

HARDINESS IN THE HEART OF THE MILITARY

HARDINESS

IN THE HEART OF THE MILITARY

Doctoral dissertation presented to obtain a PhD in Social and
Military Sciences and in Psychology

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Summary

The military occupation challenges soldiers physically and mentally. Service members should possess resilience qualities to maintain their health and perform optimally despite the high demands they face. This dissertation studies the personality trait *hardiness* (Kobasa, 1979) as such a quality. The military resilience model (Kamphuis et al., 2012) offers an overview of the relevance of hardiness in the different phases of the military career (such as inflow, basic training, deployment and post-deployment). Our literature review shows a lack of research concerning the two most challenging phases of the military life: *the basic training* and *the deployment* in military operations. Also, our review highlighted a long-lasting debate about the *dimensionality of hardiness*. Two models are currently competing to explain the underlying structure of hardiness: the dual-process model (Sinclair & Tetrick, 2000) and the three-faceted hierarchical model (Hystad et al., 2010). Hence, this dissertation intends to address the military relevance of hardiness and its dimensionality. Therefore, we conducted four empirical studies.

Study 1. In a longitudinal design including 233 infantry recruits, we showed that the hardest participants were more likely to stay involved in the basic training in comparison with their less hardy counterparts, who dropped out earlier. Study 2. This cross-sectional study including 252 deployed soldiers indicates a positive association between hardiness and work engagement, and a negative relation between hardiness and burnout. Study 3. In this study, we intended to overcome the cross-sectional nature of the results reported in the previous study. In a longitudinal design including 82 service members, our results show that the level of hardiness measured prior deployment was negatively related to the level of burnout during deployment. Study 4. In our final study, we investigated the dimensionality of hardiness. A large sample ($n = 1157$) of military candidates completed a questionnaire made of the four most military-relevant hardiness scales. Based on the results, we developed a new model for hardiness. We propose to define and measure hardiness as a composite of two distinct domains (dispositional resilience and dispositional vulnerability) that are both hierarchical and composed of three facets.

To conclude, we address three aspects: 1) the organizational benefits of hardiness-based selection; 2) the implications of the dual-process hierarchical model in hardiness theory and research; 3) five practical implications of hardiness theory to promote military resilience.

Samenvatting

Het militaire beroep is voor soldaten zowel fysiek als mentaal erg belastend. Omwille van de hoge eisen waaraan ze blootgesteld worden, moeten militairen dan ook over voldoende veerkracht beschikken om gezond te blijven en optimaal te presteren. Dit proefschrift bestudeert de persoonlijkheidstrek *hardiness* (Kobasa, 1979) als één van de kwaliteiten waarover soldaten moeten beschikken. Het militaire veerkracht model (Kamphuis et al., 2012) biedt een overzicht van de relevantie van *hardiness* in de verschillende fases van de militaire loopbaan (zoals instroom, opleiding, inzet in operatie en terugkeer uit operatie). Uit de literatuurstudie blijkt dat er een groot tekort bestaat aan onderzoek betreffende de twee meeste uitdagende fases van het militaire leven: de *initiële opleiding* en de *zending*. Ook blijkt dat er al lange tijd gedebatteerd wordt over de *dimensionaliteit van hardiness* en dat er vandaag twee concurrerende modellen naast elkaar bestaan: het dual-process model (Sinclair & Tetrick, 2000) en het three-faceted hierarchical model (Hystad et al., 2010). Om die redenen bestudeert dit proefschrift de militaire relevantie van *hardiness* en haar dimensionaliteit. Daartoe werden vier empirische studies uitgevoerd. Studie 1. In een longitudinale studie met 233 infanterierekruten werd aangetoond dat de *hardy* deelnemers meer kans hadden om in de initiële opleiding te blijven in vergelijking met hun minder *hardy* collega's. Studie 2. Deze cross-sectionele studie met 252 militairen op zending toont aan dat *hardiness* positief is gerelateerd met werkbevlogenheid en negatief gerelateerd met burn-out. Studie 3. Een longitudinale studie met 82 militairen toont aan dat het niveau van *hardiness* voor de zending negatief gecorreleerd is met het niveau van burn-out tijdens de zending. Studie 4. In onze laatste studie onderzochten wij de dimensionaliteit van *hardiness*. Een ruime steekproef ($n = 1157$) van militaire kandidaten vulde een vragenlijst in, die bestond uit de vier meest militair relevante *hardiness* schalen. Op basis van de resultaten ontwikkelden wij een nieuw model voor *hardiness*. Wij stellen voor om *hardiness* te bepalen en te meten als een samenstelling van twee domeinen (dispositionele veerkracht en dispositionele kwetsbaarheid) die beide hiërarchisch zijn en drie facetten tellen.

In ons laatste hoofdstuk bespreken wij in het bijzonder drie aspecten: 1) de voordelen, voor de militaire organisatie, van een selectie op basis van *hardiness*; 2) de implicaties van het dual-process hiërarchische model voor *hardiness*theorie en onderzoek; 3) vijf praktische implicaties van *hardiness* theorie om de militaire veerkracht te bevorderen.

Résumé

Le métier de militaire comprend des défis physiques et mentaux. Les soldats doivent être résilients pour rester sains et servir de façon optimale malgré les exigences auxquelles ils sont confrontés. La présente thèse examine la personnalité *authentique* [Hardiness] (Kobasa, 1979) comme antécédent de la résilience. Le modèle de la résilience militaire (Kamphuis et al., 2012) met en lumière la pertinence de l'authenticité dans les différentes phases de la carrière militaire (comme la sélection, l'entraînement initial, ou le déploiement). Notre revue de la littérature identifie des lacunes dans la recherche concernant les deux phases les plus exigeantes de la vie militaire : *l'entraînement initial* et le *déploiement*. Notre revue souligne également un débat concernant la *dimensionnalité de l'authenticité*. Deux modèles sont en compétition : le modèle à double processus (Sinclair & Tetrick, 2000) et le modèle hiérarchique à trois facettes (Hystad, Eid, Johnsen, Laberg, & Bartone, 2010). Ainsi, la présente thèse aborde la pertinence militaire de l'authenticité et sa dimensionnalité. A cette fin, nous avons mené quatre études empiriques.

Etude 1. Cette étude longitudinale incluant 233 recrues d'infanterie montre que les participants les plus authentiques avaient plus de chance de rester impliqués lors de l'entraînement initial, comparés à leurs camarades moins authentiques qui abandonnaient plus tôt. Etude 2. Cette étude transversale comprenant 252 militaires en opération indique une relation positive entre l'authenticité et l'engagement professionnel et une relation négative entre l'authenticité et l'épuisement professionnel. Etude 3. Cette étude avait pour but de dépasser la nature transversale de l'étude 2. Cette étude longitudinale, impliquant 82 militaires, montre que le niveau d'authenticité pré-déploiement était associé au niveau d'épuisement professionnel pendant la mission. Etude 4. Nous avons examiné la dimensionnalité de l'authenticité. Un large échantillon ($n = 1157$) a rempli un questionnaire composé des échelles d'authenticité les plus pertinentes pour notre population. Sur base de ces données, nous avons développé un nouveau modèle de l'authenticité. Nous proposons de définir et de mesurer l'authenticité comme un composé de deux domaines distincts (disposition à la résilience et disposition à la vulnérabilité) qui sont tous deux hiérarchiques et comptent chacun trois facettes.

Pour conclure, nous discutons trois aspects : 1) les bénéfices organisationnels de l'authenticité ; 2) les implications de notre modèle d'authenticité ; 3) les implications pratiques de la théorie de l'authenticité pour promouvoir la résilience militaire.

Increscunt animi, virescit volnere virtus
Furius Antias

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Chapter 1. “Lo Bue, S. Etre authentique : Un pas vers la santé [Being hardy: A step towards health]. (*Accepted in the Revue Mosaïque*).”

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Chapter 3. “Lo Bue, S., Taverniers, J., Mylle, J., & Euwema, M. (2013). Hardiness promotes work engagement, prevents burnout, and moderates their relationship. *Military Psychology*, 25, 105-115.”

Chapter 4. “ Lo Bue, S., Taverniers, J., Mylle, J., & Euwema, M. (2014). Armored against burnout: The role of hardiness in stressful occupations. In K. Kaniasty, K.A. Moore, H. Siobhan, & P. Buchwald (Eds.), *Stress and anxiety: Applications to social and environmental threats, psychological well-being, occupational challenges, and developmental psychology* (pp. 43-51). Berlin: Logos Verlag Berlin GmbH.”

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Chapter 1

Hardiness and the military human resources cycle

The military life regularly challenges the service member. Involved in a “high-reliability occupation” (Baumann, Gohm, & Bonner, 2011), the soldier has “*to operate in stressful situations involving complex environments, high degrees of uncertainty and time pressure, and severe consequences for mistakes*” (p. 548). The military organization relies on selection and different training stages to reduce the physical and psychological risks associated with these high occupational demands. First, the selection procedure retains candidates on physical and psychological criteria. Then, the selected recruit learns the necessary “skills and drills” during a basic training simulating military stressful situations. Before a deployment, the service member is prepared during a high-intensity pre-deployment training. After a deployment, the soldier must be able to fully recover timely, to be deployed again later on, eventually several times. Therefore, candidates, recruits, and service members should possess qualities that enable them to perform their tasks optimally without developing physical or mental illnesses.

The positive psychology constitutes a fertile field to study qualities that “*improve quality of life and prevent pathologies that arise when life is barren and meaningless.*” (Seligman & Csikszentmihaly, 2000, p. 5). This stream conveys the idea that stressful experiences are not only automatic antecedents of

physical or mental illness, but also catalysts for positive personal change. In this frame, research on resilience is a vibrant area. Zautra, Arewasikporn, and Davis (2010) defined resilience as “adaptive responses to adversity” (p. 222). Research on resilience has resulted in a constellation of both socio-contextual (e.g. Eshel & Majdoob, 2014; Höfler, 2014; Wang, Liu, & Zhao, 2014) and personal (e.g. Moore, Chrabaszcs, Peterson, Rohrbeck, Roemer, & Mercurio, 2014; Romero, Edwards, Fryberg, & Orduña, 2014; Sarkar & Fletcher, 2014) determinants that enable the human being to respond adaptively to environmental demands, including occupational ones. One personal resource has emerged as an important health protective and performance fostering factor in times of hardship; i.e. the personality trait *hardiness*¹ (Kobasa, 1979).

This dissertation intends to highlight the role of hardiness in the military. In this introduction, we will first give a general overview of hardiness theory and research. We provide a theoretical framework to understand how hardiness promotes resilience and then we identify two issues that we intend to address: Is hardiness an indicator for effectiveness of military service members? How to measure hardiness in the military

¹ Bartone, Ursano, Wright, and Ingraham (1989) used the term « dispositional resilience » to emphasize the importance of this personality trait to promote adaptive responses to adversity. We will prefer the original term of “hardiness” to avoid confusion with the broader phenomenon of resilience. We will reserve the term “dispositional resilience” for the Dispositional Resilience Scales and when a distinction with “dispositional vulnerability” will be necessary.

context? As a first approach to these questions, we will present a model to study hardiness along the military human resources (HR) cycle. In this model, we focus on and discuss two phases that are particularly relevant to investigate hardiness' effects among military service members: the basic training and the deployment. Finally, we translate our research questions into operationalized research objectives and propose four studies to address them.

General overview of hardiness theory and research

Common wisdom and popular media convey the idea that stress makes sick. To a certain extent, research confirms this idea. Studies show that stress can lead to dermal affections (Kimyai-Asadi & Usman, 2001), impaired digestive functioning (Mönnikes et al., 2001), and an increased vulnerability to common cold (Cohen, Tyrell, & Smith, 1991). Prolonged exposure to stress could also favor the onset and the development of more serious physical or mental diseases, such as cancer (Sklar & Anisman, 1981), cardio-vascular disorders (Dimsdale, 2008), major depression (Burke, Davis, Otte & Mohr, 2005) or burnout (Bakker, Demerouti, & Sanz-Vergel, 2014; Schaufeli & Salanova, 2014). Thus, it seems reasonable to hypothesize an etiological relationship between stress and the development of illnesses. Which mechanism could explain this relationship?

According to Selye's General Adaptation Syndrome theory (1956), a stressful experience represents any change in the

environment requiring an adaptation from the organism. Three phases will follow the occurrence of such an event: the shock, the resistance, and the exhaustion phases. After a short period of lowered stress resistance (shock phase), the organism mobilizes energy to resist to the stressor (resistance phase). After a while, the adaptation efforts lead to a temporary physical and psychological exhaustion state (exhaustion phase). If the stressors are too important - in kind, duration, or frequency - the exhaustion phase may persist. Because of the persistent lowered bodily resistance, contracting a disease becomes more likely (e.g. Melamed, Shirom, Toker, Berliner, & Shapira, 2006).

Despite this theoretical explanation, researchers have long struggled to determine a clear link between stressful experiences and health impairment. Between the sixties and the seventies, many academics pretended to confirm this relationship. However, Kobasa (1979) examined the available results and noticed that the relationship remained fuzzy. First, the variability was great between the stress scores and the health measures. Second, the correlations between those scores ranged from 0.20 to 0.78, but fell generally under 0.30. Stating that stressful experiences had inevitably a deleterious effect on health seemed to be an overgeneralization.

Selye (1956) himself pointed out that personality could attenuate the deleterious effect of stress. Kobasa (1979) investigated the relationship between stressful experiences and health and noticed that some people experienced an

accumulation of highly stressful experiences, but remained healthy (high stress/low illness group). Kobasa sought to elucidate how these individuals differed from those who experienced equivalent stress levels, but who became sick (high stress/high illness group). Her originality was to wonder: “which individual differences moderate the potentially deleterious effects of stressful experiences?” rather than “how likely are stressful experiences leading to illnesses?” She showed that the subjects from the high stress/low illness group displayed a specific constellation of personality traits that she coined “Hardiness”.

In a subsequent work, Kobasa, Maddi, and Kahn (1982) defined hardiness as a “constellation of personality characteristics that function as a resistance resource in the encounter with stressful life events” (p. 169). In their view, hardiness was a continuum along which the hardiness level ranged from non hardy to highly hardy (Figure 1.1.). The authors proposed that individuals high on hardiness possessed all together the dispositions of commitment, control, and challenge (also referred to as the three C’s) whereas individuals low on hardiness were alienated (low commitment), powerless (low control), and threatened or rigid (low challenge). We summarize the definitions of the three C’s here below.

Commitment is the tendency to feel deeply involved in the life experiences. This feeling results from a purpose in life that helps putting stressful events in a broader perspective. Committed persons involve wholeheartedly in their

relationship with others, in all their activities, and in their environment in general. They invest maximal efforts to transform what they are doing into something exciting and important. They distinguish themselves from the *alienated* individuals, who consider their activities as taxed, boring and meaningless. Alienated individuals will have a cynical, withdrawn attitude towards life experiences.

Control is the tendency to believe that one can influence his² life experiences. Persons high in control think that through their efforts, they dispose of a definite influence on the course of events they meet. They invest active efforts to transform adverse situations into advantages. They distinguish themselves from *powerless* individuals, who act as if they were passive victims of external forces beyond their control.

Challenge represents the tendency to consider changes as opportunities to learn and grow. Persons positioned high in the challenge dimension think they can learn something from every experience, whether it is positive or negative. They consider that fulfillment lies in the pleasant as well as in the strenuous aspects of life. They distinguish themselves from threatened or

²The content of the present dissertation concerns hardy women as much as hardy men. The military organization counts many valuable female collaborators and this dissertation does not intend to promote gender bias. However, to avoid textual heaviness and cumbersome formulations (he/she; him/her; his/her;...), we chose to use the traditional grammatical rule stating that the masculine form can refer to men as well as to women. What we write about "him" always counts for "her".



Figure 1.1. Kobasa et al. (1982) unidimensional conception of hardiness.

rigid individuals, who fear change because it raises the risks for decreasing comfort and stability.

Hull, Van Treuren, and Virnelli (1987) severely criticized the unidimensional approach of Kobasa et al. (1982). They advocated that commitment, control, and challenge were three independent phenomena, to be measured and studied separately. The issue they raised stimulated numerous researchers to investigate the underlying structure of hardiness. In the following section, we address this still ongoing debate.

The debate on hardiness' dimensionality and measurement

Kobasa et al. (1982) considered hardiness as a unique dimension with two poles. At one end, individuals who were low on hardiness were low on the three C's. In other words, non hardy individuals were high in alienation, powerlessness, and rigidity. At the other end of the continuum, individuals high in hardiness were high on the three C's together. In this view, measuring hardiness consisted in using items reflecting the three characteristics and summing their scores up to obtain a score of hardiness.

Later factorial approaches (Hanna & Morrisey, 1987; McNeil, Kozma, Stones, & Hanna, 1986) suggested that hardiness could be better understood as a hierarchical multidimensional construct, in which three facets of commitment, control, and challenge are nested under a global domain of hardiness (Figure 1.2.). This position gained in popularity and is widely the most accepted one (e.g. Bartone, Kelly, & Matthews, 2013; Hystad, Eid, Johnsen, Laberg, & Bartone, 2010; Maddi, 2007). This view implies to measure separately the level of four different scores: the facets of commitment, control, and challenge and their sum as a total hardiness score. This method reduces the loss of information that the mere addition of the three C's implies. Indeed, it takes into account the fact that someone can be high in commitment and control, but low in challenge, for example.

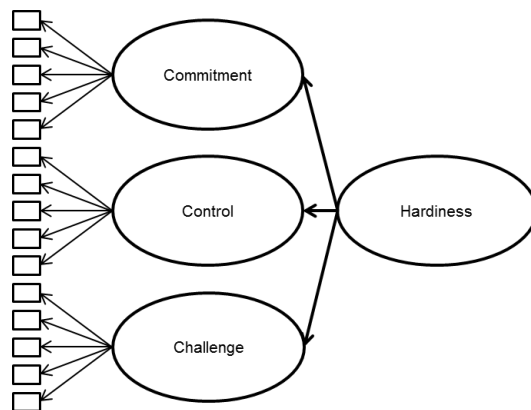


Figure 1.2. The three-faceted hierarchical model of hardiness (Hystad et al., 2010).

In the three-faceted hierarchical view, a given person can thus be localized in a three-dimensional space (Figure 1.3.). As such, the hierarchical model of hardiness represented an enrichment of hardiness theory and research. The researcher could then investigate the predictive value of each facet and of hardiness as a whole. According to the outcome under investigation, recent research found that the facets had as much importance and sometimes even more than hardiness globally. For example, Johnsen et al. (2013) found that hardiness as a whole predicted success during a demanding military task, and that among the three facets, commitment was the most important one. Sandvik, Hansen, Hystad, Johnsen, and Bartone (2015) found that commitment mediated the relationship between psychopathy and anxiety among prisoners, whereas hardiness as a whole did not. These studies emphasize the importance to test simultaneously the effect of the global hardiness domain and of its three facets.

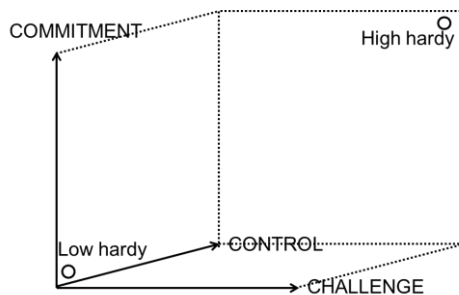


Figure 1.3. The three dimensions conceptualization of hardiness.

However, this three dimensional conception still implied that one had to be high in the three C's to be considered as hardy. At the turn of the millennium, Sinclair and Tetrick (2000) proposed a challenging alternative conception, called the dual-process view (Figure 1.4.). They suggested that the existing modelizations of hardiness confounded two distinct phenomena. They proposed that negatively formulated items of the hardiness scales actually measured *something else* than hardiness. For the authors, these items tapped a set of "separate, but hardiness-related cognitive processes" (p. 1). In this approach, positive items were more related to stress resilience, whereas negative items were more related to stress sensitivity. Sinclair and Tetrick's study showed that "positive hardiness" (measured by positive items) was distinct from "negative hardiness" (measured by negative items), and that the last also predicted outcomes over and above the first. Finally, they considered positive hardiness as a sum of the three C's and negative hardiness as a sum of alienation, powerlessness, and rigidity. This is a shortcoming of this model, as the three-dimensional information gets lost in the addition of three subdimensions.

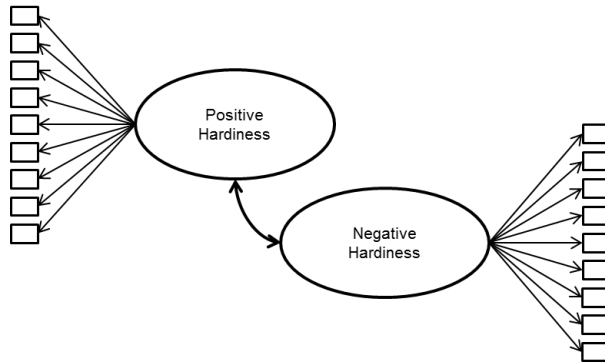


Figure 1.4. The dual-process model of hardiness (Sinclair & Tetrick, 2000).

In a later, unpublished work, Sinclair and Oliver (2003) proposed that positive hardiness provided strengths and resources in adversity while negative hardiness increased vulnerability to stressful experiences. Following this line of thoughts, we will call the first “dispositional resilience” and the second “dispositional vulnerability”. The dual-process model constituted a radical shift in hardiness’ conceptualization. This personality domain could include both positive and negative patterns of cognitions. When someone faces adversity, he may access either to positive or negative cognitions or even to both simultaneously. The human being is complex, and most people are not simply completely stress resistant, or totally stress vulnerable. For example, when deployed to a remote hostile location, a soldier may feel threatened and challenged at the same time. This view acknowledges that (at least) two tendencies can coexist in the human being regarding his dispositions towards stressors.

Therefore, by summing up dispositional resilience and dispositional vulnerability, previous researchers canceled their respective weights and lost information. Tenants of the dual-process view would measure and test dispositional resilience and dispositional vulnerability separately. Each individual can be located in a two-dimensional space (Figure 1.5). Basically, four types of individuals can be distinguished in that frame: the low-resilient/low-vulnerable; the low resilient-high vulnerable; the high resilient/low-vulnerable; and the high-resilient/high-vulnerable. The dual-process model could have opened new fascinating ways to simultaneously investigate these two dispositions. However, to our knowledge, Chan's (2003) study is the only one to refer to it. It later somehow fell into oblivion in favor of the three-faceted hierarchical model (Hystad et al., 2010).

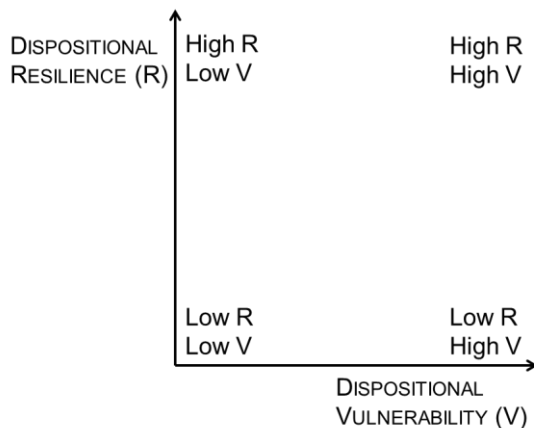


Figure 1.5. A two-dimension conceptualization of hardiness.

Because the conceptualization of hardiness varied through hardiness theory development, the way to measure it varied also but not always consequently. This resulted in a proliferation of hardiness scales that makes comparisons across studies sometimes difficult. Also, most researchers adopt the three-faceted hierarchical model (Hystad et al., 2010), but investigate only the effect of the sole overarching component of hardiness (e.g. Alfred, Hammer, & Good, 2014; Bansal, 2014; Perkins, Randall, Toozs-Hobson, Sitch, & Ismail, 2014). Accordingly, and for the sake of clarity, we will treat hardiness in this chapter (and in chapter 2, 3, and 4) as a unitary construct. By doing so, we hope to put forward the relevance of the concept hardiness as a whole.

Since Kobasa's initial study (1979), the construct hardiness has yielded a large body of research indicating its protective role regarding physical (e.g. Bartone, Spinosa, Robb, & Pastel 2008b; Dolbier et al., 2000; Eschleman, Bowling, & Alarcon, 2010) and mental health (Alarcon, Eschleman, & Bowling, 2009; Orme & Kehoe, 2014; Pengilly & Dowd, 2000). Since the nineties, researchers also investigated hardiness' potential to predict performance. Several studies confirm that hardiness is an important predictor of sport performance (Maddi & Hess, 1992; Rezae, Ghaffari, & Zolfalifam, 2009; Sheard & Golby, 2010), school and academic achievement (Lifton, Seay, & Buschko, 2000; Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2009; Sheard, 2009), and professional performance (Cash & Gardner,

2001; Maddi, Harvey, Khoshaba, Lu, Persico, & Brow, 2006; Maddi, Harvey, Resurreccion, Giatras, & Ranagold, 2007).

In the following subsections, we investigate the psychological, social, and biological mechanisms by which hardiness fosters resilience. The first subsection describes how hardiness influences cognitive appraisal processes and coping strategies (Lazarus & Folkman, 1984). In the second subsection, we will address a particular coping strategy, i.e. seeking out for social support. In the third subsection, we discuss how these psychological and social processes affect physiological reactivity at the different phases of Selye's (1956) General Adaptation Syndrome and how hardiness maintains ultimately health and performance. Finally, we address the limitations that the issue of the dimensionality of hardiness raised.

Hardiness and psychological aspects of resilience

One of the most influential theories of coping with stress is Lazarus and Folkman's transactional model (1984). According to this model, a new stressful experience leads to two types of interpretation: *primary* and *secondary appraisal*. The individual facing a stressful experience first assesses if the environmental demands represent a threat to his well-being (primary appraisal) and then if resources are available to cope with those demands (secondary appraisal). If the event does represent a threat, the individual engages in behaviors (*coping strategies*) expected to reduce the physiological arousal following the stressful experience. These behaviors can be adaptive (*problem-*
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or emotion-focused) or maladaptive (*avoidant coping*). The aim of the first type is to actively transform the stressful experience in something less threatening, and consequently to avoid a deleterious persistence of the exhaustion phase. The second type merely reduces the physiological response by focusing on the management of the emotions without any attempt to transform the stressful experience because interpreted as unchangeable. As the stressful experience remains unchanged, it keeps the potential to occur again, or to persist, and increase the likelihood of a chronic exhaustion. The model of Lazarus and Folkman has been subject to many publications (31'449 citations according to Google Scholar) and is still a leading model in research on stress and coping (e.g. Farokhzadian, Ashrafi, & Hashemi Petroudi, 2014; Lai & Oei, 2014; Yeresyan & Lohaus, 2014).

Research indicates that hardiness positively influences the primary appraisal (for a review see Wiebe, 2014) as well as the secondary appraisal (Delahaij, Gaillard, & Van Dam, 2009; Ghorbani, Watson, & Morris, 2000; Williams & Lawler, 2003) of threatening events. The hardy person is more able to appraise potentially stressful experiences in more benign terms and consequently, reduces the deleterious effects of these situations. Conversely, the less hardy individual appraises changes more frequently as undesirable. For him, the environmental demands require greater adjustments. Furthermore, the person high in hardiness remains optimistic about his ability to rally the challenges of stressful situations, whereas the individual low on

hardiness doubts about his ability to cope with them.

If a hardy person perceives an event as stressful despite his tendency to appraise it positively, he is more likely to cope adaptively in comparison to the less hardy individual. The hardy person will fully engage in activities to cope with the event in a way that reduces its stressful potential. Many studies indicate that hardiness fosters adaptive coping (e.g. Delahajj et al., 2009; Eid, Johnsen, Saus, & Risberg, 2004; Soderström, Dolbier, Leiferman, & Steinhardt, 2000).

Hence, research confirms that the hardy person interacts actively with stressful experiences to transform them. He puts them in a broader perspective that renders them less threatening. He is confident in his ability to cope with them. If the situation is threatening for his well-being anyway, he explores the event (commitment vs. alienation), influences it (control vs. powerlessness) and learns from it (challenge vs. rigidity). Thanks to a positive cognitive appraisal and adaptive coping strategies, the person with a high level of hardiness transforms stressful experiences so that they no longer involve stress. By doing so, the hardy person diminishes the likelihood to see the stressful experience appear again or last too long. Consequently, a chronic exhaustion phase is less likely; health and performance are maintained. In contrast, the individual low on hardiness appraises stressful experiences as external, uncontrollable, threatening events to be avoided. The avoidance preserves the integrity of stressful experiences. They can then

continue to impact the organism, leading to a noxious exhaustion phase.

Before discussing in detail the physiological mechanisms associated with hardiness, we will address social support seeking, one particular coping strategy that is related to social interactions.

Hardiness and social aspects of resilience

Researchers showed as much interest for hardiness as for another potential resilience resource, generally referred to as “social support” (Earnshaw, Lang, Lippitt, Jin, & Chaudoir, 2014; Panagioti, Gooding, Taylor, & TARRIER, 2014; Xou & Ou, 2014). Social support has received many definitions, but researchers generally consider it as the degree of support provided to a person, especially in time of need, by his significant others (Johnson & Sarason, 1979). It would increase resilience by giving means and/or encouragements to face stressful experiences. Many studies suggest the health protective effect of social support (e.g. Burton, Bonnano, & Hatzenbuehler, 2014; Cantwell, Muldoon, & Gallagher, 2014; Heo, Lennie, Moser, & Kennedy, 2014).

However, unlike hardiness, social support cannot be conceived as a protective resource in all cases; seeking out for social support can have different effects according to the kind of support that is given to the individual, whether he as requested for help or not (Deelstra, 2003). Therefore, we will distinguish two types of social support: *adaptive support* and *maladaptive*

support. Adaptive support provides means, information or encouragements that help to transform the event in a less stressful form. It can be compared to problem- and emotion-focused coping strategies; it helps to make an end to noxious effects of the stressful experience. Maladaptive support only provides complaisant reassurances or temporary distractions. It can be compared to a form of avoidance; it only provides a temporary relief to soothe the emotional strain or to avoid the stressful event.

Therefore, the relationship between hardiness and social support cannot be a simple one and it depends on the kind of support sought for or provided. Kobasa and Puccetti (1983) have found that social support reduced the deleterious effect of stress in hardy persons, but that family support increased the vulnerability of non-hardy individuals. Hence, this study suggests that the hardy person will seek and use an adaptive support. On the contrary, the non-hardy individual seeks a type of support made of overprotection or distraction that will not help to transform the stressful situation. Bartone et al. (1989) also described this phenomenon of detrimental family support. Through these studies, we may cautiously conclude that the level of hardiness interacts with the kind of support sought for and provided to increase the resilience to stress. However, even if the relationship between hardiness and adaptive support is well established (e.g. Blaney & Ganellen, 1990; Kobasa, Maddi, Puccetti, & Zola, 1985; Westman, 1990), the mechanism increasing resilience is difficult to reveal and gives way to

numerous interpretations. Do some people seek out for adaptive support because they are hardy or are some people hardy because they receive adaptive support?

On the one hand, it seems likely that personality influences the way a person interacts with his environment. Hardiness could lead to behaviors that favor a supportive social environment. By his active and positive attitude, the hardy person promotes an active and positive reaction from his entourage. More, as the hardy person's request aims at transforming the stressful experience, the social environment responds in a way that favors the transformation of the event.

On the other hand, we can consider that the reactions an individual typically gets from others can influence his personality. Maddi (2013) proposed a specific familial atmosphere promoting hardiness' development. Parents providing many moderately difficult tasks and supporting the child to perform them would characterize this primordial atmosphere. It would also be marked by frequent changes and the parents would emphasize the richness that change entails. Later in the life span, hardiness could be maintained or enriched through the interaction with the extended social environment. Furthermore, the social environment could praise the successful coping of hardy persons, which would in turn reinforce the confident secondary appraisal.

Hardiness and adaptive social support are probably two sides of a same coin (Ganellen & Blaney, 1984): the *intrapersonal* and *interpersonal* sides of resilience (Morote-Rios, 2014). The two

hypotheses (hardiness fosters a supportive environment; a supportive environment fosters hardiness) are not mutually exclusive and both have been corroborated by research results. The mechanism by which hardiness would interact with social support to maintain health is thus multiple: hardy persons are especially able to mobilize whatever support that is present in their life space (King, King, Fairbank, Keane, & Adams, 1998; Maddi, 2013), being hardy fosters the development of a supportive environment (King et al., 1998; Maddi, 2013), and being hardy is more helpful when there are many social resources to mobilize than when there are no or very few resources to rely upon (Bartone et al., 1989; Maddi, 2013; Manning & Fusilier, 1999).

Concordant with his other coping strategies, the hardy person's social interactions are active and aim at getting a social support that provides the means to resolve a given stressful situation (problem-focused strategy) and/or the encouragements to face it (emotion-focused strategy) in order to reduce the threat that a stressful event provoke. By doing so, the hardy person increases the likelihood of adaptive coping and avoids the deleterious effect of a chronic exhaustion phase, as we will describe in the next subsection.

Hardiness and biological aspects of resilience

Recent research showed the relationship of hardiness with emotional brain activation (Reynaud et al., 2013) and neuroendocrine response to stress (Sandvik, Bartone, Hystad, 36

Phillips, Thayer, & Johnsen, 2013). Past research helps to understand the biological mechanisms underlying hardiness. Given the above-described psychological and social aspects, the different levels of hardiness should define different developments in the physiological reaction following the confrontation with a potentially stressful situation. The hardy person is more likely to consider a new experience as non-threatening, avoiding thereby the perturbations of the shock phase. The minimization of the stressful experience will lead to a lower physiological arousal for the hardy person when compared to the individual with a lower level of hardiness. However, it is also possible that a stressful experience constitutes a real threat to the well-being, even for the hardy person. During the processing of the threat, because of their active efforts to transform the event into something more benign, the physiological arousal of the hardy person will be higher than the non-hardy's, who is temporarily eased by avoidance. This psychophysiological mechanism in two steps could explain how the hardy person avoids a chronic exhaustion and maintains in turn his health and performance. The results of Howard, Cunningham and Rechnitzer (1986) and those of Lawler and Schmied (1992) indicate that at the shock phase, the physiological reactivity is negatively related to hardiness. Van Treuren and Hull (1987) showed that the physiological arousal when performing a difficult task is positively related with hardiness. Allred and Smith (1989) have investigated the shock and resistance phases in a unique study

and found the same pattern. While waiting for a difficult test situation (shock phase), the higher the participants were in hardiness, the more they appraised the coming task in benign terms and the more they were confident and optimistic about their ability to resolve the task (hardy cognitive appraisal). During the task (resistance phase), the hardy persons showed an increased physiological arousal because their active coping efforts were mobilizing energy.

These different courses of development can explain the different health and performance outcomes related to the hardiness level. By not processing correctly the threat of a stressful experience, the individual with a low level of hardiness is frequently or for a long time confronted with the same stressful experiences, which can then accumulate. This situation of prolonged stress can lead the less hardy individual to a chronic exhaustion. Signs of physical and psychological exhaustion will mark this state, making the individual more vulnerable to health impairments and performance breakdowns.

Different biological markers confirm the physical or psychological consequences of chronic stress among individuals low on hardiness: a reduced physiological adaptation to chronic illnesses (Pollock, Christian, & Sands, 1990), an increased physical distress and a higher blood pressure (Maddi, 1999), a lower immune reactivity (Dolbier et al., 2000), a lower level of high density lipoprotein or “good cholesterol” (Bartone et al., 2008b). Several studies also confirm

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the protective role of hardiness against mental exhaustion (e.g. Chan, 2003; Garrosa, Moreno-Jiménez, Liang, & González, 2008; Lo Bue, Taverniers, Mylle & Euwema, 2013). Those results support the idea of a chronic exhaustion state in individuals low on hardiness, marked by physical and psychological distress.

Conclusion

In sum, through positive cognitive appraisal (eventually with the help of persons from the social environment), hardiness reduces the physiological reactivity at the shock phase. During the resistance phase and if needed, hardiness increases the physiological arousal to mobilize the energy necessary to cope adaptively and process the threat (eventually with the help of persons from the social environment). Consequently, the hardy person avoids a prolonged exhaustion, because he transforms the stressful experience into something more benign. In contrast, the less hardy individual risks an accumulation of recurrent and/or prolonged stressful experiences. Therefore, he shows signs of bodily and mental exhaustion that have deleterious effects on health and performance.

However, this contrasted conclusion should be taken with caution. First, some authors (e.g. Grant & Shwartz, 2011; Le, Oh, Robbins, Ilies, Holland, & Westrick, 2011; Zettler & Lang, 2013) raised the issue about a monotonic linear approach of “positive” psychological constructs’ effects. High levels of positive personality traits could actually be counterproductive.

Regarding hardiness' characteristics, some studies showed that blind challenge-seeking (e.g. Charnigo, Noar, Garnett, Crosby, Palmgreen, & Zimmerman, 2013; González-Iglesias, Gomez-Fraguela, & Luengo, 2014; Wilson & Scarpa, 2014) or overcommitment (e.g. Avanzi, Zaniboni, Balducci, & Fraccaroli, 2014; Chou, Li, & Hu, 2014; Ding, Qu, Yu, & Wang, 2014) have deleterious effects on health. Therefore, an individual with a maximum score on a hardiness scale could actually be at risk.

Second, we treated hardiness in this chapter as if its definition was univocal. This is not the case. As we noted earlier, different researchers proposed many different models to explain the dimensionality of hardiness, which have of course implications on its measurement. Considering hardiness as a unitary phenomenon (Kobasa et al., 1982) implies to sum three component scores to obtain a global hardiness score. The dual-process conception of Sinclair and Tetrick (2000) suggests that two distinct phenomena underpin hardiness: dispositional resilience and dispositional vulnerability. This approach implies the separate measurement of the two dimensions. In the three-faceted hierarchical model (Hystad et al., 2010), hardiness' assessment covers four measurements: hardiness as a whole and its three facets. In short, the debate about hardiness' dimensionality resulted in a proliferation of hardiness scales that sometimes makes comparisons across studies difficult.

Notwithstanding this limitation, this section provided a frame to understand how hardiness promotes resilience. For this

reason, several authors (e.g. Bartone & Priest, 2001; Maddi, Matthews, Kelly, Villareal, & White, 2012; Sandvik, Bartone, Hystad, Phillips, Thayer, & Johnsen, 2013) proposed that selecting hardy candidates could be beneficial to the military organization. Indeed, we can expect that a hardy service member – who is engaged in his personal and professional activities, who thinks he has a definite control on life events, and who sees stressful experiences as opportunities to grow and learn – will adapt positively to adverse situations, such as those that his profession entails.

Hence, the present dissertation aims at addressing two aspects that this general overview highlighted: the debate on hardiness' dimensionality and measurement, and the relevance of hardiness for the military context. Given the costs in time and energy that the study of the first aspect requires, we found it relevant to first investigate the organizational benefits of hardiness-based selection, to then consider an optimal way to conceive and assess hardiness in the selection context. Therefore, we addressed two issues in the following order:

1. Is hardiness an indicator for effectiveness of military service members?
2. How to measure hardiness in the military context?

As a first approach to these questions, the following section will first propose an integrative approach to investigate the relevance of hardiness along the military Human Resources

(HR) cycle and then identify four hardiness scales that are potentially relevant to the military context.

Hardiness in the military context

Hardiness along the military HR cycle

The previous section presented hardiness as a personality trait that promotes resilience (defined as the emergence of “adaptive responses to adversity”). Hardiness fosters positive appraisals of aversive situations and an adaptive coping style towards problematic ones. Hardy individuals are thus able to reduce the stressful potential of life experiences, reducing in turn their deleterious effects on health and performance. Given the demanding nature of the military occupation, service members should possess qualities such as hardiness. Authors like Bartone (1999), Britt and Dickinson (2006), and Maddi (2007) already stated that investigating hardiness was relevant to the military context. However, hardiness research misses an integrative approach to apprehend hardiness’ effects during the whole military HR cycle. The present section presents such an integrative approach.

Kamphuis, van Hemert, van Wouwe, van den Berg, and van Boxmeer (2012) proposed a model to study resilience in the military context. This model is based upon the military HR cycle and helps to identify the specific organizational challenges of seven different phases and the antecedents of resilience in the military context (Figure 1.6.). During the *inflow*, the military organization selects candidates on the basis of

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physical and psychological criteria. Then, the selected recruit has to learn the necessary “skills and drills” during the *basic training*. Afterwards, he maintains the acquired skills during the *garrison training*. When appointed for a deployment, he first enhances his skills during a demanding *pre-deployment* period and then applies them during the *deployment*. *Post-deployment*, he recovers from the operational physical and mental load before he starts the cycle again with the garrison training (or a new basic training if he chooses a new specialty). At the end of his career, he goes back to the civilian life (*outflow phase*) and the organization partly assumes the responsibility of his physical and mental health. Kamphuis et al. further suggest that different levels of antecedents promote individual resilience during the military HR cycle, with an impact on the organizational challenges. Those levels are individual, social³, team-related, leader-related, and organizational.

This model helps to identify the specific organizational challenges at each phase of the military HR cycle and to visualize the antecedent of individual resilience that may tackle these challenges. However, Kamphuis et al. (2012) do not consider hardiness as an important individual resource, whereas research suggests that hardiness affects each phase of the military HR cycle (for the inflow, see Hystad, Eid, Laberg, and Bartone, 2011b; for the basic training Bartone et al., 2013; for the garrison training, Taylor, Pietrobon, Taverniers, Fern,

³ Understood as the social environment out of the military: relatives, friends, and significant others in general.

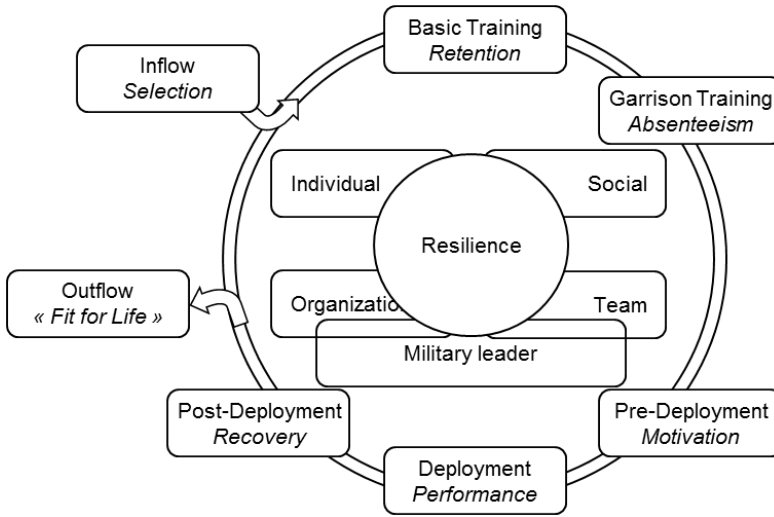


Figure 1.6. The military resilience model (Kamphuis et al., 2012).

and Leon, 2013; for the pre-deployment, Florian, Mikulincer, and Taubman, 1995; for the deployment, Britt, Adler, and Bartone, 2001; for the post-deployment, Adler and Dolan, 2006; for the outflow, King et al., 1998). Moreover, Bartone (2006) showed that hardiness reveals its positive potential in the most adverse situations. Therefore, we suggest that the basic training and the deployment phases are the most interesting ones to study hardiness and to determine if hardiness-based selection would be relevant.

Indeed, during the basic training, the recruit has to perform optimally, learn new “skills and drills” and maintain his health in adverse situations – such as sleep deprivation, evaluative-threat, or heavy physical demands. In the Netherlands, about 20% of the candidates give up during the basic training (Cremers, Van der Linden, te Nijenhuis, & Van de Ven, 2011)

and more than 25% in the United Kingdom (Fisher, 2011). In Belgium, the attrition rate 6 months after incorporation raises up to 31% (Ergen, 2011). Moreover, psychoneuroendocrinological studies conducted during that phase reported the highest cortisol levels ever published (Morgan, Doran, Steffian, Hazlett, & Southwick, 2006; Taverniers, Van Ruysseveldt, Smeets, & von Grumbkow, 2010). Thus, we consider the basic training as one of the two most stressful experiences in a military career.

The second phase where hardiness seems particularly relevant is during the deployment. Modern deployments place service members in problematic foreign countries where the environment is complex and hostile, where the threats and the way to deal with them are ambiguous. Furthermore, combat situations or patrols in difficult terrain conditions may lead to severe injuries or even to the death of colleagues. The deployment necessarily implies a months-long separation from the loved ones. The confrontation with other cultures, eventually with other views on the value of individual life, may also lead to witness atrocities. We may add to these specific occupational demands the common ones such as workload, work tempo, or harsh working conditions (for a taxonomy of operational job-demands, see Bartone, Adler, & Vaitkus, 1998; Boermans, Kamphuis, Delahaij, Korteling, & Euwema, 2013). The deployment-related job-demands can sometimes have a devastating effect on the service member's health (Hoge, Auchterlonie, & Milliken, 2006; Hotopf et al., 2006).

Thus, both the recruit and the actual service member have to maintain their health and display the highest levels of performance under threatening conditions. But researchers rarely addressed the relevance of hardiness during these phases. Previous research indicates hardiness' positive role during the basic training (e.g. Maddi et al., 2012; Bartone, Eid, Johnsen, Laberg, & Snook, 2009; Bartone et al., 2013), but these researches concerned only military cadets, a population with a highly specific profile. Only one study (Delahaij et al., 2009) suggested that hardy infantry recruits presented an adaptive coping style during their basic training. Moreover, not much is known about positive outcomes related to hardiness during the deployment phase, as only one study (Britt et al., 2001) investigated this context, and with an anecdotal dependent variable (meaning allocated to the mission).

In sum, in the military HR cycle, we identify two phases that could highlight the relevance of hardiness for the military context: the basic training and the deployment. These phases encompass specific challenges for the military organization: respectively, the retention of recruits and the enduring performance of the service members. However, research hardly ever addressed the impact of hardiness on retention of troop soldier recruits during the basic training and the performance of service members during an actual deployment. Thus, the military organization would benefit from selecting hardy candidates if they were more likely than non-hardy ones to persevere during the basic training and if they later displayed

better mental dispositions towards professional effectiveness. To address these issues, we formulate two research objectives:

- a. Does hardiness predict perseverance in troop soldier recruits during the basic training?
- b. Does hardiness predict professional effectiveness during the deployment?

Hardiness' measurement in the military context

As we noted in the general overview section, a proliferation of scales encumbers hardiness' literature. Since Kobasa et al. (1982) proposed a set of 71 items to measure hardiness (the Unabridged Hardiness Scale), the scale has been declined in numerous abridged, revised, health-related (Pollock, 1986), sport-related (Sheard, Golby, van Wersch, 2009), family-related (McCubbin & Thompson, 1987), and occupation-related (Jimenez, Munoz, Hernandez, & Blanco, 2014) instruments. However, a review by Funk (1992) compared the scales existing at that time and identified the Personal View Survey (PVS, Kobasa, 1985) and the Dispositional Resilience Scale (DRS, Bartone et al., 1989) as the most appropriate to measure hardiness.

The PVS and the DRS showed similar content, but the later scale became more popular in the military context (in the studies concerning hardiness in the military context that we report in our general reference list, 73% used a scale from the DRS class (see below for the different DRS forms) whereas 15%

used one or another version of the Personal View Survey, and 12% used a self-made or an undetermined hardiness scale). The initial DRS counted 45 items, but showed different measurement problems (see Funk, 1992). Four scales were derived from continued efforts to improve its psychometric qualities: the Dispositional Resilience Scale II (DRSII, Sinclair & Oliver, 2003), the Military Dispositional Resilience Scale II (DRSII-M, R.R. Sinclair, personal communication, July 7, 2014), the Dispositional Resilience Scale 15 (DRS15; Bartone, 1995, 2007), and the revised Norwegian version of Dispositional Resilience Scale 15 (DRS15r; Hystad et al., 2010).

To overcome the criticisms related to the initial DRS (Bartone et al., 1989), but in a series of unpublished works, Sinclair and colleagues (R.R. Sinclair, personal communication, July 7, 2014; Sinclair & Oliver, 2003; Sinclair, Oliver, Ippolito, & Ascalon, 2003, cited in Sinclair & Oliver, 2003) refined the formulation of the items and the format of the scale. They worked on a version with an equal number of positive and negative items to validate their dual-process view. Sinclair and Oliver's (2003) report presents the 18-item DRSII. It measures dispositional resilience and dispositional vulnerability. The DRSII presents a good internal consistency and good criterion-related validity, including in military samples (for the details see: Sinclair & Oliver, 2003). Later, Sinclair and colleagues developed the DRSII-M. Its content is similar to the DRSII but it counts six more items. This 24 item scale showed improved psychometric

qualities in comparison with the DRSII (R.R. Sinclair, personal communication, July 7, 2014).

In parallel, Bartone (1995; 2007) developed the DRS15. It is based upon the three-faceted hierarchical view (Hanna & Morissey, 1987), counts 15 items and measures the global hardiness trait and its facets of commitment, control, and challenge. The DRS15 showed good test-retest reliability and good criterion-related validity in military samples (for the details: see Bartone, 1995; Bartone, 2007). Norwegian researchers made several attempts to use a translation of the DRS15 (e.g. Eid et al., 2004; Eid, Johnsen, Bartone, & Nissestad, 2007; Eid & Morgan, 2006), but when faced with disappointing psychometric qualities, they quickly raised the issue of the cultural appropriateness of some items. Hystad et al. (2010) altered these items to improve its suitability to the Norwegian background and the DRS15r reflects these changes.

In sum, many scales are available to measure hardiness, but the DRS class of scales is the most used in the military context. The DRS15, DRS15r, DRSII, and DRSII-M resulted from several refinements of Bartone et al.' (1989) initial scale and constitute the state-of-the-art of the current DRS scales for military applications. According to the literature, we can consider them as reliable and valid as they show sufficient psychometric qualities and criterion-related validity (with some caution regarding the DRSII and DRSII-M that are less documented and reviewed). However, these scales rely on two different conceptions of hardiness' dimensionality; i.e. the three-faceted

hierarchical model and the dual-process view. Therefore, we define two more research objectives:

- c. Which model explains best hardiness' dimensionality?
- d. Which scale is the most appropriate to assess hardiness at the inflow?

In the following section, we propose four studies to address our research objectives.

Dissertation outline

The military occupation requires resilience qualities from the service members. Through the general overview of hardiness theory and research, we highlighted that hardiness could promote resilience among military service members and identified two research issues: Is hardiness an indicator for professional effectiveness of military service members? How to measure hardiness in the military context? To address these questions, we first used the model of Kamphuis et al. (2012) and identified two phases of interest in the military HR cycle: the basic training and the deployment. Research findings lack regarding the relevance of hardiness during those phases. Therefore, we translated the first question into two research objectives:

- a. Does hardiness predict perseverance in troop soldier recruits during the basic training?
- b. Does hardiness predict professional effectiveness during the deployment?

The second subsection identified four scales of the DRS class – the DRS15, DRS15r, DRSII, and DRSII-M – that are valid in the military context. These are based on different conceptions of hardiness’ dimensionality (three-faceted hierarchy vs. dual-process). Two more research objectives arose then:

- c. Which model explains best hardiness’ dimensionality?
- d. Which scale is the most appropriate to assess hardiness at the inflow?

To answer the first research objective, this dissertation presents first a study conducted in the context of the basic training (Chapter 2) and showing the influence of hardiness on the perseverance of troop soldier recruits and thus on the retention rate. Chapter 3 and 4 address hardiness’ relevance in the deployment phase. We chose to focus on two mental states that strongly relate to professional effectiveness: work engagement and burnout (Bakker, Demerouti, & Sanz-Vergel, 2014; Schaufeli & Salanova, 2014). Chapter 3 presents the results of a cross-sectional study indicating hardiness’ positive effects during an actual deployment in Afghanistan. Chapter 4 reports

one longitudinal study conducted during the pre-deployment and the deployment phases of another operation in Afghanistan. The latter study confirms hardiness' protective effect against burnout.

In those three chapters, we indirectly addressed the fourth research objective by using three state-of-the-art hardiness scales for the military context: respectively, the DRSII-M (R.R. Sinclair, personal communication, July 7, 2014), the DRS15r (Hystad et al., 2010) and the DRS15 (Bartone, 2007). We addressed the third and fourth research objectives more directly using the items from the DRS15, the DRS15r, the DRSII-M, and the DRS II (Sinclair & Oliver, 2003) to compare the competing dimensional models of hardiness and set the ground to develop an instrument tailored for the inflow phase (Chapter 5). Our approach intends to identify the best way to assess hardiness for military selection purposes. Figure 1.6. helps to visualize the chapters of this dissertation in Kamphuis et al.'s (2012) model.

Chapter 1 reviewed hardiness existing theory and research. Chapter 2 tests hardiness' impact on recruits' perseverance during the basic training. Chapter 3 shows hardiness' relationship to work engagement and burnout during a deployment and Chapter 4 presents a longitudinal study including the pre-deployment and the deployment phases. Chapter 5 determines the best way to measure hardiness at the inflow phase.

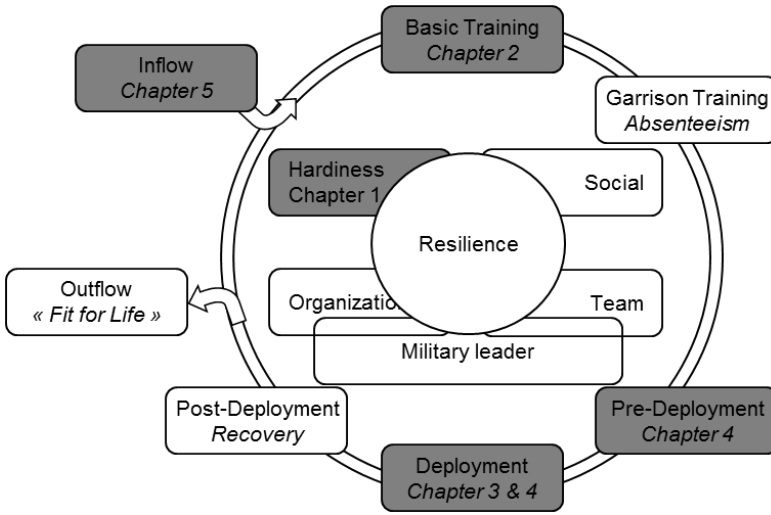


Figure 1.6. Summary of the dissertation “Hardiness in the Heart of the Military”.

Chapter 2

Hardiness during the basic training phase

Many National Defenses face an attrition problem in the early phases of recruits' military career. In the Netherlands, 20% of the recruits prematurely leave the organization before the end of the basic training (Cremers, Van der Linden, te Nijenhuis, & Van de Ven, 2011), and this figure is even 25% in the United Kingdom (Fischer, 2011). In Belgium, the attrition rate after one year amounts to 31% and costs yearly € 4,580,000 to the Defense organization (Ergen, 2011). The basic training includes stressful physical and psychological aspects (e.g. sleep deprivation, heavy physical demands and evaluative-threat) that may partly explain the candidate's decision to give up early. Research also points out several person-related variables moderating attrition: age, sex, and race (Trone, Reis, Macera, & Rauh, 2007), physical fitness (Pope, Hebert, Kirwan, & Graham, 1999), mental health (Holden & Scholtz, 2002), and substance abuse (Canada et al., 2007). Among other qualities, the recruits should possess personality features that enable them to persevere during the whole basic training, until its full completion: low neuroticism, high mastery, and the ability to identify feelings (Lee, 2010) or a high level of hardiness (Bartone, Roland, Picano, & Williams, 2008a).

Hardiness (Kobasa, 1979) is a personality trait that "provides the courage and strategies to turn stressful circumstances from

potential disaster into growth opportunity instead” (Maddi, 2007, p.61). Hardy individuals are committed to whatever activities they undertake (commitment vs. alienation), think they have a definite influence on their own life (control vs. powerlessness), and consider stressful situations as opportunities to learn and grow (challenge vs. rigidity). This positive approach of life and of its strenuous aspects provides the hardy individual the courage to face and overcome adverse situations. A large body of literature indicates the protective nature of hardiness and its components on health and performance outcomes (for recent reviews see Eschleman, Bowling, & Alarcon, 2010; Wiebe, 2013).

Recent findings consistently indicate that hardiness plays an important role during tasks that require perseverance to succeed: hardiness predicted the full completion of a 9-day Arctic ski-march during the selection of Norwegian border patrol troopers (Johnsen et al. 2013), admission of Norwegian officer candidates after a three-week selection procedure (Hystad, Eid, Laberg, & Bartone, 2011b), success in the Special Forces selection procedure, which is reputed for its high standards (Bartone et al., 2008a), and retention of the United States Military Academy cadets after the first academic year (Maddi, Matthews, Kelly, Villareal, & White, 2012). Accordingly, Bartone, Kelly, and Matthews (2013), Maddi et al. (2012), and Sandvik, Bartone, Hystad, Phillips, Thayer, and Johnsen (2013) suggest that selecting for hardiness would be beneficial for the military organization.

However, these findings have not yet been generalized to the military main work force, the troop soldiers. Indeed, the samples in Bartone et al. (2008a), Hystad et al. (2011b), and Maddi et al. (2012) included military populations selected for a very specific profile (future officers and Special Forces operators). Also, Johnsen et al. (2013) focused their attention on a specific task during the basic training (a ski-march). None of these studies address the effect of hardiness on perseverance during the basic training of troop soldiers. Accordingly, the objective of the present research note is to assess the effect of hardiness on retention among troop soldier recruits during their basic training. We hypothesize that hardy recruits are more likely to persevere to complete it. More specifically, we expect that the recruits who are still involved after two months score higher on hardiness prior the training than those who drop out earlier.

Method

Participants

The sample consisted of 233 male infantry recruits. They enrolled in a 22 weeks basic training to become paratroopers of the Dutch Airborne Brigade. Their age ranged from 17 to 29 years-old ($M = 19.09$; $SD = 2.23$). The vast majority among them had a secondary school degree (95.30%), while the others had a primary school degree (1.70%), a bachelor degree (0.90%) or another type of education (2.10%).

Measures

We used the Military Dispositional Resilience Scale II (DRSII-M; R.R. Sinclair, personal communication, July 7, 2014) to measure hardiness. The DRS type scales are the result of several refinements of the original Personal Views Survey (Kobasa, 1985) and are the most widely used in the military context (e.g. Delahaij, Gaillard, & van Dam, 2009; Lo Bue, Taverniers, Mylle, & Euwema, 2013; Taylor, Pietrobon, Taverniers, Leon, & Fern, 2013). The Dutch version of the DRSII-M that we used was composed of 24 items measuring both positive and negative aspects of hardiness. Example of items are *“I enjoy most things in life”* (commitment); *“Sometimes, life seems meaningless to me”* (alienation); *“My successes are because of my effort and ability”* (control); *“No matter how hard I try, my efforts usually accomplish nothing”* (powerlessness); *“I take a head-on approach to facing problems in my life”* (challenge); *“It bothers me when my daily routine gets interrupted”* (rigidity). The participants rated the items on a 5-points Likert scale, ranging from *Not at all true* (0) to *Completely true* (4).

We adopted a total score approach rather than an individual score or a regression approach (for a description and a comparison of the advantages and disadvantages of these different approaches see Hull, Lehn, and Teddlie, 1991). This approach is consistent with the current common practice in hardiness research (e.g. Alfred, Hammer, & Good, 2014; Bansal, 2014; Perkins, Randall, Tooze-Hobson, Sitch, & Ismail, 2014). To compute the hardiness total score, we reversed the scores of the

negatively keyed items and summed across the 24 items (score range: 0-96). In our sample, the reliability of the hardiness scale ($\alpha = 0.79$) is acceptable according to the criteria reported in Field (2005).

Procedure

At the start of the training (T1), we informed the participants about the goal of the study. Participation was voluntary and had no influence on the outcomes of their training. By completing and returning the questionnaires, the participants implicitly consented to be included in the study. At T1, 94% of the participants ($n = 220$) fully completed the DRS II. After two months (T2), 25.45% ($n = 56$) of the remaining sample refused to be further included in the study. Among the 177 other participants, 49.70% were still involved in the training whereas 50.30% had dropped out.

Statistical procedure

In our sample, hardiness is normally distributed ($\chi^2 = 0.06$; $p = .10$). The 177 participants still included in the study after two months were split into two groups: INVOLVED ($n = 88$) and DROPOUT ($n = 89$). The variances of the INVOLVED and the DROPOUT groups are homogeneous ($F = 1.70$; $p = .19$ with 163 *df*). We first performed a logistic regression to test if belonging to the INVOLVED and the DROPOUT group respectively was random or could be explained by hardiness. Second, we used

an independent sample *t*-test to compare the hardiness mean scores of the two groups.

Results

Hardiness significantly predicts whether participants belonged to the INVOLVED or to the DROPOUT groups ($\chi^2= 4.06$; $p < .05$ with 1 *df*). The Wald criterion of 3.90 ($p < .05$) also indicates that hardiness makes a significant contribution to the retention outcome. An *EXP(B)* value of 1.04 (95% confidence interval: 1.00-1.08) indicates that when hardiness rises by one unit (on the maximum of 96), the odd ratio becomes 1.04 times as large. The independent samples *t*-test confirms that the INVOLVED and DROPOUT groups' hardiness means are significantly different at $p < .05$. In other words, the recruits still involved in the basic training after two months scored significantly higher on hardiness than those who dropped out earlier. Table 2.1. displays the total sample and group means, *SD*'s, and ranges of hardiness scores.

	<i>n</i>	Mean	<i>SD</i>	Min.	Max.	<i>EXP(B)</i>	<i>t</i>
INVOLVED	88	65.78	8.40	47	93		
DROPOUT	89	63.24	7.79	45	89		
TOTAL SAMPLE	177	64.50	8.18	45	93	1.04*	2.01*

* $p < .05$

Table 2.1. Descriptive statistics and test results.

Discussion

We found that hardiness, as a global trait, predicted retention of troop soldiers recruits during the basic training. The harder the individual, the more likely he is to stay involved at least two months. Our study is the first to reveal a direct relationship between hardiness and retention in a troop soldier sample during their basic training. Our results confirm previous findings (Bartone et al., 2008a; Hystad et al., 2011b; Johnsen et al., 2013; Maddi et al., 2012) indicating that hardiness plays an important role in succeeding during a long-lasting task that requires perseverance. Hence, we may generalize hardiness' protective effect on retention of the troop soldier, the military main work force. Therefore, the current results support Bartone et al'. (2013), Maddi et al'. (2012), and Sandvik et al.' (2013) suggestion that selecting for hardiness traits would be beneficial for the military organization.

A new military recruit can experience the basic training as a threat to his well-being. This can lead to a lowered performance and an early dropout. Positive primary appraisal, confident secondary appraisal and active coping associated with hardiness may buffer that distress. Previous findings show that hardiness is positively related to primary (e.g. Florian, Mikulincer, & Taubman, 1995; Maddi, 1999; Nicholas, 1993) and secondary appraisal (e.g. Delahajj et al., 2009; DiBartolo & Soeken, 2003; Williams & Lawler, 2003), and to adaptive coping strategies (Chan, 2000; Eid, Johnsen, Saus, & Risberg, 2004; Soderström, Dolbier, Leiferman, & Steinhardt, 2000). Hence, the

hardy individual will appraise the basic training as less stressful, will be confident in his ability to succeed, and will actively cope with the basic training challenges (sleep-deprivation, evaluative-threat, heavy physical demands) in order to become a fully confirmed service member. Therefore, hardy recruits are more likely to stay committed to their engagement and to succeed when the training becomes more demanding.

We can also hypothesize an indirect effect of hardiness through other major retention predictors that are themselves influenced by hardiness. For example, research consistently indicates that hardiness is a strong predictor of health (for a recent review see Wiebe, 2013) and health is a strong predictor of retention (Canada et al., 2007; Kaufman, Brodine, & Schaffer, 2000; Lee, McCreary, & Villeneuve, 2010). Thus, it is possible that the effect of hardiness is partially mediated by the health-status of the recruit. In other words, the less hardy recruit would begin with a “health handicap” and would consequently be more likely to be injured because of the heavy physical exercises or to become ill because of the prolonged exhaustion induced by the basic training. In turn, injuries and illnesses would lead to performance breakdowns and/or premature dropout. Other indirect effects of hardiness on retention may include other retention predictors such as substance abuse (Canada et al., 2007) or social support (Lee, 2010), both having been related with hardiness in previous studies (e.g. respectively Wiebe & McCallum, 1986; Ganellen & Blaney, 1984). To get a more

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complete picture of retention predictors, future research should address the relationships between hardiness and those other major antecedents.

However, at least two aspects may limit the purport of our findings: the absence of control variables and a sole total score approach of hardiness. First, we did not include control variables in our analyses. According to the findings of Lee (2010), several other retention predictors were assessed during the data collection (age, education level, and clarity of emotions), but none of them had a significant effect on retention in our sample. Several authors (e.g. Becker, 2005; Carlson & Wu, 2012; Spector & Brannick, 2011) note that impotent control variables unnecessarily reduce the power of the analysis. Therefore, we followed Becker's (2005) recommendation and did not include the control variables in our analysis.

Second, we used a total score approach to test the effect of a multifaceted construct. This approach yields at least three limitations (Hull et al., 1991): (1) it assumes that the subcomponents are equally related to each other and to the overarching construct, (2) it leads to a loss of information and (3) it possibly masks differential components effects. However, the total score approach we used produces a more reliable and valid assessment of the independent variable and captures more adequately the complexity of hardiness.

To conclude, we based our findings on a longitudinal design that allows us to speculate about a possible causal relationship between hardiness and the outcome, measured two months

later. As a secondary finding, our data illustrate the extent to which the attrition issue is a serious one. In our Dutch infantry recruit sample, the attrition rate raised up to 50.30% after two months of basic training. Attrition represents a heavy cost for defense organizations all over the world. Selection based on hardiness may be a path to tackle and prevent that problem, as our findings indicate.

Chapter 3

Hardiness during deployment:

A cross-sectional approach

Military service members face tough challenges during contemporary deployments. While on duty in foreign conflict zones, they are confronted to a wide variety of physical and mental demands, such as repeated combat exposure, ambiguity in an asymmetrical context, colleagues injured or killed in action, and separation from the home front (Boermans, Kamphuis, Delahaij, Korteling, & Euwema, 2013). Despite these difficult working conditions, many soldiers keep on performing their tasks without getting exhausted or developing physical or mental illnesses. On the contrary, many of them tend to make the best of the stressful situation and grow and learn from their experiences.

For example, Dohrenwend et al. (2004) showed that 70.9% of male Vietnam veterans evaluated the influence of their participation in this war on their current life as mainly positive. Mouthaan, Euwema and Weerts (2005) report positive responses from the majority of Dutch peacekeepers who participated in the Balkan wars. Parmak, Mylle and Euwema (2013) also find mainly positive responses on deployment of Estonian peacekeepers. In a study of Maguen, Vogt, King, King, and Litz (2006), perceived threat in the war zone predicted strongly later appreciation of life. Positive outcomes appear

even after traumatic experiences (Sledge, Boydstun, & Rabe, 1980; Solomon & Dekel, 2007). The set of processes “enabling good outcomes despite serious threats to adaptation or development” (Masten, 2001, p. 2) constitute the phenomenon of *resilience*.

As military operational life intrinsically implies the confrontation with various stressors, it seems important for soldiers to possess such a “set of processes,” but also to study the issue of how military men and women maintain both morale and performance level during a deployment cycle. Without this capacity, excessive and repeated demands could have a devastating effect on physical health, mental health, and on job-performance (Gershon, Boracas, Canton, Li, & Vlahov, 2009; Hoge, Castro, Messer, McGurk, Cotting, & Koffman, 2004). Personality hardiness was proposed by Bonnano (2004) as a “pathway to resilience” (see also Maddi, Khoshaba, Harvey, Fazel & Resurreccion, 2010).

According to Maddi (2007), measuring hardiness is particularly relevant in a military context, basically because the trait improves resilience to adversity. Hardiness seems to play a role from the onset of a military career. It predicts admission following selection and success during the early stages of training of Norwegian cadets (Hystad, Eid, Johnsen, Laberg, & Bartone, 2011b). Hardiness also predicts success in the Special Forces selection procedure (Bartone, Roland, Picano, & Williams, 2008a). Recent works showed that it is significantly

related to performance and retention of U.S. Military Academy cadets (Maddi, Matthews, Kelly, Villareal, & White, 2012).

In 1979, Kobasa proposed that hardiness is a (broad) personality construct that functions as a resistance resource under adversity. It comprises three related factors: commitment, control, and challenge. In line with this, we can expect that a hardy service member (with a clear purpose in life, who believes in the beneficial effects of struggle and effort, and by whom difficulties are perceived as opportunities for growth) will take advantage of resources in his environment, increasing his work engagement and therefore show better performance (Salanova, Agut, & Peiro, 2005; Schaufeli & Taris, 2013), higher well-being (Demerouti, Bakker, Nachreiner, & Schaufeli, 2000; Schaufeli & Taris, 2013), and other positive outcomes in general (Boxmeer, Verwijs, & Euwema, 2011; Schaufeli & Taris, 2013), compared with low-hardy colleagues. As for positive outcomes, hardiness reduces the impact of stressful life events on mental and physical health (for a review: Eschleman, Bowling & Alarcon, 2010), predicts better immune functioning (Dolbier et al., 2001) as well as improved well-being and job satisfaction (Oliver, 2010). Studies led in the context of the military show similar positive influence on service members' physical and mental health (Bartone, 1999; Britt, Adler, & Bartone, 2001; Taylor, Pietrobon, Taverniers, Leon, & Fern, 2013).

Few studies investigated the relevance of hardiness in the context of actual military operations abroad. This is surprising,

as investigating the effect of hardiness in stressful conditions, such as military operations, is more relevant than in more peaceful situations (Bartone, 1999). Indeed, we can expect the effect to be larger during operations as compared to peaceful daily routine conditions. Therefore, in the present study, we examined a sample of deployed soldiers rather than a sample in garrison duties.

In their literature review on morale during military operation, Britt and Dickinson (2006) proposed that the personality trait hardiness, or dispositional resilience, could be related to the level of work engagement. Work engagement refers to “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli, Salanova, Gonzàlez-Romà, & Bakker, 2002, p. 74). Of these, *dedication* and *vigor* are considered as the core components of work engagement (Gonzàlez-Romà, Schaufeli, Bakker, & Lloret, 2006). Dedication is related to “a sense of significance from one’s work, feeling enthusiastic and proud about one’s job, and feeling inspired and challenged by it” (Schaufeli & Bakker, 2003, p. 5). Vigor is characterized by “high levels of energy and resilience, the willingness to invest effort, not being easily fatigued, and the persistence in the face of difficulties” (Schaufeli & Bakker, 2003, p. 5).

Meta-analytic works also emphasize the role of personality (Swider & Zimmerman, 2010), including hardiness (Alarcon, Eschleman, & Bowling, 2009), in the development of burnout. Gonzàlez-Romà et al. (2006) defined burnout as “a reaction to

occupational chronic stress characterized by emotional exhaustion and a cynical attitude toward work and persons involved to this work” (p. 166). *Cynicism* and *emotional exhaustion* are considered as the core components of burnout (González-Romà et al., 2006). Emotional exhaustion is “the feeling of being fatigued or empty as a consequence from work” (Schaufeli & Dierendonck, 2000, p. 9). The cynical attitude or cynicism refers to a distance taken from the work environment, the feeling of not being involved anymore in one’s work.

Recent conceptions (Schaufeli & Taris, 2013) propound that work engagement is negatively related to burnout. But the relationship between work engagement and burnout is not entirely clear yet. Engagement and burnout were originally operationalized as the opposite ends of a single continuum (Maslach & Leiter, 1997). More specifically, vigor is conceived as the opposite of emotional exhaustion, and dedication is conceived as the opposite of cynicism, while the underlying bipolar dimensions have been labeled, respectively, identification and energy (Maslach & Leiter, 1997). González-Romà et al. (2006) showed that the two core dimensions (identification and energy) are two independent continua within work engagement. More recent theoretical developments suggested that engagement and burnout are independent psychological states (Schaufeli & Taris, 2013), leading to a dual-process approach. This one element of the well-known job demands-resources model (Bakker &

Demerouti, 2007) opened prolific new research findings in occupational psychology (e.g. Angelo & Chambel, 2014; Huynh, Xhantopoulou, & Winefield, 2014; Qin, Hom, Xu, & Ju, 2014).

However, in a recent meta-analysis, Cole, Walter, Bedeian, and O'Boyle (2012) challenged the dual-process view. They found that correlations between work engagement and burnout core-dimensions were high, that work engagement and burnout showed a similar pattern of association with antecedents and outcomes, and that controlling for burnout reduced substantive work engagement effect sizes. The authors concluded that measuring work engagement and burnout was redundant and supported the common continuum view. However, they note that relevant antecedents may have been neglected in the analyzed studies and that "it may be that... personality traits differentially predict burnout and engagement components" (p. 1574). Since the early studies on hardiness (e.g., Kobasa, 1979), it has been demonstrated that hardy and less hardy people show different outcomes despite facing the same stressors.

Personality traits like hardiness could influence the work engagement–burnout relationship in two possible ways. First, if hardy individuals are more open to themselves when experiencing stress, they may be more aware of their own cynical tendency and/or of their developing emotional exhaustion than non-hardy ones. Therefore, the responses of hardy individuals could be more nuanced with, for example, positive answers to both work engagement and burnout scale items. On the contrary, less hardy individuals would respond

in a more black-and-white way; if they feel exhausted, they will not answer that they are vigorous at the same time. Second, as Schaufeli and Salanova (2014) note: “Burnout is seen as an erosion of engagement; energy turns into exhaustion, involvement turns into cynicism” (p.299-300). In other words, one has first to be engaged before burning out. Hardy individuals’ task-focused coping style (Delahaij, Gaillard, & Van Dam, 2009) may lead them to be more prone to deal with the stressors every time they appear in the environment. They are then at risk of burning their energy to no avail, consequently taking distance in an attempt of self-protection. Typically, at a sort of tipping-point, the hardy individual will contend that everything is fine when asked for; but at the same time, if he is asked more specific questions he will admit that he feels fatigued and that he recently took some distance from his work. In sum, for the hardy individual, work engagement and burnout may be seen as different constructs, whereas they are not in the non-hardy individual, for whom work engagement will be high when burnout is low and conversely. The inconsistencies in former findings concerning the independence of work engagement and burnout may be the result of the aggregation of these two different populations in the same samples.

Tentatively, we set up the following model as an integration of the former findings (see Figure 3.1.). As a first step in the inquiry of relationships of hardiness to work engagement and

burnout in the military context, the objective of the present study is to test the following set of hypotheses:

Hypothesis 1.1: Hardiness is positively related to dedication.

Hypothesis 1.2: Hardiness is positively related to vigor.

Hypothesis 1.3: Hardiness is negatively related to cynicism.

Hypothesis 1.4: Hardiness is negatively related to emotional exhaustion.

Hypothesis 2.1: Hardiness moderates the relationship between dedication and cynicism.

Hypothesis 2.2: Hardiness moderates the relationship between vigor and emotional exhaustion.

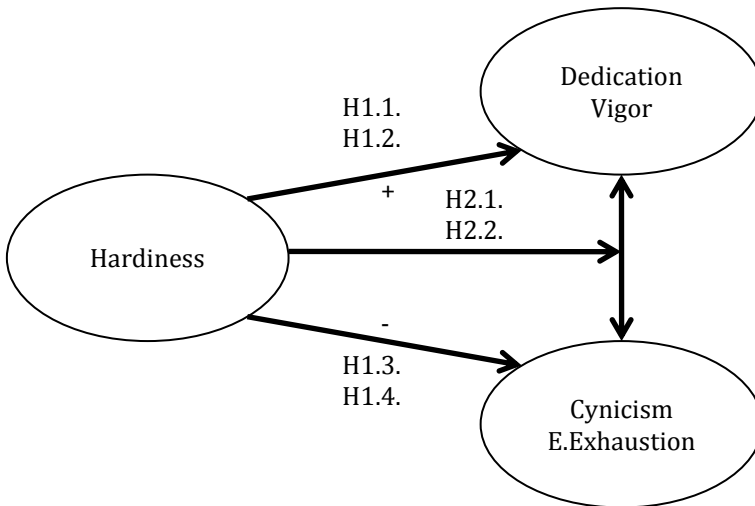


Figure 3.1. Focus of the present study.

As the reader will have noticed, we only tested the moderation hypothesis in the identification (H2.1) and energy dimension

(H2.2) because vigor and cynicism on the one hand and dedication and exhaustion on the other hand are supposed to be the poles of two independent dimensions (González-Romà et al., 2006).

Method

Participants and Procedure

Participants were 252 service members involved in a force protection mission on Kabul International Airport. Because a full data list is the preferred mode of working in this type of research (Hair, Black, Babin, Anderson, & Tatham, 2009), 81 participants were excluded (net response rate: 68%). Among the remaining 171 subjects (166 males and 5 females), 7% were officers, 21.60% noncommissioned or warrant officers, and 70.20% privates. Belgian contingents are generally composed of personnel coming from the two main language communities (French and Dutch). In our sample, 92.40% of the participants were native French speakers. Participants' ages ranged from 20 to 51 ($M = 29.93$; $SD = 7.47$) and their levels of experience ranged from no operational experience to 11 previous operations ($M = 2.19$; $SD = 2.31$).

During Belgian military deployments abroad, a midterm morale questionnaire is administrated to every service member involved in the deployment. We chose this period because practitioners describe it as a critical period (comparable with a midlife crisis). Subjects reflect on their experiences during the time elapsed and "project" them on the time to spend in theater

before going home. A paper-and-pencil questionnaire investigates antecedents of morale and service members' dedication, vigor, cynicism, and emotional exhaustion. The objective is to inform commanders about their troops' morale and the variables that impact on it. The participation is mandatory, but an informed consent was submitted anyway to the participants to allow the use of their responses for scientific purposes. Data were collected by a mental readiness advisor (a military field psychologist). To ensure a correct use of the questionnaire, the mental readiness advisor had to stick to written instructions in the handbook ad hoc.

Measures

Hardiness. Hardiness was tapped by 12 items of the revised Dispositional Resilience Scale 15 revised (DRS15r, Hystad, Eid, Johnsen, Laberg, & Bartone, 2010). We chose the revised version as it is expected to suit better to the European cultural background (Hystad et al., 2010). A translation-back translation procedure (Sperber, Devellis, & Boehlecke, 1994) was used to validate the French and Dutch versions of the scale. Given their poor psychometric qualities, items 4, 9, and 11 of the original 15-item DRS15r (namely "I feel that my life is somewhat empty of meaning," "I don't think there is much I can do to influence my own future," and "It bothers me when my daily routine is interrupted") were discarded. We presented the 12 remaining items to the participants with a 4-point Likert-scale ranging from *Not at all true* (0) to *Completely true* (3). In line with current common

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practice (e.g. Alfred, Hammer, & Good, 2014; Bansal, 2014; Perkins, Randall, Tooze-Hobson, Sitch, & Ismail, 2014), we computed scale scores by summing the items scores (after reversing the score of negatively keyed items), with higher scores indicating higher levels of hardiness. The reliability of the scale (Cronbach's alpha) in our sample was 0.74, which is acceptable according to the criteria set by Nunnally and Bernstein (1994).

Dedication and Vigor. Dedication and vigor were each measured with 4 items of the original Dutch items of the Utrecht Work Engagement Scale (Schaufeli & Bakker, 2003) and a translated version into French (using the translation-back translation method; Sperber et al., 1994). We presented the items to the participants with a 7-point Likert scale that ranged from *Never* (0) to *Always* (6). We computed scale scores by summing across items, with higher scores indicating higher levels of dedication and vigor. The reliability analysis in our sample showed very good to excellent reliability (Nunnally & Bernstein, 1994), with a Cronbach's alpha of 0.85 for the dedication scale and 0.90 for the vigor scale.

Cynicism and Emotional Exhaustion. We used eight items from the original Dutch Utrecht Burnout Scale (Schaufeli & Dierendonck, 2000) and a translated version into French (based on the translation-back translation method; Sperber et al., 1994) to measure cynicism and emotional exhaustion. We presented the items to the participants with a 7-point Likert scale ranging from *Never* (0) to *Always* (6). Scale scores were computed by

summing across items, with higher scores indicating higher levels of cynicism and emotional exhaustion. The reliability analysis in our sample provided very good to excellent values (Nunnally & Bernstein, 1994) with a Cronbach's alpha of 0.80 for the cynicism scale and of 0.89 for the emotional exhaustion scale.

Statistical Procedure

We tested our first set of hypotheses (H1.1 to H1.4) by linear regression analyses of hardiness on dedication, vigor, cynicism, and emotional exhaustion. Because age and the number of previously executed operations (NOps) might affect the investigated relationships, these factors were introduced as control variables. Next, we explored our second set of hypotheses (H2.1 and H2.2) through hierarchical regression analyses to investigate the moderation effect, following the procedure prescribed by Baron and Kenny (1986).

Results

A first look at the bivariate correlations among the study variables (see Table 3.1.) indicates that all results point in the expected direction. The bivariate correlations provide a first confirmation of our first set of hypotheses (H1.1 to H1.4) because hardiness is significantly related in the positive direction to dedication ($r = .47, p < .001$) and vigor ($r = .56, p < .001$), and in the negative direction to cynicism ($r = -0.56, p < .001$) and emotional exhaustion ($r = -.45, p < .001$). All effect

sizes are large (Cohen, 1992). It is also noteworthy that our control variables do not seem to be correlated with our dependent variables. Age is only significantly correlated with dedication ($r = .28, p < .001$) and marginally with cynicism ($r = -0.18, p = .05$), whereas NOps is not significantly correlated with any dependent variable. Finally, a high correlation is noticeable between age and NOps ($r = .72, p < .001$).

In the regression analyses, hardiness significantly predicts our dependent variables. Hypothesis 1.1 is corroborated with $B = 0.57; p < .001, F(167) = 23.40; p < .001$. Hardiness explains 20.30% of the variance of dedication. Hypothesis 1.2 is confirmed with $B = 0.65; p < .001, F(167) = 26.27; p < .001$. Hardiness explains 30.50% of the vigor variance. Hypothesis 1.3 is verified with $B = -0.56; p < .001, F(167) = 26.80; p < .001$. Hardiness explains 28.70% of the cynicism variance. Hypothesis 1.4 is upheld with $B = -0.48; p < .001, F(167) = 14.35; p < .001$. Hardiness explains 19.20% of emotional exhaustion variance. As the theory reviewed in our introduction would dictate, hardiness is significantly positively related to dedication and vigor and significantly negatively related to cynicism and emotional exhaustion.

Variable	Mean	SD	2	3	4	5	6	7
1. Age	29.93	7.47	0.72***	0.28***	0.14	-0.18*	-0.13	0.15*
2. NOps	2.19	2.31	–	0.09	0.08	-0.06	-0.10	0.06
3. Dedication	14.83	4.95		–	0.73***	-0.63***	-0.32***	0.47***
4. Vigor	15.94	4.58			–	-0.57***	-0.55***	0.56***
5. Cynicism	5.80	4.06				–	0.54***	-0.56***
6. E. exhaustion	5.04	4.06					–	-0.45***
7. Hardiness	23.89	3.96						–

Note. NOps = number of previously executed operations

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3.1. Descriptive statistics of the study variables.

Regarding the testing of hypothesis 2 (the moderating effect of hardiness), we describe the results in the same order as Table 3.2. is organized, starting with the main effect of hardiness and dedication on cynicism (Model 2.1.2), followed by the results of the interaction hypothesis (Model 2.1.3). Next we describe the main effect of hardiness and vigor on emotional exhaustion (Model 2.2.2) and continue with the results of the interaction hypothesis (Model 2.2.3), that is, how hardiness moderates the relationship between vigor and emotional exhaustion. The results of the hierarchical regression analyses predicting cynicism (H2.1) are presented in Table 3.2. The results of the hierarchical regression analyses predicting emotional exhaustion (H2.2) are presented in Table 3.3.

In Model 2.1.1, NOps was not related to cynicism ($B = -0.24$, not significant), whereas age was significantly related to it ($B = -0.15$, $p < .05$). Model 2.1.2 showed that dedication ($B = -2.06$, $p < .001$) and hardiness ($B = -1.28$, $p < .001$) were negatively related

to cynicism, yielding further support for hypothesis 1.3 and being in line with theory on the relatedness between dedication and cynicism. The predictors (dedication and hardiness) entered in Model 2.1.2 explained an additional 46.3% of the variance of cynicism. In Model 2.1.3, we entered the interaction term dedication X hardiness and found no significant relationship with cynicism ($B = 0.26$, not significant).

In Model 2.2.1, the control variables age ($B = -0.07$, not significant) and NOps ($B = 0.02$, not significant) were unrelated to emotional exhaustion. In Model 2.2.2, vigor ($B = -0.84$, $p < .05$) and hardiness ($B = -1.90$, $p < .001$) were negatively related to emotional exhaustion, yielding further support to hypothesis 1.4 and being in line with theory on the relatedness between vigor and emotional exhaustion. The predictors (vigor and hardiness) entered in Model 2.2.2 explained an additional 32.4% of variance in emotional exhaustion. In Model 2.2.3, we introduced the interaction term vigor X hardiness to test whether hardiness moderated the relationship between vigor and emotional exhaustion. That interaction term was significantly related to emotional exhaustion ($B = 0.66$, $p < .001$), explaining an additional 5.4% of variance. The interaction is displayed in Figure 3.2. As proposed, hardiness moderated the relationship between vigor and emotional exhaustion. Thus, hypothesis 2.2 was supported too.

Variable	Model 2.1.1.			Model 2.1.2.			Model 2.1.3.		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
Intercept	9.77	1.55	6.32***	5.75	1.17	4.90***	5.77	1.18	4.94***
Age	-0.15	0.60	-2.51*	0.00	0.05	0.01	-0.01	0.05	-0.13
NOps	0.24	0.20	1.16	0.04	0.15	0.03	0.02	0.15	0.16
Dedication				-2.06	0.27	-7.60***	-2.04	0.27	-7.54***
Hardiness				-1.28	0.26	-4.96***	-1.19	0.26	-4.51***
Dedication x hardiness							0.26	0.17	1.53
Df		2			2			1	
F		3.58*			41.48***			33.92***	
Proportion explained variance		0.04			0.50			0.51	
(SE)		(4.02)			(2.91)			(2.90)	

Note. NOps = amount of former executed operations.

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3.2. Hierarchical regression analyses predicting cynicism.

Variable	Model 2.1.1.			Model 2.1.2.			Model 2.1.3.		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
Intercept	7.18	1.66	4.34***	5.38	1.38	3.90***	5.54	1.33	4.17***
Age	-0.07	0.07	-1.14	-0.01	0.05	-0.17	-0.03	0.05	-0.60
NOps	0.02	0.22	0.01	-0.05	0.18	-0.29	0.00	0.17	0.02
Dedication				-0.84	0.33	-2.53*	-0.64	0.32	-1.96
Hardiness				-1.90	0.33	-5.71***	-1.61	0.33	-4.91***
Dedication x hardiness							0.66	0.17	3.82***
Df		2			2			1	
F		1.35			21.00***			21.11***	
Proportion explained variance		0.02			0.34			0.40	
(SE)		(4.31)			(3.55)			(3.41)	

Note. NOps = amount of former executed operations.

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3.3. Hierarchical regression analyses predicting emotional exhaustion.

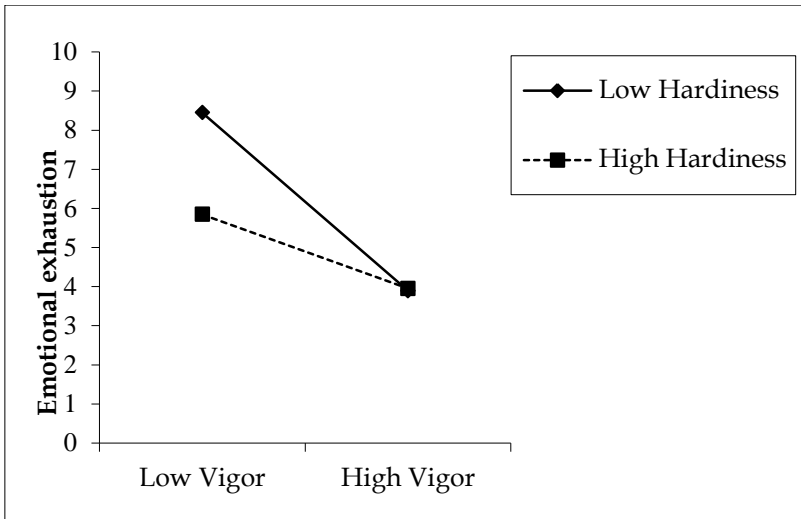


Figure 3.2. Interaction effect between vigor and hardiness on emotional exhaustion.

Hardiness is positively related to dedication and negatively to cynicism. This means that during the execution of his mission abroad, the hardy service member feels a sense of significance of his work, feels enthusiastic and proud about it and is inspired and challenged by it. Conversely, in the same situation, the non-hardy service member is more likely to consider his job with emotional distance and to doubt of its usefulness. Consequently, he stops being involved in his mission. This finding confirms the important role of hardiness in how the service member considers the meaning of his duty (Britt et al., 2001). Hardiness is also positively related to vigor and negatively to emotional exhaustion. In operational circumstances, the hardy service member brings higher “levels of energy and resilience, the willingness to invest efforts, [he or

she] is not easily fatigued and [persists] in the face of difficulties.” (Schaufeli & Bakker, 2003, p.5). Service members scoring low on hardiness are more likely to be subject to physical and mental exhaustion and to feel empty because of the repeated or chronic confrontation to the operational demands. This finding may explain the success of hardy individuals in a Special Forces selection procedure (Bartone et al., 2008a) and the performance and retention of U.S. Military Academy cadets (Maddi et al., 2012).

Our findings emphasize the relevance of personality hardiness for military service members. As a “pathway to resilience” (Bonnano, 2004), hardiness protects the service member during operations against the devastating effects of stressful experiences on physical health, mental health, and on-the-job performance. Accordingly, our results confirm those of Maddi (2007) who stated that measuring hardiness is particularly relevant in a military context. Selecting hardy individuals will increase their chances of success during their basic training (Bartone et al., 2008a; Maddi et al., 2012), will improve the retention rate of candidates (Maddi et al., 2012), and will over time help them to keep high levels of engagement during operations abroad, as our own results indicate.

In line with previous findings (Alarcon et al., 2009; Cole et al., 2012), our results emphasize the relevance of investigating the role of personal resources in the frame of the job demands-resources model (Bakker & Demerouti, 2007). We addressed the

independence-continuum issue of the relationship between those two concepts. The moderation analysis in our sample shows that vigor and emotional exhaustion seem to be less related in hardy individuals than in non-hardy ones. In other words, vigor and emotional exhaustion may coexist. The presence of positive responses to both scales can be imputed to the fact that hardy individuals are more open to and aware of negative emotional states and also more honest in reporting them. Doing so, they might not dwell in negative emotions, but rather maintain vigor and work engagement despite being tired. An alternative interpretation is that the hardy individual's persistence in the confrontation with stressors increases the possible development of burnout. In our study, the presence of both vigor and emotional exhaustion is noticeable in the answers of hardy participants. When asked about their vigor, they persist in the idea that everything is fine, that they are "bursting of energy" for example, but at the same time, they can answer to the items on emotional exhaustion by saying that they are "empty at the end of the day." Those two alternatives could also be combined. The hardy individuals could be more emotionally exhausted as a result of the repeated confrontation to stressors and they are more honest to admit it in a questionnaire.

The moderating effect of hardiness on the relationship between vigor and emotional exhaustion may indicate that researchers confusingly aggregate different populations when they try to

reveal the dependence or independence of work engagement and burnout. Different types of personality may induce different mechanisms in the relationship between work engagement and burnout. The mechanisms that we propose could explain the inconsistencies found until now in the formulations and in empirical evidence of the independence position. This assumption supports the continued use of the dual-process approach. The investigation of personal resources is a hot topic in the frame of the job demands-resources model (e.g. Bakker, Boyd, Dollard, Gillepsie, Winefield, Stough, 2010; Li, Zhong, Chen, Xie, & Mao, 2014; Schaufeli & Taris, 2013) and our findings open the way to further explore the role of hardiness, and also of other personality traits to support the interdependence of work engagement and burnout.

Limitations and Future Research

There are three limitations in our study that need to be discussed. First, inefficacy or reduced efficacy, a presumed third component of burnout, was not taken into account in our study. The current approach is consistent with the idea that cynicism and emotional exhaustion are the core components of burnout (González-Romà et al., 2006; Schaufeli & Taris, 2013), and that reduced efficacy is rather a personality characteristic than a burnout component (see Coders & Dougherty, 1993; Maslach, 1993; Shirom, 2003), which is only weakly correlated with the other factors (Lee & Ashforth, 1996). Similarly, it was

impossible to compute a combined work engagement score because absorption was not measured. Dedication and vigor are considered as the core components of work engagement (González-Romà et al., 2006), and absorption, although a relevant aspect (Schaufeli & Bakker, 2010; Schaufeli & Salanova, 2014), has no conceptual opposite in any of the burnout components, which rendered it useless in our investigation of the moderation effect.

Second, our study failed to demonstrate a moderation effect of hardiness on the dedication– cynicism relationship. This can be attributable to characteristics of our sample, but it can also be assumed that the dynamics of the dimensions energy and identification differ. Maybe identification stays a bipolar dimension irrespective of the personality, whereas energy is more sensitive to the effects of individual differences. In the absence of theoretical and empirical evidence to support this assumption, elucidating this point will require further studies.

Finally, our findings could be biased by the specificity of our sample. Our results can at least be generalized in the context of the (male) French-speaking Belgian military population participating in an operation abroad. Replication of our findings in Belgian samples with a greater proportion of Dutch-speaking service members, in other countries, and in civilian organizational settings (with also a greater proportion of female employees in high reliability professions) would be relevant to increase the generalizability of our findings. Though,

theoretically, we can expect that the effect of hardiness will not only be found in other military populations, but also in other organizational settings. By staying committed to himself and his environment, with an internal locus of control and an adventurous approach to life, the hardy individual will optimally make use of the socio-contextual resources in his environment and will reduce the threat of job demands by a correct appraisal and appropriate coping. In other words, confronted with stressful events, the hardy individual is more likely to experience a positive fulfilling work-related state of mind and less likely to suffer from occupational chronic stress.

Chapter 4

Hardiness during deployment:

A longitudinal confirmation

Modern military operations represent a tough challenge for service members. Soldiers fulfill their tasks in remote and problematic countries where they may face a wide range of stressors – such as combat situations, harsh living conditions, colleagues seriously injured or killed in action, and separation from home (Bartone, Adler, & Vaitkus, 1998). Excessive occupational stressors such as these can lead to burnout (Bakker & Demerouti, 2007): “a reaction to occupational chronic stress characterized by emotional exhaustion and a cynical attitude towards work and persons involved to this work” (González-Romà, Schaufeli, Bakker, & Lloret, 2006, p. 166). Emotional exhaustion is a state of psychological fatigue resulting from work (Schaufeli & Dierendonck, 2000). A cynical attitude – or cynicism – refers to a distance taken from the work environment, the feeling of not being involved anymore in the work itself. To avoid such deleterious psychological states, soldiers must possess qualities that enable them to continue to perform their tasks optimally. Hardiness (Kobasa, 1979) could constitute such a quality.

Personality hardiness is “a composite [...] of commitment, control, and challenge that together provide the existential courage and motivation to turn stressful circumstances from

potential disasters into growth opportunities” (Maddi, Khoshaba, Harvey, Fazel, & Resurreccion, 2010, p.369). Individuals high in hardiness are wholeheartedly involved in whatever activity they are doing and with their social environment (commitment). They believe they have a defined control on the courses of events they face (control). Also, they appraise stressful events as opportunities to learn and grow (challenge). Hence, individuals high in hardiness will interact with stressful experiences by actively coping with them, to turn them into a less stressful and more beneficial form. Therefore, stressful experiences will have less impact on hardy individuals’ health and performance.

Research indicates that hardiness does reduce the impact of stressful life events on health (Dolbier et al., 2001; Dolbier, Smith, & Steinhardt, 2007; Smith, Young, & Lee, 2004) and fosters performance (Cash & Gardner, 2011; Eschleman & Bowling, 2010; Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2009). Also, in the military, hardiness plays a relevant role: it protects health (Bartone, 1999; Taylor, Pietrobon, Taverniers, Leon, & Fern, 2013; Zakin, Solomon, & Neria, 2003) and predicts performance (Bartone, Roland, Picano, & Williams, 2008a; Hystad, Eid, Laberg, & Bartone, 2011b; Maddi, Matthews, Kelly, Villareal, & White, 2012).

Recent works emphasized the role of personality (Swider & Zimmerman, 2010) in the precipitation of or the protection against burnout. Among other traits, Alarcon, Eschleman, and

Bowling's (2009) meta-analytic approach put forward hardiness as a protective factor. Several studies have shown the protective role of hardiness against the development of burnout in different populations: mainly nurses (Costantini, Solano, Di Napoli, & Bosco, 1997; Garrosa, Moreno-Jiménez, Liang, & González, 2008; Ladstätter, Garrosa, Moreno-Jiménez, & Ponsoda, 2013), but also other health practitioners (Rowe, 1997; Sciacchitano, Goldstein, & DiPlacido, 2001) and teachers (Azeem, 2013; Chan, 2003; Pierce & Molloy, 1990). Hardiness reveals its protective potential in the most adverse situations (Bartone, 2006); stressful conditions elicit more differences in individuals scoring high on hardiness in comparison with individuals scoring low. One study has indicated that hardiness and burnout are negatively related during military deployment (Lo Bue, Taverniers, Mylle, & Euwema, 2013), but the cross-sectional design of that study limited the generalizability of the findings. The aim in the current study is to address that limitation by using a longitudinal design.

We expected that hardy service members would show lower burnout signs than those low on hardiness (hardiness' main effect). Furthermore, we expected that hardy individuals would better resist burnout, whereas less hardy ones would show an increase on burnout indicators after two months of deployment (interaction effect). Therefore, we tested the following set of hypotheses: 1) Regardless of the measurement time, individuals scoring high on hardiness score significantly lower on burnout

than individuals scoring low on hardiness; 2) These differences are significantly less pronounced during the preparation period than after two months of deployment.

Method

Participants

We invited all members of a Belgian detachment (80 men; 2 women) to participate in our study during their pre-deployment training. The sample included 10 officers, 28 non-commissioned or warrant officers, and 43 privates (one participant did not mention his rank). About 96% of the participants were native Dutch speakers; the remaining 4% were native French speakers. Participants' age ranged from 21 to 51 years ($M = 32.95$; $SD = 8.34$) and their level of experience ranged from no operational experience to 10 previous operations ($M = 2.46$; $SD = 2.58$).

Instruments

The Dispositional Resilience Scale 15 (DRS15; Bartone, 2007) is a 15 item scale measuring the three components of hardiness: commitment, control, and challenge. This scale is the result of several refinements of the original Personal View Survey (Kobasa, 1985). Currently, the DRS15 is the most widely used in the military context (e.g. Eid, Johnsen, Saus, & Risberg, 2004; Taylor et al., 2013; Vogt, Rizvi, Shipherd, & Resick, 2008). It shows an acceptable test-retest reliability (Bartone, 2007) and

the reliability in the present study was good (Cronbach's alpha = .80). The respondents rated 15 assertions (both positively and negatively formulated) on a 4-point Likert scale, ranging from *Not at all true* (0) to *Completely True* (3). Examples of items are: "*Most of my life gets spent doing things that are meaningful*" (commitment); "*By working hard you can nearly always achieve your goals*" (control); "*Changes in routine are interesting to me*" (challenge). In the present study, only the hardiness total score was taken into account in the analyses. This approach is consistent with the current practice in hardiness research (e.g. Alfred, Hammer, & Good, 2014; Bansal, 2014; Perkins, Randall, Toozs-Hobson, Sitch, & Ismail, 2014).

The Utrecht Burnout scale (Schaufeli & Dierendonck, 2000) is a Dutch version of the Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1996). It measures burnout as a composite of emotional exhaustion and cynicism. This approach is consistent with the most recent idea that cynicism and emotional exhaustion are the core components of burnout (Gonzalès-Romà et al., 2006; Schaufeli & Salanova, 2014). Schaufeli, Bakker, Hoogduin, Schaap, and Kladler (2001) showed that the two subscales of cynicism and emotional exhaustion were valid to discriminate between individuals who did and did not experience burnout. The respondents rated 8 assertions on a 7-point Likert scale, ranging from *Never* (0) to *Always* (6). Examples of items are: "*I feel mentally exhausted by my work*" (emotional exhaustion); "*I notice that I have become too distanced*

from my work” (cynicism).

In our sample, the reliability of the global Burnout scale was good to excellent (Cronbach’s alpha = .87 before deployment; .92 during deployment). The two subscales also showed good to excellent reliability before and during deployment (Emotional Exhaustion: $\alpha = .83$ and .91; Cynicism: $\alpha = .84$ and .88).

Procedure

Two months before deployment (T1), we informed participants about the purpose of our study. Participation was voluntary. We provided an informed consent advising that the data would be treated confidentially and guaranteed participants’ anonymity. We informed the participants that by completing and returning the questionnaires, they would implicitly give their agreement to be included in the study. At T1, participants completed the Utrecht Burnout Scale and Bartone’s hardiness scale. At Time 2 (T2), after two months of deployment, the same information and informed consent were distributed to the 82 deployed service members. Participants completed the Utrecht Burnout scale again. All participants consented to have filled in the questionnaire at T1. The participation rate was good over time, as 79% of the participants still agreed to complete the questionnaire at T2.

Results

For all analyses, we reversed the scores of the negatively keyed items and computed scale scores by summing the item scores. The higher scores indicate positive levels of hardiness (maximum score = 45) and negative levels of burnout (maximum score = 48), emotional exhaustion (maximum score = 24), and cynicism (maximum score = 24).

Burnout total score

One-sample Kolmogorov-Smirnov tests indicated that the scores for each variable were normally distributed: hardiness ($\chi^2 = 1.10; p > .05$), burnout (total score) at T1 ($\chi^2 = 1.31; p > .05$), and burnout (total score) at T2 ($\chi^2 = 1.18; p > .05$). Therefore, we used parametric tests to analyze the relationships between hardiness and burnout (total score). The bivariate correlations (Table 4.1.) indicate that at T1, hardiness was not significantly related to burnout; however, at T2, hardiness was significantly related with burnout.

	Mean	SD	2	3
1. Hardiness	32.55	4.48	-.18	-.25*
2. Burnout T1	5.70	4.78	-	.87***
3. Burnout T2	5.93	5.17		-

* $p < .05$

** $p < .01$

*** $p < .001$

Table 4.1. Descriptive statistics for the whole sample.

We split the sample into three groups according to the hardiness level, with a LOW group ($n = 27$; $M_{\text{Hardiness}} = 27.98$; $SD_{\text{Hardiness}} = 1.81$), an AVERAGE group ($n = 28$; $M_{\text{Hardiness}} = 31.94$; $SD_{\text{Hardiness}} = 1.21$), and a HIGH group ($n = 27$; $M_{\text{Hardiness}} = 37.75$; $SD_{\text{Hardiness}} = 2.78$). To get a clear cut for comparison, we excluded the AVERAGE group from the analyses. Variances in burnout scores were homogeneous both in the LOW and the HIGH groups at T1 ($F(52) = 3.10$; $p > .05$) and T2 ($F(52) = 0.08$; $p > .05$). Therefore, we performed a repeated-measures two-way ANOVA to test the effects of hardiness and time on burnout.

Regardless of time, hardiness has a significant main effect on burnout ($F(1, 52) = 10.11$ $p < .01$). The interaction effect between time and hardiness is marginal ($F(1, 52) = 3.69$; $p = .06$). Post-hoc t-tests for paired samples show that the level of burnout remains comparable over time in the LOW group ($t(26) = 1.11$; $p > .05$); it remains also comparable over time in the HIGH group ($t(26) = 1.64$; $p > .05$). Post-hoc t-tests for independent samples show that the level of burnout is comparable between the LOW and the HIGH groups at T1 ($t(52) = 1.14$; $p > .05$), but significantly different at T2 ($t(52) = 3.71$; $p < .01$). Figure 4.1. displays these results.

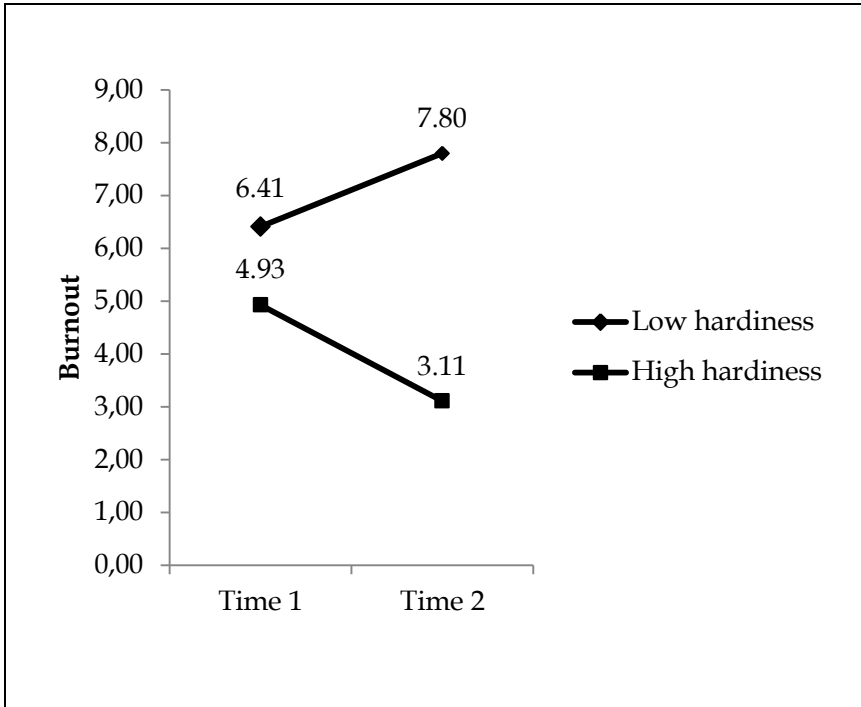


Figure 4.1. Effects of hardiness on burnout over time.

Emotional exhaustion

The distributions of the emotional exhaustion scores were not normal at T1 ($\chi^2 = 1.60$; $p < .05$) nor at T2 ($\chi^2 = 1.50$; $p < .05$). Therefore, we used non-parametric tests to analyze the effect of hardiness and time on emotional exhaustion. Mann-Whitney tests show that the LOW and the HIGH groups are comparable regarding emotional exhaustion at T1 ($U = 1.19$; $p > .05$). They differ significantly at T2 ($U = 9.01$; $p < .01$). Related-Samples Wilcoxon Signed Rank Tests indicated an interaction effect of hardiness over time: in the LOW group, emotional exhaustion levels are comparable at T1 and T2 ($z = 0.19$; $p > .05$); in the

HIGH group, emotional exhaustion levels are significantly lower at T2 in comparison with T1 ($z = -2.25; p < .05$). Figure 4.2. displays these results.

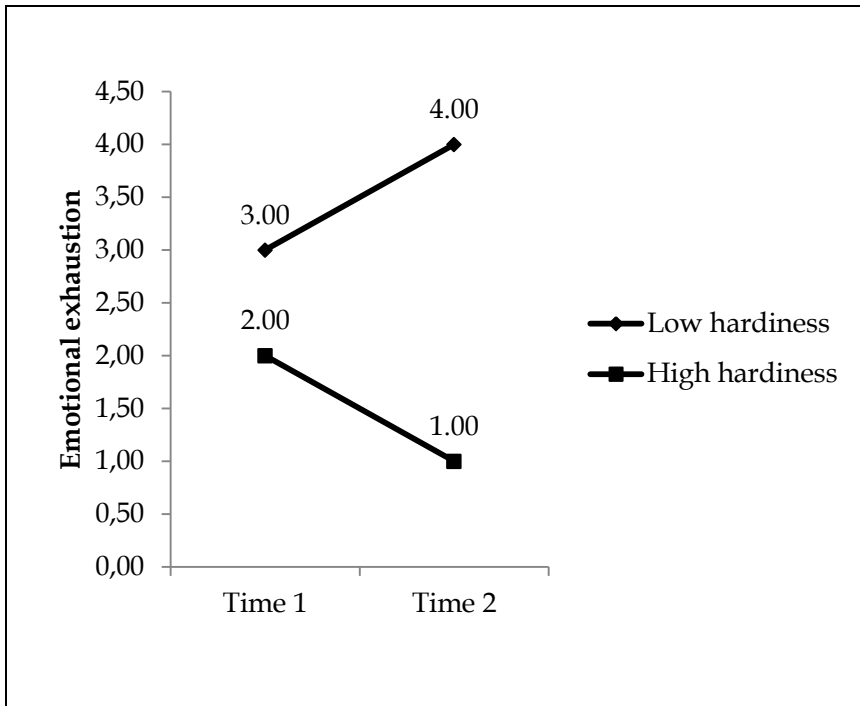


Figure 4.2. Effect of hardiness on emotional exhaustion over time.

Cynicism

The distributions of the cynicism scores were not normal at T1 ($\chi^2 = 1.61; p < .05$) nor at T2 ($\chi^2 = 1.37; p < .05$). Therefore, we used non-parametric tests to analyze the effect of hardiness and time on cynicism. Mann-Whitney tests show that the LOW and the HIGH groups significantly differ in cynicism both at T1 ($U = 6.14; p < .05$) and T2 ($U = 12.52; p < .001$), indicating a

significant main effect of hardiness. Related-Samples Wilcoxon Signed Rank Tests indicate an absence of interaction effect of hardiness over time: in the LOW group, cynicism levels are comparable at T1 and T2 ($z = 1.40$; $p > .05$); in the HIGH group, cynicism levels are also comparable at T1 and T2 ($z = 0.68$; $p > .05$). Figure 4.3. displays these results.

Discussion

Our results indicate a main effect of hardiness on burnout. In both pre-deployment and deployment periods, individuals scoring high on hardiness report less signs of burnout than those scoring low on hardiness. Interestingly, the level of burnout of service members scoring high on hardiness tends to decrease with the deployment. This finding confirms that hardiness fosters resilience (Maddi, 2013) and the ability of hardy individuals to transform stressful situations into something more positive (Maddi et al., 2010). Parmak, Mylle, and Euwema (2013) found comparable findings by showing the role of personality in soldier's well-being during a deployment. Compared with their pre-deployment level, the well-being of sensation-seekers (a trait comparable to the challenge dimension of hardiness) improved after deployment.

A closer analysis of the data reveals that hardiness affects differently the burnout core components - emotional exhaustion and cynicism - over time. Whereas the emotional exhaustion score is comparable for individuals scoring high on

hardiness and those scoring low during the pre-deployment training, the levels of emotional exhaustion are significantly lower for the high hardy group after two months of deployment. Regarding the cynicism scores, the two groups differ significantly during the pre-deployment training and during deployment, but this difference does not increase after two months of deployment. Because of the different direction of these effects, the impact of hardiness on burnout over time was hidden. Consequently, we discuss hereafter the effect of hardiness on emotional exhaustion and cynicism. Hardiness is not significantly related to emotional exhaustion during peaceful conditions (e.g. two months before a military deployment in Afghanistan), but is significantly related to emotional exhaustion during stressful conditions (during a military deployment in Afghanistan). Emotional exhaustion is lower than during pre-deployment training in the individuals scoring high on hardiness, whereas it remains at a comparable level in those scoring low. This disordinal interaction effect confirms that hardiness reveals all its protective potential during the most adverse circumstances (Bartone, 2006). Individuals scoring high on hardiness are less likely to be subject to fatigue or feelings of emptiness as a consequence of the prolonged exposure to the occupational stressors. Previous research (Lo Bue et al., 2013) and the present findings suggest they may even show the opposite mental state, i.e. vigor, which is characterized by “high levels of energy and resilience, the

willingness to invest effort, not being easily fatigued, and the persistence in the face of difficulties” (Schaufeli & Bakker, 2003, p. 5). In other words, service members scoring high on hardiness seem to be energized by a stressful situation, such as a military deployment.

During both peaceful and stressful conditions, individuals scoring low on hardiness are more cynical than those scoring high on hardiness. In other words, individuals scoring low on hardiness seem more likely to take a certain distance from their work environment and to lack a sense of involvement in their duty. This finding confirms the results of Britt, Adler and Bartone (2001) who found that hardiness positively influenced the meaning that the service member allocates to his mission.

The present results should be interpreted with caution because of two limitations. First, the exclusion of the AVERAGE group (one third of the sample). By doing so, we reduced the sample size, lost information, and that may have affected our results. However, this method allowed us to get a clear-cut comparison between the HIGH and the LOW group. A second limitation in our study is the absence of a significant level of burnout, cynicism and mental exhaustion in our sample, even for the individuals scoring low on hardiness. Although deployment can be an intense experience because of the threat of eventual attacks, the separation from the loved ones, and other stressful life events, most of our participants were not exposed to direct danger such as combat situations. Thus, it is possible that two

months was too short a period to see burnout mounting for less hardy individuals. Future research should address these limitations by investigating burnout later in the deployment or in military groups more often exposed to life threatening experiences (e.g. combat, rocket attacks, and improvised explosive devices).

Our findings emphasize the relevance of personality hardiness for military service members, but can also be extended to other occupations. Our results add to the body of literature highlighting the protective role of hardiness against occupation-related burnout (e.g. Alarcon et al., 2009; Azeem, 2013; Ladstätter et al., 2013). Nurses, health practitioners and teachers also have to perform in a stressful work environment, and research has shown the relevance of hardiness in these occupations. With our findings, we raised one important issue for future research. Over time, hardiness may differently impact cynicism and emotional exhaustion. We encourage researchers to analyze hardiness' effects on the burnout core components to avoid the risk of misinterpretation of the effects on burnout.

Chapter 5

Assessing hardiness at the inflow phase

Hardiness (Kobasa, 1979), or dispositional resilience (Bartone, Ursano, Wright, and Ingraham, 1989) is a personality trait “that enables people to turn the stress of potential disasters into growth opportunities.” (Maddi, 2014, p. 291). In the past 35 years, the construct hardiness has yielded a large body of studies showing that, in times of adversity, hardiness protects physical and mental health (e.g. Bartone, Spinosa, Robb, & Pastel, 2008; Dolbier et al., 2000; Pengilly & Dowd, 2000), and fosters sports, academic, and professional performance (e.g. Cash & Gardner, 2011; Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2013; Sheard and Golby, 2010). Therefore, researchers investigate the relevance of the concept in the context of high-reliability professions (e.g. Johnsen et al., 2013; Maddi, Harvey, Resurreccion, Giatras, & Ranagold, 2007; Violanti et al., 2014). In the military, several authors even advocate a hardiness-based selection of candidates (e.g. Bartone & Priest, 2001; Maddi, Matthews, Kelly, Villareal, & White, 2012; Sandvik, Bartone, Hystad, Phillips, Thayer, & Johnsen, 2013).

However, over the years, hardiness’ measurement has been plagued by criticisms, a lack of agreement regarding the dimensionality of the construct, and a proliferation of scales. Initially, Kobasa, Maddi, and Khan (1982) defined hardiness as

a “constellation of personality characteristics that functions as a resistance resource in the encounter with stressful life events” (p. 169) and considered it as a unitary phenomenon. In their view, a hardy person is committed to whatever activity he does (commitment), thinks he has a definite control over life events (control), and feels positively challenged by stressful experiences (challenge). At the other pole of this continuum, non-hardy individuals are alienated, powerless, and rigid. This view implied to assess the level of these three characteristics and to sum their scores to obtain a global hardiness score. Hull, Van Treuren, and Virnelli (1987) severely criticized this approach. They advocated that commitment, control, and challenge were three independent phenomena, to be measured and studied separately.

This criticism encouraged researchers to examine the underlying dimensional structure of hardiness. Hanna and Morrisey (1987) were the first to propose and show that hardiness could be better understood as a hierarchical construct, in which three facets of commitment, control, and challenge are nested under a broader domain of hardiness. This view reflects the multidimensional nature of hardiness and the existence of three interrelated, but distinct characteristics necessary to be hardy. Thus, in this frame, hardiness’ assessment should cover four measurements: global hardiness and its three facets. This approach gained in popularity and is generally the most accepted one (e.g. Bartone, Kelly, Matthews,

2013; Hystad, Eid, Johnsen, Laberg, & Bartone, 2010; Maddi, 2007).

However, an alternative conception of Sinclair and Tetrick (2000) – called the dual-process view – suggests that two distinct phenomena underpin hardiness: “one providing strengths and resources to aid in combating the stress process, while the other increases an individual’s vulnerability” (p.14). We label these two constructs “dispositional resilience” and “dispositional vulnerability”. The dual-process approach was a fundamental shift in hardiness conceptualization. It acknowledges the co-existence of two distinct tendencies in the human being when confronted to a stressful experience. In simple terms, few people are totally resilient or completely vulnerable to stress. Facing a new demanding situation, the individual may first feel alienated, powerless, or threatened, and then later become more involved, active, and positively challenged (or the other way around). Both tendencies can even compete at the same time. A deployed service member, for example, can be committed to his mission, but at the same time, alienated to the political context that defines it. In sum, the dual-process model implies the separate measurement of dispositional resilience and of dispositional vulnerability.

Hence, the dimensionality of hardiness is still disputed. This debate resulted in a proliferation of scales that makes it difficult to determine the most appropriate one for the context of high-reliability professions. Since Kobasa et al. (1982) proposed a set

of 71 items to measure hardiness (the Unabridged Hardiness Scale), the scale has been declined in numerous abridged, revised, health-related (Pollock, 1986), sports-related (Sheard, Golby, van Wersch, 2009), family-related (McCubbin & Thompson, 1987), and occupation-related (Jimenez, Munoz, Hernandez, & Blanco, 2014) instruments. However, a review by Funk (1992) compared the scales existing at that time and identified the Personal View Survey (Kobasa, 1985) and the Dispositional Resilience Scale (Bartone et al., 1989) as the most appropriate to measure hardiness. These two scales show similar content, but the latter scale became more popular in the research on high-reliability professions (e.g. Escolás, Escolás, & Bartone, 2014; Reynaud et al., 2013; Violanti et al., 2014).

This initial Dispositional Resilience Scale counted 45 items, but showed several measurement problems (see Funk's review, 1992). Four scales derived from continued efforts to improve its psychometric qualities. On the one hand, the Dispositional Resilience Scale II (Sinclair & Oliver, 2003: unpublished work), that was later declined into a military-specific version, the Military Dispositional Resilience Scale II (DRSII-M, R.R. Sinclair, personal communication, July 7, 2014). On the other hand, the Dispositional Resilience Scale 15 (DRS15; Bartone, 1995, 2007) and its revised Norwegian version (DRS15r; Hystad et al., 2010). The items of these four scales will constitute the building blocks of the present study.

Sinclair and colleagues (Sinclair & Oliver, 2003; Sinclair, Oliver, Ippolito, & Ascalon, 2003, cited in Sinclair & Oliver, 2003) refined Bartone et al.' (1989) initial scale. They worked on a version with an equal number of positive and negative items to validate the dual-process view. Sinclair and Oliver's (2003) work proposes an 18-item scale - the DRSII - measuring dispositional resilience and dispositional vulnerability by summing items respectively reflecting commitment, control, challenge on the one hand, and alienation, powerlessness, and rigidity, on the other hand. The DRSII presents a good internal consistency and good criterion-related validity in samples including high-reliability professionals (for the details see: Sinclair & Oliver, 2003). Sinclair and colleagues also developed a DRSII for military use (DRSII-M) by adding six items to the DRSII. This 24 item version showed improved psychometric qualities in comparison with the 18 item version (R.R. Sinclair, personal communication, July 7, 2014).

In parallel, Bartone (1995; 2007) developed the DRS15, based upon the three-faceted hierarchical view (Hanna & Morrissey, 1987). It counts 15 items and measures the facets of commitment, control, and challenge, and summarized hardiness as a whole. The DRS15 showed good test-retest reliability and good criterion-related validity among high-reliability professionals (for the details: see Bartone, 1995; Bartone, 2007). Norwegian researchers made several attempts to use a translation of the DRS15 (e.g. Eid, Johnsen, Saus, &

Risberg, 2004; Eid, Johnsen, Bartone, & Nissestad, 2007; Eid & Morgan, 2006), but when faced with disappointing psychometric qualities, they quickly raised the issue of the cultural and linguistic appropriateness of some items. Hystad et al. (2010) altered these items to improve its suitability to the Norwegian background and the DRS15r reflects these changes. In sum, hardiness could constitute a relevant criterion for the selection of high-reliability personnel. However, the dimensionality of the hardiness construct remains disputed and a proliferation of scales encumbers hardiness research. Current research supports two models to explain hardiness' dimensionality: a dual-process one and a three-faceted hierarchical one (see Figure 5.1.). Many scales are available to measure hardiness, but in the context of high-reliability professions, researchers mostly use the Dispositional Resilience Scale category. This category counts four scales, resulting from several refinements of Bartone et al.' (1989) initial scale: the DRSII, DRSII-M, DRS15, and DRS15r. The DRSII and DRSII-M are poorly documented; the DRS15 and DRS15r do not take into account the possible distinction between dispositional resilience and dispositional vulnerability. Finally, previous research in the Norwegian context raised the issue of the cultural appropriateness of some items.

The purpose of the present study is to use the items from the existing instruments to investigate the dimensionality of hardiness and pave the way for the development of a hardiness

scale suitable for the selection of (Dutch-speaking and French-speaking) high-reliability professionals, including military servicemen. To this end, this study will pursue two objectives: (1) *compare* models of hardiness' dimensionality and (2) *develop* a hardiness scale suitable for selecting (Dutch-speaking and French-speaking) high-reliability professionals. (1) We will compare the currently supported hardiness models – Sinclair and Tetrick's dual-process (2000) and Hystad et al.' hierarchical (2010) views – and a synthetic one, a dual-process hierarchical view, in which a domain of dispositional resilience overarches three facets of commitment, control, and challenge, and a domain of dispositional vulnerability nests three facets of alienation, powerlessness, and rigidity (Figure 5.1. depicts the three models). We hypothesize that the dual-process hierarchical model explains a larger proportion of variance among the items of the Dispositional Resilience Scales. We also hypothesize that some items will not load on their target component because of the cultural and linguistic appropriateness issue (Hystad et al., 2010) and of the pressure of the selection context to endorse items in a certain way (Harrison & McGlaughin, 1993). (2) Tentatively, we will develop an instrument based on the best supported model. That instrument would be ideally short, balanced (i.e. with an equal number for each component) and appropriate for the Belgian linguistic context, i.e. a context in which candidates can speak Dutch or French.

Method

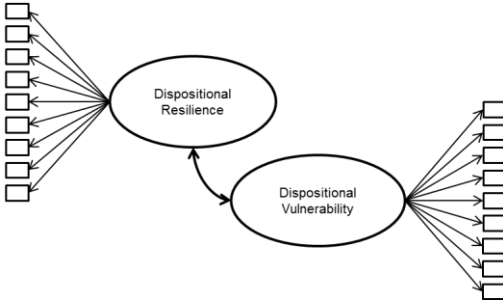
Participants

During a five months period, we invited every candidate applying at the Belgian Defense Selection Center ($N = 1157$) to complete a questionnaire on the sidelines of the normal selection procedure. The questionnaire was fully completed by 90.32% of the candidates. Age of those 1045 participants ranged from 16 to 47 (mean = 21.74; $SD = 3.94$). Among them, 55.30% were Dutch-speaking and the remaining 44.70% were French-speaking. The Male/Female ratio is 7.93:1.

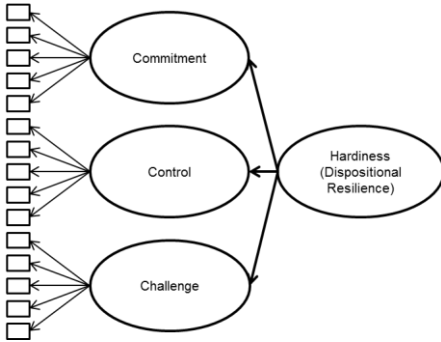
Instruments

We used the items stemming from the DRSII (Sinclair & Oliver, 2003), DRSII-M (R.R. Sinclair, personal communication, 2014), the DRS15 (Bartone, 1995; Bartone, 2007) and the DRS15r (Hystad et al., 2010). Those items were previously translated into French and Dutch, and successfully predicted relevant outcomes for high-reliability professions (Delahaij, Gaillard, & Van Dam, 2009; Lo Bue, Taverniers, Mylle, & Euwema, 2013; Lo Bue, Taverniers, Mylle, & Euwema, 2014). The content of the four scales is rather similar: they have four items in common; the DRS15 and the DRS15r share most of their items; the DRSII-M is identical to the DRSII, but counts six more items (one per component).

Model 1.



Model 2.



Model 3.

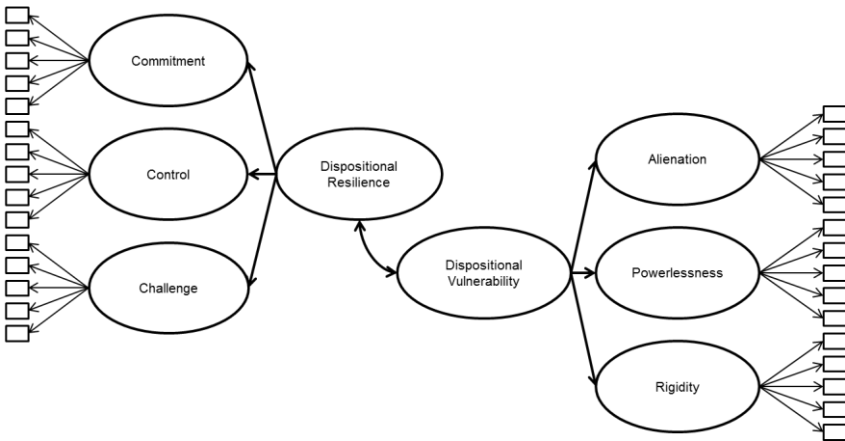


Figure 5.1. Three conceptualizations of hardiness.

Thus, the questionnaire the participants had to complete contained 39 items (23 positively keyed, 16 negatively): the four items common to the four scales; the seven items only common to the DRS15 and DRS15r; the 14 items only common to the DRSII and DRSII-M; the four items specific to the DRS15; the four items specific to the DRS15r; and the six items specific to the DRSII-M. Among those items, five intend to measure commitment; 12 control; six challenge; six negative commitment or alienation; five negative control or powerlessness; and five negative challenge or rigidity. The participants had to state to what extent the 39 items apply to them on a 4-points Likert scale, ranging from 0 (*not at all true*) to 3 (*completely true*).

Procedure

We prepared two versions of the questionnaire. Each presented the same items, but in a different order. We distributed both versions randomly over the candidates and asked them to complete it while sitting in the waiting room of the Selection Center. An informed consent preceded the questionnaire and mentioned that filling in the questionnaire was facultative, that the results of the questionnaire had no influence on the selection process, that they could retire from participation or stop it at any moment and that, by completing the questionnaire, they implicitly agreed that their data could be used for a scientific investigation on resilience.

Statistical procedure

(1) *Model comparison and modifications.* In a first step, we performed three separate principal component analyses with IBM SPSS 22 on the 39 items set. We first looked for two (Model 1), three (Model 2), or six (Model 3) oblique components. Then, in Model 2 and 3, after summing across items of the same first-order components, we looked for respectively one and two oblique second-order components. Following the instructions of the DRS15 and DRS15r manuals, we reversed the scores of the negatively keyed items to test Model 2. This was not necessary for Model 1 and 3, as these models imply that dispositional resilience and dispositional vulnerability are separated processes. In Model 1, we expected the 23 positively keyed items to load positively on the same component and the 16 negatively keyed items to load positively on the second one. In Model 2, we expected the five commitment items to positively load on the same component, the 12 control items on a second one, and the six challenge items on a third one, and this regardless of their positive or negative initial formulation. In Model 3, we expected the positively keyed commitment, control, and challenge items to significantly load on three separate components and the negatively keyed items of commitment (or alienation), control (or powerlessness), and challenge (or rigidity) to significantly load on three other distinct components. Furthermore, we expected commitment, control, and challenge to load on a single second-order

component and alienation, powerlessness, and rigidity to load on a second one.

In a second step, we performed a confirmatory factorial analysis with IBM SPSS AMOS 22 to compare the three models using Structural Equation Modeling (SEM). This is the most appropriate technique to assess the fit of multidimensional models and to test the structure of hierarchical models (Hull, Lehn, & Teddlie, 1991). Also, it is the unique factorial technique taking the measurement error into account. In order to compare the models on a common base, we temporarily excluded all the items that failed to load as expected in at least one principal component analysis (i.e. loading negatively on the expected component or presenting a factor-loading < 0.10) and exclusively retained the items common to the three models. According to Schumacker and Lomax's (2010) criteria, our sample size was appropriate for our study objectives.

To assess the overall fit of models, McDonald and Marsh (1990) recommended the Tucker-Lewis Index (TLI). TLI values close to .90 and .95 reflect a good model fit (Schumacker & Lomax, 2010). Schumacker and Lomax also recommend the Parsimony Normed Fit Index (PNFI) to compare models with different degrees of freedom. The closer to 1, the better the PNFI is. Byrne (2010) described the Root-Mean-Square Error of Approximation (RMSEA) as "one of the most informative criteria" (p.80) in SEM. The author specifies that RMSEA indicates good fit when below .05, reasonable fit between .05

and .08, mediocre fit in the interval .08-.10, and poor fit above .10. The accuracy of the RMSEA is expressed by its confidence interval (the narrower, the more precise) and a closeness-of-fit index (PCLOSE) that is expected to be greater than .50. Finally, Schumacker and Lomax recommended the Akaike Information Criterion (AIC) to compare models with different numbers of latent variables. The AIC assesses both model fit and complexity; models with poorer fit or greater complexity produce higher AIC.

In a third step, we improved the best-fitting model by eliminating non-significant parameters (Schumacker & Lomax, 2010). Also, AMOS proposes modification indexes (MI) to guide specification searches (the higher the MI, the greater the change in χ^2). We chose to follow these suggestions if they were theoretically meaningful, did not bring useless complexity along in the model and with a threshold of $MI > 10$ (Byrne, 2010; Schumacker & Lomax, 2010). We used a step-by-step approach to conduct the specification searches (Byrne, 2010; Schumacker & Lomax, 2010). First, we looked at the most relevant MI, then changed the suggested parameter, then looked for the next relevant MI, and so on until the program proposed no more relevant MI.

We then tested the resulting model fit and its invariance. According to our research objectives, we chose not to divide the sample randomly, but to split it according to the participants' mother tongue. By doing so, we expected to identify possible

discrepancies resulting from linguistic differences (Hystad et al., 2010). To compare the retained model between our two subsamples, we used the same indices as previously described.

(2) *Scale development.* Based on the best fitting model, we investigated the reliability of each scale and subscales. If the best fitting model was a hierarchical one (Model 2 or Model 3), we examined the reliability of the higher-order component(s) and of the lower ones as well. Then, to meet the objective of a short and balanced instrument, we reduced the size of each subscale to the size of the smallest one. We used a step-by-step approach to progressively exclude the items with the lowest Item-Total Correlation (ITC). Finally, with an iterative approach in mind, we attempted to confirm that the resulting instrument still reflected the best-fitting model in our sample.

Results

(1) Model comparison and modifications

The principal component analysis for Model 1 confirmed that all the items loaded significantly as expected, except two rigidity items. This two-component model explained 25.01% of the variance among the items. Model 2 entailed more issues: in the commitment component, two items failed to load as expected; in the control component, four; and in the challenge component, two. Also, it was more difficult to clearly identify three components (a number of items significantly loading on more than one component). These three first-order components

explained 31.45% of the variance among the items and the second-order component explained 49.83% of the variance among the three subcomponents. In Model 3, 11 of the 12 control items loaded on the same component and all the other items loaded as expected on their respective component. In this model, the six first-order components accounted for 41.95% of the variance among the items and the two second-order components explained 61.66% of the variance among the first-order components (that loaded as expected).

The SEM analysis concerned the 28 items that loaded as expected in the three principal component analyses. Table 5.1. reports the results of the CFA for each of the three models. The results indicate that Model 3 showed the best fit with our data when compared with Model 1 and 2. Namely an overall reasonable, almost good fit ($RMSEA = .05$). The $RMSEA$ indicated also a reasonable fit for Model 1 and Model 2, but the other indices are systematically better for Model 3. The TLI is closer to .90 and the model is over and above the most parsimonious one ($PNFI = .72$, larger than the two concurrent models). Remarkably, the AIC is lower for Model 3 whereas it is more complex. Taken together with the results of the principal component analyses, our data indicate that Model 3 is the best one to explain the variance among the items. In other words, these results support our hypothesized dual-process hierarchical view of hardiness. However, we can note here that the $PCLOSE$ of Model 3 indicated a lack of accuracy for the

RMSEA. This justified, in our view, the model modifications described in the following paragraphs.

	χ^2	<i>df</i>	<i>TLI</i>	<i>PNFI</i>	<i>RMSEA</i>	<i>PCLOSE</i>	<i>AIC</i>
Model 1	2305.71	349	.65	.59	.07 [.07-.08]*	.00	2475.71
Model 2	2107.51	347	.71	.62	.07 [.07-.07]*	.00	2281.51
Model 3	1350.26	344	.82	.72	.05 [.05-.06]*	.05	1530.26

*reasonable-fit index

Table 5.1. Comparison of the three models.

We then attempted to improve the accuracy of Model 3 and used therefore the 38 items that loaded as expected in the principal component analysis. AMOS indicated a “Heywood Case” for the variance of powerlessness (Estimate > -0.004; $p > .05$). Given that the negative variance of Powerlessness was not significant, we could remove it from the model (Schumacker & Lomax, 2010). After this modification, all estimates were significant at $p < .01$. We continued the specification search by examining the MI’s and first add an error covariance between rigidity items “*I carefully plan just about everything I do*” and “*I like to have a lot of structure in my life*”. This change was relevant (MI = 188.30) and meaningful as those two items have a rather similar content. We used the same criteria to add, one by one, nine more error covariances. After that, no more meaningful MI went over the MI > 10 threshold. After these modifications all estimates were significant at $p < .05$. Table 5.2. reports the fit indices of the resulting model in the whole sample and in the

Dutch-speaking and French-speaking subsamples respectively. These results indicate that the RMSEA improved in precision (see PCLOSE), except in the French-speaking subsample. This discrepancy could be due to inaccurate translation, linguistic differences, or differences in item formulation and could then be reflected in separate reliability analyses.

	χ^2	<i>df</i>	<i>TLI</i>	<i>PNFI</i>	<i>RMSEA</i>	<i>PCLOSE</i>	<i>AIC</i>
Whole sample	2196.85	649	.80	.70	.05 [.05-.05]*	.95	2456.85
Dutch-speaking	1408.98	649	.81	.67	.05 [.04-.05]*	1.00	1668.98
French-speaking	1528.63	649	.77	.63	.05 [.05-.06]*	.03	1788.63

*reasonable-fit index

Table 5.2. Improved Model 3 and invariance.

Scale development

Table 5.3. reports the reliability analysis for each scale (dispositional resilience and dispositional vulnerability) and their respective subscales (commitment, control, challenge, alienation, powerlessness, and rigidity) performed on the whole sample and the two linguistic subsamples. According to the common standards (Tavokol & Dennick, 2011) for a scale at this stage of development, the Cronbach’s alphas of the dispositional resilience and dispositional vulnerability scales are acceptable for the whole sample. The internal consistency of the subscales approximates acceptability, except for the challenge and powerlessness subscales. A comparison of the Cronbach’s alphas between the Dutch-speaking and French-

speaking subsamples confirms some discrepancies. Therefore, in our attempt to reduce the scales' size, we looked for the items with the lowest ITC separately for each linguistic subsample.

Scales and subscales	<i>N</i> items	α total	α Dutch	α French
Commitment	5	0.66	0.68	0.66
Control	11	0.76	0.73	0.79
Challenge	6	0.57	0.62	0.56
Alienation	6	0.74	0.66	0.77
Powerlessness	5	0.55	0.53	0.59
Rigidity	5	0.68	0.71	0.64
Dispositional Resilience	22	0.84	0.84	0.84
Dispositional Vulnerability	16	0.72	0.71	0.75

Table 5.3. Scales and subscales characteristics.

The commitment, powerlessness, and rigidity subscales were the smallest ones (five items each). This size served as a reference to reduce the other subscales and to obtain a shorter and balanced scale (i.e. with the same number of item for each subscale). Analyzing separately each linguistic subsample, we eliminated items with the lowest ITC one after the other, until each subscale consisted of five items. In both subsamples, the items with the lowest ITC were the same, except one of the control subscale. In the Dutch-speaking subsample, we excluded the item *"How things go in my life depends on my own action"* (ITC = 0.38). In the French-speaking subsample, we excluded the item *"I can solve most of my problems on my own"* (ITC = 0.44). This method ultimately resulted in a 15 item dispositional resilience scale (five items per subscale) and a 15

item dispositional vulnerability scale (five items per subscale), with one different item in the control subscale according to the linguistic version.

Table 5.4. reports the Cronbach’s alpha for these scales. Our reduction method improved the reliability of the challenge subscale, did not notably affect the alienation subscale, and slightly affected the control scale, which stayed within an acceptable range. The reduction hardly affected the reliability of the dispositional resilience and dispositional vulnerability scales, which stay acceptable. The powerlessness scale however remained a problematic one.

Scales and subscales	<i>N</i> items	α Dutch	α French
Commitment	5	0.68	0.66
Control	5	0.68	0.71
Challenge	5	0.68	0.62
Alienation	5	0.63	0.76
Powerlessness	5	0.53	0.59
Rigidity	5	0.71	0.64
Dispositional resilience	15	0.84	0.82
Dispositional vulnerability	15	0.70	0.73

Table 5.4. Characteristics of a 30-item hardiness assessment tool.

Based on this resulting 30-item instrument, we tested the homogeneity of Model 3 with a new SEM analysis. Table 5.5. reports the results in both linguistic subsamples. In both subsamples, the model-fit indices remained stable. In the two subsamples, all items and first-order latent variables (the 6 facets) estimates were significant at $p > .05$, which means that

all the items were appropriate to measure their target component, that each positive component was appropriate to measure dispositional resilience, and that each negative component was appropriate to measure dispositional vulnerability.

	χ^2	<i>df</i>	<i>TLI</i>	<i>PNFI</i>	<i>RMSEA</i>	<i>PCLOSE</i>	<i>AIC</i>
Dutch-speaking	912.29	395	.84	.70	.05[.04-.05]*	.83	1112.29
French-speaking	1130.71	395	.75	.63	.06[.06-.07]*	.00	1330.71

*reasonable-fit index

Table 5.5. Final model-fit.

We computed scores for each of the 6 subcomponent scales (commitment, control, challenge, alienation, powerlessness, and rigidity) and for the dispositional resilience and the dispositional vulnerability component scales. We choose to sum across item scores. Table 5.6. reports the means, standard-deviations and correlations among the scales and subscales. These results provide further support to the dual-process hierarchical view. The facets commitment, control, and challenge correlate strongly with dispositional resilience and weakly with dispositional vulnerability; the facets alienation, powerlessness, and rigidity correlate strongly with dispositional vulnerability and hardly with dispositional resilience; and dispositional resilience and dispositional vulnerability are weakly correlated too.

	Mean	SD	2.	3.	4.	5.	6.	7.	8.
1. Commitment	10.92	2.14	.54***	.51***	-.35***	-.27***	-.13***	.82***	-.18***
2. Control	11.12	2.08	-	.53***	-.12**	-.23***	-.12**	.83***	-.07*
3. Challenge	10.54	2.29		-	-.13***	-.18***	-.09**	.83***	-.18***
4. Alienation	1.26	1.84			-	.48***	.11***	-.24***	.71***
5. Powerlessness	1.11	1.46				-	.14***	-.27***	.68***
6. Rigidity	5.66	2.37					-	-.06*	.70***
7. Resilience	32.58	5.38						-	-.17***
8. Vulnerability	8.03	3.96							-

* $p < .05$

** $p < .01$

*** $p < .001$

Table 5.5. Descriptive statistics of the study variables.

Discussion

Our results support a dual-process hierarchical view of hardiness, i.e. a model with two distinct domains of dispositional resilience and dispositional vulnerability, respectively nesting three facets of commitment, control, and challenge on the one side, and alienation, powerlessness, and rigidity on the other side (see Model 3 in Figure 5.1.). We compared this model to Sinclair and Tetrick's (2000) dual-process model and to Hystad et al.'s (2010) hierarchical model and found that the dual-process hierarchical model provided the best fit. Based on this model and on pre-existing items, we prepared the ground for the development of a new instrument to assess each component of hardiness in the context of high-reliability profession selection.

This finding brings along a theoretical shift in the conceptualization of hardiness. In contrast with Kobasa et al.' (1982) original bipolar conception of hardiness and to the current common practice (e.g. Alfred, Hammer, & Good, 2014; Bansal, 2014; Perkins, Randall, Toozs-Hobson, Sitch, & Ismail, 2014), our study indicates that what most of researchers consider as end of a same continuum are actually two distinct phenomena. We propose a new definition of hardiness. Hardiness is a composite of two dispositional tendencies towards stressful life events: a disposition of resilience made of commitment (feeling deeply involved in life experiences), control (feeling that one can influence life experiences), and challenge (considering changes as opportunities); a disposition of vulnerability made of alienation (withdrawn from the environment), powerlessness (a passive attitude towards stressful life events), and rigidity (change is a threat to comfort and stability).

Furthermore, the dual-process hierarchical view of hardiness synthesizes previous positions (Hystad et al., 2010; Sinclair & Tetrick, 2000). To our knowledge, it is the first time that this model is empirically supported. The hierarchical aspect of hardiness reflects – in a comparable way as the dominant personality theories (e.g. Costa & McCrae, 2008) – that hardiness is as a broad personality domain composed of specific facets that in turn affect typical behavioral responses. In line with Sinclair and Tetrick (2000), the dual-process aspect of

hardiness reflects that dispositional resilience and dispositional vulnerability refer to distinct cognitive constructs: the personality aspects of individual strengths and resources in adversity on the one side, and the personality aspects of stress sensitiveness on the other side. Given the complexity of the human nature, this view entails that (at least) two tendencies coexist in the human being. In the confrontation with stressful situations, both dispositions can compete. We can first feel alienated, powerless, and rigid and then cope actively with the situation with commitment, control, and challenge. The opposite may also be true. We can feel resistant to stress in the daily life (e.g. because predictable), but sometimes our vulnerability may surface when confronted with specific stressors (e.g. because unexpected).

This theoretical position has empirical implications. Previous research indicates that the facets of hardiness sometimes unequally predict health and performance outcomes (e.g. Bartone, Kelly, & Matthews, 2013; Johnsen et al., 2013; Sheard, 2009). Therefore, considering hardiness as a unique dimension (Kobasa et al., 1982) or as three separated constructs only (Hull et al., 1987) leads inevitably to an important loss of information (see Carver, 1989; Hull et al., 1991). In line with current theoretical conceptions (e.g. Chan, 2003; Sinclair & Oliver, 2003; Hystad et al., 2010), researchers could investigate specific effects of each domain and of each facet. The most appropriate technique to perform such an investigation is Structural

Equation Modeling (SEM). It enables researchers to test simultaneously a whole multidimensional/hierarchical model and all its components, and, over and above, it is the only factorial technique to take the measurement error into account. However, the mere test of a model with SEM does not attest the existence of second-order latent variables, such as those we proposed here. Previous research (Chan, 2003; R.R. Sinclair, personal communication, July 7, 2014) failed to support hardiness models including second-order latent variables. Though, in our own study, the principal component analyses results support the existence of the second-order latent variables (dispositional resilience and dispositional vulnerability). They explain about 60% of the variance in the first-order components. Furthermore, these two dimensions are weakly related. These elements justify, in our view, the use of separate dispositional resilience and dispositional vulnerability scores in future research.

Limitations and Future Research

The participants of our study were auto-selected military candidates and we cannot completely exclude a social desirability bias. However, we found it relevant to work with this sample for two reasons: a) our participants completed the questionnaire under the pressure of a selection context that is very similar to the one that future candidates will experience

when applying for high-reliability professions; b) we expected that this contextual pressure would reduce the inconsistencies in item responses due to the respondents' carelessness (Schmitt & Stults, 1985) and to the cognitive carryover effect (Feldman & Lynch, 1988).

Furthermore, our results support the dual-process hierarchical model in comparison to the dual-process (Sinclair & Tetrick, 2000) and hierarchical three-faceted (Hystad et al., 2010) models, but most of the indices of our hypothesized model fell short regarding standard values of good fitting models. Indeed in the SEM analysis, our hypothesized model showed better fit indexes than the two others, but the RMSEA was just at the edge of the good-fit value of .05 (Byrne, 2010). The TLI, which has to approach .90 or even .95 (Schumacker & Lomax, 2010) was at its maximum with .84 in the Dutch-speaking subsample. In our view, this indicates that our hypothesized model is the best fitting in comparison with the two others, for our sample, and with our methods, but that there still is room for improvement. Testing this model in other populations and other contexts is one of the following challenges for future research to bring more evidence in support of this new conception of hardness.

Our tentative to develop a scale based on the dual-process hierarchical model resulted in a new and comprehensive instrument. However, some of the subscales were just beneath the standard .70 value for an acceptable Cronbach's alpha.

According to Tavokol and Dennick (2011), three aspects may cause low Cronbach's alphas: (1) the presence of heterogeneous constructs, (2) a poor interrelatedness of the items, or (3) a small scale size. Our principal component and SEM analyses indicated that the constructs we investigated were homogeneous. The significant estimates of the 30 items also indicated that they were appropriate to measure their target component. Although we cannot completely exclude a lack of interrelatedness, we expect that the low alphas resulted from the relatively small number of items for the subscales (as some reduction in alpha between Table 5.3 and 5.4. suggests)⁴.

⁴ Several authors (e.g. Green & Yang, 2009; McCrae, Kurtz, Yamagata, & Terracciano, 2011; Sijtsma, 2009; Tavokol & Dennick, 2011) have questioned the usefulness of Cronbach's alpha to assess the validity of a psychometric test. For Sijtsma (2009), this statistic is unrelated to the internal structure of a test and is of limited usefulness when it is based on a single test administration. Green and Yang (2009) proposed that SEM was "an informative process" (p.121) to assess the reliability of a scale. Our own database confirms these positions. In a first attempt to explore our dataset, we used a method that was more restrictive in item selection. From the Model 3 modifications on, we only used the 28 items that loaded as expected in the three principal component analyses. The scale reduction that followed was based on a smaller reference (the Rigidity subscale was then made of 3 items) and we looked for an 18-item scale solution. A SEM test of Model 3 based on this 18-item instrument provided superior goodness-of-fit indexes in comparison to the ones we presented here (for the whole sample: TLI = .92, PNFI = .76; RMSEA = .04 [.04-.05]; PCLOSE = 1.00; AIC = 488.46). However, all the Cronbach's alphas of the subscales (except the Rigidity one) were then inferior to .61 (confirming, in our view, that the low alpha values resulted from the small scale size). In other terms, this solution provided a more homogeneous, more consistent solution, but that was unreliable according to the canonic use of the Cronbach's alpha. Given the ongoing debate, the solution we

To conclude, our psychometric approach is only a first important step in the validation of the dual-process hierarchical model of hardiness. The dual-process hierarchical model presented the best fit to our data, but future research should further investigate its validity and usefulness. It is clear that the validation process needs to be continued to end with an instrument to measure the two domains and six facets of hardiness in a proper way. Then, researchers could investigate the retest reliability and the criterion-related validity of each component of hardiness (e.g. the predictive validity on military relevant outcomes such as retention during training, motivation before a deployment, and job-performance during a deployment). Incremental validity could also be an aim to investigate the usefulness of the negative components above the positive ones (see Sinclair & Tetrick, 2000; Sinclair & Oliver, 2003). Finally, the relevance of the dual-process hierarchical conception of hardiness goes beyond the military context. Investigating its validity in other populations could open a new way to conceive the dispositional aspects of resistance to stress.

presented in this chapter is a trade-off: what we gained in reliability, we lost in homogeneity. For McCrae et al. (2011), the Cronbach's alpha is a convenient index to check the quality of research data, but is of limited use to evaluate the validity of a scale in development. They stated that test-retest reliability remains the best way to assess the validity of a scale. Therefore, we report (Appendix A and B) the 30-item solution (more "reliable" but less consistent) and the 18-item solution (less "reliable" but more consistent) for future research to investigate their validity.

Chapter 6

General Discussion

The military profession is a high-reliability occupation (Baumann, Gohm, & Bonner, 2011) because soldiers have to execute their tasks in dangerous and stressful situations. The stressors they face can have multiple sources, such as the separation from the loved ones, the danger of heavy machinery, or the threat to life that a combat situation may represent (Bartone, Adler, & Vaitkus, 1998; Boermans, Kamphuis, Delahaij, Korteling, & Euwema, 2013). To reduce the physical and psychological risks associated with these specific occupational demands, the military organization relies on selection and training to improve service members' resilience, i.e. their ability to adapt positively to stressful situations (Zautra, Arewasikporn, & Davis, 2010). Several environmental and personal characteristics foster resilience (e.g. Eshel & Majdoob, 2014; Höfler, 2014; Sarkar & Fletcher, 2014). We focused this dissertation on a personal one, the personality trait hardiness (Kobasa, 1979).

In Chapter 1, we presented a general overview of hardiness theory and research. This section described how hardiness promotes resilience. In Kobasa, Maddi, and Khan's (1982) conception, hardy individuals are committed to their social environment and to the activities they perform, they feel that they have a definite control on what happens in their lives, and

they consider changes as challenges. On the other side of the continuum, less hardy individuals tend to feel alienated, powerless, and rigid. Therefore, hardy individuals are expected to be more able than less hardy ones to appraise stressful events positively, to be confident in their ability to cope with them and to effectively cope with them in an adaptive way (e.g. Maddi, 1999; Delahaij, Gaillard, & Van Dam, 2009; Eid, Johnsen, Saus, & Risberg, 2004). Consequently, hardy individuals will show less signs of physical and mental exhaustion (Chan, 2003; Dolbier et al., 2000; Garrosa et al., 2008), and will be healthier and more performant than individuals lower on hardiness (e.g. Eschleman et al., 2010). For these reasons, several researchers (e.g. Bartone & Priest, 2001; Maddi, Matthews, Kelly, Villareal, & White, 2012; Sandvik, Bartone, Hystad, Phillips, Thayer, & Johnsen, 2013) argued that hardiness could be a relevant selection criterion for the military organization. Based upon this statement, we forged a first question to investigate. *Is hardiness an indicator for professional effectiveness of military service members?*

Chapter 1 also put forward the debate about hardiness' dimensionality and measurement. Throughout the years, researchers presented hardiness as a constellation of personality traits (Kobasa, 1979), as a unitary phenomenon (Kobasa et al., 1982), or as three distinct phenomena labeled commitment, control, and challenge (Hull, Van Treuren, & Virnelli, 1987). Current research supports two views of hardiness. The first

implies two distinct phenomena, that we named dispositional resilience and dispositional vulnerability (Sinclair & Tetrick, 2000), and the second one considers hardiness as a three-faceted hierarchical personality construct (Hystad, Johnsen, Laberg, & Bartone, 2010). This debate led to a second issue that we intended to address. If the military organization should select candidates among other based on their level of hardiness, then *how to measure hardiness in the military context?*

As a first approach of the first research question, we proposed to use the military resilience model of Kamphuis, van Hemert, van Wouwe, van den Berg, and van Boomeer (2012; see Figure 6.1). This model identifies seven distinct phases in the military HR cycle, each of them characterized by specific organizational challenges. Kamphuis et al. propose that improving resilience among military service members could be a way to tackle these phase-specific challenges. This dissertation intended to investigate hardiness' relevance in this context and as hardiness reveals its potential in the most adverse situations (Bartone, 2006), we identified the basic training and the deployment as the most relevant ones to investigate. However, most of the studies conducted in the context of the basic training concerned military cadets, a population with a highly specific profile. Furthermore, few researchers investigated the relevance of hardiness in the deployment context. To address these gaps, we proposed three studies, described in Chapter 2, 3, and 4.

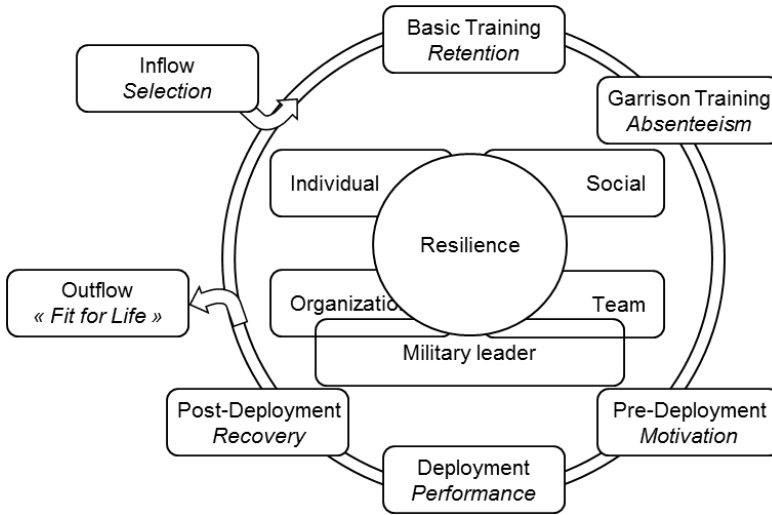


Figure 6.1. The military resilience model (Kamphuis et al., 2012).

The model of Kamphuis et al. (2012) emphasizes that retention is the major organizational challenge at the basic training phase and the literature confirms the extent of this issue (e.g. Cremers, Van der Linden, te Nijenhuis, & Van de Ven, 2011; Ergen, 2011; Fisher, 2011). In Chapter 2, we provided empirical support to the hypothesis that the qualities of hardy candidates help them to persevere in such a long-lasting stressful task as the basic training. Paratrooper recruits completed the DRSII-M (R.R. Sinclair, personal communication, July 7, 2014) at the start of the basic training. Two months later, we measured retention and noted that the hardest recruits were significantly more likely than lesser hardy ones to be still involved in the training. Secondly, our results confirm that attrition is a large-extent problem. In our Dutch sample, 50.30% of the selected recruits had dropped out before two months of basic training. This

chapter highlights that selecting for hardiness could be beneficial for the military organization. The selected personnel would be more likely to stay engaged in the early phases of the military HR cycle.

The model of Kamphuis et al. (2012) identifies enduring performance as the main challenge during the deployment phase. However, given the difficulty to operationalize and measure performance during an actual military operation, we chose to focus our interest on two mental states strongly related to professional effectiveness in organizations: work engagement and burnout (Bakker, Demerouti, & Sanz-Vergel, 2014). Based on Chapter 1 assumptions, we hypothesized that hardiness would be related to more work engagement and less burnout during deployment. Chapter 3 and 4 investigated these relationships, respectively by dint of a cross-sectional and a longitudinal design.

In Chapter 3, deployed military personnel completed the DRS15r (Hystad et al., 2010), the Utrecht Work Engagement Scale (Schaufeli & Bakker, 2003) and the Utrecht Burnout Scale (Schaufeli & Dierendonck, 2000). Correlations indicated strong positive relationships between hardiness and the two core components of work engagement (vigor and dedication) and strong negative relationships between hardiness and the two core components of burnout (emotional exhaustion and cynicism). Our results also indicate that hardiness moderates the relationship between vigor and emotional exhaustion,

emphasizing the relevance of including personality traits in the study of the job demands-resources model (e.g. Bakker, Boyd, Dollard, Gillespie, Winefield, Stough, 2010; Li, Zhong, Chen, Xie, & Mao, 2014; Schaufeli & Taris, 2013).

We designed the study described in Chapter 4 to overcome the drawbacks of cross-sectional data and consequently of the results reported in Chapter 3. In Chapter 4, military service members completed the DRS15 (Bartone, 2007) and the Utrecht Burnout Scale (Schaufeli & Dierendonck, 2000) during the pre-deployment phase (two-months before deployment), and then the Utrecht Burnout Scale again during the deployment phase (two months after the beginning of the deployment). The results confirm the negative relationship between hardiness and burnout, at least during deployment. A more specific examination of the data indicated that for hardy service members, emotional exhaustion diminishes with the length of the deployment whereas it rises for less hardy ones. Regarding cynicism, our results indicate that hardy service members are generally less cynical than individuals scoring lower on hardiness (regardless of the situation, i.e. pre-deployment as well as during the deployment). Finally, the temporal precedence (hardiness measured before deployment) suggests a possible causal relationship.

Chapter 3 and 4 highlight that selecting candidates for hardiness would be beneficial for the military organization. The hardy service member feels that his work is meaningful, and he

is proud of it. Also, stressful experiences are sources of positive challenge and energy for him. On the contrary, a less hardy service member is more likely to keep a certain distance from his work environment and to lack a sense of involvement in his duty. Also, he is more likely to become exhausted as the operational demands mount. Therefore, we can expect that these hardy individuals' mental states would benefit to the organization in terms of performance, the organizational challenge identified in the model of Kamphuis et al. (2012).

We can integrate the results from Chapter 2, 3, and 4 and from previous research to give a complete picture of hardiness effects during the whole military HR cycle. Figure 6.2. shows the positive effects of hardiness at each phases of this model. Hardiness promotes individual resilience in a way that tackles the phase-specific organizational challenges. Starting from the basic training, our results show that recruits high in hardiness are more perseverant than less hardy ones (Chapter 2). During that phase, the retention rate is thus higher for them. During the garrison training, compared to service members scoring low on hardiness, hardy soldiers are more mentally and physically healthy (Taylor, Pietrobon, Taverniers, Leon, & Fern, 2013), show less signs of emotional stress and report a better quality of life when the occupational demands rise (Eid et al., 2004). Therefore they are less absent for medical reasons (Hystad, Eid, & Brevik, 2011a).

During the pre-deployment phase, hardy service members are more mentally healthy (Florian, Mikulincer, & Taubman, 1995) and less cynical than non-hardy ones (Chapter 4). If we consider burnout and work engagement as the opposite poles of a same continuum, the pre-deployment lower burnout level of hardy service members is a sign of higher work engagement, and thus as a higher level of motivation – the specific challenge of the pre-deployment period. During the deployment, hardy service members allocate a positive meaning to their mission (Britt, Adler, & Bartone, 2001), are more professionally engaged (Chapter 3) and less burned out by the occupational demands (Chapter 3 and 4) in comparison to less hardy ones. Given the importance of these individual outcomes to promote performance (Bakker et al., 2014), hardy individuals are supposedly more performant during a deployment. Finally, Bartone (1999), Britt et al. (2001), Adler and Dolan (2006), King, King, Fairbank, Keane, and Adams (1998), and Taft, Stern, King, and King (1999) showed that hardy service members were more able to recover after deployment and after their whole career, even if they experienced highly stressful events, such as combat or captivity.

These findings provide an answer to the first issue of this dissertation. Selecting troop soldier candidates for their hardiness level would be beneficial for the military organization. Hardiness predicts individual outcomes (e.g. in this dissertation, perseverance, work engagement, and burnout)

that in turn respond to phase-specific organizational challenges (e.g. retention during the basic training and performance during the deployment). So, to impact the military HR cycle challenges, the military organization has first to act on the inflow phase and select hardy candidates. This leads to the second issue of this dissertation, how to measure hardiness in the military selection context.

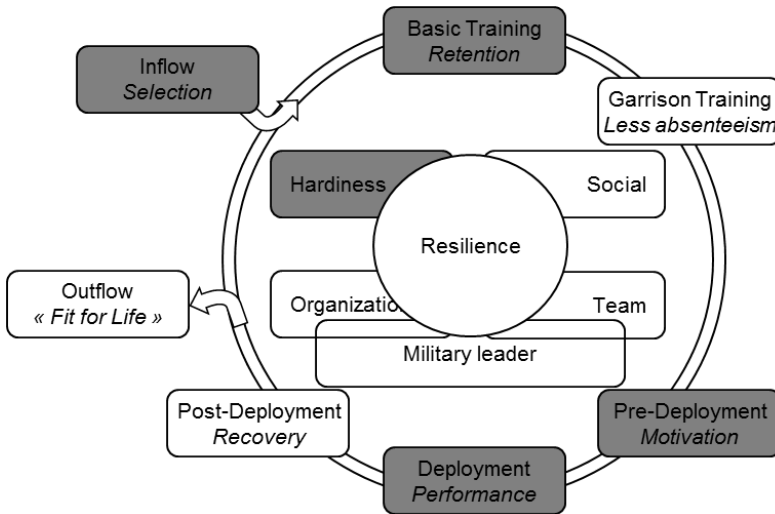


Figure 6.2. Effect of hardiness in the military HR cycle. The main empirical findings of the dissertation: “Hardiness in the Heart of the Military” are highlighted in grey.

A brief literature review identified the DRS class of scales as the most widely used in the military context. This category counts four state-of-the-art scales: the DRSII (Sinclair & Oliver, 2003), the DRSII-M (R.R. Sinclair, personal communication, July 7, 2014), the DRS15 (Bartone, 2007), and the DRS15r (Hystad et al.,

2010). Two different models of hardiness' dimensionality underpin these scales: a dual-process model for the DRSII and the DRSII-M, and a three-faceted hierarchical model for the DRS15 and the DRS15r. Therefore, to apply hardiness-based selection at the inflow phase of the military HR cycle, we forged two research objectives: *Which model explains best hardiness' dimensionality? And which scale is the most appropriate to assess hardiness at the inflow?*

We first addressed the second research question indirectly in Chapter 2, 3, and 4 by using three different hardiness scales: respectively, the DRSII-M (R.R. Sinclair, personal communication, July 7, 2014), the DRS15r (Hystad et al., 2010), and the DRS15 (Bartone, 2007). Contrary to our expectations (we expected that the European background of the DRS15r would better suit our own Belgian population), this first approach suggested that the DRS15r seemed to be the less indicated to measure hardiness in the Belgian military context (in Chapter 3, we had to exclude three items to obtain an acceptable reliability). The reliability of the DRSII-M and the DRS15 were respectively acceptable and good in Chapter 2 and 4, but the facet level lacked reliability. In Chapter 5, we addressed the second question more directly by comparing the two current views on hardiness (the dual-process and the three facet hierarchy) with a synthetic model, a dual-process hierarchical view. We then attempted to develop a hardiness

instrument suitable for military selection, among other high-reliability occupations.

In the study described in Chapter 5, a large sample of auto-selected military candidates completed a questionnaire composed of 39 items coming from the four current Dispositional Resilience Scales (DRS15, DRS15r, DRSII, and DRSII-M). Our results support a dual-process hierarchical view of hardiness. Three facets of commitment, control, and challenge are nested under a more global domain of dispositional resilience, whereas three facets of alienation, powerlessness, and rigidity are nested under a more global domain of dispositional vulnerability; in this model, dispositional resilience and dispositional vulnerability are two hardiness-related phenomena that are barely interrelated. In this conceptual framework, we paved the way for the development of a hardiness instrument measuring the two domains and the six facets of hardiness. The items homogeneously measure their respective components, but future research should investigate the retest reliability and the criterion-related validity of these items.

In summary, this dissertation highlights the relevance of hardiness all along the military HR cycle. We addressed gaps in the existing literature and proposed an integrative approach to investigate hardiness' relevance in the military context. We showed that hardiness is important for the retention of troop soldiers at the basic training phase and for the motivation of

actual service members during the pre-deployment period and for their performance during deployments (see Figure 6.2). Hardiness promotes positive individual outcomes (perseverance and work engagement) and prevents negative ones (burnout) that in turn affect organizational outcomes (retention, motivation and performance). Therefore, the military organization would benefit from selecting hardy candidates and future research should further develop an instrument to do so.

Theoretical implications: The dual-process hierarchical view

Chapter 5 provided the main theoretical implication of the present dissertation. Our results suggest that hardiness – a personal antecedent of resilience – is more than a unitary phenomenon, a composite of three attitudes or the result of a dual-process. It is underpinned by a dual-process hierarchical structure (Figure 6.3.). We propose to redefine hardiness as the result of two dispositional tendencies towards stressful life events: dispositional resilience, which is a pattern of the personality characteristics of commitment (the feeling of being deeply involved in life experiences), control (the belief one can influence life experiences), and challenge (the ability to see changes as opportunities); dispositional vulnerability, which is a composite of the personality characteristics of alienation (withdrawing from the environment because of adversity), powerlessness (a passive attitude towards stressful life events),

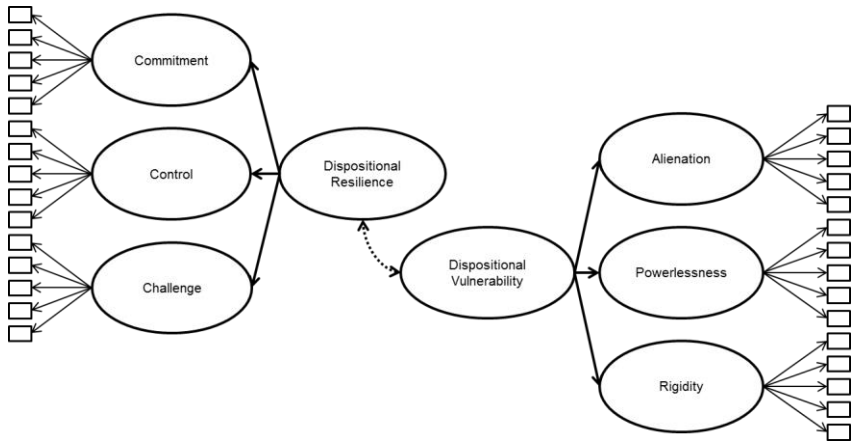


Figure 6.3. The dual-process hierarchical model of hardiness.

and rigidity (considering changes as a threat to comfort and stability).

One may have ambivalent thoughts and feeling when facing a new situation. Few individuals immediately appraise and cope with stressful situations by engaging in an active interaction with it and seeing it as a new learning opportunity. Also, few individuals will freeze or lose all their means when facing adversity. Thus no one is completely resilient or totally vulnerable. The dual-process hierarchical model of hardiness acknowledges that the two tendencies may coexist in the human being. Taking an interactionist perspective, we can consider that according to the moment and/or the situation, one tendency will take over the other.

For example, after having worked hard on a manuscript, a researcher may face harsh critics from a reviewer. At first sight,

he may want to give up his paper and feel that these criticisms constitute a threat to his ego. He is then under the influence of his vulnerable tendencies. After a while, he may find reasons and ways to again commit to his project, process actively the comments, and learn from them. His dispositional strengths and resources take gain the upper hand. Sometimes, the co-presence of the two tendencies may even persist. A military service member deployed in a remote problematic country may feel challenged as well as threatened by the hostile environment. These examples show that the two tendencies may coexist in the same person and that by simply subtracting vulnerability from resilience, one loses information about a person's dispositions towards stress.

This innovative view on hardiness opens new ways to investigate hardiness-related phenomena. The individual can be localized on two independent sets of three dimensions (Figure 6.4.), representing, in a certain way, two parts of him, two co-existing tendencies. Future research could now determine the respective impact of the domains and facets of hardiness on behavior in stressful situations. Previous research has already pointed out that the components of hardiness were sometimes unequal to predict health and performance outcomes. In Johnsen et al. (2013), dispositional resilience predicted success during a demanding physical task and commitment was the most important contributor to this prediction. Sandvik, Hansen, Hystad, Johnsen, and Bartone

(2015) found a mediation of commitment between psychopathy and anxiety, whereas dispositional resilience as a whole did not mediate this relationship. Also, Sinclair and Tetrick (2000) showed that dispositional vulnerability predicted academic performance over and above the effect of dispositional resilience.

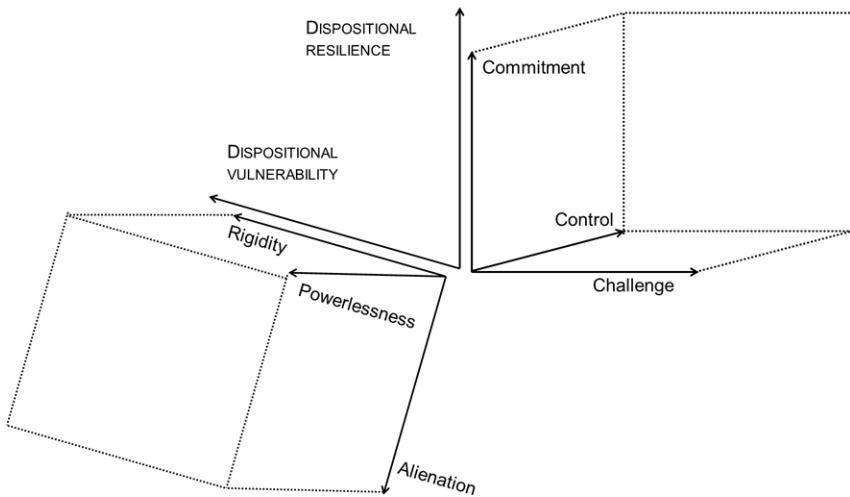


Figure 6.4. Hardiness: Two dimensions in three dimensions.

Thus, determining which component has more impact on important organizational outcomes (e.g. hypothetically, alienation on absenteeism during the military garrison training) could help in determining optimal selection profiles and developing tailored intervention strategies to tackle the phase-specific organizational challenges (Kamphuis et al., 2012). Also, determining which component is the most important to learn,

maintain, or improve specific skills in adverse situations could help orientate training strategies. The following sections will describe how the frame of the dual-process hierarchical model can be used to implement new methods of selection and training to increase military resilience.

Practical implications 1: Hardiness-based selection

This dissertation leads to six practical implications: one related to the selection of military personnel and five related to the levels of military resilience (Kamphuis et al., 2012). The most obvious practical implication of our findings is the relevance of hardiness-based selection at the inflow phase. Even if previous research seems to indicate that the military organization already *accidentally* selects hardy candidates (Hystad, Eid, Laberg, & Bartone, 2011b; Johnsen et al., 2013), our own findings indicate that it would benefit from *intentionally* selecting hardy candidates. The selection process would thereby reduce the false positive as well as false negative selection outcomes. However, in the frame of the dual-process hierarchical conception of hardiness, one question remains unanswered. *What level of dispositional resilience and dispositional vulnerability are minimal to join the armed forces and then train to later stay healthy and perform optimally in the challenging military context?*

The question of hardiness-based selection goes far beyond the mere determination of cut-off scores predicting health and

performance outcomes. The possibility of hardiness-tainted interventions and training strategies means that hardiness-based selection should not retain candidates for their actual hardiness level, but for their resilience potential. More research is thus necessary to determine under which conditions hardiness is improvable, what the relationships of hardiness to other resilience antecedents are, and which minimal level of hardiness is necessary at the inflow to become a resilient soldier. So the question of the selection does not concern the minimal level of hardiness to function correctly during the whole military HR cycle, but the minimal level to draw maximal benefits from individual, social, team-related, leadership, and organizational strategies (that we will expose in the next section).

Based on previous research, one could argue that the ideal soldier would show maximal levels of dispositional resilience and a close-to-zero level of dispositional vulnerability. We feel that (assuming that this perfect hardy candidate exists) selecting this type of personnel would later lead to problems both in garrison or during deployments. First, some authors (e.g. Grant & Shwartz, 2011; Le, Oh, Robbins, Ilies, Holland, & Westrick, 2011; Zettler & Lang, 2013) suggest that the exaggeration of “positive” psychological constructs’ can actually have deleterious effects. Second, regarding the specific characteristics of dispositional resilience, research shows that someone who is always seeking for challenges may also take

inconsiderate risks (e.g. Charnigo, Noar, Garnett, Crosby, Palmgreen, & Zimmerman, 2013; González-Iglesias, Gomez-Fraguela, & Luengo, 2014; Wilson & Scarpa, 2014); someone overcommitted may end up burnt out (e.g. Avanzi, Zaniboni, Balducci, & Fraccaroli, 2014; Chou, Li, & Hu, 2014; Ding, Qu, Yu, & Wang, 2014). In Chapter 2, we hypothesized that the moderation effect of hardiness between vigor and emotional exhaustion resulted from hardy individuals' ability to recognize their own vulnerability and/or from a tipping-point when work engagement decreases and burnout rises. Accordingly, we can speculate that both possibilities are correct, but that they concern two different populations: (1) a resilient/low vulnerable group that can admit its own weaknesses and (2) a resilient/invulnerable group at the verge of burnout because they cannot let go and/or admit they feel exhausted.

The military organization needs members that are resilient, but also able to admit their own vulnerability. During operations abroad, the military service member may sometimes feel the urge to get back home (because of the stress of the combat, of interpersonal conflicts, or of a dramatic situation at home). This can happen to the most vulnerable ones as well as the most resistant. However, the resilient/invulnerable would be at risk because he wouldn't admit that he faces difficulties. Therefore, he may cope inadequately (behavioral disruptions, disciplinary issues, alcohol abuse) and in the end the chain of command could decide to send him back home. The resilient/low

vulnerable type can admit his weaknesses and seek for help to cope with the problem. Eventually, the steps he undertakes will help to prevent an early repatriation. In other words, one has to accept and determine his own vulnerabilities to be resilient. In military selection, assessing dispositional vulnerability could help identify a group of applicants who do not admit their vulnerability, who could then be considered as a group at risk, to select out.

In sum, the dual-process hierarchical model emphasizes the importance to investigate the two dispositions towards stress. Future research should further develop a hardiness scale based on this model. Appendix A and B propose respectively a 30-item and an 18-item scale as a base for development. Using this kind of scale could help to distinguish between the candidates at risk because they are too vulnerable to stress, or because they present themselves as resilient/invulnerable, from the potential service members can face adversity but who know their own limitations regarding stress resistance.

Practical implications 2: Five tracks to improve military resilience

Hardiness theory provides an interpretative framework to understand that the attitudes of commitment, control, and challenge can enhance resilience, whereas the attitudes of alienation, powerlessness, and rigidity would increase vulnerability to stress. To develop hardiness-tainted resilience-

enhancing strategies, we can apply this interpretative framework to the five levels of resilience that Kamphuis et al. (2012) identified in their own model: the individual, social, team-related, leader-related, and organizational levels.

At the individual level, the traditional military training relies on a stress-inoculation model (Grossman, 1996). The recruit repeatedly experiences stressful situations and the trainers expect him to develop a mental armature and to become tougher. If this strategy can, to a certain extent, render the recruit more resistant to stress, there is no guarantee that he learns to appraise stressful experiences and to cope *adaptively* with them. He could precisely learn maladaptive ways of coping: withdraw from the environment (alienation), passively endure the situation (powerlessness) and experience it as a threat (rigidity). In the long run, he may become more vulnerable to stress because of a repeated exposure to stressors, or an accumulation of unprocessed ones.

Past research indicates that hardiness is, to a certain extent, trainable (e.g. Judkins, Reid, & Furlow, 2006; Maddi, Kahn, & Maddi, 1998; Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2009). Military training could be designed to specifically develop the three facets of dispositional resilience: commitment, control, and challenge. To this end, recruits or actual service members could experience stressful situations where involvement with the environment is necessary (e.g. resolving situations that requires the help of others), where the

individual must actively take decisions (e.g. and not only follow orders), and with a specific feedback emphasizing the personal benefit of the stressful experience. This strategy could be particularly effective among young adults who are generally prone to personality changes through work experiences (Roberts, Caspi, & Moffitt, 2003; Parmak, Mylle, & Euwema, 2013). For older recruits or actual service members, changing the stable personality trait could be more difficult. However, Jameson (2014) showed that hardiness-tainted intervention strategies can affect the appraisal of stressful situations without requiring a change personality. In our view, these strategies could target the social, team, the leader and the organizational level to enhance resilience.

Many researchers investigated the role of family hardiness to promote family or individual resilience (e.g. Chen, Clark, Chang, Liu, 2014; Deist & Greeff, 2014; Molfenter & Brow, 2014). However, by ethical regards to the privacy, the military organization has limited rights to intervene directly in the service member's social environment. Interventions at the social network level would therefore behoove the service member himself. For example, the way a soldier appraise and communicate about a coming deployment could be crucial to promote resilience among his social network. If the soldier emphasizes that he wants to participate in the deployment (commitment), that he chooses to participate (control), and that the experience will be enriching for himself as well as for the

members of his social network (challenge), he is more likely to foster resilience among them than if he presents the deployment as an inevitable part of the job (alienation), mandatory (powerlessness), that will affect negatively the social network's stability (rigidity). Educating service members on how to communicate with their social environment about their job could thus help to enhance family resilience and individual resilience in turn.

The military team is a powerful instrument to influence the individual's appraisal of a stressful event. The members of a military group experience stressful situations together (e.g. combat situations, but also uncertainty regarding the return date) and, in the aftermath of such an event, a natural process of experience sharing takes place. The team-members communicate their interpretation of the event, the place they took in, and eventually how they felt during the event. This process contributes to the building of a common story that will inevitably influence the individual's appraisal of the event. Here also, psycho-education could help to foster this process. Also, an external consultant (like the field psychologists as they exist in the Belgian military organization) could help to orientate this natural process, for example during a "third-location decompression" program (see Garber & Zamorski, 2012; Jones, Jones, Fear, Fertout, Wessely, & Greenberg, 2013; Terte, Wray, & O'Sullivan, 2014). His role would be to emphasize the broader perspective in which the event took

place (commitment), the definite influence that the members of the group had during the event (control), and how the group gained in maturity through this experience (challenge). By doing so, resilience could be improved at the group level.

The leader should also play his role of catalyst in the aftermath of a stressful event. Leaders already implicitly play this role. One of their missions is to conduct the team and give their own interpretation of mission-related events in an after action review or mission debriefing. By doing so, military leaders occupy a crucial place in the team to influence cognitions and behaviors of the team members. Bartone, Barry, and Armstrong (2009) proposed explicit advices for leaders to guide the resilience processes of commitment, control, and challenge and to avoid the vulnerability processes of alienation, powerlessness, and rigidity. For example, leaders should “share hardship with troops” (commitment), “set achievable standards” (control), and “be willing to change the plan to meet changing circumstances” (challenge). Bartone et al. expect behaviors such as “criticize and denigrate initiative”, “not listening to feedback”, and “never take a risk” as respectively promoting the service member’s alienation, powerlessness, and rigidity, and consequently increasing his vulnerability to stress.

Finally, the military organization could improve the resilience of its members through its internal and external communication. Internally, the military organization could promote the attitudes of commitment, control, and challenge as

organizational values. To proudly serve, the military service member should commit to his organization, his leaders, his colleagues, and his tasks; he should actively take decisions wherever necessary; and always consider adversity as a challenge to be rallied. The military organization could use the same values for its external communication and in particular to advertise for recruitment. If the military would present these values as core values, it would be more likely to attract candidates who already identify to these values, i.e. hardy candidates. By doing so, the military organization could impact on the earliest stages of the inflow phase.

“Hardiness in the heart of military” in seven heart-beats.

1. Hardiness is better understood as a dual-process hierarchical phenomenon.
2. The military organization would benefit from hardiness-based selection.
3. Hardiness training could improve dispositional resilience in young recruits.
4. A hardy leader’s behavior is crucial to improve service members’ resilience.
5. Hardiness intervention strategies at the team-level could improve team-members resilience.
6. Educating service members on how to communicate about a coming deployment may improve family resilience and individual resilience in return.
7. Internal and external organizational communication can play a role in service members’ level of resilience.

Limitations, strengths and future research

Each chapter of this dissertation presented its own limitations and we detailed them at the end of their respective discussion section. The following section intends to address the limitations and strengths of the dissertation as a whole.

First, the purport of the findings presented in Chapter 2, Chapter 3, and Chapter 4 could be limited by the small sample size used for the analyses (respectively 177, 171, and 65 participants). The longitudinal approach of Chapter 2 and 4 inevitably entails a certain amount of participants' dropout, but reinforce the robustness of the findings. Also, the strength of the present dissertation is the ecological validity of the studies. We conducted them in real-life stressful situations that are relevant to the military selection, basic training, and deployment contexts. Therefore, our findings are at least generalizable to these situations and the military population, and possibly to other comparable high-reliability occupations (e.g. police, firefighters, or other security forces).

Second, the total score approach we used in Chapter 2, Chapter 3, and Chapter 4 led inevitably to a loss of information (about the respective impact of hardiness' components). However, this method simplified the analyses and the interpretation of the results. Consequently, the emphasis on hardiness' relevance in the military context was clearer. However, the results of Chapter 5 emphasize that future researchers should use structural equation modeling to test simultaneously the effect of

the different hardiness' domains and facets. The possibility that these different aspects of hardiness may have different outcomes is of special interest to develop hardiness-based training and intervention strategies.

Third, the dual-process hierarchical model should be further validated. This view represents a fundamental shift in hardiness theory and research and its reach goes beyond the sole military context. To our knowledge, Chapter 5 of this dissertation is a unique attempt to test and support this model. However, one may find intriguing that, for example, dimensions such as control and powerlessness are hardly related (in Chapter 5, $r = -.23$). Tentatively, we can take a closer look at the items used in our comprehensive instrument (see Appendix A). For the time being, we can only speculate that control would be a matter of aspects that are internal, stable, and specific (it concerns the "success" and "plans" of the person) whereas powerlessness would be more related to external, unstable, and global aspects (it concerns the future, "events" or generalities referred to with "often" or "usually"). In other words, the dual-process hierarchical model would take into account that we can feel resilient regarding specific successful events (or plans that we make on our own), while vulnerable in the face of the vague events and distressing aspects in the near or distant future. We can apply the same line of thoughts to commitment and alienation ($r = -.35$): three commitment items concerns specifics (work activities, activities,

and tasks) whereas the alienation items are more global (people, life in general). Finally, regarding challenge and rigidity ($r = -.09$), it is not unconceivable that one can have a lot of structure in his life, and still be positively challenged by changes.

The challenging issue of the independence of phenomena that actually seem related constitutes, in our view, the richness of the dual-process hierarchical model. It acknowledges the complexity of the human being and his inner ambivalence(s). However, more research is necessary to determine how the resilience and vulnerability processes function. The job demands-resources model (Bakker, Demerouti & Sanz-Vergel, 2014) that we evoked in Chapter 3 and 4 could represent a fertile theoretical background to investigate the dual-process of hardiness in relation to the dual-process of the job demands-resources model. Hypothetically, dispositional resilience, as a personal resource, would be more related to work engagement and the motivational process, whereas dispositional vulnerability, as sensitivity to stressors and demands, would be more related to burnout and the health impairment process. As the dual-process hierarchical model implications could go far beyond the military context, future research should entail a test of the model in different populations (other than applicants for the military), contexts (other than the military one), and cultural backgrounds (other than the Belgian one). Replication

studies are needed to ensure that our results were not specific to our sample and methods.

Finally, the use of three different scales limits the possibility to compare the studies presented in Chapter 2, 3, and 4. However, our method allowed us to test the appropriateness of these scale among Dutch, Belgian Dutch-speaking, and Belgian French-speaking samples. By doing so, we addressed our second research question (how to measure hardiness in the military selection context) and showed that an improvement of the existing scales was necessary to apply their content to the Belgian (Dutch- and French-speaking) selection context. This dissertation prepared the ground for the development of an appropriate instrument to assess hardiness-related phenomena in the military selection context. Furthermore, the participation of Dutch-speaking and French-speaking samples extends the cross-cultural validity of the hardiness construct to two West-European main cultural streams: the Germanic and the Latin ones.

Conclusion

In these times of financial crises, a burden of austerity weights on many Departments of National Defense. The cuts in expenditures affect the manpower of our departments, with an impact on the operational tempo; less people to execute the same amount of deployments, eventually with less organizational, material, and logistic support. Therefore, the

military organization needs members who are resilient all along a military HR cycle that runs increasingly faster. Individual resilience could help to reduce attrition at the basic training phase, to lower absenteeism at the garrison training phase, to improve motivation at the pre-deployment phase, performance during deployment, recovery after deployment, and finally to help Veterans to be “fit for life”. Several levels of antecedents promote individual resilience: individual, social, team-related, leadership-related, and organizational antecedents. Hardiness is one individual antecedent of resilience among others and was the focus of the present dissertation. Without pretending to solve the personnel issues that the military organization will have to face in the coming years, this dissertation intended to provide a humble building block to understand and improve resilience among military service members.

The cuts in expenditure also affect other high-reliability occupations: police departments, fire-fighters brigades, and other security forces must learn to do more with less means. What we found in this dissertation may also be applicable to these occupations. These organizations have their own HR cycle, their own challenges to tackle, but the ability of hardy individuals to positively adapt to stressful circumstances makes personality hardiness a relevant variable also in these contexts. The same could be true to many high-pressure occupations (e.g. pilots, anesthetists, and politics).

Beyond the occupational psychology scope, hardiness is a *manière d'être* in the world, a way to interpret the reality and to act on this reality. As Ellis (1991) noted: "*You largely feel the way you think*" (p. 14); the human being is not affected by life events *per se*, but by his cognitive interpretation of these events. Hardiness is a prism of positivity, helping to place life events in a broad meaningful perspective (commitment), to feel as an active agent in life (control), and to consider setbacks as positive challenges favoring personal flourishing (challenge). In direct line with its existential roots, hardiness is not a form of toughness, but rather a form of existential courage. Hardiness theoretical framework emphasizes that the human being establishes meaning through his decisions and actions. He is more than a passive victim of his environment, prey of life contingencies. By attempting to establish meaning through his will and actions, the human being may be the architect of his own life.

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Appendix A

A 30-item Dual-Process Hierarchical Scale of Hardiness

Dispositional Resilience

Commitment

1. I really look forward to my work activities
2. Most of my life gets spent doing things that are meaningful
3. Most days, life is really interesting and exciting to me
4. I enjoy most things in my life
5. I really look forward to the tasks I have to do each day

Control

6. When I make plans I'm certain I can make them work
7. How things go in my life depends on my own actions (French version)
I can solve most of my problems on my own (Dutch version)
8. I feel confident I can handle just about any challenge
9. My successes are related to the choices I make
10. My successes are because of my efforts and ability

Challenge

11. I'm always seeking for challenges to overcome
12. I see stressful events as opportunities to grow personally
13. I take a head-on approach to facing problems in my life
14. Changes in routine are interesting to me
15. I enjoy the challenge when I have to do more than one thing at a time

Dispositional Vulnerability

Alienation

16. I often feel alienated from the people around me.
17. Life in general is boring for me.
18. I feel that my life is somewhat empty of meaning.
19. Sometimes life seems meaningless to me.
20. I often feel that my life has no purpose.

Powerlessness

21. I often feel powerless to control events in my life.
22. No matter how hard I try, my efforts usually accomplish nothing.
23. I often feel helpless.
24. Trying hard doesn't pay since most things still don't run out right.
25. I don't think there is much I can do to influence my own future.

Rigidity

26. I carefully plan just about everything I do.
27. I like to have a lot of structure in my life.
28. It bothers me when my daily routine gets interrupted.
29. I don't like to make changes in my everyday schedule.
30. I like to have a daily schedule that doesn't change very much.

Appendix B

An 18-item Dual-Process Hierarchical Scale of Hardiness

Dispositional resilience

Commitment

1. Most days, life is really interesting.
2. I really look forward to the tasks I have to do each day.
3. Most of my life gets spent doing things that are meaningful.

Control

4. I feel confident I can handle just about any challenge.
5. When I make plans I'm certain I can make them work.
6. My successes are because of my efforts and ability.

Challenge

7. I see stressful events as opportunities to grow personally.
8. I enjoy the challenge when I have to do more than one thing at a time.
9. I'm always seeking for new challenges to overcome.

Dispositional vulnerability

Alienation

10. I feel that my life is somewhat empty of meaning.
11. I usually feel alone in the world.
12. Sometimes, life seems meaningless to me.

Powerlessness

13. Trying hard doesn't pay since most things still don't run out right.
14. I don't think there is much I can do to influence my future.
15. No matter how hard I try, my efforts usually accomplish nothing.

Rigidity

16. It bothers me when my daily routine gets interrupted.
17. I don't like to make changes in my regular activities.
18. I like to have a daily schedule that doesn't change very much.