

Soldiers Lead Themselves to More Success: A Self-Leadership Intervention Study

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Neck and Manz (1999) elaborated in their article “In Search of the Self-Lead Soldier” on the need for continuous improvement of personnel qualities such as increase in self-efficacy, increase of performance, and decrease of perceived strain. Self-leadership is a tool that fosters exactly these personal resources. This study examines self-leadership training effects on soldiers participating in a military training course over 14 weeks. It is the first self-leadership training study to evaluate performance improvement using objective criteria (examination marks, physical tests) in intervention and control group consisting of soldiers of the Austrian army. Its design features a large sample ($N = 130$), duration of self-leadership training over 10 weeks, and evaluation over 4 time points. The intervention group accomplished significantly higher educational achievements in examinations and physical tests. Also levels of self-efficacy were significantly higher and levels of strain were marginally to significantly lower.

Keywords: self-leadership, self-leadership training, performance, self-efficacy, perceived strain

Because of the sheer variety of assignments in most extraordinary settings, soldiers are confronted with exceptional strain and challenges. To meet these demands at a physical, psychological, and cognitive level and also to better manage such requirements, the ability to swiftly adapt to any encountered situation is necessary. As defined previously by Peter Drucker (1999), this requires personalities who are capable of intrinsically directing themselves and motivating themselves, who work on their personal skills, and who are self-assured and reflect their own behavior continuously. Thereby, the focus is placed on soldier’s individual skills, which needs to be taken into account during military

training. Neck and Manz (1999) already portrayed this need for continuous and consistent improvements of individual skills in their article “In Search of the Self-Lead Soldier.” In their vision, an army of the 21st century must place emphasis on continuous improvements of individual qualities in military personnel. The self-leadership approach offers the unique opportunity to improve the personal quality and individual, competency-based skills of soldiers. Through combination of several strategies, soldiers learn to consciously influence their own behavior, to control it and to guide it, resulting in better leadership of themselves and others (Furtner, Baldegger, & Rauthmann, 2013; Manz, 1983; Manz & Sims, 1991). The effects of the self-leadership approach are considered to reach far beyond the well-known self-management strategies (Furtner, Rauthmann, & Sachse, 2015; Neck & Houghton, 2006). For example, the potential to improve self-efficacy and thereby increasing overall performance in addition to improvements in self-esteem are attributed to these strategies (Neck & Manz, 1996; Prussia, Anderson, & Manz, 1998; Sims & Manz, 1996; Unsworth & Mason, 2012). In this study, the effects of self-leadership on the

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personal performance of soldiers was examined. Improvements in performance were assessed with objective measures such as examination marks of theoretical and practical tests as well as results of physical tests achieved by soldiers during a military training course. In addition, effects on self-efficacy and perceived strain by self-leadership were investigated. The concept of self-leadership is a development of the behavior-related self-management approach and was described by Neck and Manz (2012, p. 5) as "The Process of Influencing Yourself." Neck and Houghton (2006) defined self-leadership as a unique concept, which is based on different and distinguishable theories (e.g., self-determination theory, which specifically describes intrinsic motivation) (Manz, 1986). The uniqueness of self-leadership was shown by Furtner et al. (2015) by demonstrating a difference between distinct but related motivational constructs such as intrinsic motivation, self-regulation, self-efficacy, and leadership. Self-leadership can be distinguished fundamentally in three areas from similar approaches: (a) Standards of self-influence—self-leadership broadens the behavior-oriented spectrum of the self-management approach into a higher order system of self-influence. Although self-management focuses on the question of "what" needs to be done, self-leadership additionally takes into account the "why and how" something needs to be done. The latter approach achieves that tasks are experienced as naturally rewarding (intrinsically motivating) (Manz, 1986). (b) Intrinsic motivation and self-regulation—self-leadership favors intrinsic motivation (natural reward), in which case the reward (positive amplification) also involves the carrying out of the activity in itself in contrast to the self-management approach, which rewards the final result separated in time from the task (Manz & Neck, 2004; Neck & Manz, 1996). (c) Strategies of self-control—(1) choice of working context: People with high self-leadership skills actively search for a work environment in which they can experience the positive influence of motivation and thereby improve their working situation (Manz, 1986) and (2) task-related performance strategy: Naturally rewarding aspects are consciously integrated in the process of execution. (c) Self-influence through thought patterns—as tasks do not only consist of pleasant and desirable but also unpleasant and undesirable elements, the focus of thoughts

is of vital importance. Guidance of mental energy toward the desired and positive aspects of a task (e.g., challenge, opportunity for learning, and free choice) results in an improvement of intrinsic motivation. In summary, self-leadership includes behavior-focused strategies, components of control, and self-regulation as well as aspects of motivation (Neck & Houghton, 2006).

Houghton and Neck (2002) differentiated three primary self-leadership strategies: (a) behavior-focused strategies: self-observation, self-goal-setting, self-reward, self-punishment, self-cuing; (b) natural reward strategies (intrinsic motivation); and (c) constructive thought strategies: visualization (imagination) of successful achievement, self-talk, evaluation of beliefs and perceptions. The behavior-focused strategies aim directly at alterations of one's own behavior (self-management). Control of behavior is executed by self-observation. If a discrepancy between the current state (actual state) and the desired state (target state) becomes evident, a reduction of this discrepancy is pursued using self-regulatory strategies. This cybernetic process (regulation process) is based on the self-regulation/control theory of Carver and Scheier (1998). Another foundation of the self-leadership concept is the social-cognitive (learning) theory of Bandura (1991). In this approach, goals are set proactively resulting in a conscious increase of discrepancy between the current state and the target. Subsequently, this discrepancy is reduced by specific behavior. In the process of reaching the target state, self-observation provides information about the progress. Self-reward as well as self-punishment either strengthen desirable behavior or reduce undesirable behavior. Self-cuing uses external memory aids such as Memos, Post-It's, or motivational posters as well as social reminder cues (Houghton & Neck, 2002). Natural reward strategies are a crucial characteristic feature of self-leadership strategies (Furtner & Baldegger, 2013). These are mainly based on literature on intrinsic motivation available to date (Deci, 1971, 1972, 1975; Deci & Ryan, 1980) and more specifically on the self-determination theory (Deci & Ryan, 1987). Building on work of White (1959) and DeCharms (1968), the cognitive evaluation theory assumes that a need for competency and self-determination serve as the primary mechanism leading to intrinsic

motivation. The focus on pleasant and joyful aspects of a task as well as the integration thereof in the task can improve feelings of competency and self-determination (Deci & Ryan, 1987). Another requirement at the root of natural rewards is the usefulness of the task. This is important as a person can experience feelings of competency and self-determination but still have difficulties to feel motivated for the task. It shows that each task needs a purpose connected with personal value. The usefulness connected to personal values of one's actions is described by Neck and Manz (2012) as a basic human need. If a task complies with personal values, it is also experienced as naturally rewarding. Constructive thought strategies act at the level of self-influence and control of habitual thought patterns (Neck & Manz, 1992). In this process existing thought patterns are evaluated for their functionality and dysfunctional or irrational beliefs are replaced by constructive thought patterns (Manz & Neck, 2004; Neck & Manz, 1992). Visualization of successful performance and self-talk serve to improve individual motivation concerning the achievement of goals and the maintenance of motivation.

Self-Leadership Training

Self-leadership can be acquired and thus enables persons to adopt self-leadership skills as well as self-leadership competency (Furtner, Sachse, & Exenberger, 2012; Manz, 1986; Neck & Manz, 2012). Improvements of self-leadership skills are connected to several different positive consequences. In current literature four self-leadership training studies were described so far: Neck and Manz (1996) trained accountants of an American airline close to insolvency for 6 weeks focusing on cultivation of constructive thought strategies and more specifically on the subdomains visualization of successful achievement, self-talk and evaluation of beliefs and perceptions. With this approach, positive effects in self-leadership skills were shown. Improvements in mental and cognitive performance, increase in positive emotions (e.g., enthusiasm) and a reduction of negative emotion (e.g., nervousness) were detected in addition to an increase in self-efficacy. Stewart, Carson, and Cardy (1996) trained employees in the hotel sector in strategies of natural reward and constructive thought strategies. At the center of this

study was the management of difficult and unattractive, but necessary, tasks. General effects resulting in improvements of self-leadership skills were not shown; however, it was demonstrated that people with little developed conscientiousness (personality trait) benefited most from the training. It needs to be noted that a limitation of the above described studies is the fact that not all self-leadership dimensions were trained in both cases. Furtner et al. (2012), however, for the first time, trained all three self-leadership dimensions (behavior-focused strategies, natural reward strategies, and constructive thought strategies). After 4 weeks of training, the sample of university students displayed a general improvement of self-leadership skills. These effects became apparent in particular in constructive thought patterns (visualization of successful performance (mental imagery), self-talk, and natural reward strategies as well as self-cuing). Furthermore, using qualitative analysis, the five most important and most frequently used strategies were identified (natural reward strategies, self-cuing, self-talk, mental imagery, self-reward). Unsworth and Mason (2012) examined the effects of online conducted self-leadership training with a focus on work pressure (strain). Evidence for positive training effects could be detected, which led to a decrease in subjectively perceived work strain. Moreover, improvements of positive emotions and self-efficacy were shown. The authors postulated that self-leadership can be used as a strategy for stress management. Taken together, studies have demonstrated that self-leadership training can improve self-leadership skills and that positive consequences are connected to it as for example improvements of self-efficacy and the decrease in subjectively perceived strain. It has to be critically noted, however, that in the described studies the positive effects were measured using self-reported information from questionnaire-based assessments and interviews.

Objectives and Hypotheses

Within the context of "In Search of the Self-Lead Soldier" by Neck and Manz (1999), this study addressed self-leadership training in the military setting. More specifically, the question whether self-leadership training exerts positive effects on personal performance of soldiers was

investigated using objective measures for the first time. Results from theoretical and practical exams as well as physical tests obtained during military training were used for efficacy measurements. Also, a potential effect of self-leadership training on self-efficacy and perceived strain (psychological performance) of soldiers was examined. The training was conducted within the framework of a 14-week training course for noncommissioned officers. Accompanying the military training, self-leadership skills were developed and improved. All three strategy dimensions including their substrategies were taught to participants. The objective of this study was to provide evidence of the positive effects of self-leadership also in the military context. For this purpose, the following considerations were taken into account: Can efficacy of self-leadership be demonstrated within the framework of military education? Do improved self-leadership skills lead to higher performance? Can this training increase self-efficacy? What effects has self-leadership on subjectively perceived strain? Are soldiers who received self-leadership training more successful than others? This study attempts to demonstrate the already established improvements of performance by using externally evaluated tests and examinations within the military education system as a measure. Results of educational examinations as well as results from physical performance tests were used as key success criteria and include all examination and test results acquired during the military training program. Physical tests consist of results achieved in a 2,400-m run as well as a 500-m obstacle course composed of 20 obstacles. Based on the described considerations and current state of knowledge this study examines the following question:

The efficacy of training interventions was already shown several times in previous studies (Furtner et al., 2012; Neck & Manz, 1996; Prussia et al., 1998; Stewart et al., 1996; Unsworth & Mason, 2012). This efficacy lies in the increase of self-reported application of self-leadership strategies and is considered the central foundation for increase of personal performance, which was shown already in several studies (Furtner et al., 2015; Manz, 1986; Neck & Houghton, 2006; Neck & Manz, 2012; Stewart, Courtright, & Manz, 2011). Neck and Manz (1996) were able to detect an increase in

mental and cognitive performance. Equally, an improvement in performance was also shown in the study of Prussia et al. (1998). Thus it is expected that in the context of military training, improvements will be observable using the already described key success criteria of examination results and physical tests. This study will determine whether self-leadership trained soldiers can be distinguished from untrained soldiers by higher educational achievements and whether this difference can be detected in differences of examination results and physical performance. The following hypothesis is formulated:

Hypothesis 1: It is assumed, that self-leadership trained soldiers achieve a higher self-reported self-leadership and higher objective educational achievements (examination marks and physical performance).

Another consequence of self-leadership training is the improvement of self-efficacy, which was described by Manz (1986) as a key characteristic of the self-leadership concept. Self-efficacy describes self-evaluation of personal skills (resources), which are necessary to complete certain tasks (Bandura, 1986, 1991; Gist, 1987). Therefore self-observation is of significant importance, because the application of self-observation can lead to improved self-awareness and enhancement of self-focus (Neck & Houghton, 2006) further resulting in improved self-evaluation (self-efficacy). An increased level of self-efficacy consequently leads to higher performance standards, increased efforts, and more tenacity in pursuance of the goal and ultimately to even higher levels of personal efficacy. Prussia et al. (1998) provided empirical evidence for these claims by showing that self-efficacy mediates performance. Also, Unsworth and Mason (2012) found in their study improved levels of general self-efficacy. This increase in general self-efficacy and the resulting positive effects are specifically important for soldierly challenges. Therefore, this study examines whether soldiers trained in self-leadership can be distinguished from untrained soldiers by higher levels of self-efficacy.

Hypothesis 2: It is assumed, that soldiers trained in self-leadership distinguish them-

selves from untrained soldiers by higher self-efficacy.

Unsworth and Mason (2012) postulated that self-leadership is also suited for stress management. According to Hobfoll (1989) the loss or the impending loss of valued resources like, for example, objects, personal characteristics, conditions, or energies, is connected with higher levels of stress (perceived strain). Empirical studies of Binnewies, Sonnentag, and Mojza (2009) as well as Chen, Westman, and Eden (2009) could show evidence that the reduction of strain can be connected with an increase in resources. Furthermore, Unsworth and Mason (2012) showed that self-leadership training creates resources, which cannot only be used against the current stressor, but are also able to prevent occurrence of future stressors. In the context of military assignments, this finding gains particular significance. Especially on missions, but also during military training, soldiers are exposed to high levels of pressures and thus require effective stress management in order to remain operational and capable to stay in command. Therefore, the effects of self-leadership on perceived strain of soldiers are investigated and the following hypothesis formulated:

Hypothesis 3: It is assumed, that soldiers trained in self-leadership distinguish themselves from untrained soldiers by lower levels of perceived strain.

Methods

Study Design

In the present study, a quasi-experimental longitudinal intervention and evaluation design was used. This examination was conducted during military training for noncommissioned officers over a period of 14 weeks.

Sample

The sample consisted of soldiers in basic military training for all military services (infantry, artillery, engineers, etc.). The participants consented voluntarily to an active (intervention group) or passive involvement (control group). At the first evaluation time point (T1), the total sample comprised 130 subjects (121 men, 9 women). The intervention group ($n = 50$) in-

cluded those volunteers, who chose to participate in the self-leadership training (control group, $n = 80$). The average age was 23.15 years ($SD = 3.27$; range = 18–36 years). Average time of military service was 3.04 years ($SD = 1.60$; range = 1–8 years). Changes to the sample size occurred during the training as some soldiers had to end the course prematurely due to a variety of reasons (e.g., low performance, sickness). The resulting sample size for each evaluation time point was: T2, $n = 118$ subjects (110 men; 8 women); T3, $n = 117$ subjects (109 men; 8 women); T4, $n = 115$ subjects (107 men; 8 women).

Experimental Procedures

At the beginning of this study all participants were assessed in the pretest also referred to as the first evaluation time point (T1). Questionnaire based tests were used to assess self-leadership (Revised Self-Leadership Questionnaire; RSLQ), self-efficacy (New General Self-Efficacy Scale; NGSE), and perceived strain (Perceived Stress Questionnaire 20; PSQ20). Further evaluation time points (T2, T3, and T4) were conducted using the same scales every 4 weeks until completion of the military training. Soldiers, who chose to participate voluntarily in self-leadership training, formed the intervention group. The control group consisted of all other soldiers on this military training course. Immediately after the first assessment, the intervention group started to receive self-leadership training.

Training Concept

The training concept developed for the presented study was essentially based on the suggestions by Neck and Manz (2012). All three self-leadership strategies (behavior-focused strategies, natural reward strategies, and constructive thought pattern strategies) and also respective substrategies were covered. For design of training content and training conduct, special attention was paid to the practical application, more specifically the active practice of self-leadership strategies, which were already strongly demanded by Neck and Manz (2012). The progressive training program focused over 10 weeks on short theoretical instructions, prolonged periods of individual practice, and re-

flection on the application of the learned content. The training concept was divided in three phases: (a) introductory phase, (b) information and application phase, and (c) reflection phase:

Introductory phase. Every person leads him/herself. Even in highly controlled situations human behavior is influenced in various ways (Neck & Manz, 2012), often governed by processes of the unconscious mind. In this phase, the potential that lies in the conscious use of self-leadership was made clear to participants. Using an interactive process, subjects are sensitized to a variety of application possibilities as well as the resulting positive effects. Special emphasis was given to making connections with already established knowledge and experiences. To establish self-leadership consciousness and to increase interest, several successful people were used for illustration purposes; for example, Arnold Schwarzenegger, who said, "As long as your mind is convinced that you can do something, then you can do it. I always imagine I have already reached my goal." Furthermore, the following questions were discussed in a group setting such as "Why are some people more successful than others?" or "Why are some people better at mastering crisis than others?" During these discussions associations to self-leadership strategies were established. In addition to the two hour long introduction session, a task was set for the participants to connect personal wishes and goals to self-leadership over a period of 1 week. During this time soldiers had time to reflect on the task and optionally also discuss it with others. At the beginning of phase 2 (workshop 1) those experiences were reflected. Total duration of the sensitization phase was 1 week.

Information and application phase. This two-part phase served two main goals: provision of theoretical knowledge about self-leadership and practical application of those strategies. Special focus was given the transfer process from theory to the practical application. To achieve a successful transition, the transfer of knowledge was combined with a personal planning phase, during which every soldier had to create an individual plan of implementation and application of self-leadership strategies in everyday life. Three-hour workshops were held to facilitate practical implementation and were dedicated to individual self-leadership strategies and substrategies: Workshop 1 on behavior-

focused strategies, Workshop 2 on natural reward strategies, and Workshop 3 on constructive thought pattern strategies. Two weeks were scheduled for the practical implementation as special emphasis was placed on the application of self-leadership strategies especially during the initial phase. At the end of each 2-week phase, a reflection on the application of strategies was performed. Thereby, any open questions were clarified, experiences exchanged between participants and required adaptations implemented. After completion of the reflection the next workshop was started.

Reflection phase. At this point in training a complete review of the entire self-leadership training was performed. To this end a 3-hr reflection workshop was held, in which theoretical concepts as well as the practical application thereof were repeated and any outstanding questions about the training were discussed. Also a significant part of this workshop was dedicated to the exchange of experiences between participants. The aim was to strengthen soldiers in their actions so far or to make potentially necessary adaptations to create a lasting effect.

Measures

Self-leadership. For measurement of self-leadership the German version of the RSLQ (RSLQ-D) of Andreßen and Konradt (2007) was used. This is a slightly revised version of the original English scale by Houghton and Neck (2002) and was validated in German language. In comparison to the original scale comprising 35 items, the RSLQ-D consists of 27 items. All three self-leadership strategies as well as the substrategies can be measured with the RSLQ-D. An example of an item which is used for the measurement of behavior-focused strategies (self-observation) is the following statement: "I pay attention to how well I am doing in my work." Answer options to each item follow a five-step Likert scale ranging from 1 (*not at all accurate*) to 5 (*completely accurate*). The overall scale (RSLQ-D) demonstrates a high internal consistency in this study at T1 ($\alpha = .85$) and at T4 ($\alpha = .93$).

General self-efficacy. General self-efficacy was measured with the NGSE by Chen, Gully, and Eden (2001). The scale is a development of the General Self-Efficacy Scale by Schwarzer and Jerusalem (1995) resulting in a

one-dimensional, theory-driven scale, which is stable over time and provides higher reliability (Chen, Gully, & Eden, 2001). The scale consists of eight items and is economical in use. An example item is "I will be able to successfully overcome many challenges." Answer options to each item follow a 5-step Likert scale ranging from 1 (*disagree*) to 5 (*strongly agree*). In this study, NGSE demonstrated high internal consistency at T1 ($\alpha = .85$) and at T4 ($\alpha = .93$).

Perceived strain. For measurement of the current, subjectively perceived strain (stress) the PSQ20 by Fliege, Rose, Arck, Levenstein, and Klapp (2001) was used. The version selected for this study is a validated translation of the original Perceived Stress Questionnaire (Levenstein et al., 1993) into German language with a concomitant reduction from 30 to 20 items (Fliege et al., 2001). PSQ20 assesses the following four scales with five items each: worries, tension, joy, and demands. An example of the scale on challenge is "You feel that too many demands are being made to you." Answer options to each item follow a four-step Likert scale ranging from 1 (*almost never*) to 4 (*usually*). The overall scale (PSQ20) showed satisfactory internal consistency at T1 ($\alpha = .70$) and at T4 ($\alpha = .74$).

Results

First, the efficacy of self-leadership training was tested as described in Hypothesis 1 using a self-reported questionnaire. Both groups (intervention and control group) were tested for a potential difference in self-leadership using RSLQ-D. At the start of the study at T1, $t(85.197) = 0.58$, *ns*, no significant difference between the two groups could be detected and it was confirmed that the sample can be considered equivalent. For calculations of efficacy (efficient application of self-leadership strategies), an analysis of variance with repeated measurements was applied with time as within-subject variable (T1, T2, T3, T4) and both groups as between-subjects variable (intervention and control group). As expected, a significant Group \times Time interaction was found for self-leadership, $F(2.663, 297.541) = 11.521$, $p < .001$. This demonstrates a significant increase of self-leadership behavior in the intervention group ($M_{T1} = 3.50$; $M_{T2} = 3.86$; $M_{T3} = 3.88$; $M_{T4} = 3.91$), whereas in the control group

values of self-leadership behavior decreased with slight improvements toward the end of the study (see Figure 1), but never reaching the value of T1 again ($M_{T1} = 3.45$; $M_{T2} = 3.41$; $M_{T3} = 3.36$; $M_{T4} = 3.42$).

Furthermore, the influence of self-leadership training on the educational success and performance ability of soldiers was examined using objective measures. A difference in higher educational achievements between self-leadership trained soldiers and untrained soldiers was expected. For this purpose, examination marks—weekly tests for the first 6 weeks, final examination; scores ranged from 1 (*best*) to 5 (*worst result*)—and physical performance were used. The 6-week tests (WTs) were theoretical knowledge tests, which soldiers have to perform once a week during the military training course. Both final examinations (on educational methodology = 1, on leadership in mission = 2) were conducted at the end of the training course and consisted of both, a theoretical and a practical segment. Physical performance was examined with a running test over 2,400-m and completion of a 500-m obstacle course with 20 obstacles. The expectation was that self-leadership trained soldiers perform better in examinations as well as in physical tests. The difference between both groups was calculated using a *t* test for independent samples. The participants of self-leadership training reached significantly

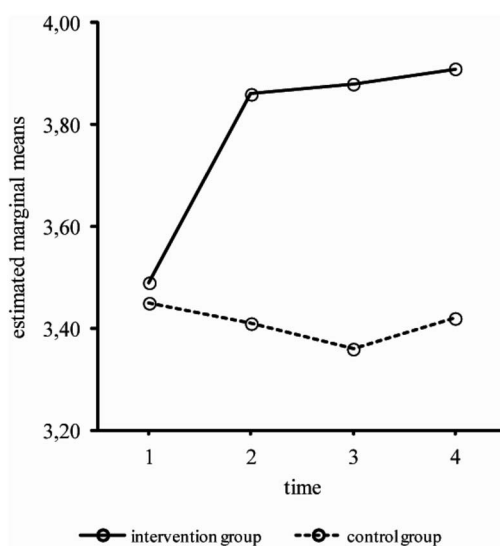


Figure 1. Illustration of self-leadership development.

better results in most WTs. An exception were the first WTs at which both groups did not differ significantly as well as WT 3 and 4, when a difference in test results was observed. In this case untrained soldiers achieved significantly better results (see Table 1).

In final examinations, however, self-leadership soldiers attained significantly better results. Furthermore, nine soldiers in the intervention group and five soldiers of the control group passed the final examination with distinction. Two trained soldiers and five untrained soldiers have failed the final examination. Similarly, a significant difference was found in physical performance. The intervention group reached significantly better running and obstacle course times (see Table 2). Hypothesis 1 could be confirmed as self-leadership trained soldiers differ from untrained soldiers by higher level of self-leadership and higher educational achievements.

Hypothesis 2 was focused on self-efficacy. It was expected that self-leadership trained soldiers display higher levels of self-efficacy compared to untrained soldiers. At the beginning, both groups (intervention and control group) were examined for a possible difference in self-efficacy (NGSE). No significant difference, $t(128) = 0.20$, *ns*, could be observed, thus both groups can be considered equivalent with regards to self-efficacy. The comparison of means over T1 to T4 showed a continuous increase in self-efficacy on four evaluation assessments in the intervention group ($M_{T1} = 3.98$; $M_{T2} = 4.35$; $M_{T3} = 4.35$; $M_{T4} = 4.51$), whereas levels

of self-efficacy were variable in the control group ($M_{T1} = 3.97$; $M_{T2} = 4.00$; $M_{T3} = 3.89$; $M_{T4} = 3.93$) (see Figure 2). For further calculations, a covariant analysis was performed. The dependent variable was defined as self-efficacy at T4, the covariant as self-efficacy at T1, and as fixed factors both groups were used. The result showed with corrected R^2 of 41.20%, a significant explained variance, $F(2, 112) = 40.956$, $p < .001$, significant effects of the covariant, $F(1, 112) = 50.593$, $p < .001$, and the factor group, $F(1, 112) = 27.763$, $p < .001$. This means that under control of self-efficacy in T1 a significant difference in self-efficacy between intervention and control group can be observed. This confirms Hypothesis 2. After completion of the training (T4) levels of self-efficacy are higher in participants of self-leadership training.

With Hypothesis 3 the effects of self-leadership training on perceived strain (stress) were investigated. It was expected that self-leadership trained soldiers perceive less strain than untrained soldiers. Before start of training at T1, potential differences between groups were examined with PSQ20 and showed that the intervention group displayed marginally higher strain, $t(128) = 1.52$, $p = < .10$, and significantly more worries, $t(128) = 2.51$, $p < .05$. Comparison of means displayed stable values for perceived strain in the intervention group ($M_{T1} = 28.50$; $M_{T2} = 27.78$; $M_{T3} = 26.59$; $M_{T4} = 28.21$). On the contrary, the progression of perceived strain in the control group (see Figure 3) was at first steeply increasing with slightly falling values at T3 and T4 ($M_{T1} =$

Table 1
Means and Standard Deviations of Group Differences From the Overall Result, Week Tests, and Final Examinations

Scale	IG		CG		<i>t</i> -value	<i>p</i> value	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Overall result	3.07	.78	3.40	.50	-2.48**	.008	.50
Week Test 1	2.60	1.34	2.29	1.06	1.25	.110	.27
Week Test 2	2.67	1.10	4.03	1.16	-6.19***	.000	1.20
Week Test 3	2.71	1.11	1.95	1.03	3.77***	.000	.71
Week Test 4	4.26	1.17	3.85	1.29	1.75*	.042	.33
Week Test 5	3.93	.97	4.85	.43	-5.86***	.000	1.23
Week Test 6	3.43	1.45	4.52	.94	-4.39***	.000	.67
Final Examination 1	2.36	1.01	2.77	.97	-2.17*	.017	.41
Final Examination 2	2.60	.99	2.93	.70	-1.96*	.028	.38

Note. *N* = 117. IG = intervention group (*n* = 42); CG = control group (*n* = 75).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Means and Standard Deviations of Group Differences From the Physical Test Results Total, Obstacle Course, and Running Test (Time = Seconds)

Scale	IG		CG		<i>t</i> -value	<i>p</i> value	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Physical test results total	804.20	68.32	845.22	75.95	-2.81**	.003	.57
Obstacle course	227.32	27.59	252.78	46.03	-3.22***	.000	.67
Running test 2400m	577.78	43.70	593.75	33.50	-1.99*	.025	.41

Note. IG = intervention group; CG = control group. Obstacle course: *N* = 113; IG, *n* = 41; CG, *n* = 72. Running test: *N* = 108; IG, *n* = 40; CG, *n* = 68.

p* < .05. *p* < .01. ****p* < .001.

24.42; $M_{T2} = 30.22$; $M_{T3} = 36.11$; $M_{T4} = 31.64$). Because of the large difference between averages at T3, additional *t* tests for independent samples were performed and showed that soldiers trained in self-leadership perceived significantly less strain, $t(115) = -2.63$, $p < .01$, less worries, $t(115) = -2.08$, $p < .01$, less tension, $t(115) = -3.07$, $p < .01$, and significantly more joy, $t(115) = 3.34$, $p < .001$. For further investigation of perceived strain, an additional covariant analysis was done using the respective values for strain at T2 and T4 as independent variable, strain at T1 as covariate and both groups as fixed values. With corrected R^2 of 40.40%, the results at T3 showed a significant explained variance, $F(2,$

114) = 40.325, $p < .001$, significant effects of the covariate, $F(1, 114) = 69.648$, $p < .001$, and the factor group, $F(1, 114) = 16.241$, $p < .001$. The analysis at T4 with corrected R^2 of 32.10% resulted in a significant explained variance, $F(2, 112) = 27.899$, $p < .001$, and a significant effect of the covariate, $F(1, 112) = 54.490$, $p < .001$. The group factor only displayed a marginal effect, $F(1, 112) = 3.794$, $p = .54$. These results suggest that under control of strain at T1 a significant difference between intervention and control group at T3 and a marginal difference at T4 existed. Thereby Hypothesis 3 could be confirmed. Participants of the self-leadership training experienced less perceived strain with stable progression.

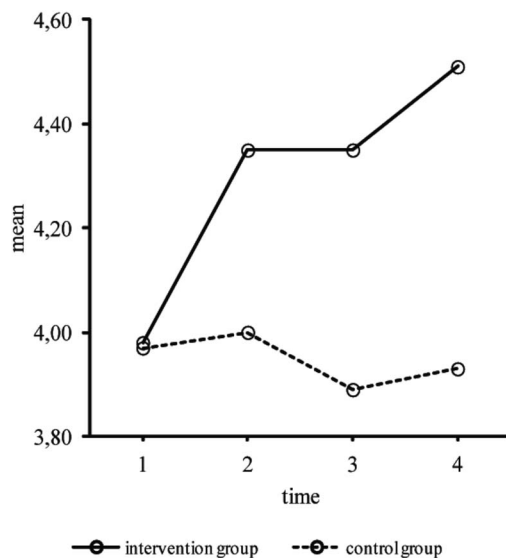


Figure 2. Illustration of self-efficacy development.

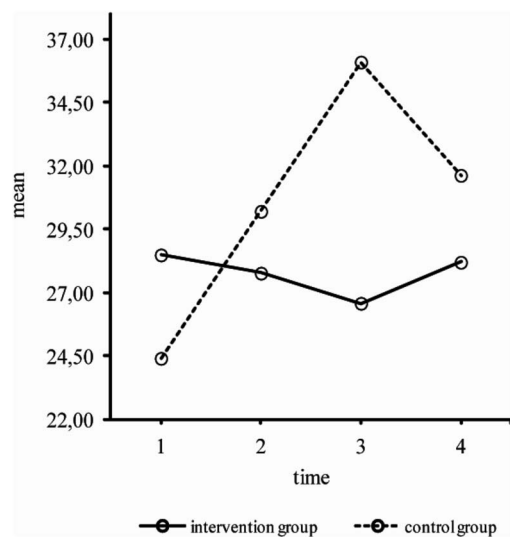


Figure 3. Illustration of strain course.

Discussion

In this study the effects of self-leadership training on educational achievements, self-efficacy, and perceived strain of soldiers during military training were examined. As expected, a significantly better educational outcome, significantly higher self-efficacy, and significant to marginal reduction in levels of perceived strain were observed in the intervention group. Taken together, these results confirm all three hypothesis set out in the beginning of the study.

Efficacy of Self-Leadership Training

The efficacy of self-leadership training served as the central question in this study. The efficacy of self-leadership training intervention was already demonstrated in previous work (e.g., Furtner et al., 2012; Neck & Manz, 1996; Prussia et al., 1998; Stewart et al., 1996; Unsworth & Mason, 2012). In this study the interventions were evaluated based on the self-reported increase of self-leadership strategies and objective criteria. The assessment of efficacy demonstrated significant main effects in time and group, which in addition showed a significant interaction. Because this interaction is an ordinal interaction, it allows the content of the two main effects to be interpreted (Bortz & Schuster, 2010). This means that the intervention group differs from the control group by significantly higher levels of self-leadership behavior over time (T1–T4). Because no significant difference in self-leadership behavior was observed between the two groups at the beginning of the study, both can be considered equivalent in levels of self-leadership. Consequently, the steady increase in self-leadership behavior can only be explained with the efficacy of the described training intervention. Furthermore, results of the study confirm the efficacy of the developed progressive training concept and the training setting.

Improvement of Performance

The connection between self-leadership and increased performance was already postulated several times (Manz, 1986; Neck & Houghton, 2006; Neck & Manz, 2012; Stewart, Courtright, & Manz, 2011). In this study this relationship was confirmed for the first time using objective criteria of successful completion of military

training consisting of all examination marks achieved during the theoretical training (WTs, final examinations) and results from physical tests (obstacle course, 2,400-m run). Participants of self-leadership training predominantly achieved significantly better results. An exception was WT 1, which did not result in a significant difference. The test was conducted only three days after Workshop 1 (behavior-focused strategies). This showed that at this point in time the effect of self-leadership training was not strong enough to result in significantly better performance. Nevertheless, the finding that there were no significant differences in performance levels suggests that both groups were equivalent initially. At WT 2 the expected increase in performance was detected for the first time. At this point in the study, soldiers, who at the time had already participated in Workshops 1 and 2 (behavior-focused strategies and natural reward strategies), produced significantly better results. For WT 3 and 4, which took place during the 4 weeks between Workshop 2 and 3, a reversal of results was observed, when soldiers not trained in self-leadership achieved significantly better marks. These results demonstrate that soldiers are able to improve their performance also without self-leadership training. The incomplete self-leadership training process at WT 3 and 4 is a possible explanation for the observed reversal of results. This assumption was confirmed by the significantly better results of training participants toward the end of the military training course. At WT 5 and 6, which were conducted after completion of Workshop 3 (constructive thought strategies), the expected performance difference in self-leadership soldiers was observed again (e.g., Neck & Manz, 1996). In the same time period, physical tests at the obstacle course were conducted, in which soldiers who had participated in self-leadership training, achieved significantly better times. The exam results described so far were all achieved during the self-leadership training process. These results show that an impressive and significant increase of performance is possible already in the process of developing self-leadership skills. Self-leadership training was completed at T3 and thereafter further assessments were performed. Training participants continued to display persisting improvements in performance as shown in significantly better times in the 2,400-m run.

The superior results achieved on the obstacle course and the running test can be connected to mental strength increased by self-leadership training (e.g., Neck & Manz, 1996). In final examinations at the completion of the military training course (after T4), “self-leadership soldiers” convinced again with significantly better examination results. Nine soldiers of the intervention group and only five soldiers of the untrained group were able to complete training with distinction. Two soldiers of the intervention group and five of the control group did not complete the training course. These results further underline the significant difference in examination results and efficacy of self-leadership training. Results of final examinations show that a further increase in performance exceeding effects during the active training program is possible and points toward a lasting effect of self-leadership training beyond the training period itself. Given that all soldiers possessed a certain basic intention to successfully complete the training course with or without the training intervention, the observed significant results in “self-leadership soldiers” gain in significance and validity. In summary, this study confirms the postulated increase in performance through self-leadership training (Furtner et al., 2012; Manz, 1986; Neck & Houghton, 2006; Neck & Manz, 2012; Stewart et al., 2011). This was demonstrated for the first time using objective criteria such as successful completion of a military training course including theoretical, practical and physical examinations.

Self-Efficacy

The key component of self-leadership, self-efficacy, as described by Bandura (1986), was examined in the next step. The expectation was an increase of general self-efficacy as a result of self-leadership training. Before the training intervention, both groups displayed almost identical self-efficacy values, which did not differ significantly. Again, this shows that both groups can be viewed as equivalent at the beginning of the study. However, after the training, the difference between the groups reached significant levels. Especially notable is the difference in development of self-efficacy comparing both groups over time, whereby self-leadership trained soldiers were able to tremendously increase levels of general self-efficacy early in

training in contrast to untrained soldiers. This shows the efficacy of self-leadership strategies (behavior-focused strategies, natural reward strategies), which were already taught at this time in the study, suggesting improvements of self-assurance and self-focus (Neck & Houghton, 2006), ultimately resulting in improvements of self-evaluation of personal skills (resources) and consequently self-efficacy. Levels of self-efficacy subsequently stabilized in trained soldiers, whereas levels in untrained soldiers even dropped. This progression can be interpreted in connection with the endurance exercise (duration of 5 days), which took place in the same time period and forms the pinnacle of psychological and physical strain for soldiers in training. The stabilization of self-efficacy in “self-leadership soldiers” can be related to an improved self-evaluation of personal skills, which are necessary to complete specifically demanding tasks such as the endurance exercise (Bandura, 1986, 1991; Gist, 1987). After completion of the training intervention, an increase in self-efficacy in both groups was found, whereby the difference between trained and untrained soldiers was still significant. These results show that self-efficacy can be improved through self-leadership training with lasting effects beyond the training intervention and at the same time confirms results found in previous studies (Neck & Manz, 1996; Prussia et al., 1998; Unsworth & Mason, 2012).

Perceived Strain

Because strain is of particular relevance to soldiers accomplishing tasks, it was also included in this study. In comparison to untrained soldiers, a lower level of perceived strain was expected in self-leadership soldiers. An assessment conducted before the start of the training showed marginally more strain and even significantly more worry in the intervention group. Until T3, strain levels in soldiers who participated in self-leadership training dropped steadily, whereas untrained soldiers experienced a steep increase. This difference between both groups, which developed at T3, was characterized by significantly less strain, significantly less worry and tension, and significantly more joy in “self-leadership” soldiers. This result implies that trained soldiers have access to more resources (Hobfoll, 1989) to appropriately manage the challenges posed by military train-

ing as well as by the already described endurance exercise. In untrained soldiers, a reduction of strain was recorded only after completion of the endurance exercise (stress) as opposed to trained soldiers, who under same demands experienced steadily dropping levels of strain, less worry and tension as well as more joy. This reduction in perceived strain found in “self-leadership soldiers” indicates that self-leadership training has the capability to create the necessary resources (Hobfoll, 1989) to facilitate strain reduction (e.g., Binnewies et al., 2009; Chen et al., 2009; Unsworth & Mason, 2012). Toward the end of the training course, a slight increase in perceived strain was noted in trained soldiers and can be potentially explained by approaching final examination. The two very different progressions of perceived strain levels found in soldiers trained in self-leadership when compared to the control group, clearly show the potential of self-leadership even in the light of a marginal difference in strain levels at the end of the study. The application of self-leadership as an individual and preventive stress management (Unsworth & Mason, 2012) can be recommended to every soldiers.

Merits and Limitations

The following paragraphs will discuss distinguishing features of this study but will also examine the study critically. The use of objective criteria for measuring increase in performance as an effect of self-leadership, which was postulated already multiple times in the past, is considered particularly worth mentioning as a differentiating quality. Thereby, the first step away from subjective assessment was taken (Furtner et al., 2012; Neck & Manz, 1996; Unsworth & Mason, 2012), further increasing the significance of the presented results and providing direction for continuous improvement of personnel quality in a military setting. The duration of the training is of particular relevance, which with duration of 10 weeks is longer than previously completed self-leadership interventions, including the complete instruction of all three self-leadership strategies. Another important feature is the duration of data acquisition, which exceeded training duration with a total of 14 weeks and was performed at four evaluation time points. This allows surveillance of the development progression of self-leadership skills,

which enables association to accomplishments affected during different phases of training. For this reason differentiated assessment of performance with regards to the developmental stage of self-leadership are possible.

The quasi-experimental design can be viewed as a limiting factor of this study; such a setting bears the possibility that bias is introduced by differences in starting values between two groups. Nevertheless, these circumstances were controlled with a covariant analysis of the starting values of self-leadership skills and self-efficacy at T1 as the option of choice. However, also a positive aspect can be found in this quasi-experimental design, as self-leadership training was conducted in a real world training setting in the context of a military training course increasing ecological validity.

The specific motivation of soldiers to participate in the self-leadership training was not evaluated and thus can be viewed as another limiting factor. Nonetheless, the positive completion of this training course is a prerequisite for advancing into the subsequent course, and thus represents a strict requirement for career advancement. Therefore, it can be assumed that all participants had the same basic motivation to complete the course successfully. For future studies, an assessment of the motivation should be incorporated.

The duration of the study is considered another restriction, as it was not possible to perform an assessment of long-lasting effects of self-leadership skills and thus no conclusion about long-term impact could be made. The small number of female soldiers in the sample is another limitation and does not allow conclusions across genders.

To draw conclusions about the stability of self-leadership, future studies should aim to evaluate the application of self-leadership skills over a longer period of time. Also an increase of the number of female soldiers is desirable. Beyond the application of self-leadership in the military setting, it would be interesting to repeat the experiment and confirm cross-domain validity for example in the rescue services or in law enforcement.

Conclusion

The goal of the presented study was to demonstrate the positive effects of self-leadership

training on soldiers enrolled in a military training course. It was expected that participants of self-leadership training can be distinguished from untrained soldiers by higher educational achievements, higher self-efficacy and reduced levels of perceived strain. The results from this study show impressively the potential of self-leadership. For the first time, the positive effects of self-leadership training were confirmed by independent measurements of performance increases using the objective criterion of successful completion of a military training course. Thereby, it was demonstrated that “self-leadership soldiers” achieved better results across theoretical, practical, and physical assessments resulting in overall higher educational achievements. In addition, significant increase in self-efficacy was achieved, shown by a significant difference between groups. On levels of perceived strain, a very important factor for soldiers, a significant to marginal reduction was recorded as expected. The most remarkable finding with regards to perceived strain levels was the stable progression of values in trained soldiers, which in contrast to untrained soldiers did not show any peak levels. In summary, the positive results of this study clearly demonstrate the contribution of self-leadership training to quality of personnel and recommend this training as an important component of continuous improvement for individual soldiers throughout military service.

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