017). As shown in Figure 1, the external stressors affect family functioning, which comprises marital dyadic adjustment, and parenting practices, this eventually impairs child outcomes (Gewirtz, DeGarmo, & Zamir, 2017). Informed by the Military Family Stress Model, this study seeks to understand the inter- and
intra-spousal influence of depression on couples proposed in the original Family Stress Model. Although PTSD symptoms rather than depressive symptoms were addressed in the Military Family Stress Model, the association between depression and combat deployments in military population has been established (Goff et al., 2007; Knobloch, & Theiss, 2011; Milliken et al. 2007; Renshaw et al., 2008). Therefore, depressive symptoms are also conceptualized here as a deployment-related stressor within the Military Family Stress Model.

Little research has been done to understand the association between depressive symptoms and relationship satisfaction among NG/R fathers and mothers. There is lack of research on examining the impact of depression on couple dynamics in military families, given that non-deployed spouses play a crucial role in supporting families after deployment. Also, the conceptualization of stress has not been well-discussed and measured in previous studies to understand the association between depressive symptoms and relationship satisfaction (Goff, & Smith, 2005; Knobloch, & Theiss, 2011). Therefore, the current study aims to fill these gaps in our understanding and examine the unique association between depressive symptoms and relationship satisfaction in post-deployed NG/R families. Specifically, the actor-partner interdependence model (APIM; Cook, & Kenny, 2005) was used to measure the inter- and intra-spousal effects of depressive symptoms on couple relationships among military couples. This model includes the dyad as the unit of analysis, with individuals nested within the dyad. Thus, it is possible to calculate how a person’s independent variable affects one’s dependent variable (i.e. an actor effect), and also his/her partner’s dependent variables (i.e. partner effect), which allows for
estimation of interdependence within interpersonal relationships.

**Research Question**

Are depressive symptoms associated with one’s own and one’s partner relationship satisfaction, controlling for combat exposure and stressful life events among military couples following deployment to war of the male partner?

**Hypotheses**

**H1.** There will be statistically significant actor associations between deployed men’s and non-deployed women’s depressive symptoms and relationship satisfaction after controlling for combat exposure and life events stress.

**H2.** There will be statistically significant partner associations between deployed men’s and non-deployed women’s depressive symptoms and relationship satisfaction after controlling for combat exposure and life events stress.

**Method**

**Sample**

The current study involves secondary data analyses, using a data set from a longitudinal randomized controlled trial of a parenting program designed for post-deployed military families, the ADAPT program (After Deployment, Adaptive Parenting Tools; Gewirtz, Pinna, Hanson, & Brockberg, 2014). The sub-sample was drawn from the baseline assessment of the ADAPT study, which contained 228 married or cohabitating couples. Therefore, the research design for this study will be considered as a descriptive study with cross-sectional design. In this sub-sample, deployed men served in NG/R units and they reported at least
one overseas deployment in support of OEF, OIF, or OND since 2001. The majority of couples were married (97.8%), with few couples cohabitating (2.2%). The duration of the marital relationship ranged from 1 to 28 years ($M = 9.95$ years; $SD = 5.3$). Number of children reported by couples ranged from 1 to 5 ($M = 2.45$; $SD = 0.92$). The mean ages of fathers and mothers were 37.04 ($SD = 6.56$) and 35.5 ($SD = 5.86$), respectively. Approximately 90% of parents were Caucasian.

In the present study, we focused on heterosexual couples, which included deployed husbands/partners who were married to non-deployed wives/partners. The justification is that the majority of service members within the US military are husbands/partners and there are fewer veterans who are wives/partners (Defense Manpower Data Center, 2015). Given the potential for gender differences (Erbes, Meis, Polusny, & Compton, 2011; Gewirtz, McMorris, Hanson, & Davis, 2014), focusing on the majority group within the military population is more appropriate to examine the dyadic pattern within couples. Single fathers and mothers were excluded from dyadic analysis due to their marital status and lack of data from a spouse/partner. Couples who were double-deployed were also excluded from the analysis due to potential differences in dynamics between double-deployed and single-deployed couples.

In addition, the number of children and duration of marriage were entered as covariates. The justification is that the ADAPT study is a parenting program for military families, thus more children may correlate with greater parenting responsibilities. Moreover, couples from the ADAPT study may have varying years of marriage which could impact relationship satisfaction. Therefore, holding such factors constant will allow for a better understanding of the actor and partner.
effects of depressive symptoms on relationship satisfaction.

**Sampling and Recruitment Strategy**

In the ADAPT study, non-probability sampling strategies were employed to reach the military population in the state of Minnesota. Specifically, self-selected sampling, snowball sampling, convenience sampling and purposive sampling were implemented. Recruitment was conducted using multiple strategies including by word-of-mouth, Veterans Affairs mailings, military-sponsored events such as pre-deployment and reintegration events for NG/R personnel, referral from military personnel, flyers posted in the Twin-Cities area in Minnesota, social media (e.g. Facebook and Twitter), and media (e.g. newspapers and radio reports).

**Measures**

**Relationship satisfaction.** The Dyadic Adjustment Scale (DAS-7; Hunsley, Best, Leftbvre, & Vito, 2001) was completed by each spouse/partner. Three items are measuring degree of agreement from 0 (“always disagree”) to 5 (“always agree”). Three items are measuring degree of dyadic cohesion from 0 (“never”) to 5 (“more often”). One item is measuring global dyadic satisfaction from 0 (“extremely unhappy”) to 6 (“perfect”). The scale score was composed by equally weighted mean of response scores for all the items. Items were rated on a six-point scale. Reliability (Sharpley, & Rogers, 1984) and validity (Hunsley, Best, Leftbvre, & Vito, 2001) of DAS were well-established in the original study. Cronbach’s alphas for men is .84 and women is .84.

**Depressive symptoms.** The Hopkins Symptoms Checklist-25 (HSCL-25; Hesbacher et al., 1980) was completed by each spouse/partner. The full checklist consists of two scales: a 10-item anxiety scale and a 15-item depression scale.
assessing depressive symptoms. Items were rated on a 4-point scale from 1 (“not at all”) to 4 (“extremely”). Only the depressive symptoms scale score was used for the current study. The concordance rate between symptom screening and structured diagnostic interviews was empirically validated for HSCL-25 (Sandanger et al., 1998). In addition, the HSCL-25 was used as a screening tool in different settings, including primary care settings, or cross cultural settings (Kaaya et al., 2002). In this study, items from the depression sub-scale of HSCL-25 were summed to yield a total symptom severity score for data analysis. Cronbach’s alphas of the HSCL-25 for men is .93 and women is .90.

The Deployment Risk and Resilience Inventory-2 (DRRI). To operationalize combat exposure, two sub-scales were used from the DRRI (King et al., 2006, Vogt, Proctor, King, King. & Vasterling, 2008). The Combat Experiences scale, which contained 15 items (e.g., “I personally witnessed someone from my unit or an ally unit being seriously wounded or killed.”), measured respondents’ exposures during combat. The Aftermath of Battle Scale also contained 15 items (e.g., “I saw bodies of dead civilians.”), measured respondents’ exposures to the consequences of combat. Both scales were rated on dichotomous scale (0 = no, 1 = yes). Internal reliability of both scales and their associations with PTSD symptoms were well established (King et al., 2006; Vogt et al., 2008; Polusny et al., 2011). In the current study, items from both scales were summed to yield a total severity score on traumatic exposure for data analysis.

Months of deployment. Participants were asked to report the total number of months that they have been deployed overseas since the military conflicts in
Response was entered into a numeric scale according to participants’ responses.

**Post-deploy duration.** Participants were asked to report the date when they returned from their previous overseas deployment. The duration of time since the participants’ deployments were calculated by subtracting the in-home assessment date of the ADAPT study from the return date. Response was entered into a numeric scale, in the form of months, according to the date difference.

**Stressful life events.** The Life Event Questionnaire (LEQ; Norbeck, 1984) is an 82-item inventory-type questionnaire in which respondents mark the life events or changes which have occurred during the past year. The LEQ was filled out by both post-deployed service members and their spouses. The LEQ was modified from the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978). Respondents indicated whether the event was considered as “good” or “bad” according to their subjective feeling. The impact of each event shown in the scale was rated on a 4-point scale, ranging from 0 (“No Effect”) to 3 (“Great Effect”). Three scores are obtained from the questionnaire, including: negative events score, the positive events score, and the total events score. Test-retest reliability was established in the original study, where the Pearson correlation for each item at two time points was ranged between 0.78 to 0.83 (Norbeck, 1984). Sarason and his colleague (1978) also established the validity of the LEQ by showing correlations with other relevant personality indices, including the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970).

To control for the effect of stressful life events on relationship satisfaction among military families, the sum of weighted negative events scores was used for
data analysis. Weighting negative event scores takes into consideration the
temporal element, which incorporates the concept that the stressful impact of an
event decline over time (Kale, & Stenmark, 1983). For instance, a negative event
may have fewer scores if it occurred between seven months to one year than
occurred between zero to six month. Summed scores were computed from the
responded items that were marked as negative by respondents, in order to reflect
both the perceived severity and number of stressful life events.

**Duration of Marriage.** Participants were asked to report duration of
marriage, or cohabitating in the format of year. Response was entered into a
numeric scale according to participants’ responses.

**Number of Children.** Participants were asked to report the number of
children they are living with. Parent-child relationship can be biologically related
or not. Response was entered into a numeric scale according to participants’
responses.

**Education.** Participants were asked to report the highest level of education
they have attained. Responses were placed on a numeric scale with scores ranging
from 1 to 8, where 1 (“some high school or less”), 2 (“GED”), 3 (“high school
diploma”), 4 (“some college”), 5 (“associate’s degree”), 6 (“4-year college
degree”), 7 (master’s degree”), and 8 (“doctoral or professional degree”).

**Socio-Economic Status.** Participants were asked to report their annual
household income. Response was entered into a numeric scale according to
participants’ responses. Scores were ranged from 1 (“less than $10,000”) to 16
(“more than $150,000”). The range within each score was $10,000.

**Data Analytic Plan**
The missing data strategy employed for the current study was the Full Information Maximum Likelihood (FIML). This strategy enabled us to estimate parameters based on all available information from each participant. Hence, participants with missing data in one measure can be kept in the analysis to contribute to the parameter estimation. Descriptive statistics were computed using SPSS version 23. To answer the research question, the data was analyzed using the actor-partner interdependence model (Cook, & Kenny, 2005). The use of APIM treats dyad as unit of analysis to measure interdependence, but without taking the sum or average of two individual scores. Commonly used statistical analyses, such as ANOVA or multiple regression, assume independence in the dependent variable. Therefore, using common statistical analyses to measure interdependence within couples would violate such an assumption and lead to inaccurate statistical results (Kenny, 1995). Therefore, the use of APIM allowed for estimation of interdependence with no independence of observations.

Estimator of maximum likelihood estimation with robust standard errors (MLR) was used by Mplus 7 in the analysis. MLR is suggested to use when there are non-normality of observations in the data (Muthen, & Muthen, 2015). Pearson-correlation coefficients for men and women’s self-reported relationship satisfaction are correlated ($r = .571, p < 0.001$), which meets the assumption of no independence (Kenny, Kashy, & Cook, 2006). In the sample for the current study, only heterosexual couples were included. This fulfills the criterion of treating subjects as distinguishable dyads. The assumption of normality was also fulfilled.

In the APIM analysis, the dependent variables were deployed fathers’ and
their non-deployed spouses’ self-reported relationship satisfaction. The independent variables were deployed fathers’ and their non-deployed spouses’ depressive symptoms. Demographic variables, combat exposure, and stressful life events were entered as covariates in the model. Demographic variables included income, education level, number of children, and duration of marriage. Combat exposure included two scales from the DRRI, months of deployments and post-deploy duration. Total negative life event scores from the LEQ were used for stressful life events.

Results

Means, standard deviations, and zero-order correlations are displayed in Table 1. As shown in Table 1, a significant positive correlation was found between men’s depressive symptoms and women’s depressive symptoms \((r = .216, p < .001)\). Significant correlations were found between the dependent variables and covariates. Among men, relationship satisfaction was positively correlated with education level \((r = .176, p < .05)\). Among men, relationship satisfaction was negatively correlated with marriage duration \((r = -.133, p < .05)\), and depressive symptoms were positively correlated with their own reports of stressful life events \((r = .451, p < .001)\) and their wives’/partners reports of stressful life events \((r = .160, p < .05)\). Women’s depressive symptoms were positively correlated with their reports of stressful life events \((r = .337, p < .001)\).

To test the two hypotheses, APIM analysis was conducted. The model was saturated \((df = 0)\). As shown in Figure 1, the results showed evidence to support Hypothesis 1. Depressive symptoms were negatively associated with both men’s \((\beta = -.338, p < .001)\) and women’s \((\beta = -.384, p < .001)\) actor relationship
satisfaction, after controlling for combat stress and life event stress. There was also evidence to support Hypothesis 2. Men’s depressive symptoms were negatively associated with women’s relationship satisfaction ($\beta = -.190, p = .003$). Negative partner association was also found between women’s depressive symptoms and men’s relationship satisfaction ($\beta = -.140, p = .039$). The model accounted for 19.1% of the variance in men’s relationship satisfaction and 22.3% of women’s relationship satisfaction.

**Discussion**

The study applied the Military Family Stress Model to explicate the relationship between depressive symptoms and couple relationship satisfaction among military parents. Although couple relationship satisfaction and PTSD symptoms have been extensively studied using military couple samples (Dekel & Monson, 2010b; Galovski & Lyons, 2004; Goff & Smith, 2005; Goff, Crow, Reisbig, & Hamilton, 2007; Lambert, Engh, Hasbun, & Holzer, 2012; Renshaw, Rodrigues, & Jones, 2008), much less research has examined depressive symptoms and couple relationship satisfaction. Consistent with the findings from literature that showed negative association between PTSD symptoms and couple functioning (Knobloch, & Theiss, 2011; 2012), the current study found both actor and partner effects for the negative associations between depressive symptoms and couple relationship satisfaction.

The use of the APIM research design showed that the dyadic pattern within couples is bi-directional in this cross-sectional study. Men’s depressive symptoms are negatively associated with their own and their partner’s relationship satisfactions, and we found the same result for their non-deployed partners’
depressive symptoms. The findings show that depressive symptoms are linked to how couples perceive their intimate relationships. During the deployment and upon reintegration from overseas deployments, both men and women are at risk for developing depressive symptoms (Allen et al., 2010; Hoge et al., 2004). The findings are in accord with studies showing the negative effects of depressive symptoms on relationship quality among civilian couples (Beach, Sandeen, & O'Leary, 1990; Beach, 2001). Although the current findings are cross-sectional, they are consistent with findings showing that mental health concerns after military service can hamper intimate relationships (Dekel & Monson, 2010b; Galovski & Lyons, 2004; Lambert, Engh, Hasbun, & Holzer, 2012).

Goff & Smith’s (2005) CATS model suggests that trauma-related symptoms are contagious between intimate partners, impairing relationship quality (Goff, Crow, Reisbig, & Hamilton, 2007). Unlike the findings of the current study, however, Nelson-Goff et al. (2007) did not find similar evidence when examining the influence of individual depressive symptoms on self-reported couple relationship satisfaction in an army family population. One possible explanation for the discrepant findings is that Goff et al. (2007) used different measurers. Specifically depressive symptoms were assessed using the Trauma Symptom Checklist-40, rather than the HSCL-25 (Goff, Crow, Reisbig, & Hamilton, 2007). Nevertheless, our findings are consistent with the Military Family Stress Model by showing the unique negative association between depressive symptoms and couple relationship satisfactions.

In addition, the current findings take a step forward to explore the unique role of depressive symptoms in association with couple relationships. Consistent
with Knobloch and her colleague’s findings based on the Relational Turbulence Model (2011; 2012), our findings broaden the literature by showing that both actor and partner effects of depressive symptoms on couple relationship satisfactions remain, even after controlling for combat exposure and stressful life events. This study highlights the importance of disentangling associations of different mental health symptoms with couple relationships, given the different etiology and mechanisms of PTSD and depression in military populations (Erickson et al., 2001; Stander, Thomsen, & Highfill-McRoy, 2014).

In reference to the trans-diagnostic approach (Cuthbert, 2014), a post-hoc analysis was performed. Latent variables consisting of PTSD symptoms, depressive symptoms, and anxiety symptoms for men and women were created. With this study sample, similar actor and partner associations were found when replacing the depressive symptoms latent variable with the trauma symptoms latent variable. The only difference between using the latent variable and solely depressive symptoms in the two models was that no partner association between women’s trauma symptoms and men’s relationship satisfactions was found in the model using latent variables. Even so, this post-hoc analyze confirms with the dyadic pattern between men and women in other studies (Zamir, Gewirtz, Labella, DeGarmo, & Snyder, 2017). Future studies should further examine this pattern.

**Limitations and Future Directions**

One of the limitations of the study is the reliance on self-report measures, which increases method bias. Participants may lack the ability to provide accurate responses of their depressive symptoms or negative life events. Observational measures should be used in future studies to address this limitation.
Another limitation is the lack of control for PTSD symptoms in this study. The high multi-collinearity between self-reported PTSD symptoms and depressive symptoms in ADAPT samples for men \((r = .747, p < .001)\) and women \((r = .622, p < .001)\) render us unable to include both measures in analyses. One possible explanation is due to the overlap on mood disturbance symptoms (DSM-IV; American Psychiatric Association, 1994). This is despite the fact that studies have shown the difference in etiology and prognosis between PTSD and depression in military samples (Erickson et al., 2001; Stander, Thomsen, & Highfill-McRoy, 2014). The current study used combat exposure measure as a proxy to avoid the violation of multi-collinearity in the actor-partner interdependence model, but to control for trauma exposure, at least.

Since the present study only adopted cross-sectional data, current finding can only imply association between depressive symptoms and couple relationships. There is a need for using longitudinal design in future studies to unfold the temporal relationships between mental health symptoms and couple relationships.

**Implications and conclusions**

The bi-directional dyadic pattern identified within military couples points to the importance of treating depressive symptoms in military couples. It may thus be useful to add a focus on depressive symptoms in both intervention and prevention focused programs for military families, especially for NG/R members.

In conclusion, we adopted the APIM research design to test the association between depressive symptoms and couple relationships on post-deployed NG/R male service members and their civilian wives. Informed both by military and civilian theoretical frameworks the study explored the unique role played by
depressive symptoms in affecting couple relationships following reintegration from deployment. The results speak to the need for targeting depressive symptoms in military couples, in both intervention-focused and prevention-focused program.
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Mansfield, A. J., Kaufman, J. S., Marshall, S. W., Gaynes, B. N., Morrissey, J. P.,


Appendix

Table 1

Pearson Correlation, Means, and Standard Deviations between Study Variables.

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<thead>
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<th>Variables</th>
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<td>5. LEQ</td>
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<td>6. DAS</td>
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<td>11. Income</td>
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<td>.013</td>
<td>.104</td>
<td>-.004</td>
<td>-.188**</td>
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</tbody>
</table>

Note: ***p < .001, **p < .01, *p < .05.

Figure 1. The Military Family Stress Model (Gewirtz, DeGarmo, & Zamir, 2017).
Figure 2. APIM model of the Actor and Partner Associations of Depressive Symptoms and Relationship Quality.

Note. *p < .05, **p < .01, ***p < .001.