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Who's Afraid of Death and Terrorists? Investigating Moderating Effects of Sense of Coherence, Mindfulness, Neuroticism, and Meaning in Life on Mortality Salience

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Sense of coherence (SOC) is thought to be a stress-buffering personality construct. We explored if SOC has a moderating effect on the distress experienced following mortality salience. SOC, mindfulness, neuroticism, and meaning in life were measured as potential moderators. Participants reported on death anxiety and completed a worldview defense task. Results indicated that all potential moderators were correlated with death anxiety, but not with worldview defense. Yet despite a large sample no main effect for the mortality salience induction could be found. Results highlight the importance of various personality variables on death anxiety.

Keywords: Mortality salience, personality, death anxiety, sense of coherence, mindfulness, neuroticism, meaning in life

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Death is an inescapable fact of life, yet most often people do not confront this fact directly (Becker, 1973). Terror management theory (TMT) proposes that humans, different from other animals, are consciously aware of their mortality, creating a potential for existential anxiety (Greenberg, Solomon, & Pyszczynski, 1997). This terror is considered to be aversive and a serious threat to individuals. A person's culture can then function as a buffer and psychological means to cope with the terror, enhancing both self-esteem, feeling of security, and meaning in life. As a motivational theory, TMT proposes that in the face of their mortality individuals cling to their cultural context, devalue persons who threaten their culture and appreciate individuals who live up to these values. For example, mortality salience (MS) has been shown to increase prejudice against individuals who subscribe to a different cultural belief system (Greenberg et al., 1990), belief in afterlife and divine intervention (Norenzayan & Hansen, 2006), or biased treatment of racists who are the same race as study participants (Greenberg, Schimel, Martens, Solomon, & Pyszczynski, 2001). One study even showed that warnings on cigarette packages invoking death threats could backfire. Participants for whom smoking was a source of self-esteem actually developed more positive attitudes towards tobacco following MS (Hansen, Winzeler, & Topolinski, 2010).

The oft-documented effects of MS however are not universally valid. Individual differences have been shown to moderate the effects of MS (Harmon-Jones et al., 1997). For example, individuals with high trait mindfulness showed reduced defense responses to MS. Mindfulness has been conceptualized as a quality of consciousness characterized by a receptive, open state of mind. It has been defined as "paying attention in a particular way: on purpose, in the present moment, nonjudgmentally" (Kabat-Zinn, 1994; p.4). This disposition to exhibit a receptive attention to the present experiences should allow people to confront death thoughts, ultimately obviating the need to alleviate existential anxiety through cultural worldview defense (Niemiec et al., 2010). Confronting one's own mortality is an essential part of Buddhist teachings, which form the original basis of mindfulness. Yet effects have been shown for the most common samples of university students, samples without any sizeable number of professed Buddhists or meditation practitioners.

Mindfulness is generally correlated with many other aspects of personality. Most dominantly mindfulness is negatively correlated with neuroticism ($\rho = -.58$; Giluk, 2009). Neuroticism has also been shown to moderate MS. Individuals high in neuroticism were especially vulnerable to negative effects of body awareness (Goldenberg, Heflick, & Cooper, 2008). Neurotic individuals should exhibit greater problems with their physical bodies, because they are less able to cope with existential threat through symbolic modes of defense, such as meaning and value (Goldenberg, McCoy, Pyszczynski, Greenberg, & Solomon, 2000; Goldenberg, Pyszczynski, Greenberg, & Solomon, 2000).

Neuroticism has been shown to be negatively correlated with experiencing meaning in life (Addad, 1987). Striving for meaning in life is a common outcome of MS (Hofer, 2013; Landau, Greenberg, Solomon, Pyszczynski, & Martens, 2006; Pyszczynski, Solomon, & Greenberg, 2003). Unsurprisingly meaning in life has been found a moderator too. MS increased death anxiety specifically for individuals who generally lack meaning in life (Routledge & Juhl, 2010).

Sense of coherence (SOC) is the core aspect of Antonovsky's salutogenic theory and describes a tendency to view life as comprehensible, manageable, and meaningful (Antonovsky, 1979, 1987). SOC is generally connected to a broad range of mental and physical health outcomes (Eriksson & Lindström, 2005, 2006). Additionally, SOC is associated with neuroticism (Grevenstein & Bluemke, 2015; Hochwälder, 2012), mindfulness (Glück, Tran, Raninger, & Lueger-Schuster, 2015; Grevenstein, Aguilar-Raab, & Bluemke, 2015), and meaning in life (Piedmont, Magyar-Russell, DiLella, & Matter, 2014). One of the core aspects of SOC is its ability to buffer against stressful experiences (Amirkhan & Greaves, 2003). Yet so far SOC has not been tested as a moderator for MS. In the past SOC has shown incremental validity over many competing aspects of personality, such as the Big Five (Grevenstein & Bluemke, 2015), general self-efficacy (Grevenstein, Bluemke, & Kroeninger-Jungaberle, 2016), resilience, optimism, self-compassion (Grevenstein, Aguilar-Raab, Schweitzer, & Bluemke, 2015), or mindfulness (Grevenstein, Aguilar-Raab, & Bluemke, 2015) when predicting mental health or life satisfaction. Thus it seems reasonable to hypothesize that SOC could also buffer existential anxiety.

The present research aims to test the moderating role of the aforementioned personality variables. Participants with higher SOC, higher mindfulness, and lower neuroticism should be less susceptible to existential anxiety and consequently show attenuated effects in a worldview defense task. Additionally, the buffering effect of SOC should be stronger than for mindfulness, given SOC's favorable track record.

Method

Participants and Procedure

Participants completed an online study advertised via social media sites and email lists. The final sample included $N = 254$ individuals ($n = 196$ female, $n = 58$ male, $M_{\text{age}} = 30.01$ years, $SD_{\text{age}} = 11.77$). Participants were informed about the study goals, that participation was completely voluntary, and that they could drop out any time. Participants provided informed consent at the beginning of the study, prior to encountering the survey questions on subsequent webpages in the order outlined below. After thanking participants, they could partake in a lottery for compensation.

Materials

SOC-13: Sense of Coherence. We used a German adaptation of Antonovsky's original 13-item Orientation to Life scale (Schumacher, Gunzelmann, & Brähler, 2000; Schumacher, Wilz, Gunzelmann, & Brähler, 2000). It includes four meaningfulness items (e.g., "Do you have the feeling that you don't really care about what goes on around you?"), five comprehensibility items (e.g., "Has it happened in the past that you were surprised by the behavior of people whom you thought you knew well?"), and four manageability items (e.g., "Has it happened that people whom you counted on disappointed you?"). Answers were given on 7-point rating scales (labeled from 1 = *very rarely* to 7 = *very often*). Mean scores were computed. Cronbach's Alpha was .86 in our sample.

CHIME: Mindfulness. We used the German language Comprehensive Inventory of Mindfulness Experiences (CHIME) to measure trait mindfulness (Bergomi, Tschacher, &

Kupper, 2013, 2014). It is a validated measure with 37 items aiming to include major aspects of currently used mindfulness scales. Sample items include “I immediately realize when my mood changes” and “I see my mistakes and difficulties without judgment”. To reduce the number of items for the current study, we selected 10 of the 37 CHIME items with the highest item-to-total correlation based on a different sample of $N = 1033$ individuals. The 10 selected items showed a correlation of $r = .88$ with the full CHIME mean score. Answers were given on 6-point scales (labeled from 1 = *almost never* to 6 = *almost always*) and mean scores were computed. This reduced version of CHIME yielded an Alpha of .90 in the present sample.

MIL: Meaning in Life. The MIL is a brief four-item measure of a person’s tendency to see one’s life, past and present, as meaningful (Ryff, 1989), e.g., “My personal existence is purposeful and meaningful”. Answers were given on 5-point scales (labeled from 1 = *disagree strongly* to 5 = *agree strongly*). Mean scores were computed. Cronbach’s Alpha was .88 in our sample.

NEO-FFI: Neuroticism. We used the neuroticism subscale of the popular NEO Five-Factor Inventory (Costa & McCrae, 2009). Fifteen items measure neuroticism, e.g., “I am not a worrier”. Answers were given on 5-point scales (labeled from 1 = *disagree strongly* to 5 = *agree strongly*). Mean scores were computed. Cronbach’s Alpha was .83 in our sample.

Experimental Condition. Participants were randomly assigned to one of two experimental conditions and received either the mortality salience (MS) manipulation or a control manipulation following Rosenblatt and colleagues (1989). Specifically, the MS condition prompted participants to answer two open questions: “Jot down, as specifically as you can, what you think will happen to you physically as you die and once you are physically dead” and “Briefly describe the emotions that the thought of your own death arouses in you”. In the control condition, parallel instructions asked participants to imagine a situation when they watch TV.

Mood and Arousal. Following the experimental manipulation participants rated their mood and arousal using the Self-Assessment-Mannequin (SAM; Bradley & Lang, 1994). SAM is common non-verbal pictorial assessment technique that can directly measure the pleasure, arousal, or dominance associated with a person’s affective reaction to a wide variety of stimuli. In its original form, SAM constitutes a five-point scale with scale option being marked with the corresponding SAM pictures. To illustrate, SAM’s mood scale depicts a mannequin with a smiling face on the positive mood end that gradually turns into a frowning face at the negative mood end.

PANAS: Affect. The 20-item Positive and Negative Affect Scheme (PANAS) is a measure of trait-affect (Breyer & Bluemke, 2016; Watson, Clark, & Tellegen, 1988). It is most often used as a filler task to allow the conscious experience of mortality salience to fade from the focus of attention. PANAS consists of 10 positive affect items (Alpha = .88) and 10 negative affect items (Alpha = .88). Answers were given on 5-point scales (marked from 1 = *not at all* to 5 = *very often*) and mean scores for positive and negative affect were computed.

EDAS: Death Anxiety. Existential anxiety was measured using the 12-item Existential Death Anxiety Scale (EDAS; Jong & Halberstadt, 2016)¹. EDAS is constituted by two strongly correlated factors capturing “cessation of life” and “annihilation of self.” Answers were given on 9-point scales (marked from 1 = *do not agree at all* to 9 = *completely agree*).

¹ EDAS materials are currently available from <http://jonathanjong.net/resources/>

Mean scores were computed (Alpha = .98). Death anxiety was noticeably non-normally distributed. Hence we also inspected all results using a logarithmic transformation, yet we did not notice any substantial differences between results of log-transformed and raw EDAS scores. We will therefore report results based on raw scores to ease interpretation.

Worldview Defense. We developed a worldview defense task to measure participants' tendency to defend cultural values. Participants were confronted with a description of the "Islamic State" (ISIS) terror group in the Middle East. We then asked participants how strongly they would support several measures to combat the Islamic State. On consecutive pages participants were prompted with twelve measures, i.e., "Increased border controls to detect ISIS combatants entering Europe" or "Deployment of attack drones to fight ISIS." A complete list of items is presented in Appendix A. Answers were given on 7-point scales (marked from 1 = *do not agree at all* to 7 = *completely agree*). One item ("Humanitarian aid for victims of ISIS in Iraq and Syria") had an item-to-total correlation close to zero and was consequently excluded. The remaining eleven items constituted an internally consistent measure with Cronbach's Alpha = .80. Factor analysis (principal axis factoring, Promax rotation) indicated two factors with Eigenvalues > 1. An inspection of the items suggested a possible categorization into security and defense (i.e., increased border controls, more police), and attack and aggression (i.e., armed drone attacks, deployment of special forces units). Separate analyses of these factors did not alter any conclusions, so we will present analyses with the global score as originally intended.

Results

Means, standard deviations, and difference tests are displayed in Table 1. There were no significant differences with regard to participant sex. We first investigated the MS main effect. Contrary to our prediction, no main effect for MS could be found. Both

Table 1. Sample characteristics and difference tests (sex: $N_{male} = 57, N_{female} = 195$; experimental condition: $N_{MS} = 118, N_{control} = 143$) for study variables.

	Men	Women				MS	Control			
	M (SD)	M (SD)	t (df)	p	d	M (SD)	M (SD)	t (df)	p	d
Age	31.51 (12.68)	29.57 (11.48)	1.09 (250)	.276	0.1	29.69 (12.44)	30.29 (11.17)	0.40 (250)	.68	0.0
Sense of Coherence	4.57 (1.12)	4.66 (0.88)	-0.57 (79.10)	.573	0.0	4.54 (0.98)	4.73 (0.90)	1.55 (252)	.11	0.2
Mindfulness (CHIME)	3.98 (1.00)	3.81 (0.92)	1.18 (252)	.240	0.1	3.83 (0.91)	3.86 (0.97)	0.26 (252)	.79	0.0
Meaning in life (MIL)	3.68 (0.91)	3.83 (0.81)	-1.18 (252)	.241	0.1	3.76 (0.80)	3.83 (0.88)	0.69 (252)	.49	0.0
Neuroticism (N)	2.70 (0.81)	2.83 (0.75)	-1.15 (252)	.252	0.1	2.84 (0.76)	2.77 (0.77)	-0.80 (252)	.42	0.0
Mood (SAM)	4.66 (0.85)	4.61 (0.90)	0.32 (252)	.746	0.0	4.60 (0.83)	4.64 (0.93)	0.38 (252)	.70	0.0
Arousal (SAM)	3.07 (0.93)	3.12 (0.95)	-0.34 (252)	.733	0.0	3.10 (0.88)	3.11 (1.00)	0.10 (252)	.92	0.0
Death anxiety (EDAS)	3.81 (2.42)	3.83 (2.52)	-0.04 (252)	.966	0.0	3.76 (2.42)	3.88 (2.57)	0.36 (252)	.72	0.0
Worldview defense	3.90 (1.12)	3.81 (1.05)	0.59 (252)	.554	0.0	3.83 (0.99)	3.84 (1.13)	0.06 (252)	.95	0.0

Note: No significant differences emerged. |d| is Cohen's effect size.

Table 2. Main effects of personality and interactions effects with mortality salience.

		Death anxiety				Worldview defense				
		β	p	$F(df)$	R^2	β	p	$F(df)$	R^2	
SOC	step1	SOC	-.23**	<.001	14.20 (1,252)	.053	-.08	.201	1.65 (1,252)	.006
	step2	SOC	-.22*	.014	4.91 (3,250)	.056	-.05	.564	0.63 (3,250)	.007
		MS	-.05	.462			-.01	.853		
		SOC \times MS	-.02	.802			-.04	.651		
Mindfulness	step1	mind	-.29**	<.001	22.54 (1,252)	.082	-.07	.266	1.24 (1,252)	.005
	step2	mind	-.28**	.001	7.55 (3,250)	.083	-.01	.889	0.78 (3,250)	.009
		MS	-.03	.654			-.01	.937		
		mind \times MS	-.02	.827			-.09	.298		
Meaning in Life	step1	meaning	-.17**	.008	7.09 (1,252)	.027	.09	.162	1.97 (1,252)	.008
	step2	meaning	-.11	.186	2.80 (3,250)	.033	.15	.079	1.04 (3,250)	.012
		MS	-.03	.627			.00	.994		
		meaning \times MS	-.09	.294			-.09	.281		
Neuroticism	step1	N	.32***	<.001	29.23 (1,252)	.104	.08	.191	1.72 (1,252)	.007
	step2	N	.35***	<.001	9.88 (3,250)	.106	.03	.694	0.81 (3,250)	.010
		MS	-.04	.518			-.01	.897		
		N \times MS	-.03	.701			.07	.832		

Note: Regression weights are significant at * $p < .05$, ** $p < .01$, *** $p < .001$

experimental groups did not differ on death anxiety, mood, arousal, worldview defense, or any personality variable. We also investigated our data using 2 (sex) \times 2 (experimental condition) MANOVA to better control for error. No differences to the t-tests reported in Table 1 emerged and not a single pair-wise comparison turned out to be significant, thus we report no further details.

To investigate this failure to reject the null hypothesis, we conducted post-hoc power analysis using G-Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007). Our sample size should have been sufficient to detect an effect size of $d = 0.45$ assuming optimal power ($1 - \beta = 0.95$) and $\alpha = 0.05$ (two-tailed). Most commonly a power of 0.80 is assumed, which corresponds to a detectable effect size of $d = 0.35$.

To examine the hypothesized moderator function of personality all personality variables were z-standardized and interaction terms were computed with the experimental condition (coded as 0 = control, 1 = MS). Regression analyses were then used to examine the main effect of personality and the interaction with MS. Results of the regression analyses can be seen in Table 2. For all potential moderators a similar picture emerged. There was a significant main effect for personality variables when predicting death anxiety. Descriptively this effect was strongest for neuroticism. More importantly no interaction effect could be found between the mortality salience manipulation and any of the personality traits. No main effects or interaction effects emerged for the worldview defense task. Even though the worldview defense task represented an internally consistent measure, it remained unaffected by both the experimental manipulation as well as by any individual difference variable.

To further examine the main effects of personality on death anxiety, we conducted

a multiple regression analysis with all personality variables (SOC, mindfulness, meaning in life, neuroticism) predicting death anxiety simultaneously. Neuroticism emerged as the most important and only significant predictor ($\beta = .29, p < .05$). All three competitors (SOC: $\beta = .03, p = .77$; mindfulness: $\beta = -.10, p = .28$; meaning in life: $\beta = .05, p = .54$) did not add significantly to the explained variance.

Discussion

The aim of the present study was to examine the moderating effects of personality on mortality salience (MS). We expected to find moderating effects of mindfulness, meaning in life, sense of coherence (SOC), and neuroticism. Contrary to our expectations no main effect for the MS manipulation could be found on any measure. This does not rule out possible interaction effects with individual difference variables. For example, an interaction effect with personality in the absence of a MS main effect was reported by Routledge and Juhl (2010). However, no interaction effects emerged in our data. The failure of our MS manipulation stands in contrast to existing literature.

MS has received a long range of empirical support and MS effects have been replicated many times. Burke and colleagues (2010) concluded in a meta-analysis that MS works and generally yields moderate effects on various outcomes ($r = 0.35$). Effects have been especially strong for (a) American participants, (b) college students, (c) a long delay between the MS manipulation and the measurement of the dependent variable, and (d) outcomes related to actual people, rather than concepts. Our study diverges from these criteria in all aspects.

The present study was conducted online in Germany and our participants constituted a more diverse sample than most common samples of predominantly young, female university students. Cultural aspects might have influenced our results. Yen and Cheng (2010) investigated MS in Taiwan and East Asia. They failed to replicate the common MS effects in Taiwan. In a meta-analysis of 24 studies conducted in East Asia, they found only a very small average effect size of $r = 0.06$ that wasn't significantly different from zero. Given our sample size, we should have been able to detect effects as large as those reported in general ($r = 0.35$, corresponding to $d = 0.75$). We are not able to completely rule out effects as low as those reported for Asian participants ($r = 0.06$, corresponding to $d = 0.12$).

In another meta-analysis Yen and Cheng (2013) reanalyzed the data presented by Burke et al. (2010). They found that the majority of MS studies was conducted by or related to a small number of American researchers. These studies produced significantly larger effect sizes than studies conducted by other research teams. It is unlikely though that the failure to produce a MS effect is fully attributable to the nationality of our sample, since MS effects have been shown for German participants before (i.e., Frischlich, Rieger, Hein, & Bente, 2015; Fritsche et al., 2007; Jonas & Greenberg, 2004).

One aspect that may be responsible for the null finding might be the delay between the MS induction and the dependent variables. Burke et al. (2010) concluded that delays as long as 7 to 20 minutes produce significantly larger effects than short delays of 2 to 6 minutes. We have used a common practice and had our participants fill out the PANAS questionnaire. This is a proven procedure, yet it may have been less than ideal in our case. Martens and colleagues (2011) laid out that MS and meaning threats can have comparable effects. With longer delay between manipulation and outcomes, however, MS produced higher effects. We considered a longer delay to be impractical in an online study. We were

not in control how much time our participants would spend on the MS manipulation, yet we checked the statements they provided in the writing task to identify non-compliant participants.

Non-negligible interaction effects between MS and personality have previously been shown, so the complete absence of interaction effects in our data is somewhat unexpected. Florian and colleagues (2001) showed that individual hardiness (Kobasa, 1979) has a buffering effect on MS. Hardiness is also a construct of resilience highly reminiscent of SOC. In our study, we observed main effects of personality on death anxiety, yet these were not moderated by the experimental condition. Neuroticism could best predict individual death anxiety, which is a plausible result, given the theoretical connection between neuroticism and overall anxiety. From this we conclude that the EDAS, the measure of death anxiety used in this study, is indeed not only a reliable, but also a valid measure of existential anxiety.

The worldview defense task used in the present study asked participants how much they would support several possible measures to combat the Islamic State (ISIS). Eleven items formed an internally consistent measure. Nonetheless no significant effect or correlation with any other study variable could be found. This outcome might have been affected by bad timing. Unintentionally, data collection was started only very shortly before the Russian intervention in Syria in 2015. Shortly after the study was started, we observed a noticeable increase of stories on the ISIS across various media outlets on a daily basis. Incidentally, one study participant contacted the experimenter and expressed his appreciation for this “highly important and highly up-to-date” study. Our worldview defense measure may thus have assessed potentially strong opinions people had formed before the study. This may be especially pronounced for the one item we excluded (“humanitarian aid for victims of ISIS”). Providing aid to Syrian refugees had become a widely discussed topic by the time the study was started. However previous research on mortality salience has used cultural, political, or even religious outgroups. Measuring worldview defense with regard to ISIS does not seem highly unusual and may even have been a topic where socially desirable answering might be minimized. Burke and colleagues (2013) showed in a meta-analysis that MS can have diverse effects on political attitudes. Two major effects were discussed. A commonly assumed worldview defense effect was supported by the meta-analysis ($r = 0.35$). This indicates that people indeed defend their own cultural and political convictions. Another effect often discussed is a general conservative shift following MS. This effect was descriptively smaller, but also supported ($r = 0.22$). With regard to our own study, rating measures to combat ISIS may have itself served as a MS induction, leading to generally stronger conservative responses. However, the interpretation that the ISIS dependent variable is responsible for the null finding is not supported by an increase of death anxiety following the MS induction.

Overall, we couldn't find any effect of MS on either death anxiety or worldview defense. As we have recruited a large sample and used a highly standardized and proven manipulation these results are surprising. More research will be necessary to explore the moderating effects of personality on MS.

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Appendix A1. Items for the worldview defense task (English translation)

- 1 Increased border controls to detect ISIS combatants entering Europe
- 2 Increased police presence on the streets and controls of foreigners without suspicion
- 3 Block youtube videos and censor media supporting ISIS
- 4 Extensive surveillance of all public places to defend against suicide attacks
- 5 Surveillance of mosques to detect radical islamists
- 6 Humanitarian aid for victims of ISIS in Iraq and Syria (item excluded from analysis)
- 7 Support enemies of ISIS with money and train rebel groups to fight ISIS
- 8 Deployment of attack drones to fight ISIS
- 9 Bomb positions of ISIS combatants and use air strikes to fight back ISIS attacks
- 10 Build a fortified wall on the southeastern border of the EU to defend against infiltrating ISIS combatants
- 11 Deploy special forces to free ISIS hostages
- 12 EU/NATO peacekeeping mission using heavy weaponry and ground troops to destroy ISIS

Appendix A2. *Items for the worldview defense task (German original)*

- 1 Verstärkte Grenzkontrollen, um nach Europa einreisende IS Kämpfer zu entdecken
- 2 größere Polizeipräsenz auf den Straßen und verdachtsunabhängige Kontrollen von Ausländern in Deutschland
- 3 Sperren von youtube Videos und Zensieren von Medien, die den IS unterstützen
- 4 flächendeckende Videoüberwachung an allen öffentlichen Plätzen in Deutschland zur Abwehr von Selbstmordattentätern
- 5 Überwachung von Moscheen in Deutschland, um radikalisierte Islamisten zu entdecken
- 6 humanitäre Hilfe für Opfer des IS in Syrien und im Iraq (item excluded from analysis)
- 7 Feinde des IS sollten mit Geld unterstützt werden und Rebellengruppen für den Kampf gegen den IS ausgebildet werden
- 8 Einsätze von Kampfdrohnen gegen den IS
- 9 Bombenangriffe aus der Luft auf Stellungen von IS Kämpfern und Luftschläge zur Abwehr von IS Angriffen
- 10 Bau einer befestigten Mauer an der Südost-Grenze der EU zur Abwehr eindringender IS Kämpfer
- 11 Einsätze von Spezialeinheiten zur Befreiung von Geiseln des IS
- 12 EU/NATO Friedensmission mit Einsatz schwerer Waffen und Bodentruppen zur Vernichtung des IS

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