

# The Role of an Animal-Mascot in the Psychological Adjustment of Soldiers Exposed to Combat Stress

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## Abstract

For many soldiers confronted with exposure to stressful situations, an animal-mascot bond is considered effective help for dealing with the stress. While most studies carried out on animals' needs concentrate on the care of civilian individuals, our focus was on determining the reliability of an instrument to measure emotional, rational and psychosocial needs of the military engaged in numerous conflicts around the world, and to analyze its external validation. **Methods:** In an anonymous cross-sectional retrospective survey, we applied the animal-mascot bond questionnaire (AMBS) associated with Coping Inventory Stressful Scale (CISS), Post-Traumatic Stress Disorder (PTSD) and Check List Scale (PCL-S) assessments to 168 soldiers after their deployment in theatre. **Results:** Factor analyses of the 23-item construct (Cronbach's alpha = 0.962) pointed to a 3-factor solution, which revealed 77.03% of variance: 1) Animal-group bond, 2) Individual-animal emotional bond, and 3) Individual-animal rational bond. All these factors were positively correlated with the emotional-centred coping style. Human-animal bonds were greater for soldiers with the provisional diagnosis of PTSD. Limited responsibility was the strongest predictor for animal-mascot bonds. Both individual animal bonds were also predicted by the PTSD status and emotional coping. **Conclusions:** The evaluation of the AMBS revealed that the instrument had good psychometric properties. Soldiers with less responsibility, PTSD and emotional-coping scored the highest on the AMBS suggesting that they expressed the highest needs for a bond with an animal-mascot. One may assume that the animal-mascot bonds will trend to a therapeutic coping process

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**for mitigating distress for soldiers.**

## Keywords

**Animal-Mascot, Coping, Stress**

## 1. Introduction

Military units very often have an animal-mascot during their deployment. Military mascots are animals kept by the armed forces for ceremonial purposes, as emblems of special units, or simply for companionship. They differ from a military animal in that they are not employed in warfare. Dogs are the most common companions for becoming mascots but cats, donkeys, monkeys, lizards, pigs and birds are also adopted as companions and/or mascots. Many are only temporary mascots, but the majority serves through an entire campaign. In 2011, the Canadian Veterans Affairs ([veterans.gc.ca/public/...animals/.../tales-animals-war-2011-f](http://veterans.gc.ca/public/...animals/.../tales-animals-war-2011-f)) clearly draws on a history of animal-mascots since the first world war highlighting types, roles and the importance of these animals for soldiers.

To our knowledge, study focusing on the question of the psychological interest of having an animal-mascot for military individuals during a deployment, doesn't exist. Explanation about this lack of interest may be attributed to a traditional point of view. An animal-mascot is considered as the memory of a war, of a personal affair inside a unit, etc. Those are data which only come from particular case report about specific mascot or extraordinary action of an animal during a deployment. This means that you have official and non-official animal-mascot. When stationed overseas for example, British soldiers often adopted an extraordinary menagerie of animals. Some of these remained pets, some rose to become regimental mascots and a few became recognized. James H. Hillestad reflected on the unique and at times bizarre roles played by animals such as goats, sheep and elephants in British military history and traditions as "official" mascots. Official mascots are those recognized by the British Army Honours and Distinction Committee. Such mascots, of which there are nine, receive a regimental number, assume a proper rank (with prospects for promotion) and get a fair share of Army rations. Some mascots are indicative of the recruiting area of a regiment. Examples include the Staffordshire bull terrier, Irish wolfhound and Welsh goats. For history, the earliest record of a regimental mascot is a goat adopted by the Royal Welch Fusiliers during the American Revolutionary War. After wandering into the Battle of Bunker Hill during the 1775 Siege of Boston, the goat wound up leading the Fusiliers' Regimental Colours off the battlefield. Based on personal histories, the available information does not enable an accurate objective report of the benefits of human-mascot animal interaction for soldiers during deployments.

Since the first demonstrated a positive impact on health when interacting with companion-animals (Friedman, Katcher, Lynch, & Thomas, 1980), research on pet-effects produced an array of positive results (Chur-Hansen, Stern, & Winefield, 2010; Herzog, 2011). But it appears that this topic concerning pets, as companions, needs future research employing more rigorous designs and systematically building upon a more clearly defined line of inquiry to advance our knowledge of the benefits of human-animal interaction (Barker & Wolen, 2008; Chur-Hansen, Stern, & Winefield, 2010; Herzog, 2011).

When taking into account data on the benefits of human-animal interaction published since 1980 (Barker & Wolen, 2008; Munozlasa, Ferriero, Brigatti, & Franchignoni, 2011), one can assume benefits are afforded to soldiers by the presence of animals during a deployment when faced with repeated stressors. But, some particularity of the military functioning may conflict with such benefits.

On one hand, many reasons clearly suggest benefits for military individuals deployed in conflicted area. At an individual level first, the relationship between a soldier and an animal mascot and the extent to which this bond mitigates distress for soldiers comes from studies considering the human-animal bond as an anti-stress agent. For example, stroking dogs and cats, watching tropical fish in an aquarium and even caressing a pet boa constrictor have been reported to reduce blood pressure and stress levels (Herzog, 2011). A very convincing clinical trial, randomly assigning hypertensive stockbrokers to being with a pet or without a pet, showed that six months later, when put in a stressful situation, subjects in the pet group showed lower increases in blood pressure than those in the non-pet situation (Allen, Shykoff, & Izzo, 2001). The positive effects of human-animal bond on

stress have been used to develop therapies based on relationships with animals (Lutwac-Bloom, Wijewickrama, & Smith, 2005; Souter & Miller, 2007; Wells, 2009). In such human-animal studies, firstly the animal appears to provide help to maintain or restore a sense of identity. Animals are helpful to individuals for coping with potentially stressful environments such as the workplace (Schneider & Harley, 2006) or hospitals (Caprilli & Messeri, 2006). Secondly, the companion animals reduce psychosocial distress by altering perceptions to make them more comfortable (Friedmann & Lockwood, 1991; Rossbach & Wilson, 1992). The enhancement of psychosocial status by the animal bond is greater in stressed and socially isolated individuals who experience a reduction of psychosocial distress and stress responses (Zasloff & Kid, 1994; Siegel, 1990; Siegel, Angulo, Detels, Wesh, & Mullen, 1999). Although living with a companion animal is associated with positive health outcomes (Friedmann & Heesook, 2009; Headey & Grabka, 2007), the main factor is not the ownership but merely the presence of the animal (Friedmann & Heesook, 2009). Although such results come from studies examining the impact of animal-assisted assessment/therapy, taken together, the data suggest that the animal, as companion and/or mascot, could act as a “transition object or security blanket” (Furby & Wilke, 1982).

Another point of interest to explore is the role of the animal-mascot in bringing a bridge between humans. In a military unit, cohesion is known to be an important point of functioning for enhancing group performance (Beal, Cohen, Burke, & McLendon, 2003). Training and debriefing are used to increase cohesion. Nevertheless, when debriefing, a soldier, reporting psychological suffering, can be at risk of stigmatization in his unit (Baert, Trousselard, & Clervoy, 2011). In such a case, the animal-mascot as a “possible shared transition object” may represent a way of coping for a suffering soldier to maintain socialization.

Furthermore, group identification, such as experienced in “gang membership”, is very important for the functioning of military units as it increases the individual’s sense of identity and belonging (Siebold, 2007). Integrating individuals into groups based on common interests provides a positive environment for self-development to occur (Siebold, 2007). A “gang” is a group of individuals who share common traits, and who are often identified by the clothes or colors that they wear and they have a name. The animal-mascot could play an identification role for certain soldiers functioning in a small group, similar to a gang, within the unit. The nature of modern war indicates that small-unit cohesion is the only force capable of causing soldiers to expose themselves consistently to enemy fire in pursuit of an army’s goals (Siebold, 2007). This human element must be referred to in such terms as community spirit, group morale and impetus. The benefits obtained by individuals from such membership have been studied showing the impact of purely emotional bonds in combat motivation and adjustment to severe stressors (Griffith, 2002; Grinker & Spiegel, 1945; Siebold, 2007). Whether the animal-mascot may enhance interactions between soldiers experiencing psychological suffering and others during deployment needs to be evaluated further, as to our knowledge no literary data are available.

On the other hand, negative effects for military units of such human-companion animal interactions negatively may impact the relationship between soldiers and animal. During deployment, hypotheses about conflicts between soldiers for defining who takes care of the animal can be done. Animal mascots have no training for interacting with suffering soldiers suggesting that some animals may fight or flight faced with emotionally disturbed soldiers. Another possible negative concern arises from the rupture of the soldier-animal bond resulting at the end of a deployment: when soldiers return home without the mascot, they may consider the separation as abandoning the animal. This feeling can be added to the loneliness, communication difficulties and social isolation that are usually described in post-deployment clinical and occupational management (Vasterling, Proctor, Amoroso, Kane, Heeren, & White, 2006).

Overall, the data suggest that an animal-mascot could have beneficial effects for helping soldiers cope with the strain of their job and that this topic needs research on military area. It is all the more important than on one hand no data are available and than on the other hand the role of an animal-mascot has not been evaluated. Indeed, the boundary between companion and mascot is not clearly defined for soldiers using one or the other name for the animals living with them when deployed (veterans.gc.ca/public/...animals/.../tales-animals-war-2011-f.). This is a question of interest as an increasing number of soldiers experience psychological illnesses affecting mood, thoughts, and behaviour, even suffering from Post-Traumatic Stress Disorder (PTSD). “American troops deployed in Iraq or Afghanistan reports a large set of psychological disorder ranging from anxiety to psychosomatic troubles, major depression and addiction (Hoge et al., 2007) and 17% of PTSD (Hoge et al., 2004). The risk of PTSD appears increased in case of combat situation or body aggression such as rape (Kessler, Sonnega, Bromet, & Hughes, 1995) or wound (Hoge et al., 2004) as compare to the 8% risk in the general population (Breslau, 2001)”. The percentages are similar for other country engaged in conflicted operations.

Whether an animal-mascot could have beneficial effects for helping soldiers cope with the strain of their job, it is therefore important to take into account individual differences in coping styles. Coping refers to the set of cognitive and behavioural strategies used by an individual to manage the demands of stressful situations (Folkman & Moskowitz, 2004). It is usually focussed on the problem (task-oriented), the emotion or avoidance of the situation according to skills developed by the individual (Krohne, 1993). Problem-focused coping is directed at managing or altering the problem that is causing distress and usually includes defining the problem, generating alternative solutions, determining the costs and benefits of these solutions and acting to solve the problem. Emotion-focused coping refers to regulating the emotional response to the problem and might include avoiding, minimising, and distancing oneself from the problem (Folkman & Lazarus, 1985).

An individual coping style influences the transition from distress to the disorder (Dagleish, Joseph, Trasher, Tranah, & Yule, 1996; Johnsen, Eid, Laberg, & Thayer, 2002). Avoidant coping increases the risk of sensitization to stress in subjects repeatedly exposed to life-threatening situations compared to task- or emotion-centered coping styles (Johnson et al., 2002). Retrospective studies suggest that an avoidant coping style predicts PTSD severity (Bryant & Harvey, 1995; Bryant, Marossezeky, Crooks, Baguley, & Gurka, 2000). Prospective studies (Benotsch, Brailey, Vasterling, Uddo, Constans, & Sutker, 2000; Gil, 2005; Pineles, Mostoufi, Ready, Street, Griffin, & Resick, 2011; Solomon, Mikulincer, & Avitzur, 1988) also suggest that emotion and an avoidance-focused coping style before being traumatized could influence the risk of developing PTSD (Pineles et al., 2011). It is believed that a dispositional avoidance-focused coping style may be a risk factor for greater PTSD symptom development after a traumatic event (Baschnagel, Gudmundsdottir, Hawk, & Beck, 2009; Foa & Kozak, 1986; Horowitz, 1986). Lastly, post-trauma coping styles may mediate the evolution from acute stress disorder to subsequent psychological symptoms (e.g., DeRoma, Saylor, Swickert, Sinisi, Marable, & Vickery, 2003; Endler & Parker, 1990; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). After trauma as resource availability decreases, the probability of avoidance coping increases over time (Stein et al., 2005). Avoidance coping by preventing the individual from fully processing events emotionally results in feelings of powerlessness and ineffectiveness (Foa & Hearst-Ikeda, 1996; Wolfe, Keane, Kaloupek, Mora, & Wine, 1993), and over time can reduce familial and social support (Benotsch et al., 2000), which can ultimately contribute to a decrease in acute stress recovery and an increase in the risk of PTSD development. Emotion-focused coping style with rumination, worry and self-blame, may also hinder stress recovery (Ehlers & Clark, 2000).

Unfortunately, one of the limitations of the studies on coping style and stress adaptation is that no information was gathered on subjects' previous exposure to stressful events. The scarce data highlight that the use of specific coping strategies may vary over the course of a stressful experience. For example, faced with mild stress such as a college examination, both problem-focused and emotion-focused coping were used at different stages of the exam (Folkman & Lazarus, 1985). For the highest stress, available data highlight the difficulties in evaluating coping style for PTSD because avoidance is a core-symptom of the disease (Murphy, 2002). After trauma, positive affects diminish as described in PTSD criteria (American Psychiatric Association, 1994; Litz, 1992). Emotional numbing, alexithymia, anhedonia, negative mood, depression, anxiety contributes in a decrease in appetitive functioning (Badura, 2003). This results in loss of interest in activities, detachment from others and a restricted range of emotional expressiveness (Kashdan, Elhai, & Frueh, 2006) that could impact coping styles and their assessment (Besharat, 2010). Negative cognitions about self, the world and self-blame (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Kolts, Robinson, & Tracy, 2004) are also described in PTSD. They may favour the emergence of emotion-focused coping style structured around self-blame, rumination, catastrophizing (Garnefski & Kraaij, 2006). All together, these data suggest that dispositional coping styles may vary after stressor exposure due to the dramatic changes that occurs in the brain under stress. It appears, thus, to be important to understand how coping styles relate to stress to therefore ideally assess both the coping style before a trauma (prospective design) and after a trauma (prospective and retrospective design) as well as evaluating anxiety, depression and alexithymia.

Since available data is scarce on the human-animal bond for soldiers deployed in conflict zones and without a scale evaluating the dimensions of this relationship, our intention was to develop an exploratory instrument addressing the needs of animal-mascot bonds for deployed soldiers as a means of coping with stress. Because these needs have to be seen in the context of stress and suffering (PTSD), addressing these needs is of utmost importance for health care and health care research. Therefore, the aim of the study was to validate a newly developed instrument so-called the "Animal Mascot Bond Scale" (AMBS) for measuring individual and collective needs and to analyze the self-ascribed importance of the respective dimensions in terms of adaptative coping and

PTSD. This was done retrospectively as it seems preferable to investigate the role of a mascot in the emotional stability of military personnel after returning from deployment to take into account the potential deleterious effect of the separation from a mascot. The hypothesis was that the most suffering soldiers expressed the highest needs for a bond with an animal-mascot.

## 2. Methods

### 2.1. Participants and Procedures

Infantry soldiers were enrolled in an exploratory anonymous cross-sectional survey, just after they returned home from a deployment. From the 300 subjects concerned, 210 were self-selected rating the return to 70% of the available sample. The socio-demographic data included age, ethnicity, gender, educational level, matrimonial situation, tobacco use, service duty, rank and number of deployments. Since the study was anonymous, the questionnaire did not contain questions about names, initials, addresses or clinical details. Subjects were also questioned about the presence of stressful events for both their private and professional life in the last two years. The only instruction given for that purpose was to answer “yes” or “no”.

The subjects were given the questionnaires and a cover letter containing three types of information. Firstly, the main aim of the study was noted as an investigation in the Armed Forces through the use of questionnaires concerning the role of animal mascots during deployments. Secondly, guidance for completion of the instruments, like when, where and how they participated were specified. Thirdly, there were two criteria to be included in the study: *i*) to be a volunteer and *ii*) to have taken part in a recent operational deployment with an animal-mascot in the zone. Individuals gave informed consent for participation by returning the completed questionnaire. The cross sectional survey was required by the French Military Health Service.

The questionnaires were given to an operational infantrymen unit and were administered in a single session at the Unit Health Service when soldiers were invited for the post deployment medical visit (in the two months following deployment). Subjects arriving to visit the physician received all information concerning the investigation and guidance for completing the instruments by one of the military nurses. If they agreed to participate in the study, they were instructed to take a set of “paper and pencil” self report questionnaires and were required to complete it in the waiting room in accordance with the guidelines before visiting the physician. During the visit, they could ask the physician information about this study. The completed questionnaires were thereafter collected and placed into a large box located in the entrance of the Unit Health Service in order to maintain the anonymity of each participant. Two hundred ten responses were received. Responses from those who had not fully completed the psychological questionnaires ( $n = 17$ ; 8.09%) or when soldiers had reported the absence of an experience with an animal mascot when deployed ( $n = 25$ ; 11.90%) were rejected. A total of 168 sets of questionnaires (80%) were considered for this study.

### 2.2. Measures

The Animal Mascot Bonds is a complex relationship between human and animal involving a mixture of emotional, behavioural and cognitive components. Construction of the scale using motifs from the Handbook on Animal-Assisted Therapy (Fine, 2006), reports from the French military physician and military veterinarian and the help of a French Center of Animal Assisted Therapy (Institut Français de Zoothérapie) was done. In accordance with the experience of experts on stress therapies based on relationships with animals, items dealing with the soldier-animal bond's break were included. It was chosen to use all items expressed without the use of negative connotations. On one hand, negatively worded items have been often used and discussed in instrument design as a way to modify respondents' behaviors and detect non-attending behaviors. Adoption of negatively worded items is claimed to reduce instances of response set (Barnette, 2000; Bergstrom, 1998; Marsh, 1996; Schriesheim & Hill, 1981; Yamaguchi, 1997). However, responses to negatively worded items do not necessarily represent polar opposite responses from positive items. Research has shown that negatively worded items tend to cluster as if they constituted a unique dimension unto themselves (Schriesheim, Eisenbach, & Hill, 1991), which may adversely affect internal consistency of the measures (Chamberlain & Cummings, 1984; Marsh, 1996; Schriesheim et al., 1991). As a result, several researchers have recommended that the practice of using of negative items to control response sets should be eliminated (Chamberlain & Cummings, 1984; Schriesheim et al., 1991; Schriesheim & Hill, 1981; Yamaguchi, 1997). On the other hand, such a choice avoids difficulties in

interpretation whilst reading the items in this exploratory study face to the unknown educational background of the soldiers. First release of the questionnaire was sent to the respective experts for item modifications. It is comprised of a 25-item questionnaire with items scoring on a 7-point scale ranging from total disagreement to full agreement ((1) never; to (7) always). The entire score is calculated the sum of the item score ranged from 1 to 7. A high score on the scale indicated a strong bond with the animal. A supplementary question about having an animal at home was added at the end of the questionnaire.

To assess how PTSD may influence the bond with an animal-mascot we used the PTSD Checklist Scale (PCL-S), which is a self-report rating scale for assessing PTSD. It has been shown to have good internal consistency ( $\alpha = 0.97$ ) and to correlate highly with a structured interview to assess PTSD (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). It consists of 17 items, which correspond to the DSM-III-R symptoms of PTSD (re-experiencing, avoidance, and hyperarousal). Subjects were instructed to indicate how much they have been affected by each symptom in the past month using a 5-point (1 - 5) scale. The anchors for the severity ratings ranged from “Not at all” to “Extremely”. In fact, subjects with a score above the cut-off of 44 were considered to meet the provisional diagnosis of PTSD (Blanchard, et al., 1996). Studies have supported cut scores ranging from about 30 (Bliese, Wright, Adler, Cabrera, Castro, & Hoge, 2008; Walker, Newman, Dobie, Ciechanowski, & Katon, 2002; Yeager, Magrudetr, Knapp, Nicholas, & Frueh, 2007). The cut-off of 30 was taken into account in the study.

To make statements about the conceptual relationships between an animal bond and coping, the French version of the Coping Inventory Style Scale was used (CISS, Endler, & Parker, 1999). This is a 48-item self-report measure that assesses three general coping styles: Task-oriented coping, emotion-oriented coping and avoidance-oriented coping. Separate factor analyses of avoidance coping items have yielded support for two components of avoidance-oriented coping: Distraction and social diversion. Internal consistency estimates for the three scales have exceeded 0.80 across different samples (Endler & Parker, 1999).

### 2.3. Statistical Analyses

The reliability of the questionnaire was evaluated with internal consistency coefficients (Cronbach’s alpha) that reflect the degree to which all items on a particular scale measure a uni-dimensional concept. A method based on the application of Principal Components Analyses and in the subsequent analysis of partial correlation matrices (Exploratory Factorial Analysis, EFA based on Varimax rotation with Kaiser Normalization) was used to determine how many components to extract. As a rule, we retained factors that had high loadings on each retained component to find the best factor solution, rather than finding out the cut off point for the number of factors (Tabachnick & Fidell, 2001). Finally, to determine putative predictors of animal-mascot bonds, we performed stepwise regression analysis enrolling variables such as underlying pertinent sociodemographic characteristics and coping styles, anxiety and PTSD assessments.

Data were treated as ordinal data, except for the sex, age, marital status, having a pet at home, employment status, length of service, number of deployments, tobacco use, and reported stressful events. Non-parametric analyses were applied for these variables. Reliability, factor analyses, variance analyses (ANOVA), correlation analyses (Spearman rho) and stepwise regression analyses were performed with SPSS 17.0 for Windows (SPSS GmbH Software, Munich). A value of  $p < 0.05$  was considered significant. A value of  $p \leq 0.10$  was considered as a tendency towards a difference.

## 3. Results

### 3.1. Demographics Characteristics

The descriptive findings are presented in **Table 1**. Most of the participants were Caucasian men aged between 21 and 36, white, divorced or single, without a pet at home. Half of the individuals were smokers. They had served  $8.08 \pm 8.29$  years in active duty. Their average length of service was seven years. Most of them served as officers or non-commissioned officers (NCO). Their educational background varied from one year (i.e., school) to six years (i.e., more specialized technical courses). Mean (standard deviation) for the number of missions was 3.26 (2.39) and with a range from one to eleven missions. Half of the individuals reported more than three deployments (median). Three-quarters of the participants had not reported a recent stressful experience in the last few years.

**Table 1.** Characteristics of respondents: For active duty and numbers of missions, the sample was divided into two groups according to the respective medians.

		Full sample	Control	Sub-clinical	H or F values	p-value <sup>1</sup>
<b>PCL-S score</b> Mean (SD)		30.16 (10.94)	18.36 (10.37)	41.95 (14.81)	23.49	0.000
<b>Number</b>		168	133	35		
<b>Gender</b>	M/F	159/9	125/8	34/1	1.008	0.315
	<21 years	10 (5.95%)	7	3		
<b>Age</b> Number (%)	21 - 37 years	144 (85.71%)	113	31	2.463	0.106
	>37 years	9 (5.36%)	9	0		
	No response	5 (2.97%)	4	1		
<b>Marital status</b> Number (%)	Married or as couple	75 (44.64%)	62	13	0.895	0.344
	Divorced or Single	90 (53.57%)	69	21		
	No response	3 (1.78%)	2	1		
<b>Pet</b> Number (%)	No	100 (59.53%)	75	25	2.598	0.107
	Yes	68 (40.47%)	58	10		
<b>Employment status</b> Number (%)	Junior soldiers	56 (33.33%)	47	9	10.796	0.001
	NCOs and Officers	108 (64.28%)	82	26		
	No response	4 (2.38%)	3	1		
<b>Length of service</b> Number (%)	≤7 years	86 (51.19%)	66	20	0.562	0.453
	>7 years	81 (48.21%)	66	15		
	No response	1 (0.59%)	1	0		
<b>Number of missions</b> (%)	1 - 3	99 (58.93%)	76	23	0.8361	0.36
	≥3	69 (41.07%)	57	12		
<b>Tobacco use</b> Number (%)	No	78 (46.43% <sup>o</sup> )	67	11	4.127	0.042
	Yes	89 (52.97%)	65	24		
	No response	1 (0.59%)	1	0		
<b>Stressful event reported</b> Number (%)	No	117 (69.64%)	97	20	4.056	0.044
	Yes	48 (28.57%)	33	15		
	No response	3 (1.78%)	3	0		
<b>Task-oriented score</b> Mean (SD)		50.73 (17.11)	50.85 (16.94)	50.21 (18.21)	0.30	0.863
<b>Emotion-oriented score</b> Mean (SD)		35.13 (16.34)	33.98 (15.71)	40.46 (18.34)	3.415	0.067
<b>Avoidance-oriented score</b> Mean (SD)		42.62 (16.53)	42.45 (15.97)	43.40 (19.24)	0.701	0.792
<b>Distraction score</b> Mean (SD)		19.51 (8.54)	19.25 (8.21)	20.73 (9.80)	0.646	0.423
<b>Social diversion score</b> Mean (SD)		14.56 (6.01)	14.64 (5.85)	14.17 (6.74)	0.132	0.717

<sup>1</sup>Cross-tabulation (K-W) and ANOVA, respectively.

Psychological data: The mean score of the PCL-S is 30.16 (SD: 10.94, scale range: 17-73). When regarding the subjects' distribution on the PCLS score, results showed that 35 subjects (N = 20.84%) were above the cut-off of 30 (sub-clinical group; PTSD), and the remaining (133, N = 79.16%) were under the score of 30 (control group; Cont). As shown in **Table 1**, the sub-clinical group tended to differ in terms of emotional coping style score, with a tendency to higher scores compared to the controls.

### 3.2. Reliability

In order to eliminate items from the 25-item pool that were not contributing to the questionnaire reliability, items with poor reliability (<0.2) had to be removed. As shown in **Table 2**, all values were in the acceptable range from 0.2 to 0.8, except two items (item 15 "Was it good for you to have an animal with you?" and item 20

**Table 2.** Correlations between animal-mascot bond and coping styles' dimensions.

	Animal-group bond	Individual-animal emotional bond	Individual-animal rational bond	Animal bond score
Animal-group bond	1	0.841**	0.794**	0.938**
Individual-animal emotional bond		1	0.804**	0.939**
Individual-animal rational bond			1	0.928**
Task-oriented	0.09	-0.016	0.108	0.068
Emotion-oriented	0.199*	0.199*	0.201*	0.213*
Avoidance-oriented	0.117	0.038	0.113	0.127
Distraction	0.156	0.072	0.131	0.127
Social diversion	0.078	-0.003	0.101	0.064

Pearson correlations are significant at the \*\*0.01 respectively the \*0.05 level (2-tailed).

“Did you like taking care of the animal?”). The resulting 23-item construct had good quality (cronbach's alpha = 0.962).

### 3.3. Factor Analysis

Factor analysis of the questionnaire revealed a Kaiser-Mayer-Olkin value of 0.932, which is a measure of the degree of common variance indicating that the item-pool is suitable for factorial validation. Exploratory factor analysis showed a three-factor solution (all with initial eigenvalues > 1), which would explain 77.03% of variance (**Annexe 1**):

- Individual-animal emotional bond (eight items, alpha = 0.96) addresses the emotional relationship developed between a soldier and an animal-mascot leading to positive feelings, quiet, and acceptance.
- Animal-group bond (eight items, alpha = 0.93) enrolling the relationship among the group, oneself and the animal-mascot participate in taking care of the animals together, and using it as a common object to share cohesion.
- Individual-animal physical interaction and caring (seven items, alpha = 0.94) enrolling soldiers' behaviour towards the animal-mascot, includes speaking with the animal, taking care of its food and needs.

Item 11 from the Individual-animal emotional bond scale would also load onto the scale Group-animal bond (0.53).

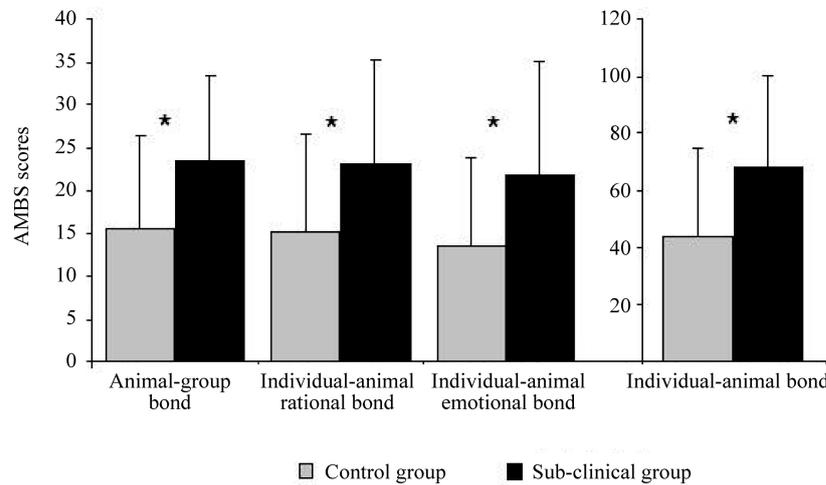
### 3.4. The Importance of the Animal-Mascot Bonds and Influencing Variables

As shown in **Figure 1**, Animal-group bond ( $F = 15.59$ ,  $df 1$ ,  $p < 0.001$ ), and Individual-animal emotional bond ( $F = 15.42$ ,  $df 1$ ,  $p < 0.001$ ), Individual-animal rational bond ( $F = 12.95$ ,  $df 1$ ,  $p < 0.001$ ), and the total animal bond score ( $F = 17.01$ ,  $df 1$ ,  $p < 0.001$ ) were higher for the clinical group compared to the control group.

To analyze the impacts of covariates, i.e. sex, age, marital status, having a pet at home, employment status, length of service, number of missions, tobacco use and reported stressful events, non-parametric analyses (Kruskal-Wallis analyses) were performed between the two groups (**Table 1**). Compared to the control group, the sub-clinical group had a significantly lower employment status, was more often the junior soldiers, smokers and they reported more stressful events. Sub-clinical status also had an age impact trend with a tendency for older soldiers in the Sub-clinical group compared to the control group.

### 3.5. Correlation Analyses (Construct Validity)

As shown in **Table 2**, significant correlations were identified between the factors of the AMBS and the coping styles indicated by the CISS. It can be noted that there were just some weak associations between the emotional-coping style score and the animal-mascot needs scores. This was observed for each of the three factors of the AMB scales.



**Figure 1.** Importance of the animal-mascot bonds of soldiers according to their PTSD status.

### 3.6. Animal Mascot Bond Predictors

To determine putative predictors of animal-mascot bonds, we performed stepwise regression analyses enrolling variables such as PTSD status, emotional coping style, employment status, tobacco use and a reported stressful event. As shown in **Table 3**, employment status was the best predictor for all AMB scales, albeit with weak predictive power ( $R^2 < 0.30$ ). It was followed by the PCL-S and emotion oriented coping scores for Individual-animal emotional bond, Individual-animal rational bond and the Animal-mascot bond score. For the Animal-group bound, PCL-S and emotion oriented coping scores had a trend on the impact of the regression model.

Finally, stepwise regression analyses enrolling as variables the scores of the scale and its sub factors to determine whether the scale would predict employment status, PTSD status, and emotional coping status, showed no usefulness of the scale for making predictions. I originally suggested that it might be more interesting to see whether scores on the Animal Mascot Bond scale predict employment status, PTSD status, emotional coping status, etc., because it seems to me that the usefulness of the scale would be for making predictions.

## 4. Discussion

Based on the statement that animals may help suffering individuals to cope with their difficulties, this retrospective study assessed how the presence of a mascot in theatre could have helped soldiers to deal with the emotional hardships and stress of life in a combat zone.

First, construction and validation of a questionnaire to evaluate the human-animal mascot bond were done; to our knowledge no scale was available. The psychometric properties of the 23-item questionnaire were satisfactory. The Cronbach- $\alpha$  coefficient was good and suggested an internal consistency. The inter-individual sensitivity showed an acceptable normal distribution of the scale scores. The exploratory factorial structure showed a three-factor solution with items easily separable and interpretable factors dealing with “Group-animal bond”, “Individual-animal emotional bond” and “Individual-animal physical interaction and caring bond”. Such results suggest that the animal-mascot bond have both an individual and a group dimension from the retrospective point of view of the soldiers. Concerning the individual point of view, the bond appears both emotional and practical. Items from emotional bonds concern feelings shared by the soldiers regarding the animal. Those concerning “physical interaction and caring” relationships are characterized by questions about the communication with the mascot and implied behaviour in caring for the animal. Concerning the group’s opinion, the items encourage relationships between soldier and animal inside the group to take care of the animal together and use it as a common object to share feelings. Moreover, items 2, 3 and 4, that constitute this factor, indicate that the animal may serve as a means to defuse the tensions inside the group; the animal may improve cohesion within the group.

The distinction between these two individual factors and the collective one may reflect a distinction between two roles that the animal may have. The former could be related to the nature of a living animal, the role of a pet; the latter could be related to a more symbolic role due to the mascot role that the pet may represent within the

**Table 3.** Predictors of animal-mascot bonds (stepwise regression model).

Factor	Predictors*	R <sup>2</sup>	R <sup>2</sup> adjusted	B	Std. Err.	Beta	T	Sign. T
Animal-group bond	Constant	0.224	0.189	11.992	5.694		2.105	0.037
	Employment status		0.078	4.617	0.078	0.329	4.073	0.000
	PCL-S score		0.077	4.022	2.305	0.140	1.745	0.083
	Emotion-oriented		0.018	0.088	0.052	0.132	1.698	0.091
Individual-animal emotional bond	Constant	0.187	0.169	3.866	5.508		0.701	0.483
	Employment status		0.077	3.246	0.081	0.238	2.961	0.003
	PCL-S score		0.077	5.590	2.229	0.206	2.507	0.013
	Emotion-oriented		0.018	0.108	0.050	0.171	2.142	0.034
Individual-animal rational bond	Constant	0.195	0.168	2.105	5.974		0.352	0.725
	Employment status		0.077	4.106	1.189	0.276	3.452	0.000
	PCL-S score		0.077	6.160	2.418	0.208	2.546	0.012
	Emotion-oriented		0.018	0.107	0.005	0.156	1.968	0.051
Animal bond score	Constant	0.227	0.202	17.964	15.758		1.140	0.256
	Employment status		0.078	11.970	3.815	0.299	3.815	0.000
	PCL-S score		0.077	15.773	6.379	0.198	2.472	0.014
	Emotion-oriented		0.018	0.304	0.144	0.164	2.108	0.036

B, factor B; Beta, beta coefficient; Std. Err. Standard error of B; T, t-test; Sign. T, significance (T).

group. The positive correlations between group and individual factors may address a common bond enrolling both pet and mascot roles. The positive correlations (external validation) found between all factors and the emotion-centred coping may address the bonds as an emotional need for managing the demands of stressful situations. This latter finding is of outstanding importance because it suggests that animal bonds may act as a means for feeling, expressing and sharing emotions for individuals who are together and exposed to daily stressful missions. An absence of correlation between the Group-animal bond factor and both social and avoidance coping styles was observed. Firstly this suggests that the animal-mascot does not appear to act at reducing familial and social support over time, which is known to be a consequence of a high social coping style (Benotsch et al., 2000). Secondly, the animal-mascot did not appear as a means of avoidance, which is known to increase feelings of powerlessness and ineffectiveness (Foa & Hearst-Ikeda, 1996; Wolfe, Keane, Kaloupek, Mora, & Wine, 1993).

It was striking that the intensity of the relationship between the soldier and the animal mascot was higher for soldiers with a PTSD status. On the one hand, a possible explanation of these closer links could be based on a therapist role of the animal. The animal could act by helping suffering individuals to deal with the spontaneous or cued recurrent and intrusive distressing memories of the traumatic event(s) because it may constitute a harmless oasis zone protecting them from the intrusive memories. By the possible verbal and behavioural interactions that the animal may create for the soldiers, each can feel and communicate emotion without referring to the stressful situation, in other words, without danger. The tendency towards the increase of the emotion-centred coping style for soldiers with provisional diagnose of PTSD was in accordance with such an explanation. On the other hand, the animal-mascot bonds may act at a group cohesion level. Cohesion depends on a process which directs and limits individual behaviour and thus creates a sense of commonality and shared experience that can help in promoting further supportive interpersonal relationships (Griffith & Vaitkus, 1999) and creating social support (Griffith, 2002). Literature data values group cohesion as crucial for dealing with stress. Cohesion may counteract a deficient coping style by providing a sense of enjoyment and belonging (Bales, 1950); satisfying personal needs (Bass, 1960); helping the attainment of personal goals (Deutsch & Gerard, 1955); increasing

self-identity (Hogg, 1992), enhancing individual performance (Solomon, Mikulincer, & Hobfoll, 1986; Steiner & Neumann, 1978), and promoting individual health and wellbeing (Cohen & Wills, 1985). Independent from the individual or group level, the presence of a pet is known to afford such wellbeing (Friedmann & Heesook, 2009; Headey & Grabka, 2007) even in stressful situations (Schneider & Harley, 2006; Caprilli & Messeri, 2006).

Soldiers with PTSD status were soldiers without responsibility, smokers and prone to reporting stressful events. They also tended to be older. The limitation of responsibility was found to be the most important predictor for all animal-mascot needs, whereas PTSD and emotional coping were found to be a less important predictor for the individual animal bond scales. These sociopsychological variables often address vulnerability faced with stress (Stein, Cloitre, Nemeroff, Nutt, Seedat, Shalev et al., 2009). Such relationships with an animal-mascot may be considered to offer soldiers with limited responsibility a chance to share and express their pure selves without needing to defend their actions or feelings. Companion animals may give them their greatest opportunities to express emotion, without ever having to worry about being judged or rejected or being seen as disturbed in front of their buddies. Stigmatisation is a real fear in the military environment (Baert et al., 2011). Then, it may offer them a private harmless and/or an oasis of unqualified acceptance in an otherwise stressful and critical world. It may give them back a devotion, or a love that is unmatched by any other relationship during a deployment. Such a love may provide them with an oasis of unqualified love and acceptance. Their obedience and respect may give them an increased sense of self-worth that adds “new” meaning to their lives in a war zone. In return, they may assimilate them into positions of great personal value. These statements are consistent with existing literature that provides evidence of the value of Animal Assisted Therapy programs as an effective medium for increasing socialization among residents. A study conducted to determine the effect of the presence and absence of a dog on the frequency and types of social interactions among nursing home residents at a Veterans Administration Medical Center showed a significant difference in verbal interactions among residents with a dog present (Fick, 1993). Because an increase in social interactions can improve the social climate of an institution, it can be suggested that the presence of an animal among a military unit on a war zone can become a valuable adjunct to reaching operational goals.

Finally, the interest of an animal-mascot for soldiers confronted with stressful military situations may reflect a particular emotion-centred coping style. Most research has looked at people’s general coping styles, that is, how they usually cope with stressful events. A limitation of this style perspective is that it is based on the assumption that certain coping styles are always in action, regardless of the particular situation in which they are being used. This perspective may oversimplify the rich variety of cognitions people may have in a particular highly stressful situation (Lazarus, 1999). Our results were in accordance with this statement by highlighting that distress (PTSD), as vulnerability factors may increase a subsymbolic (bond with the being living animal) as a more symbolic (group bond with the mascot) specific emotional coping need. Such an emotional coping facility may constitute a protective one. This could explain why all the soldiers, namely those who met provisional diagnose of PTSD, finished their deployment without going to military doctor’s office and had no symptoms reported after they came back in their unit.

This work may simply be the first stage underlining the necessity of an animal-mascot in conflict zones faced with its important limitations, i.e. no baseline measure, no measures during deployment, no control group and self-selected subjects. The retrospective evaluation may also induce elements of affect-bias affecting the soldiers’ recall. Among assessments, factors related to psychological functioning status as alcohol or drug use, medication as anti-depressants or anxiolytics were not taken into account. Nevertheless, the AMBS questionnaire appears as an acceptable tool for investigating how the presence of an animal may help soldiers cope with repeated hard stressors. One may assume that i) the individual bond with the animal could constitute an operational emotional coping mechanism because it crystallises emotional feeling and expression for suffering subjects, and ii) the animal-group bond could constitute an oasis for social interaction for suffering subjects because it supports a harmless social support. This was for suffering soldiers who have a limited level of responsibility. Continued prospective studies are needed to clarify the role of dispositional coping styles and specific coping behaviour and their relationship to PTSD. To use animal-mascot bonds may be an active coping strategy in dealing with traumatic stress for subjects high in emotion-oriented coping behaviours. One may assume that coping strategies using animals for helping soldiers to regulate emotion and stress faced with stressful events should potentially be a specific target for clinical intervention. But this remains to be proven in a further study.

To sum up, soldiers with less responsibility, PTSD and emotional-coping expressed the highest needs for a

bond with an animal-mascot suggesting the role of animal-mascot bonds for mitigating distress for soldiers.

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## Competing Interest

The authors declare that there are no competing interests.

## Authors' Contributions

M. Trousselard, and F. Canini participated in the study design, analysis and interpretation of data and revision of the manuscript. A. Jean and F. Beiger participated in the building scale, study design and drafting the manuscript. M. Marchandot and B. Davoust participated in data acquisition and made substantive contributions to the study design. All authors read and approved the final manuscript.

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**Annexe 1.** Factorial structure of the AMBS-23 and mean values of respective items.

Factors and Items	Mean Value	SD	Corrected Item-Total Correlation	Alpha if Item Deleted	Factor Loading		
					I	II	III
<b>Individual-animal emotional bond (eigenvalue 15.57; alpha = 0.93)</b>							
I.7 Did the animal have a reassuring side?	2.012	1.701	0.864	0.974	0.620		
I.8 Did you feel less alone with the animal?	1.943	1.752	0.839	0.974	0.713		
I.9 Did you feel protected by the presence of the animal?	2.031	1.649	0.860	0.974	0.663		
I.11 Did the animal bring peace of mind?	2.050	1.707	0.898	0.974	0.689	0.534	
I.20 Did you miss the presence of the animal when it was not with you?	1.893	1.642	0.832	0.974	0.745		
I.21 Did you miss the animal when you returned home?	1.775	1.549	0.817	0.974	0.765		
I.22 Was the animal a mark for you?	1.625	1.344	0.774	0.975	0.746		
I.23 Did the animal help you to overcome difficult moments?	1.675	1.494	0.712	0.975	0.851		
<b>Animal-group bond (eigenvalue 1.49, alpha = 0.96)</b>							
I.1 Did the animal enable the group to be more united?	2.056	1.606	0.837	0.974		0.790	
I.2 Did the animal allow anyone to be more easily connected with the group?	1.925	1.429	0.781	0.975		0.791	
I.3 Did the animal enable tensions to defuse inside the group?	1.787	1.300	0.723	0.975		0.754	
I.4 Did the animal enable the group to relax together?	2.218	1.757	0.758	0.975		0.804	
I.5 Did the animal enable contact between two people that had not previously taken place?	1.793	1.249	0.734	0.975		0.761	
I.6 Did everyone have esteem for the animal?	2.712	2.241	0.716	0.976		0.675	
I.10 Could the animal make you laugh or smile?	2.412	1.998	0.871	0.974		0.610	
I.18 From your point of view, did the animal serve to divert the present aggressiveness in the group?	1.937	1.592	0.814	0.974		0.670	
<b>Individual-animal rational bond (eigenvalue 1.22, alpha = 0.94)</b>							
I.12 Did you take care of the animal?	3.031	2.536	0.717	0.976			0.677
I.13 Did the animal react to contact with you?	2.618	2.162	0.795	0.975			0.713
I.14 Did the animal react to your words?	2.293	1.924	0.800	0.974			0.806
I.15 Did you have a real interaction with the animal?	2.031	1.649	0.809	0.974			0.783
I.16 Did you feel you responsible for the animal?	2.131	1.819	0.831	0.974			0.753
I.17 Did the animal respond how you expected it to?	2.050	1.707	0.817	0.974			0.777
I.19 Did you feed the animal?	2.400	2.059	0.851	0.974			0.638

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