



The Effect of Deployment to a Combat Zone on Testosterone Levels and the Association with the Development of Posttraumatic Stress Symptoms: A Longitudinal Prospective Dutch Military Cohort Study

Reijnen, A., Geuze, E., Vermetten, E. (2015). The effect of deployment to a combat zone on testosterone levels and the association with the development of posttraumatic stress symptoms: A longitudinal prospective Dutch military cohort study. *Psychoneuroendocrinology*, 51, 525-533. doi:10.1016/j.psyneuen.2014.07.017

SUMMARY: 918 Dutch males participated in a study to understand the relationship between testosterone, cortisol, and the development of PTSD (posttraumatic stress disorder) symptoms. Participants completed one set of predeployment assessments and four postdeployment assessments. After deployment, no differences existed in testosterone levels between males with high and low levels of PTSD symptoms. However, predeployment testosterone level predicted later onset of PTSD symptoms.

KEY FINDINGS

- Approximately 10% of the Service members were experiencing PTSD six months after deployment.
- Plasma testosterone levels were significantly higher after deployment as compared to predeployment.
- After deployment, there were no differences in testosterone levels between participants exhibiting high vs low levels of PTSD symptoms.
- Low levels of testosterone at predeployment significantly predicted PTSD symptoms at the one and two-year postdeployment assessments.
- Cortisol did not affect the relationship between testosterone and the prediction of PTSD symptoms in postdeployment assessments.

IMPLICATIONS FOR PROGRAMS

Programs could:

- Educate military members about both the psychological and physical factors that may contribute to PTSD symptoms
- Provide a range of healthy activities to reduce post deployment stress
- Offer classes for family members about how to support a Service member managing PTSD

IMPLICATIONS FOR POLICIES

Policies could:

- Recommend thorough medical screening for Service members prior to deployment
- Allocate funding for wellness programs for at-risk deploying Service members in an effort to minimize mental health symptoms
- Encourage leadership to openly discuss mental health challenges associated with deployment and encourage help-seeking behavior when appropriate

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METHODS

- One-month prior to deployment, participants completed two questionnaires about PTSD and early childhood trauma and gave plasma blood samples to measure testosterone levels.
- Follow-up assessments were conducted four times after deployment: 1 month, 6 months, 1 year, and 2 years.
- The first three post deployment assessments were administered at the installation, with the fourth assessment delivered by mail.

PARTICIPANTS

- 918 Dutch males who were deployed to Afghanistan between 2005 and 2008.
- Combat deployments were four months in duration and duties included searching houses, combat patrols, transportation into enemy-controlled areas, and clearing land mines.
- Participants were on average 28 years of age.

LIMITATIONS

- Due to the volunteer nature of the study, a selection bias may have affected the sample.
- Assessments used self-report data, which has inherent limitations.
- No control group was employed in the study.

AVENUES FOR FUTURE RESEARCH

- Continued research into the biological mechanisms of PTSD will be important for the development of effective prevention and intervention protocols.
- Future research could replicate this study among a more diverse sample to increase generalizability.
- Results could be strengthened by using medical assessments and records to diagnose PTSD symptoms instead of using self-report data.

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