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Less Engagement in Pleasure Activities is associated with poorer quality of life for Veterans with
Comorbid Post-Deployment Conditions

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Objective: The presence of multiple comorbid conditions is common after combat deployment and complicates treatment. A potential treatment approach is to target shared mechanisms across conditions that maintain poorer health-related quality of life (HRQOL). One such mechanism may be decrements in pleasurable activities. Impairment in pleasurable activities frequently occurs after deployment and may be associated with poorer HRQOL.

Method: In this brief report, we surveyed 126 Veterans who had previously sought an assessment at a Veterans Affairs post-deployment health clinic and assessed pleasurable activities, HRQOL, and post-deployment health symptoms.

Results: Forty-three percent of Veterans met our criteria for all three post-deployment conditions (PTSD, depression and chronic wide-spread physical symptoms). Greater engagement in pleasurable activities was associated with better HRQOL for all Veterans regardless of type or level of post-deployment health symptoms.

Conclusion: Future research should study if interventions that encourage Veterans with post-deployment health conditions to engage in pleasurable activities are effective rehabilitation strategies.

Keywords: Quality of life, veterans, posttraumatic stress disorder, chronic multisymptom illness, depression, medically unexplained symptoms, pleasurable activities, daily behavior

Multiple comorbid and overlapping post-deployment health conditions are a critical health concern facing Veterans returning from Afghanistan (Operation Enduring Freedom) and Iraq (Operation Iraqi Freedom). Lew and Colleagues (2009) found that 78% of Veterans seen at a Veterans Affairs (VA) polytrauma clinic have two or more post-deployment health conditions. While Seal and Colleagues (2010) examined mental health diagnoses of approximately 100,000 OEF/OIF Veterans first seeking VA healthcare services after deployment, and found that over 50% were dually (or more) diagnosed. Veterans with comorbid conditions have poorer health-related quality of life (HRQOL) as compared to Veterans with only one post-deployment health condition (Alschuler & Otis, 2014; Gill et al., 2014). HRQOL is defined as the impact of physical and mental health on well-being including perceived health, participation and health function. It has been argued that comorbid post-deployment health concerns exacerbate each other resulting in excessive symptoms that make recovery more difficult and can lead to long-term decrements in HRQOL (Brenner, Vanderploeg, & Terrio, 2009).

Treating Veterans with comorbid post-deployment health conditions is complicated as most evidence based treatments were developed for a single disorder. Thus management requires prioritizing a primary condition, treating the comorbid conditions sequentially or combining treatments. In order to determine the prioritize treatment targets, there have been attempts to disentangle the differential impact of comorbid post-deployment conditions (Polusny et al.,

2011). However, this work is complicated by the common causes (e.g., polytraumatic injuries) and overlap of symptoms between the conditions (Brenner et al., 2009; Gironde et al., 2009).

An alternate treatment approach is to target common mechanisms across post-deployment conditions that lead to worse HRQOL. Gil and Colleagues (2014) found that elevated inflammation (operationalized as IL-6 concentrations) was more common among Veterans with multiple conditions than only one post-deployment health condition. This study found that it is possible to identify common mechanisms across post-deployment conditions. However, there is a need for further investigation into additional factors maintaining comorbid conditions, particularly those that can be targeted through existing treatments.

One mechanism that may lead to worse HRQOL across post-deployment health conditions, and is a potential treatment target, is less involvement in pleasurable activities, such as hobbies, sports or socializing. Veterans seeking treatment at the VA report reduced engagement in pleasurable activities. Sayer and Colleagues (2010) found that 47% of returning combat Veterans report difficulties in making good use of free time. Resnick and Allen (2006) conducted interviews with returning veterans and found Veterans reported significant limitations in completing household chores and engaging in social interactions.

Among civilians, greater involvement in pleasurable activities is linked better psychological health outcomes including happiness (Csikszentmihalyi & Hunter, 2003), less experiential avoidance (Kashdan, Barrios, Forsyth, & Steger, 2006), reduced negative affect and increased positive affect (Watson, 1988) and improved wellbeing (White & Dolan, 2009). Some studies have also examined if involvement in pleasurable activities is related to better physical health outcomes. Adams and Colleagues (2011) reviewed the literature and found in older adults that greater engagement in pleasurable daily activities was associated with better health function

and lower morbidity and mortality. Pressman and Colleagues (2009) published a study in younger adults and found that greater pleasurable daily activity was related to better health function, lower blood pressure, lower total cortisol, and lower body mass index. These findings are consistent with behavioral reinforcement theory which suggests avoidant behaviors (e.g., withdrawal from pleasurable activities) in response to environment cues (e.g., chronic pain, fight with spouse) cause or maintain mental health symptoms and lower HRQOL (Csikszentmihalyi & Hunter, 2003; Hopko, Robertson, & Lejuez, 2006; Jacobson, Martell, & Dimidjian, 2001; Jakupcak, Wagner, Paulson, Varra, & McFall, 2010; White & Dolan, 2009)

What is not known is if Veterans' reduced engagement in pleasurable activities is related to worse HRQOL and if this relationship is consistent for Veterans who report different types and levels of symptoms of post-deployment conditions. If such relationships are observed it suggests a possible mechanism to intervene on to improve post-deployment HRQOL. Importantly, there are already established treatments (e.g., Behavioral Activation) that target increasing pleasurable activities, have been tested among Veterans with a depression and posttraumatic stress disorder (Gros & Haren, 2011; Jakupcak et al., 2006; Jakupcak et al., 2010) and could potentially be expanded to treat Veterans with multiple complex post-deployment health conditions. In the current study, we surveyed Veterans seeking treatment for post-deployment health concerns. We hypothesized that the majority of Veterans would meet criteria for two or more post-deployment health conditions. Further, that there would be a strong relationship between greater engagement in pleasurable activities and higher HRQOL for all Veterans regardless of symptom presentation.

Methods

In this brief report, we recruited Veterans from a VA referral evaluation center for deployment-related health concerns. Veterans were approached at the end of their comprehensive evaluation by a study staff member and offered the opportunity to participate in a longitudinal study seeking to understand predictors of health outcomes. There were approximately 1,200 eligible Veterans seen at the center between 2004 and 2010. Of those who consented to participate in the study, we had up to date mailing addresses for an estimated 265 Veterans. We mailed a survey in October 2010 and 126 Veterans (48% response rate) completed it. We found few differences between those who completed the follow-up measures and the sample of all Veterans seen at the center for which we had baseline clinical data (see Table 1). Although Veterans from all eras were eligible to participate, 97% of our study sample reported deploying to Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF). All research was approved by the local Institutional Review Board and appropriate VA research committees.

Measures

Pleasurable Activities. The Pleasurable Activities List (PAL) is a reliable and valid measure that captures the frequency of 139 different activities (Roozen et al., 2008). Summing 86 of the items provides a cumulative measure and there are also six valid activity subscale scores: (1) Social (e.g., visiting friends); (2) Sensation-Seeking (e.g., riding a motorcycle); (3) Domestic (e.g., gardening); (4) Culture/Science/Travel (e.g., going to a concert); (5) Passive/Relaxing (e.g., sitting quietly); and (6) Sports-Related (e.g., doing organized sports).

Health-Related Quality of Life. The Veterans Medical Outcomes Study 36-Item Short Form Health Survey (VR-36) (Ware, 1992) is a composite measure of health-related quality of life that has been used to characterize the health status of Veterans. We used the composite mental health-related quality of life (MCS) and the composite of physical health-related quality

of life (PCS). These scores are created using a scoring algorithm from 8 subscales including: physical function, role physical, vitality, bodily pain, general health, role emotional, social functioning and mental health. Scores are standardized and normed with a range from 0 to 100, a mean of 50 and a standard deviation of 10. Higher scores denote better HRQOL. Cronbach's alpha for the eight domains range from 0.76 to 0.90. Validity of the SF-36 has been confirmed through comparisons with similar measures (Jones et al., 2001; Kazis et al., 2004).

Posttraumatic Stress Disorder (PTSD) symptoms. The seventeen item PTSD Checklist is a self-report measure of PTSD symptoms consistent with the DSM-IV (Blanchard, 1996). Compared against to the gold standard for assessing PTSD, the Clinician Administered PTSD scale, the PTSD Checklist has been shown to provide a valid and reliable measure of PTSD symptoms. A cut-off score of 50 or greater denotes probable PTSD.

Depression. The Patient Health Questionnaire, depression scale (PHQ-8) assesses the presence and frequency of depressive symptoms over the past two weeks. Scores range from 0 to 24 with higher scores indicating greater depressive symptoms. A cut off score of 10 or greater indicates likely depression (Kroenke et al., 2009).

Physical Symptoms. The Patient Health Questionnaire somatic scale (PHQ-15) assesses fifteen physical symptoms. The PHQ-15 has excellent internal reliability and validity (Kroenke, Spitzer, & Williams, 2002). Multiple studies have validated this symptom checklist to determine physical symptom severity. This questionnaire has been used in civilian and veteran populations, (Hallman et al., 2003; Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Kroenke et al., 2002). A cut off score of 10 or greater indicates moderate level of physical symptoms (Kroenke, Spitzer, Williams, & Lowe, 2010).

Results

The Veterans' average physical HRQOL score ($PCS = 42.8 \pm 11.9$) and mental HRQOL score ($MCS = 34.6 \pm 15.6$) were poorer than national norms (Ware, 1992). To understand the relationship between symptoms, SigmaPlot was used to create a 3-D graph ($n=123$ due to administrative error). In the graph we smoothed areas between data points by predicting these points using a negative exponential predictor with a second polynomial degree. The graph shows a bimodal distribution with most participants reporting high levels of multiple symptoms and a second group reporting low rates of PTSD symptoms and depressive symptoms and low to moderate rates of physical symptoms (Figure 1). We also graphed symptoms using the established cut-off scores for each measure (Figure 2). Most of the sample reported symptom burden suggesting at least 2 comorbid conditions (55%).

Pearson product-moment correlation analyses were used to examine the relationship between pleasant activities and HRQOL. Engaging in fewer pleasurable activities overall was strongly associated with poorer mental and physical HRQOL (see Table 2). Social activities were positively related to physical and mental HRQOL. Domestic activities (e.g., household chores) and science, culture and travel were positively related to mental HRQOL.

We examined if the relationship between pleasurable activities and HRQOL is the same for Veterans with no/low or high levels for PTSD, depression and physical symptoms. We used Preacher and Colleagues (2008) process macro for SPSS which uses a bootstrapping method to create 5,000 samples to determine if there is an interaction. We conducted six separate models, examining the interaction between each type of symptom (e.g., PTSD) and total pleasurable activities on the dependent variables (mental HRQOL and physical HRQOL) controlling for the other comorbid symptoms. All variables were entered as continuous variables. We found no

interactions; in other words, there was a relationship between pleasurable activities and HRQOL at all levels of all measured post-deployment health symptoms.

Discussion

Lew and Colleagues (2009) found that almost 80% of Veterans presenting at a poly-trauma clinic had two or more post-deployment health conditions. In this brief report, we similarly found that over 55% of Veterans seeking treatment at a VA specialty post-deployment clinic screened positive for two or more post-deployment conditions. Combat conveys risk for multiple comorbid mental and physical health conditions. Trying to disentangle these conditions may be futile and artificial, yet evidence based treatments are typically developed to treat one disorder. Identification of shared factors that maintain these conditions may inform trans-diagnostic treatments.

Among a sample of Veterans seeking treatment at a VA tertiary care clinic we hypothesized and found a strong correlation between pleasurable activities and mental and physical HRQOL for all Veterans in our sample. This was true for Veterans who reported any level or type of symptom of post-deployment health conditions (PTSD, depression or physical symptoms). When pleasurable activities were separated into categories, social activities were most strongly associated with HRQOL. Social activity may increase available emotional and instrumental support which can improve mental HRQOL (Adams et al., 2011). Social activity may also offer physiological benefits, leading to improved physical HRQOL (Uchino, 2006).

Our data suggests that interventions that target increasing pleasurable activities, such as Behavioral Activation, may improve HRQOL. This may be particularly valuable for patients with multiple comorbidities. Activating pleasurable activities may provide a first-step to engaging the Veteran while improving HRQOL. For some Veterans, this hypothesized

improvement in HRQOL could also help clarify if there is an additional need for disorder specific treatments (e.g., exposure treatment). Alternatively, increasing pleasurable activities may be useful as a supplement for Veterans with comorbid post-deployment conditions who are engaging in evidence based treatments for single disorders. Improving Veterans HRQOL by increasing their preferred pleasurable activities addresses Veterans' own preferences for treatment. McAndrew and Colleagues (2013) found that Veterans are most likely to describe their life goals as wanting to improve their family and careers.

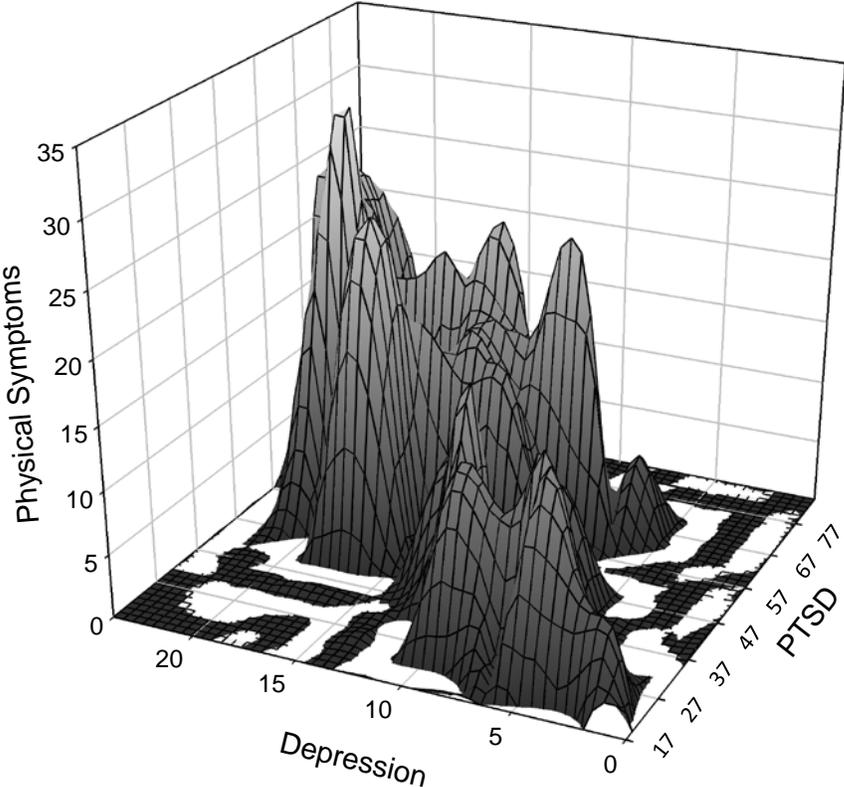
Like all cross-sectional studies we cannot determine the direction of the relationship between the variables. An alternative hypothesis is that lower HRQOL may lead to reduced engagement in pleasurable daily activities. Future studies should use a prospective or experimental design to explore the directionality and stability of these relationships. Collecting data on physiological mediators (e.g. autonomic function, inflammation) might also clarify these issues by identifying mechanisms of action. Caution should be used when interpreting the Passive Relaxation and Domestic Activity subscales due to the low reliability (Table 2) the reliability of the full pleasurable activities measure and the Social Activity subscale was high. This study had a low response rate and focused on Veterans seeking treatment at the VA for significant post-deployment health concerns. Future work should examine the relationship between pleasurable activities and HRQOL in other Veteran populations and explore if interventions that encourage Veterans with post-deployment health conditions to engage in pleasurable activities are effective rehabilitation strategies.

In this brief report, we find initial evidence that greater engagement in pleasurable activities is related to better HRQOL. While, causality is beyond the interpretation of these initial results, the results are suggestive and, if confirmed, provide a much needed avenue for treatment.

What is needed now is a randomized controlled trial study of Veterans with comorbid post-deployment health conditions in which some veterans receive coaching and encouragement to engage in pleasurable activities and others serve as the control group. If veterans in the experimental group show improved HRQOL it would suggest increasing engagement in pleasurable activities is an effective trans-diagnostic approach for post-deployment health.

Figure 1: 3D Graph depicting relationships between PTSD, depression and physical symptoms

3D Graph 11



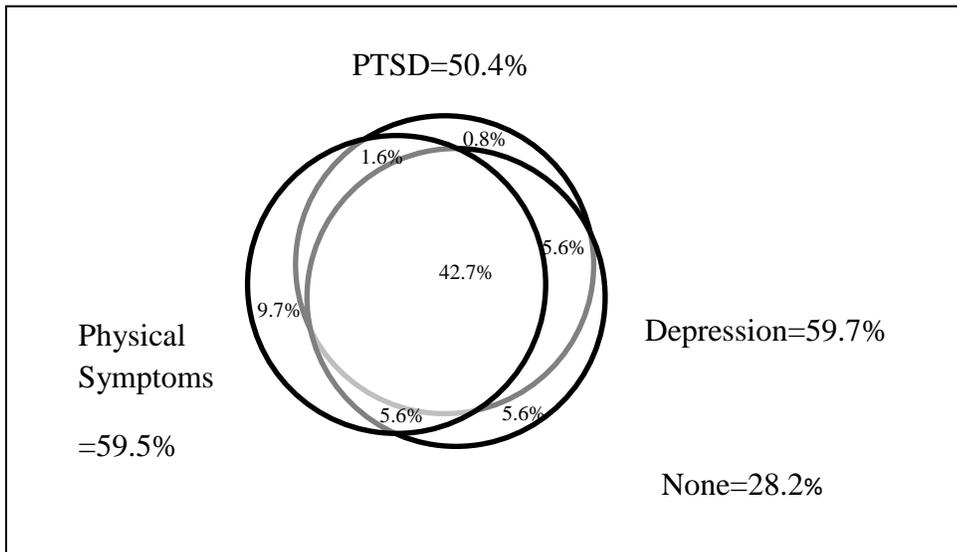


Figure 2: Percent of sample reporting clinically significant PTSD, depression and physical symptoms

Table 1. Description of the study participants as compared to the recruitment population

	Study Participants (N=126)	Overall Clinical Sample (N=1086)
Age (years)	37.58 (11.13)	35.73 (12.38)
Male	85.5%	88.0%
Hispanic/Latino	27.8%	28.7%
White*	67.9%	56.6%*
Black/African-American*	17.9%	26.1%*
Other Race	14.2%	17.3%
Education (years)	13.8 (1.98)	13.5 (1.8)
PTSD Symptoms at Intake	45.1 (19.0)	44.4 (19.8)

*p<.05; PTSD Symptoms=posttraumatic stress disorder symptoms from the PTSD Checklist

Table 2. Correlations between pleasurable activities subscales, quality of life and symptoms of Veterans

	Mean (SD) reliability	Physical HRQOL	Mental HRQOL	Physical Symptoms	Depression	PTSD
Mean (SD) reliability		42.82 (11.86)	35.01 (15.55)	12.10 (6.28) $\alpha=.87$	11.89 (7.60) $\alpha=.93$	48.31(21.54) $\alpha=.98$
Total Activities	.88 (.39) $\alpha=.93$	.38**	.41**	-.44**	-.44**	-.42**
Social Activities	1.08 (.61) $\alpha=.92$	.46**	.38**	-.43**	-.46**	-.47**
Sensation-seeking	.22 (.34) $\alpha=.65$	.06	.07	-.02	-.02	.05
Domestic Activities	1.06 (.59) $\alpha=.58$	.14	.36**	-.26**	-.29**	-.23*
Culture/Science/ Travel	.40 (.47) $\alpha=.84$	.04	.24**	-.18*	-.15	-.19*
Passive Relaxing	.90 (.57) $\alpha=.58$	.07	-.04	-.20*	-.00	-.10
Sports Related	.56 (.58) $\alpha=.77$	.16	.14	-.20*	-.16	-.12

PTSD=Post-traumatic stress disorder symptoms, HRQOL=Health-Related Quality of Life

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