



Longitudinal measures of hostility in deployed military personnel



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ABSTRACT

Increases in anger and hostility are commonly found after military deployment. However, it is unknown how anger and hostility develop over time, and which veterans are more at risk for developing these complaints. Data of 745 veterans one month before deployment to Afghanistan and one, six, twelve and 24 months after deployment were analyzed in a growth model. Growth mixture modeling revealed four classes based on their growth in hostility. Most of the participants belonged to a low-hostile group or a mild-hostile group that remained stable over time. Two smaller groups were identified that displayed increase in hostility ratings after deployment. The first showed an immediate increase after deployment. The second showed a delayed increase between twelve and 24 months after deployment. No groups were identified that displayed a decrease of hostility symptoms over time. Multinomial logistic regression was applied to predict group membership by age, education, early trauma, deployment stressors and personality factors. This study gains more insight into the course of hostility over time, and identifies risk factors for the progression of hostility.

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1. Introduction

During deployment, military personnel are often exposed to heightened stress and traumatic events. Mental health problems after returning from deployment, in particular (symptoms of) depression, anxiety and posttraumatic stress disorder (PTSD), have been identified in several studies (reviewed by Hoge et al., 2004). Furthermore, some studies point towards an increase in anger and hostility after deployment (Jakupcak et al., 2007; Elbogen et al., 2010; Reijnen et al., 2015; Worthen et al., 2014). However, many aspects such as the development over time and the risk factors of heightened anger and hostility after deployment remain unknown.

Anger and hostility are terms that partly overlap. Anger refers to the emotions and feelings, or the affective component of aggressive behavior, whereas hostility points towards the negative attitude or evaluation of persons or objects (Ramirez and Andreu, 2006). Anger can be divided into state and trait anger. State anger refers to a current emotional state, which can change over time. Trait anger can be described as a rather stable character trait

(Spielberger, 1999). Both anger and hostility can lead to aggressive behavior, and anger and hostility are related to intimate partner violence (Birkley and Eckhardt, 2015). Anger and hostility are closely associated with a large number of disorders, including anxiety and depressive disorders (Painuly et al., 2005), intermittent explosive disorder (Coccaro, 2012), and PTSD (Orth and Wieland, 2006). In the DSM-5, an anger symptom has been added to the PTSD classification (American Psychiatric Association, 2013).

Anger and hostility may increase the risk of developing PTSD symptoms, whereas PTSD symptoms and exposure to traumatic events can lead to heightened anger and hostility (Heinrichs et al., 2005; Meffert et al., 2008; van Zuiden et al., 2011; Lommen et al., 2014). Anger and hostility is mainly treated using cognitive behavioral therapy (Chemtob et al., 1997). Aggressive behavior is a difficult condition to treat due to a high drop-out (Chemtob et al., 1997) and number of treatment utilizations is not related to changes in aggression (Shin et al., 2012). The presence of anger and hostility has been found to predict a worse course of psychiatric disorders and worsen the prognosis of psychotherapy (Painuly et al., 2005; McHugh et al., 2012).

The course of anger and hostility over time has not been studied in a military sample before. One longitudinal study in a civilian sample revealed that hostility remained moderately stable into young adulthood (Hakulinen et al., 2014). Although exposure

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to traumatic events can lead to increased anger and hostility (Meffert et al., 2008), anger and hostility are more common after combat experience compared to any other type of major stress experience (Orth and Wieland, 2006). This suggests that combat experiences may have a different effect on post-traumatic adjustment than other types of traumatic experiences. Alternatively, it is possible that military personnel are characterized by increased pre-trauma anger and aggression. Although heightened anger and hostility are commonly reported after deployment, it is still unknown how they develop over time and which factors affect the development and course of these symptoms.

Previous studies on the course of posttraumatic reactions over time in military samples (Orcutt et al., 2004; Berntsen et al., 2012; Bonanno et al., 2012) revealed different trajectories including chronic, new-onset, delayed-onset, recovery and benefit groups. Moreover, the majority of respondents was resilient and did not suffer from PTSD. Because anger and hostility in a deployed military sample are closely related to PTSD symptoms (Novaco and Chemtob, 2002), it is hypothesized that the progression of hostility symptoms over time is similar to the trajectories that are usually observed in PTSD symptom severity.

Heightened anger and hostility in military samples has been linked to increased reactivity to fearful or threatening distress (Chemtob et al., 1997). This increased reactivity might, at least partially, be attributed to individual differences in personality dimensions (Brandes and Bienvenu, 2006) as both general reactivity and behavior activation and inhibition reflect inherent dimensions of temperament (Cloninger et al., 1993). Furthermore, the cognitive aspect of hostility, for example a negative attitude, is linked to personality as well (Ramirez and Andreu, 2006). Thus far, it remains largely unclear how personality factors may affect and shape the development of hostility symptoms after deployment over time (Orth and Wieland, 2006).

In the present study we used growth mixture modeling (GMM), to examine trajectories of hostility in military personnel from pre-deployment to two years after homecoming. GMM is a technique to identify homogenous groups within a larger heterogeneous sample (Jung and Wickrama, 2008). The first aim was the determination of the trajectories of hostility after deployment. The next aim was the identification of predictors of these trajectories, specifically age, education, early trauma, deployment stressors and personality.

2. Methods

2.1. Participants and procedure

The current study is part of a large prospective study on biological and psychological predictors of deployment-related disorders in the Dutch Armed Forces. The Dutch Armed Forces are a volunteer army. Participants included in this study consisted of 993 healthy veterans who were deployed for 4 months to Afghanistan as part of the NATO International Security Assistance Force (ISAF). Duties during deployment included combat patrols, clearing or searching homes and buildings, participation in demining operations, and transportation across enemy territory. Participants were exposed to typical war-zone stressors such as enemy fire, armed combat, and seeing seriously injured fellow soldiers and civilians (including women and children). An overview of exposure to deployment stressors is presented in Table 1.

Questionnaires were administered one to two months prior to deployment to Afghanistan (T0) and one (T1), six (T2), twelve (T3) and 24 months (T4) after this deployment. Data of participants were only included in the analyses if data from at least three assessments were available. Therefore, 248 participants were excluded, leading to a final analysis sample of 745 participants (mean age = 29.5 years, 90.2% male). All participants gave written informed consent prior to the study. The study was carried out in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of the University Medical Center Utrecht, the Netherlands.

Table 1

Percent of sample endorsing each traumatic event during deployment.

	%
Enemy fire	62.3
Witnessed people suffering	60.1
Witnessed wounded	46.6
Colleague injured or killed	46.1
Incoming fire	38.3
Witnessed dead	37.4
Rejection by locals	33.9
Personal danger	29.2
Screaming of injured people	20.6
Witnessed people getting killed/injured	19.6
Insufficient means to intervene	17.1
Insufficient control over situation	13.5
Mission experienced as useless	12.9
Memories of former deployments	12.3
Traffic accident	9.1
Held at gunpoint	5.1
Being injured	2.5
Colleague held hostage	0.5
Held hostage	0.0

2.2. Measures

Hostility was measured at all time-points using the hostility scale of the Dutch version of the Revised Symptom Checklist-90 (SCL-90; Derogatis and Unger, 2010). The SCL-90 has good reliability and has been used frequently in previous studies as well as in clinical settings (Schmitz et al., 1999). The hostility scale consists of six items, in which participants have to indicate whether they were bothered by the items in the last week, ranging from 1 (not at all) to 5 (extremely). The items on this scale measure both anger and hostile symptoms (Orth and Wieland, 2006). Scores on this scale range from 6 to 30 with higher scores reflecting more severe anger and hostility symptoms. The scale measures the current state of anger and hostility symptoms. Cronbach's α ranged from 0.63 till 0.82 on all time-points for this scale.

The Dutch short version of the Temperament and Character Inventory (TCI; Duijsens, 1999) was filled out prior to deployment to assess personality. This version of the TCI consists of 105 dichotomous 'true' or 'false' items. The questionnaire measures four temperament dimensions: novelty seeking, harm avoidance, reward dependence and persistence; and three character dimensions: self-directedness, cooperativeness and self-transcendence. 'Novelty seeking' is defined as impulsivity and activity in response to novelty. 'Harm avoidance' refers to inhibition of behavior and passive avoidant behavior. 'Reward dependence' is defined as maintenance of behavior and dependence on approval of others. 'Persistence' refers to perseverance. 'Self-directedness' is defined as self-determination. 'Cooperativeness' refers to empathy and helpfulness. 'Self-transcendence' refers to a spiritual union with one's surroundings. Cronbach's α ranged from 0.63 till 0.80 on all subscales.

Exposure to childhood trauma was assessed prior to deployment using the Dutch short-form self-report version of the Early Trauma Inventory (Bremner et al., 2007; Rademaker et al., 2008). This checklist consists of 27 dichotomous items in order to assess exposure to traumatic experiences (general trauma, physical abuse, emotional abuse and sexual abuse) before the age of 18 years. The total score represents the number of different traumatic events experienced.

Exposure to traumatic events during deployment was assessed one month after homecoming using a 19-item checklist, the Deployment Experiences Scale (DES; Reijnen et al., 2015). The items are depicted in Table 1.

2.3. Statistical analyses

Growth mixture modeling (GMM) is an explorative technique to estimate unobserved homogeneous subpopulations of trajectories within a larger heterogeneous sample (Jung and Wickrama, 2008). Using GMM, trajectories of hostility from predeployment to two years after deployment were modeled in models assuming 1–10 classes including the intercept, linear and quadratic terms. Fit indices as the log-likelihood, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) and examination of the classes of the different models were used to decide on the final model (Nylund et al., 2007; Ram and Grimm, 2009). The BIC has been found to be a good indicator for deciding on the number of classes (Nylund et al., 2007). Besides the fit indices, further examination of the models was performed, with number of group members and plots of group trajectories taken into consideration (Ram and Grimm, 2009).

Next, predictors for class-membership were identified using multinomial logistic regression analyses (MLRA). Predictors in these models were age, education,

early trauma, number of traumatic experiences during deployment and the subscales of the TCI (Cloninger et al., 1993).

All analyses were performed using Mplus version 6.11 for Macintosh (Muthén and Muthén, 2010). All models were estimated using full information maximum likelihood (FIML) with robust standard errors (MLR estimator) as implemented in Mplus (Muthén and Muthén, 2010). FIML produces unbiased parameter estimates and standard errors when data is missing at random (Graham, 2009).

3. Results

3.1. Growth mixture modeling

The fit indices for the models are depicted in Table 2. A four-class model that included a quadratic term was found to provide the best fit, based on the combination of fit indices, group sizes and group differences. The four-class model showed a high entropy of 0.95, indicating a confident group classification (Ram and Grimm, 2009). The AIC and BIC were lower in the four-class model compared to the models with one to three classes. Furthermore, the Vuong-Lo-Mendell-Rubin Likelihood Ratio Test nearly reached significance ($p=0.057$), indicating that the four-class model was superior to the model with three classes. Models with more than four classes resulted in classes with insufficient group members (less than 1%) and much overlap. A description of the four subgroups is presented in Table 3.

The trajectories of the four groups are depicted in Fig. 1. In the largest group, hostility scores remain low throughout all time-points, and is therefore described as a 'low-hostile group' ($N=612$). A second group shows a rather stable profile of hostility scores around the 80th percentile. This group is defined as a 'mild-hostile group' ($N=95$). Two smaller groups show a large increase in hostility scores over time, with scores above the 95th percentile. One of these groups is showing an increase immediate after deployment, and is defined as an 'early-hostile group' ($N=22$). In the last group the increase takes place with a delayed onset, between 1 and 2 years after deployment and is therefore described as a 'late-hostile group' ($N=16$).

3.2. Multinomial logistic regression analysis

The MLRA was first conducted using the low-hostility group as the reference group for comparisons with the other three groups. Veterans who reported more early trauma (odds = 1.092, $p < 0.05$), and/or who reported more deployment stressors (odds = 1.140, $p < 0.01$), and/or with a lower score on the subscale 'cooperativeness' (odds = 0.870, $p < 0.01$), had a higher chance to be in the mild-hostile group versus the low-hostility group (Table 4).

Table 2
Fit indices for the latent growth models of hostility.

Number of classes	Log likelihood	AIC	BIC	BIC-ssa	Entropy	p-value VLMR
1	−6691.09	13398.17	13435.08	13409.68	na	na
2	−6172.14	12368.27	12423.63	12385.53	0.97	0.623
3	−5962.17	11956.34	12030.15	11979.35	0.95	0.225
4	−5833.86	11707.73	11800.00	11736.49	0.95	0.057
5	−5735.63	11519.26	11629.98	11553.77	0.96	0.187
6	−5668.03	11392.06	11521.24	11432.33	0.94	0.185
7	−5605.49	11274.98	11422.61	11321.00	0.95	0.473
8	−5561.46	11194.91	11360.99	11246.68	0.95	0.260
9	−5513.04	11106.08	11290.62	11163.60	0.94	0.686
10	−5470.37	11028.75	11231.73	11092.02	0.93	0.169

Note. AIC=Akaike information criterion; BIC=Bayesian information criterion; BIC-ssa=Sample-size-adjusted Bayesian information criterion; VLMR=Vuong-Lo-Mendell-Rubin Likelihood Ratio Test; na=not applicable; BOLD=model used in further analyses.

Table 3
Description of the four subgroups.

	Low-hostile group ($n=612$)	Mild-hostile group ($n=95$)	Early-hostile group ($n=22$)	Late-hostile group ($n=16$)
Gender (% male)	90.4	91.6	86.4	81.3
Age during deployment (SD)	30.18 (9.40)	26.45 (8.23)	24.86 (6.55)	26.56 (8.64)
<i>Education</i>				
% low	2.4	5.5	4.8	0.0
% moderate	82.3	89.0	81.0	100.0
% high	14.7	5.5	14.3	0.0
Early trauma (SD)	3.27 (2.85)	4.23 (3.59)	5.91 (3.35)	4.93 (5.01)
Trauma exposure (SD)	4.29 (3.08)	6.18 (3.07)	7.24 (3.11)	4.57 (3.61)
<i>Hostility measures</i>				
T0	6.59 (0.93)	7.77 (1.55)	9.60 (3.35)	9.79 (3.07)
T1	6.66 (1.05)	9.47 (2.49)	13.35 (3.40)	8.20 (1.82)
T2	6.44 (0.75)	9.75 (1.86)	15.37 (3.20)	7.60 (1.50)
T3	6.58 (0.92)	9.37 (2.25)	16.60 (6.52)	7.71 (1.70)
T4	6.62 (1.00)	9.10 (2.08)	11.85 (4.29)	18.50 (3.69)
<i>Subscales of the TCI</i>				
Novelty seeking (SD)	7.88 (2.81)	7.77 (3.15)	8.71 (2.41)	7.92 (1.78)
Harm avoidance (SD)	3.11 (2.81)	3.36 (2.97)	4.35 (3.60)	3.83 (2.59)
Reward dependence (SD)	8.49 (2.94)	7.97 (2.57)	7.05 (2.56)	9.37 (2.76)
Persistence (SD)	10.39 (2.70)	10.50 (2.66)	10.09 (3.28)	11.31 (2.91)
Self-directedness (SD)	13.8 (1.79)	12.92 (1.94)	11.99 (2.57)	13.42 (1.51)
Cooperativeness (SD)	12.35 (2.66)	10.57 (3.20)	8.76 (2.93)	10.32 (4.30)
Self-transcendence (SD)	2.53 (2.60)	3.42 (3.41)	4.16 (2.57)	4.08 (3.48)

Note. Education: low=primary education/four years of secondary education; moderate=Intermediate Vocational Education/five or six years of secondary education; high=higher vocational education/university; SD=Standard Deviation; TCI=Temperament and Character Inventory

Lower education level (odds=0.454, $p < 0.05$), more early trauma (odds=1.159, $p < 0.05$), a higher score on TCI scale 'harm avoidance' (odds=1.189, $p < 0.05$), and a lower score on TCI scale 'cooperativeness' (odds=0.764, $p < 0.01$), were found to predict group membership of the late-hostile group versus the low-hostility group (Table 4).

Significant predictors of the early-hostility group versus the low-hostility group were lower age (odds=0.899, $p < 0.01$), more early trauma (odds=1.255, $p < 0.01$), more deployment stressors (odds=1.232, $p < 0.05$), a higher score on TCI scale 'harm avoidance' (odds=1.201, $p < 0.05$), and a lower score on TCI scale 'cooperativeness' (odds=0.753, $p < 0.01$; Table 4).

3.2.1. Acute versus delayed onset of hostility

A second MLRA was performed to compare the early-hostile group with the late-hostile group, in order to identify differences between the two groups. In the early-hostile group versus the late-hostile group, lower education (odds=0.194, $p < 0.01$), and the subscale 'reward dependence' of the TCI (odds=1.311, $p < 0.05$), were found to be significant predictors (Table 4).

4. Discussion

This study aimed to identify distinct trajectories of hostility in a deployed military sample from 1 month prior to deployment until two years after returning home. Furthermore, predictors of class-

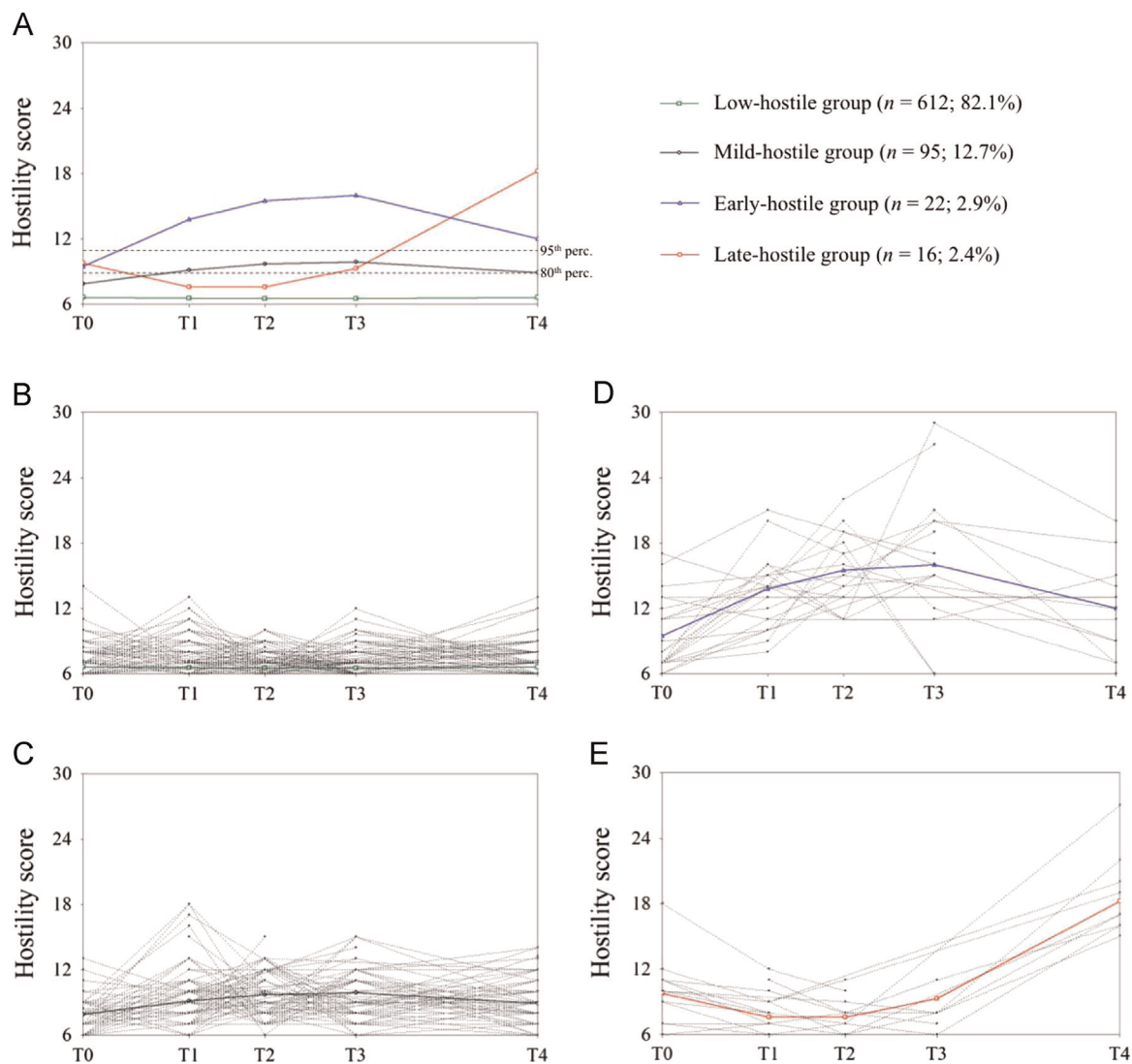


Fig. 1. Trajectories of hostility in the four groups identified with growth mixture modeling: (A) The four-class model. (B) Individual trajectories of the low-hostile group. (C) Individual trajectories of the mild-hostile group. (D) Individual trajectories of the early-hostile group. (E) Individual trajectories of the late-hostile group. perc.=percentile score; T0=one month prior to deployment; T1=one month after deployment; T2=6 months after deployment; T3=1 year after deployment; T4=2 years after deployment.

Table 4

Results of the multinomial logistic regression analysis.

Predictor	Mild vs. low			Late vs. low			Early vs. low			Late vs. early		
	Estimate (S.E.)	Odds	p	Estimate (S.E.)	Odds	p	Estimate (S.E.)	Odds	p	Estimate (S.E.)	Odds	p
Age	−0.261 (0.157)	0.972	0.096	−0.296 (0.305)	0.960	0.331	−0.470 (0.148)	0.899	p < 0.01	0.358 (0.295)	1.068	0.225
Education	−0.203 (0.130)	0.609	0.119	−0.249 (0.123)	0.454	p < 0.05	0.164 (0.121)	2.344	0.175	−0.392 (0.149)	0.194	p < 0.01
Early trauma	0.272 (0.119)	1.092	p < 0.05	0.351 (0.173)	1.159	p < 0.05	0.330 (0.087)	1.255	p < 0.01	−0.142 (0.177)	0.924	0.420
DES	0.421 (0.116)	1.140	p < 0.01	−0.074 (0.264)	0.971	0.780	0.316 (0.122)	1.232	p < 0.05	−0.447 (0.236)	0.788	0.058
Novelty seeking	−0.196 (0.134)	0.933	0.144	−0.086 (0.196)	0.961	0.661	0.026 (0.103)	1.020	0.798	−0.098 (0.191)	0.943	0.609
Harm avoidance	0.058 (0.154)	1.020	0.708	0.382 (0.193)	1.189	p < 0.05	0.248 (0.123)	1.201	p < 0.05	−0.017 (0.174)	0.990	0.924
Reward dependence	−0.017 (0.128)	0.994	0.891	0.438 (0.241)	1.215	0.069	−0.104 (0.119)	0.927	0.383	0.461 (0.209)	1.311	p < 0.05
Persistence	0.028 (0.132)	1.010	0.832	0.227 (0.248)	1.114	0.359	−0.035 (0.135)	0.973	0.795	0.216 (0.241)	1.145	0.370
Self-directedness	−0.130 (0.136)	0.934	0.341	0.273 (0.256)	1.207	0.287	−0.050 (0.101)	0.945	0.618	0.269 (0.231)	1.277	0.244
Cooperativeness	−0.406 (0.117)	0.870	p < 0.01	−0.604 (0.220)	0.764	p < 0.01	−0.390 (0.104)	0.753	p < 0.01	0.025 (0.237)	1.015	0.916
Self-transcendence	0.211 (0.147)	1.079	0.152	0.309 (0.192)	1.156	0.107	0.177 (0.097)	1.145	0.067	0.015 (0.199)	1.010	0.938

Note. Early=early-hostile group; Late=late-hostile group; Low=low-hostile group; Mild=mild-hostile group; SE=Standard Error; DES=Deployment Experiences Scale.

membership were identified, in order to distinguish risk factors for groups with high hostility scores.

Using GMM, four trajectories of hostility were identified. These

were a low-hostile group, a mild-hostile group, an immediate-increase group and a late-increase group. The majority of the respondents (82.1%) belonged to the low-hostile group, with

hostility remaining low across all time points. 12.7% of the combat veterans were in the mild-hostile group. They showed slightly increased hostility scores across all time points, with scores above the 80th percentile (Arrindell and Ettema, 2003) at all time-points after deployment. Two small groups with an increase in hostility were identified, one with an immediate increase after deployment (2.9% of the respondents), and one with a late-increase (2.4% of the respondents). The scores of the early-hostile group are above the 95th percentile after deployment. The late-hostile group scores above the 80th percentile at T3, and increase to above the 95th percentile at T4 (Arrindell and Ettema, 2003). The increase-groups were only a small percentage of the total sample, thus these group should be replicated in the future to be more certain about the inferences.

To some extent, comparable latent classes were identified in studies regarding PTSD symptoms in a deployed military sample (Berntsen et al., 2012). In these studies, the majority of the veterans belonged to a resilient group, and a smaller amount to early and late increase groups. However, in these studies benefit-groups or recovery groups were also identified, in which the groups show a decrease of symptoms over time (Berntsen et al., 2012; Bonanno et al., 2012; Orcutt et al., 2004). In the current study, these groups were not identified. The absence of a recovery group in the current study suggests that anger and hostility problems may rarely be targeted for interventions. In addition, it could also indicate that anger and hostility are resistant to change. It could also imply that individuals do not recognize symptoms of anger and hostility as psychological problems needing intervention. It is suggested that in order to avoid trauma-related feelings of fear, anger is used. The patient might more easily accept this emotion compared to fear (Foa et al., 1995).

The three hostile-groups were all characterized by more childhood trauma and less cooperativeness in comparison to the low-hostile group. This indicates that the experience of traumatic events early in life contributes to more hostility and symptoms of anger. This finding is comparable to findings concerning aggression in Vietnam veterans (Lenhardt et al., 2012); in that study pre-military traumatic events were related to more symptoms of anger. Furthermore, a link between early-life trauma and delinquency, violent behavior and aggression has been reported before (Chen et al., 2012). Lower cooperativeness is associated to less empathic skills and being more self-centered (Cloninger et al., 1993). This finding is consistent with a previous study that has shown that deployed veterans with episodes of impulsive aggression reveal a lack of empathy (Teten et al., 2008). Furthermore, lower cooperativeness was found as a predictor for hostility in patients with depressive disorder as well (Conrad et al., 2009).

Membership of the mild-hostile and the early-hostile group versus the low-hostile group was also predicted by more stressful deployment experiences. Previous research in veterans with anger-related problems also reported an association with more traumatic events during deployment (Elbogen et al., 2010). Furthermore, high combat stress exposure has been related to more mental health problems (Hoge et al., 2004). However, deployment experiences were not found as a predictor in the late-hostile group. This suggests that experiences during deployment may have an immediate effect on hostility, whereas delayed hostility might be caused by other factors.

The two groups that showed an increase in hostility over time, i.e., the immediate-increase and late-increase groups, showed higher baseline scores on 'harm avoidance'. This indicates that the people in these groups may show more passive avoidant behavior, for example fear of uncertainty (Cloninger et al., 1993). Elevated levels of harm avoidance were found in other psychiatric disorders such as depression (Abrams et al., 2004) and substance abuse (Hoge et al., 2004).

The last comparison, the late-hostile versus the early-hostile group showed lower education levels and higher scores on 'reward dependence' for the late-hostile group. These higher scores on 'reward dependence' indicate that in the late-hostile group people are more dependent of approval of others (Cloninger et al., 1993). The people in the late-hostile group might be better able to control their anger because of this temperament factor. According to Pedersen (2004), one is less prone to aggressive behavior when interpersonal relationships are regarded as more important. When social attachment is higher, one might be more committed to control the anger. In case of lower attachment and less dependence of approval of others, this control might be considered as less important, leading to earlier complaints of anger and hostility.

Being the first of its kind, this study reveals trajectories of anger and hostility in a military sample and explored risk factors for these trajectories. However, some limitations must be mentioned. First of all, only data of deployed military personnel were taken into account, the percentage of woman in this sample was only 9.8%, and the increase-groups were rather small. This limits the generalizability of these results, and results should therefore be replicated. Second, anger and hostility symptoms were measured using the SCL-90 hostility subscale (SCL-hos). Although the use of this scale in GMM resulted in reliable distinction of different underlying groups, this six-item scale does not measure all aspects of anger and hostility symptoms. Third, in all the analyses, full information likelihood (FIML) was used. When missing data are missing at random, FIML produces unbiased parameter estimates (Graham, 2009). In this study, it is not completely certain whether the data are indeed not related to the outcome measures. Hostile respondents might be more prone to drop-out compared to respondents with low-hostility.

Our main finding is the identification of subgroups based on trajectories of anger and hostility symptoms. Because anger and hostility symptoms receive less attention compared to other psychological problems, it has been relatively unknown how they change over time. This study shows that an increase in anger and hostility symptoms does not only take place immediate after deployment, but even between one and two years after homecoming. Symptoms of anger and hostility are frequently reported by military personnel after deployment and seriously hamper the ability to reintegrate after deployment (Elbogen et al., 2012a, 2012b). Moreover, the present study demonstrates that hostility symptoms may easily become chronic. This underlines the necessity to follow military personnel for an extended period of time and when necessary, targeted intervention, such as cognitive behavioral therapy and group therapy, is offered to relieve these symptoms.

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