EUROPEAN JOURNAL OF PSYCHOTRAUMATOLOGY
2024, VOL. 15, NO. 1, 2429334
https://doi.org/10.1080/20008066.2024.2429334

EUROPEAN JOURNAL OF PSYCHO-TRAUMATOLOGY
THE OFFICIAL JOURNAL OF THE EUROPEAN SOCIETY FOR TRAUMATIC STRESS STUDIES

Taylor & Francis
Taylor & Francis Group

BASIC RESEARCH ARTICLE

OPEN ACCESS Check for updates

Exploring meaning in life as a potential target for early intervention – results from a randomized trauma analogue study

Lea Jasmin Seidel-Koulaxis *, Judith K. Daniels and Brian D. Ostafin

Department of Clinical Psychology and Experimental Psychopathology, University of Groningen, Groningen, The Netherlands

ABSTRACT

Background: Previous studies in individuals exposed to stressors, including traumatic ones, have shown inverse relations between life meaning and distress. Furthermore, meaning-related treatments can benefit (traumatic) stressor-exposed individuals. However, the evidence regarding the effect of life meaning interventions on PTSD symptoms is limited. Moreover, early post-stressor interventions preventing distress are needed. This study investigated the effects of a short, online life meaning intervention after an analogue traumatic stressor on intrusions and anxiety following the intervention, intrusions over a week, and explored distress and life meaning differences after a week.

Method: Following an analogue traumatic stressor (i.e. an aversive film), $N = 237$ participants were randomized to a life meaning intervention, an active or inactive control condition. Participants completed questionnaires in the laboratory, in an online seven-day diary, and at one-week follow-up.

Results: The intervention resulted in significantly lower post-intervention state anxiety and higher life meaning, but not significantly less severe wait-period intrusions than the control conditions. Intrusions in the subsequent week as well as depression, anxiety, PTSD, and life meaning after a week did not significantly differ between the conditions.

Conclusion: This intervention showed promising temporary effects on anxiety and life meaning after a trauma analogue, but no significant longer-term effects and no effects on PTSD symptoms including intrusions. Meaning-related interventions for PTSD target stressor-related meaning-making rather than life meaning. Thus, future studies may benefit from implementing more intense interventions to extend effects on general distress, as well as stressor-addressing meaning interventions to elicit stressor-related meaning-making.

Exploración del sentido de la vida como un objetivo potencial de intervención temprana: resultados de un estudio aleatorizado sobre análogos de trauma

Antecedentes: Estudios previos en individuos expuestos a estresores, incluidos los traumáticos, han demostrado relaciones inversas entre el sentido de la vida y malestar. Además, los tratamientos relacionados con el sentido de la vida pueden beneficiar a las personas expuestas a un estresor (traumático). Sin embargo, la evidencia relacionada con el efecto de las intervenciones para el sentido de la vida sobre los síntomas de TEPT es limitada. Además, se necesitan intervenciones tempranas post-estresor para prevenir el malestar. Este estudio investigó los efectos de una breve intervención en línea sobre el sentido de la vida después de un estresor traumático análogo, sobre las intrusiones y la ansiedad posteriores a la intervención, las intrusiones durante una semana y exploró el malestar y las diferencias del sentido de la vida después de una semana.

Método: Después de un estresor traumático análogo (ej., una película aversiva), $N = 237$ participantes fueron asignados aleatoriamente a una intervención de sentido de la vida, una condición control activa o inactiva. Los participantes completaron los cuestionarios en el laboratorio, en un diario en línea de siete días y en un seguimiento de una semana.

Resultados: La intervención resultó en un estado de ansiedad post intervención significativamente más baja y un mayor sentido de vida, pero no intrusiones significativamente menos graves durante el periodo de espera que en las condiciones de control. Las intrusiones en la semana siguiente, así como la depresión, ansiedad, TEPT y sentido de vida después de una semana no difirieron significativamente entre las condiciones.

Conclusión: Esta intervención mostró efectos temporales promisorios en la ansiedad y sentido de vida después de un análogo del trauma, pero no efectos significativos a largo plazo ni

ARTICLE HISTORY

Received 8 December 2023
Revised 10 August 2024
Accepted 29 October 2024

KEYWORDS

Meaning in life; early intervention; distress; Intrusions; trauma film paradigm; anxiety

PALABRAS CLAVE

Sentido de la vida; intervención temprana; malestar; intrusiones; paradigma del cine traumático; ansiedad

HIGHLIGHTS

- Meaning in life may counteract psychological distress in the context of (traumatic) stressors.
- The current study investigated the effect of a short life meaning intervention on psychological distress after an analogue traumatic stressor.
- Compared to control conditions, individuals who received the life meaning intervention reported greater state meaning in life and lower state anxiety. However, the intervention did not result in significantly less severe intrusions.

CONTACT Lea Jasmin Seidel-Koulaxis l.j.seidel@rug.nl Department of Clinical Psychology and Experimental Psychopathology, University of Groningen, Grote Kruisstraat 2/1, 9712 TS Groningen, The Netherlands
*Present address: MSH Medical School Hamburg, Hamburg, Germany; Psychiatric Hospital Rickling, Rickling, Germany.
Supplemental data for this article can be accessed online at https://doi.org/10.1080/20008066.2024.2429334.

efectos sobre los síntomas de TEPT incluidas las intrusiones. Las intervenciones relacionas con el sentido para el TEPT se centran en la construcción de significado relacionada con el estresor en lugar del sentido de la vida. Por lo tanto, los estudios futuros se podrían beneficiar implementando intervenciones más intensas para extender los efectos sobre el malestar general, así como intervenciones del sentido/significado que aborden los estresores para obtener la construcción del sentido relacionado con el estresor.

1. Introduction

Although many individuals experience potentially traumatic stressors in their lives (Benjet et al., 2016), most experience only limited stressor-related psychological distress or elevated initial distress that declines naturally (e.g. see Dworkin et al., 2023; Forbes et al., 2015). Identifying factors that counteract stressor-related distress is important since this allows the development of targeted early interventions for stressor-exposed individuals.

One candidate factor counteracting stressor-related distress is meaning in life. According to a tripartite perspective, life meaning consists of (i) a sense of comprehension and coherence, (ii) a sense of purpose and related motivation and direction, and (iii) a sense that one's life is significant and matters (e.g. George & Park, 2016; King & Hicks, 2021; Martela & Steger, 2016). Clinical, cross-sectional, and longitudinal studies have demonstrated the beneficial effects of meaning in life on post-stressor distress. However, experimental evidence for post-stressor life meaning interventions is lacking. The only published study demonstrated that a life meaning intervention after an analogue traumatic stressor resulted in significantly less anxiety and rumination than control conditions (Ostafin & Proulx, 2023). Although the results were promising, that study did not examine effects beyond the laboratory session, did not assess intrusion symptoms, and used a video clip of racial violence that, while stressful, may not be personally relevant for many participants.

The current study goes beyond prior research by examining the effect of a novel, short, online life meaning intervention following an analogue traumatic stressor that was selected to be personally relevant (that is, in this study female participants viewed a sexual assault scene with a female victim) on intrusions and anxiety after the intervention, diary-reported intrusions in the week post-stressor, and distress and life meaning after a week.

1. Clinical evidence for beneficial effects of meaning-related interventions

In clinical populations including individuals exposed to (traumatic) stressors, meaning-focused and meaning-related interventions have been shown to reduce distress such as PTSD, depression, and anxiety symptoms. For example, one commonality among different therapies for PTSD is the aim to make meaning of the traumatic experience, oneself, and one's life post-trauma (Burback et al., 2024; Schnyder et al., 2015). For instance, in *Narrative Exposure Therapy* (NET) for PTSD, patients review their past with a lifeline visualizing positive and negative/traumatic experiences. Such integration of the past may foster life meaning by establishing a sense of coherence (Shin & Steger, 2014). NET has been shown to moderately reduce PTSD symptoms (for a meta-analysis, see Raghuraman et al., 2021) and a large proportion of patients do not meet diagnostic criteria anymore after NET (for a network meta-analysis, see Yunitri et al., 2023). Furthermore, *Brief Eclectic Psychotherapy* (BEPP) includes potentially meaning-related mechanisms such as narrating experiences in an ongoing letter and therapist-assisted meaning-making of and learning from traumatic experiences. In randomized controlled trials, BEPP resulted in lower post-treatment distress including PTSD, depression, and anxiety symptoms compared to inactive control conditions with mostly moderate effects (Lindauer et al., 2005; Schnyder et al., 2011). Also, *Cognitive Processing Therapy* (CPT) may re-establish meaning when integrating one's meaning framework (e.g. beliefs, goals) with the traumatic experience (Resick et al., 2017). CPT resulted in lower PTSD symptoms compared to inactive control or alternative treatments post-treatment and at follow-up with large effect sizes (for a meta-analysis, see Asmundson et al., 2019). Moreover, network meta-analyses have shown its high efficacy in reducing symptoms compared to other PTSD treatments (Jericho et al., 2022; Yunitri et al., 2023).

While the abovementioned treatments involve trauma-related meaning-making, also treatments focussing on overall *life* meaning can reduce distress (for reviews and meta-analyses, see Guerrero-Torrelles et al., 2017; Manco & Hamby, 2021). Compared to control conditions, meaning interventions reduced distress (e.g. depression, anxiety symptoms) with moderate to large effects in samples including potentially trauma-exposed individuals such as terminally ill patients and palliative care nurses (Vos et al., 2015; Vos & Vitali, 2018). However, the evidence for the effects of meaning-focused therapies on PTSD symptoms is scarce and inconsistent (Classen et al., 2008; Forstmeier et al., 2023; Kissane et al., 2007).

While the abovementioned findings indicate that addressing life meaning or making meaning of traumatic stressors can reduce stressor-related distress, it remains unclear whether life meaning might also offer a target for early post-stressor intervention to prevent distress from developing. The current study addresses this gap in the literature by examining the effects of a life meaning intervention after a vicarious film stressor as a trauma analogue.

2. Non-clinical evidence for the link between life meaning and distress in (traumatic) stressor-exposed individuals

The clinical evidence for the beneficial effects of meaning-related interventions is complemented by cross-sectional and longitudinal evidence showing inverse relations between meaning and distress in (traumatic) stressor-exposed individuals. *Cross-sectionally*, life meaning has been moderately linked to lower psychological distress such as depression and anxiety symptoms with stronger links in clinical samples (meta-analysis by Boreham & Schutte, 2023). Studies with traumatic stressor-exposed individuals showed comparable relations in veterans (for a meta-analysis on PTSD, see Fischer et al., 2020), cancer patients (for a meta-analysis on e.g. depression and anxiety, see Winger et al., 2016), trauma-exposed students (outcome: PTSD; Kashdan & Kane, 2011), earthquake survivors (outcome: depression; Feder et al., 2013) and subjects exposed to the COVID-19 pandemic (outcomes: anxiety, depression, intrusions; Schnell & Krampe, 2020; Seidel et al., 2022; Seidel-Koulaxis et al., 2023).

Moreover, some *longitudinal* studies have demonstrated inverse, prospective links between life meaning and distress. Regarding potentially traumatic stressors, post-stressor life meaning prospectively predicted lower depression symptoms in older adults (Krause, 2007) and higher pre-incident meaning predicted less event-related rumination after a flood (Ostafin & Proulx, 2020, Study 2). In sum, studies with (traumatic) stressor-exposed individuals have found life meaning to relate to lower distress.

3. Life meaning as a target for early interventions after (Traumatic) stressors

As life meaning interventions can benefit trauma-exposed individuals and treatments involving meaning-related components can benefit patients suffering from (traumatic) post-stressor distress, meaning interventions might offer a useful target for early post-trauma intervention to prevent distress development. While evidence-based treatments for established PTSD are available, preventative post-trauma interventions are needed since the available ones only show limited effects (for reviews, see Asselbergs et al., 2023; Bryant, 2021; Roberts et al., 2019). Therefore, interventions targeting additional, potential mechanisms involved in the etiology of distress such as intrusions may be relevant to study.

Different theoretical reasons for the inverse relation between life meaning and distress exist. One potential working mechanism involves the effect of life meaning on uncertainty. By increasing the salience of goal- and belief-related behavioural and perceptual information (George & Park, 2016), life meaning may reduce anxiety-eliciting uncertainty (Hirsh et al., 2012). Supporting this model, fear of uncertainty has been shown to function as a partial mediator between life meaning and anxiety (Ostafin et al., 2022). Potential working mechanisms related to intrusion severity following traumatic events might include rumination and cognition. A previous study indicated that a life meaning intervention counteracted rumination following an analogue traumatic stressor (Ostafin & Proulx, 2023). As rumination has been identified as a risk factor for PTSD development (Moulds et al., 2020), it might be worthwhile to explore whether a life meaning intervention can also limit the advent of post-traumatic intrusions. Another potential pathway via which a post-stressor meaning intervention might counteract intrusions is that it may change problematic post-traumatic appraisals and cognitions, which are considered central in some models of PTSD (Ehlers & Clark, 2000; Resick et al., 2017). Life meaning interventions might foster a sense of autonomy and ownership of one's actions (Martela et al., 2018) as well as strengthen purpose, associated goals, and a positive future outlook. This may, in turn, counteract posttraumatic cognitions such as 'Nothing good can happen to me anymore' (Foa et al., 1995). Moreover, by reminding individuals of their strengths and the challenges they successfully overcame in the past, such interventions may reduce power- and helplessness beliefs and enable active goal pursuit. Pursuing valued goals and the motivation and positive experiences linked with goal pursuit have previously been shown to counteract distress (Lejuez et al., 2001), with positive experiences partly mediating the link between life meaning and depression longitudinally (Disabato et al., 2017). Conversely, a meaning intervention might also target working mechanisms identified prior as it somewhat resembles the visuospatial and verbal interference tasks which have been shown to have small-medium effects (Asselbergs et al., 2023). Typically, meaning interventions include imagination exercises and writing tasks. An active control condition might help elucidate whether meaning interventions indeed act via additional pathways or constitute a version of an interference task. The goal of the current study therefore is as a first step to investigate whether a life meaning intervention affects intrusion development as well as broader

distress as compared to active and inactive control conditions. Future research will be needed to further dismantle the working mechanisms resulting in potential effects.

4. The trauma film paradigm as an experimental model for traumatic stressors

The trauma film paradigm, presenting individuals with an analogue traumatic stressor, offers an experimental model to examine reactions to traumatic experiences in a controlled environment (for an overview, see Asselbergs et al., 2023). When randomly allocating participants to different experimental conditions, this paradigm allows the modelling of the conditions' effects on subsequent distress. Commonly, diaries are used to assess intrusions for a week post-stressor. This primary outcome assessment can be complemented by including secondary outcomes assessing broader distress as well as different assessment time points such as during the laboratory session (Asselbergs et al., 2023). Several early interventions have been studied with this approach (for an overview, see Asselbergs et al., 2023). The only published trauma film study with a meaning intervention found moderate-to-large effects on anxiety symptoms and rumination immediately after the intervention compared to reading about racial equality or computers (Ostafin & Proulx, 2023).

5. The current study

In sum, meaning-related interventions counteract posttraumatic distress in clinical populations, and life meaning is inversely linked with distress in (traumatic) stressor-exposed individuals. However, no research has examined the effect of an early post-stressor life meaning interventions on intrusions in the days following the stressor. The current study aims to address this gap in the literature by randomly assigning participants to a life meaning intervention, an active control, or an inactive control condition following an analogue traumatic, vicarious stressor of a film showing severe abuse. This design allows investigating if focussing on and strengthening life meaning after exposure to an analogue traumatic stressor reduces stressor-related distress. We only included female participants. Female gender has been positively linked to post-traumatic distress (for a meta-analysis, see Brewin et al., 2000), indicating the potential need for support in this group.

6. Hypotheses

We hypothesized that participants receiving the life meaning intervention experience less severe intrusions in the one-week diary following the analogue stressor compared to the control conditions (H1).

We also hypothesized that participants receiving the life meaning intervention experience less severe intrusions during a waiting period and less anxiety in the laboratory session compared to the control conditions (H2).

Moreover, we explored if participants receiving the life meaning intervention experience less depression, anxiety, and PTSD symptoms in the week following the laboratory session than the control conditions.

7. Method

7.1. Participants

Between February and November 2023, $N = 237$ women participated in this three-part study (i.e. the laboratory session, daily diary, and follow-up assessment). The two participants who rated the film clip as not upsetting were excluded from analyses, resulting in a final sample of $n = 235$. Of these participants, $n = 217$ fully completed their daily diary and $n = 228$ completed the follow-up assessment (Figure 1). Most participants were young (age: M 21.76; SD = 3.44; range: 17–44) students ($n = 196$; 83.4%) of social sciences ($n = 83$; 35.3%), economics and business ($n = 22$; 9.4%), or arts ($n = 14$; 6.0%). Most participants were Dutch ($n = 53$; 22.6%) or German ($n = 36$; 15.3%; other EU nationalities: $n = 110$; 46.8%; non-EU nationalities: $n = 36$; 15.3%) and were relatively fluent in English (completely fluent: $n = 142$; 60.4%; almost completely fluent: $n = 75$; 31.9%).

7.2. Materials

Depression symptoms were assessed at baseline, referring to the last two weeks, and follow-up, referring to the last week, with the *Major Depression Inventory* (Bech et al., 2001). Participants reported their symptom frequency from 'At no time' (1) to 'All of the time' (6) on ten items (example items and Cronbach's alphas for all measures as well as cut-offs indicating clinically relevant symptoms can be found in Supplement 'Additional Information about Study Measures').

We assessed **anxiety** symptoms at baseline, referring to the last two weeks, and at follow-up, referring to the last week, with the *General Anxiety Disorder Questionnaire* – 7 (GAD-7; Spitzer et al., 2006). Participants reported their symptom frequency 'Not at all' (0) to 'Nearly every day' (3).

We measured **meaning in life** with the *Multidimensional Existential Meaning Scale*, assessing comprehension, purpose, and mattering with five items each (George & Park, 2017) at baseline, post-film, post-intervention, and at follow-up. At baseline without a time frame, post-film and post-intervention

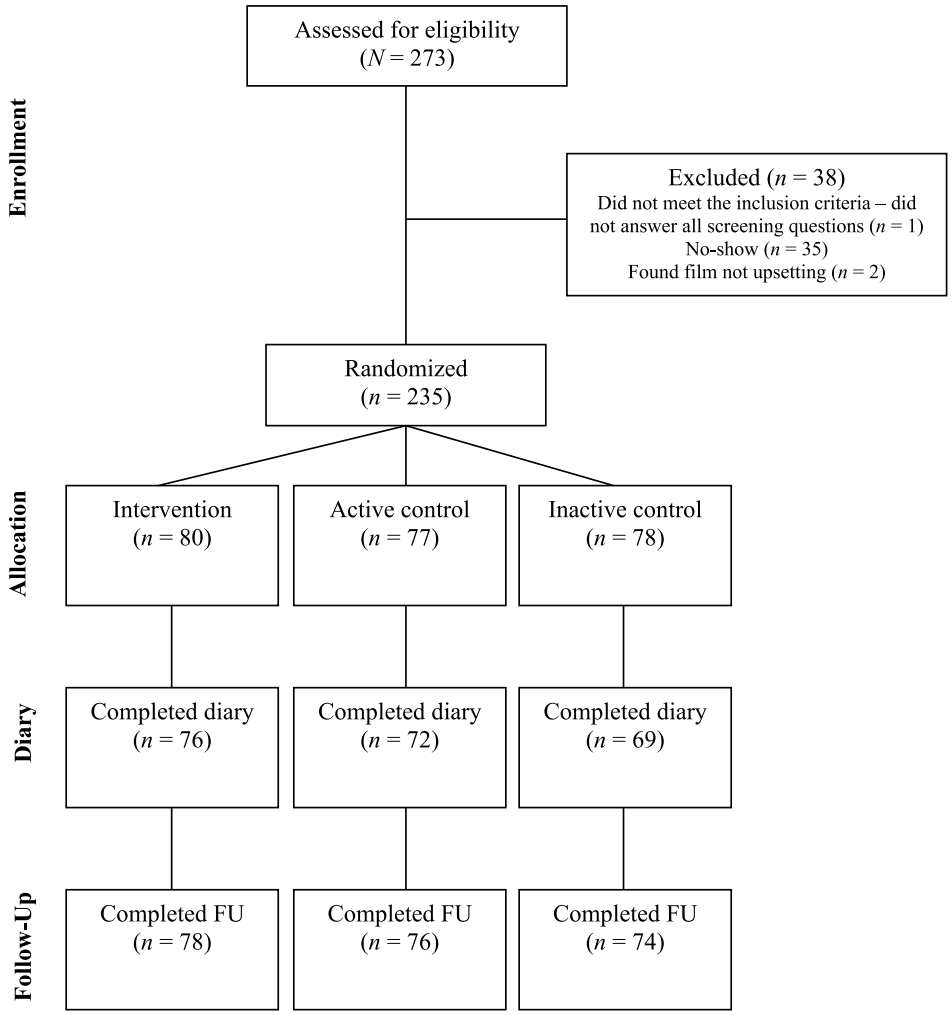

Figure 1. Flow of participants.

referring to 'Right now', and at follow-up referring to last week. Participants rated statements from 'Very strongly disagree' (1) to 'Very strongly agree' (7).

We used the six-item short form of the *Spielberger Trait-State Anxiety Inventory* (Marteau & Bekker, 1992) to assess **state anxiety** at baseline, after the film, after the intervention, and after the waiting period. Participants indicated their current state from 'Not at all' (1) to 'Very much' (4).

To what extent the film clip was experienced as a **meaning violation** was assessed with the *Integration of Stressful Experience – Short Form* (Holland et al., 2014) referring to the film clip right after the film and at follow-up ('Over the last week … '). Participants rated six statements from 'Strongly agree' (1) to 'Strongly disagree' (5). We reversed the scores for the analyses, such that larger values indicate a greater meaning violation.

7.2.1. The analogue stressor

Participants watched a 12-min excerpt of the French movie Irréversible with English subtitles (Noé, 2003) showing a young woman being threatened, raped, and beaten up by a stranger in a metro tunnel. Versions of this scene have been used in previous trauma film studies (e.g. Rombold et al., 2016; Sherrill et al., 2019) and reliably elicit distress (Weidmann et al., 2009). We showed this film clip to female participants to ensure that the film clip depicted a personally relevant stressor.

Film ratings. Participants indicated to what extent (i) they found the film clip upsetting, (ii) they paid attention to the clip or (iii) distracted themselves, and (iv) whether they had seen the clip before.

7.2.2. The experimental conditions

The life meaning intervention consisted of reading an essay (comparing life to a journey and pointing out the importance of living authentically and following intrinsic rather than extrinsic forces), reflection and writing exercises (e.g. regarding their values, influential experiences and decisions in the past and their effects on the present, successfully overcome obstacles and related skills, strengths and positive outcomes, and central relationships), an imagination exercise (imagining their ideal future with their authentic values, beliefs, and strengths in mind), freewriting (writing about their ideal future), and goal setting

(1-week, 1-month and 1-year goals toward realizing their ideal future).

The format of the *active control condition* resembled that of the meaning intervention, but it consisted of reading about elephants, learning about them in gamified memory exercises, imagining, and free writing about elephants. This condition was developed during a pilot study to be equally interesting and engaging as the meaning condition. Due to the structural resemblance and content differences, differences between these conditions may be attributed to life meaning. In the *inactive control condition*, participants were instructed to sit quietly in the cubicle for 15 min, with the option of reading a magazine. For the experimental conditions as well as rationales, please refer to the Supplement 'Experimental Conditions'.

7.2.3. Intrusions during a waiting period in the laboratory

During a 3-min waiting period, participants were instructed to let their minds wander. Afterwards, participants completed a version of the *Intrusive Memory Questionnaire* (Michael & Ehlers, 2007) assessing the frequency and duration of, and distress associated with film-related intrusions. We summed the *z*-scores of intrusion frequency, duration, and distress to estimate intrusion severity (for a similar method see Friesen et al., 2022; Streb et al., 2017).

7.3. Intrusion diary

For seven days, participants completed identical online questionnaires about film-related intrusions. Each diary started with the definition of intrusions as, e.g. involuntary, spontaneous, distressing memories of the film clip, not reflective or deliberate. Participants described their intrusion content and reported intrusion frequency, associated distress (VAS from 'Not at all' (0) to 'Highly distressed' (100)), valence (from 'Happy' (1) to 'Unhappy' (5)), and arousal (from 'Not aroused' (1) to 'Aroused' (5)). We summed the *z*-scores of intrusion frequency, distress, valence, and arousal over the week to estimate intrusion severity (for a similar method, see Sopp et al., 2019).

7.4. Follow-Up assessment after a week

In addition to the same *depression*, *anxiety*, *life meaning,* and *meaning violation* measures as at baseline, participants reported film-related *PTSD* symptoms on the *PTSD Checklist for DSM-5* (Blevins et al., 2015). For additional information regarding the measures, please see the Supplement 'Additional Information About Study Measures'.

7.5. Procedure

This study was approved by the Ethics Committee of Psychology of the University of Groningen and advertised via research participation websites, social media, and flyers. We aimed to include $N = 250$ participants based on an a priori power calculation ($f = .2$; $\alpha = .05$; power = .8) but stopped at $N = 237$ due to time constraints. We addressed ethical considerations regarding participants' well-being, e.g. by explicitly informing participants about the study design, the film content (rape, graphic assault), length, and potential to elicit distress (i) in the advertisements, (ii) before signing up, (ii) and verbally and in writing in the laboratory. Participants could stop the film if necessary. Moreover, the experimenters were trained to look for and mitigate potential distress in the laboratory via a multi-step plan. Also, participants received resources for managing distress in the online debriefing after the follow-up assessment. Inclusion criteria were being female, being able to read and write in English, and not having a diagnosis of or being in treatment for depression, anxiety, or PTSD. We did not stipulate additional exclusion criteria to maintain ecological validity. All study parts were implemented in Qualtrics, including the 'response request' option, allowing but discouraging skipping items. Inclusion criteria were assessed in an online screening questionnaire. In the laboratory, participants received a short verbal briefing summarizing the study content and were seated in individual cubicles with 23-inch monitors. Participants gave electronic informed consent, completed questionnaires, and watched the film clip. After subsequent questionnaires, Qualtrics automatically randomly allocated participants to one of the three experimental conditions. After the laboratory session (~50 min), participants received their first link for the online diary at 7 pm of the same day by email and subsequently received daily emails at 11 am containing the diary link (~1.5 min/day) and reminder emails at 7 pm. If participants did not complete their diary by 8 am the next day, they received a reminder email. After a week, participants received the link to the 10–15-min online follow-up assessment. As a compensation, participants received study credit ($n = 25$) or 15€ ($n = 212$). Participants who dropped out received partial compensation.

7.6. Statistical analyses

We used SPSS Statistics for Windows, Version 28 for all analyses. Descriptive statistics for relevant variables were obtained and assumptions for analyses were checked. Across hypotheses, we executed separate analyses per outcome (e.g. laboratory intrusions, anxiety). All data points were considered valid. No

values were considered outliers as even relatively high and low values are common and offer relevant information. Study continuation was independent of distress and demographic variables in the laboratory session (p's ≥ .08 in logistic regressions). Otherwise missing data was minimal (<1% per measure) and complete cases are analysed (Jakobsen et al., 2017). We tested the hypothesis of whether diary intrusions differed between groups (*H1*) threefold: we compared the composite intrusion scores over the week with an ANOVA and followed up with RM-ANOVAs on daily z-scores. Since graphs suggested differences on initial diary days, one-way ANOVAs were carried out for days 1 and 2. Moreover, we compared intrusion frequency over the week between groups with an ANOVA because previous studies commonly focussed only on this intrusion characteristic. We tested the hypothesis that in-session distress differed between groups (*H2*) with an ANOVA comparing the intrusion composite scores and an ANCOVA comparing state anxiety post-intervention controlling for post-film state anxiety. We conducted exploratory ANOVAs comparing the groups on follow-up depression, anxiety, and PTSD symptoms and followed up with ANCOVAs since they offer higher statistical power. We also executed additional group comparisons, e.g. at baseline, and compared baseline with follow-up measures with t-tests. We refrained from family-wise error correction as Type II errors may be considered more problematic than Type I errors for novel interventions since Type II errors may discourage the continuation of relevant research (e.g. see Armstrong, 2014; Mohr et al., 2009). Since this approach has the risk of increasing the likelihood of Type I errors, future replication is important to clarify the robustness of the effects. The abovementioned hypothesis tests were preregistered on aspredicted.org under #151981. Across analyses, we implemented a significance level of α = .05, two-sided and when assumptions appeared violated, we followed up with non-parametric tests.

8. Results

8.1. Descriptive statistics

Baseline Assessment. At baseline, the experimental groups were comparable in terms of depression, anxiety, state anxiety, and life meaning (for an overview of group mean comparisons, see Table 1). At least moderately severe and clinically relevant symptoms of depression were reported by 21.7% (n = 51; ≥ 26; Bech et al., 2001) and anxiety by 10.2% (n = 24; ≥ 10; Spitzer et al., 2006).

Reactions to the trauma analogue – the aversive film. On average, participants found the film very upsetting, paid much attention to it, only slightly distracted themselves during it, and were quite/very present while watching it across the experimental groups (Table 1). Even the n = 10 participants who had seen the film clip before, showed increases (range: + 3 to +13) in state anxiety from pre- to post-film. Two participants rated the film as 'not at all' upsetting. Since the film does therefore not constitute a valid stressor for these participants, we excluded them from further analyses. Moreover, three participants indicated distracting themselves 'very much' during the film. As, however, they also indicated paying at least 'moderate' attention and their state anxiety increased from pre- to post-film, these participants were not excluded. Hence, the final sample size was n = 235 (n_{MIL} = 80; $n_{active\ c.}$ = 77; $n_{inactive\ c.}$ = 78).

State anxiety increased from pre- to post-film (t = −35.86; p < .001; d = 4.07) resulting in moderately high post-film anxiety. Post-film state anxiety was comparable across groups (Table 1). Additionally, the film posed a moderate meaning violation, and life meaning decreased (t = 9.93; p < .001; d = 0.65; Table 1), particularly its comprehension subcomponent (t = 13.80; p < .001; d = 0.90; purpose: t = 5.90; p < .001; d = 0.39; mattering: t = 4.21; p < .001; d = 0.28). During the waiting period, participants reported M = 2.47 (SD = 2.89) intrusions (M = 2.45; SD = 2.91 distressing intrusions).

8.2. The meaning intervention resulted in group differences in life meaning

We compared post-intervention life meaning across groups (for group comparisons, see Table 1). When controlling for post-film life meaning, the group differences were significant, with higher life meaning in the meaning intervention group (Table 1) than the active (p < .001; d = 0.84) and inactive control (p < .001; d = 0.67) groups.

8.3. Intrusion diary

Intrusion frequency, distress, negative valence, and arousal decreased over the week (see supplement 'Intrusions Over the Course of the 7-Day Diary'). For example, 91% of the participants reported experiencing intrusions on day 1, and 41% on day 4. On day 7, 29% still reported intrusions with, on average, very low frequency (M = 0.61; SD = 1.38) and very limited distress (M = 6.69; SD = 16.35) across conditions (F's ≤ 1.34; p's ≥ .263). Distress-evoking intrusions across the first three days were more frequent (M = 9.73; SD = 11.21) than in some previous studies.

8.4. Follow-Up assessment

In the week following the film stressor, 29.8% showed clinically relevant levels of depression (n = 68; Bech

Table 1. Hypothesis testing and additional group comparisons.

Timepoint	Outcome	MIL intervention *M* (SD)	Active control *M* (SD)	Inactive control *M* (SD)	Overall mean *M* (SD)	Omnibus group comparison *F*(df)	*p*	η^2
Baseline	Depression	20.66 (7.53)	20.95 (7.21)	21.14 (8.52)	20.91 (7.74)	0.08 (2,232)	.927	.00
	Anxiety	4.73 (3.20)	5.19 (4.90)	4.49 (3.60)	4.79 (3.64)	0.83 (2,232)	.437	.01
	State anxiety	10.33 (3.22)	10.58 (3.44)	10.46 (3.05)	10.46 (3.23)	0.13 (2,232)	.882	.00
	Life meaning	72.43 (14.06)	71.10 (13.20)	72.54 (12.77)	72.03 (13.32)	0.28 (2,232)	.759	.00
Post-film	Film: attention	4.56 (0.69)	4.62 (0.69)	4.47 (0.82)	4.55 (0.73)	0.81 (2,232)	.447	.01
	Film: distraction	1.36 (0.66)	1.42 (0.78)	1.64 (1.03)	1.47 (0.84)	2.44 (2,232)	.089	.02
	Film: being present	4.39 (0.76)	4.61 (0.59)	4.40 (0.78)	4.46 (0.72)	2.42 (2,232)	.091	.02
	Film: upsetting	4.65 (0.73)	4.73 (0.50)	4.77 (0.62)	4.71 (0.63)	0.74 (2,232)	.480	.01
	Film: meaning viol.	16.60 (4.23)	16.26 (4.18)	15.77 (4.65)	16.21 (4.35)	0.73 (2,232)	.486	.01
	Life meaning	65.85 (14.10)	65.92 (13.68)	67.14 (12.92)	66.30 (13.53)	.22 (2,232)	.800	.00
	State anxiety	19.61 (3.74)	20.17 (3.27)	20.19 (3.66)	19.99 (3.56)	0.67 (2,232)	.512	.00
Wait period	Intrusion composite	−0.38 (1.86)	0.42 (3.12)	0.04 (2.34)	0.02 (2.50)	2.10(2,232)	.130	.02
Post-condition	State anxiety	11.79 (3.244)	13.16 (4.36)	13.35 (3.96)	12.75 (3.92)	3.29(2,230)	.039	.03 (*p*)
	Life meaning	73.10 (11.26)	67.79 (12.77)	69.76 (11.79)	70.25 (12.10)	15.86 (2,231)	<.001	.12 (*p*)
Diary	Intrusion composite	−0.19 (3.38)	−0.09 (3.36)	0.35 (3.77)	0.01 (3.50)	0.47(2,214)	.624	.00
	Intrusion frequency	11.40 (10.23)	13.44 (12.89)	14.26 (18.90)	12.99 (14.31)	0.77(2,215)	.462	.01
	Intrusion distress	91.75 (94.28)	101.71 (98.26)	117.23 (117.27)	103.10 (103.38)	1.12(2,216)	.329	.01
	Intrusion valence	15.91 (5.76)	15.45 (5.27)	15.91 (5.58)	15.76 (5.52)	0.17(2,216)	.847	.00
	Intrusion arousal	13.05 (4.86)	12.79 (4.26)	13.30 (4.62)	13.05 (4.58)	0.22(2,216)	.804	.00
	Daily intrusion composite					Between		
		-	-	-	-	0.51(2,214)	.602	.01 (*p*)
						Time		
		-	-	-	-	0.18(5.32,1139.16)	.975	.00 (*p*)
		-	-	-	-	Interaction 1.45(10.65,1139.16)	.146	.01 (*p*)
Diary day 1	Intrusion composite	−0.48 (2.83)	0.20 (3.51)	0.40 (3.25)	0.04 (3.21)	1.60(2,227)	.204	.01
	Intrusion frequency	4.19 (3.97)	5.38 (6.25)	5.74 (7.09)	5.09 (5.91)	1.47(2,227)	.233	.01
	Intrusion distress	26.71 (21.95)	35.38 (27.59)	35.68 (28.47)	32.53 (26.34)	2.94(2,227)	.055	.03
Diary day 2	Intrusion composite	−0.24 (3.10)	0.13 (3.29)	0.15 (3.76)	0.01 (3.38)	0.32(2,227)	.729	.00
	Intrusion frequency	2.64 (2.86)	2.97 (2.73)	3.18 (4.28)	2.93 (3.36)	0.51(2,228)	.601	.00
	Intrusion distress	18.71 (18.65)	22.67 (22.72)	23.16 (24.81)	21.49 (22.19)	0.94(2,228)	.393	.01
Follow-up	Depression	21.47 (8.22)	22.79 (9.10)	23.29 (10.04)	22.50 (9.13)	0.81(2,225)	.446	.01
	Anxiety	5.42 (4.02)	6.14 (4.41)	5.72 (3.90)	5.76 (4.11)	0.60(2,225)	.551	.01
	PTSD	33.78 (11.62)	35.37 (12.18)	36.23 (11.60)	35.11 (11.80)	0.85(2,226)	.430	.01
	PCL intrusions	8.98 (3.70)	9.01 (3.34)	9.37 (3.58)	9.12 (3.54)	0.29(2,226)	.747	.00
	Life meaning	70.26 (12.89)	68.97 (14.93)	70.91 (15.48)	70.04 (14.42)	0.35(2,226)	.705	.00
	Film: meaning viol.	15.87 (4.33)	14.72 (4.72)	15.18 (5.15)	15.26 (4.74)	1.15 (2,225)	.319	.01

Notes: In the laboratory assessment, *n*'s ranged from 76 to 80. In the diary, *n*'s ranged from 69 to 78. In the follow-up assessment, *n*'s ranged from 74 to 78. (*p*) in the column η^2 indicates partial η^2. Meaning viol. abbreviates meaning violation. Interaction refers to the interaction effect between group and time.

et al., 2001), 19.3% of anxiety ($n = 44$; Spitzer et al., 2006), and 67.2% of PTSD symptoms ($n = 153$; ≥ 28; Blevins et al., 2015).

8.5. Hypothesis testing (H1): the groups did not significantly differ on diary intrusions

The intrusion composite scores did not significantly differ between groups (for hypothesis tests, see Table 1; for diary intrusions graphs, see Supplement 'Intrusions Over the Course of the 7-Day Diary'). Also comparing the summed intrusion frequency over the week showed no significant differences. A secondary repeated measures ANOVA on the intrusion composite scores per day showed no overall effect of condition, but a trend level day*condition interaction. Exploratory one-way ANOVAs showed no significant differences between the groups on the intrusion composite scores for day 1, day 2 (Table 1), or other days. Similarly, intrusion frequency did not differ between groups on days 1 and 2, but intrusion distress showed a trend on day 1 but not day 2. In sum, the life meaning intervention did not result in significantly less severe intrusions over the week following the analogue traumatic stressor.

8.6. Hypothesis testing (H2): the meaning group experienced lower post-intervention state anxiety but rather comparable waiting period intrusions

Controlling for post-film state anxiety, the groups significantly differed on post-intervention state anxiety (Table 1). The intervention group reported less anxiety than the active ($p = .046$; $d = 0.34$) and inactive control ($p = .019$; $d = 0.37$) groups. To examine if group differences could be attributed to life meaning differences, we executed a mediation analysis, again controlling for post-film state anxiety. The link between condition and state anxiety was indeed mediated by life meaning after the intervention (Bootstrapped 95% CIs for the indirect effects [0.40; 1.29] for intervention vs active control; [0.31; 1.10] for intervention vs inactive control). Exploring the three subcomponents separately as mediators demonstrated significant effects for comprehension ([0.15; 0.89];

[0.01; 0.67]) and purpose ([0.09; 0.77]; [0.04; 0.72]), but not mattering ([−0.09; 0.42]; [−0.23; 0.28]).

Regarding waiting period intrusions, only a non-significant trend emerged (Table 1). The intervention group reported non-significantly fewer intrusions than the active control (Tukey $p = .108$; t-test $p = .053$; $d = -0.32$) but not inactive control (Tukey $p = .538$; t-test $p = .213$; $d = -0.20$) group. A non-parametric Kruskal-Wallace test confirmed the null result. To explore these null findings regarding intrusions, we also examined (i) only intrusions eliciting distress and (ii) a composite score including duration as a percentage of the waiting period, finding no significant differences (i: $p = .170$; ii: $p = .240$). Moreover, separate ANOVAs for intrusion frequency, distress, and duration showed no significant differences (ps ranged from .147 to .363; η^2 ranged from 0.01 to 0.02).

8.7. The groups did not differ on depression, anxiety, and PTSD symptoms in the week after the analogue stressor

Separate ANOVAs showed no significant group differences on depression, anxiety, and PTSD symptoms over the week (Table 1). Also, subsequent non-parametric tests (ps ranged from .282 to .723) and ANCOVAs controlling for baseline distress (ps ranged from .443 to .733) showed non-significant results. A secondary analysis showed that the intrusion subscale of the PTSD scale did not significantly differ between groups (Table 1), corroborating the diary null findings. Moreover, we exploratively compared follow-up life meaning, finding no significant group differences (Table 1, non-parametric test: $p = .745$, not preregistered), also not when controlling for baseline life meaning ($p = .833$). This indicates that the effect of the intervention on life meaning was short-lived. Exploratory t-tests demonstrated that follow-up depression ($p < .001$; $d = 0.23$) and anxiety symptoms ($p < .001$; $d = 0.28$) exceeded baseline estimates.

9. Discussion

Since exposure to potentially traumatic, distress-eliciting stressors are common (Benjet et al., 2016), effective early interventions are needed to prevent pathological distress (e.g. Asselbergs et al., 2023). This study investigated whether a short online life meaning intervention following an analogue traumatic stressor resulted in (H1) less severe intrusions over a week following the stressor, and (H2) less state anxiety and intrusions in the laboratory session. To examine these hypotheses, participants watched an aversive film and were then randomized to a life meaning intervention, an active control, or an inactive control condition. The current findings did not support H1, but partly supported H2 by showing that the life meaning intervention resulted in less state anxiety, but not significantly less severe intrusions compared to the control conditions.

9.1. The life meaning intervention significantly impacted state measures of life meaning and anxiety

Compared to the control conditions, the life meaning intervention led to higher state life meaning. However, this group difference was not sustained throughout the week. In line with a previous trauma analogue study (Ostafin & Proulx, 2023), also post-intervention state anxiety was significantly lower in the intervention condition compared to controls, possibly because the intervention reduced uncertainty (Hirsh et al., 2012). That life meaning, particularly its comprehension and purpose subcomponents, mediated the link between the experimental conditions and state anxiety indicates that it was indeed group differences in life meaning that drove this effect. Given that anxiety and depression symptoms over the subsequent week were elevated across the groups without significant group differences, the findings suggest that the distress-counteracting effect of the intervention was short-lived. Effect sizes were comparable to intense positive psychology interventions in medical patients, though less lasting (Brown et al., 2019), potentially due to the comparatively low intervention intensity. However, unlike other interventions, the current intervention is cost-effective and could be scaled up to extend its effects.

9.2. The life meaning intervention did not result in significantly less severe intrusions

When comparing intrusion severity (including intrusion frequency, distress, valence, arousal) over a week, the life meaning condition did not significantly differ from the control conditions. Follow-up analyses exploring this null finding showed a trend towards group differences over time, but insignificant effects, even on day 1 of the diary. Examining only intrusion frequency or elicited distress did not alter this finding. Exploratory additional analyses demonstrated a trend towards less intrusion distress on day 1.

This absence of an intervention effect on intrusions was also seen in the laboratory session: during a waiting period, the experimental groups did not differ significantly regarding the frequency, distress, or duration of intrusions. That the active control condition also did not report fewer intrusions than the inactive condition indicates that not working memory occupation alone counteracts distress, but rather specific, e.g. visuospatial occupation (Asselbergs et al., 2023). The assessment of PTSD symptoms after a week corroborates these null effects. Neither PTSD nor intrusion severity showed

significant group differences. In conjunction, the current life meaning intervention did not significantly counteract intrusions and other PTSD symptoms after the analogue traumatic stressor. This is not likely due to insufficient variance. The manipulation checks indicated that the film posed a valid stressor (similarly to Weidmann et al., 2009) as indicated by participants finding it upsetting and state anxiety rising from pre- to post-stressor. The film also elicited relatively many intrusions. Compared to prior studies using the same film, fewer distress-eliciting intrusions were reported in the waiting period, but more in the week-long diary (Maslahati et al., 2023; Weidmann et al., 2009). However, some previous studies limited intrusion modalities (e.g. visual or thought, Maslahati et al., 2023) while we included 'thoughts, images, sounds, words, phrases, feelings', potentially resulting in higher intrusion frequencies. Previous studies have shown that exposure to stressors such as the current film clip or reflecting on a past stressor elicits distress which decreases over the subsequent days (e.g. Jaffe et al., 2015; Maslahati et al., 2023). However, in the current study, some participants continued experiencing intrusions evoking limited distress until the last day of the diary, potentially because the film content was particularly distressing (Arnaudova & Hagenaars, 2017).

Previous clinical studies on meaning-focussed interventions mostly examined their effects on general distress such as depression and anxiety rather than intrusions or PTSD (see, e.g. Guerrero-Torrelles et al., 2017; Vos et al., 2015). The few available studies investigating the effects on PTSD symptoms showed mixed effects. For example, a study comparing a 12-week supportive-expressive writing condition (meaning intervention according to Vos et al., 2015) with an education-only condition, found no significant group differences in PTSD symptoms over 2 years ($p > .05$; Classen et al., 2008). Another study, comparing long-term (≥1 year) supportive-expressive group therapy plus relaxation therapy (meaning intervention) with 3-session relaxation therapy, showed no significant difference in PTSD symptoms (ps ranged from .07 to .31), but fewer PTSD symptoms in patients with a depression diagnosis at baseline ($F = 4.61$; $p = .04$; Kissane et al., 2007). Another study on life review therapy in Holocaust survivors found significant differences in PTSD symptoms at follow-up ($p = .005$, $d = 1.00$) but not post-treatment ($p = .148$, $d = 0.41$) compared to supportive group meetings (Forstmeier et al., 2023). However, as these studies did not assess life meaning, it remains unclear whether they successfully elevated meaning and hence constitute meaning interventions.

Moreover, effective psychotherapies for PTSD containing meaning components such as *Narrative Exposure Therapy* and *Brief Eclectic Therapy* also contain less meaning-related components (Schnyder et al., 2015). Additionally, the links between these therapies, life meaning, and treatment outcomes have not been investigated. Therefore, treatment effects cannot be attributed to (life) meaning. In sum, the role of life meaning (interventions) in post-stressor distress remains uncertain since (i) the current study showed no effect of a meaning intervention on intrusions and (ii) the effect of intense (partly) meaning-related interventions counteracting traumatic distress can currently not be attributed to life meaning.

There are several potential reasons for the current null findings regarding intrusions. One mechanism how meaning interventions may reduce intrusions is by counteracting negative posttraumatic cognitions involved in PTSD (Ehlers & Clark, 2000; Resick et al., 2017). Potentially, our intervention did not address relevant cognitions sufficiently, e.g. it might not have counteracted threat/danger beliefs, which are considered central in some models of PTSD (e.g. Ehlers & Clark, 2000). Another mechanism via which the intervention could have counteracted intrusions is visuospatial interference, which previous research has shown to counteract intrusions (Asselbergs et al., 2023). However, the imagination exercise only constituted a small part of the intervention, which might not have posed a sufficient interference. Moreover, the meaning intervention could have counteracted intrusions by reducing rumination (as in Ostafin & Proulx, 2023). However, since the previous study reporting this effect only assessed rumination immediately after the intervention, it remains unclear whether the rumination reduction persists and hence lasts sufficiently long to impact intrusions throughout the following week. Some models of PTSD suggest that successful integration of the traumatic experience and one's meaning framework including goals and beliefs alleviates symptoms (Janoff-Bulman, 1992; Park, 2010; Resick et al., 2017). According to these models, intrusions should subside once the integration occurs. From this perspective, the reason the current meaning intervention did not lower posttraumatic distress may be that the intervention did not foster this mental integration more than would naturally occur. Potentially, the intervention was too early as it did not specifically target subjects showing non-recovery in the form of sustained intrusions. Future studies could explore whether meaning interventions are a useful addition to treatments for acute stress disorder.

9.3. Strengths and limitations

Strengths of the current study include that it investigated the effect of a life meaning intervention on distress in the laboratory, over a week, and at 1-week follow-up, extending previous findings limited to

laboratory outcomes. Moreover, the current sample size allowed detecting even small-to-moderate effects with high statistical power. Additionally, the here used film clip has been described as particularly reliable in inducing intrusions (Weidmann et al., 2009) and may constitute a personally relevant stressor for young women.

In addition to these strengths, the study has several limitations. Though recruitment mostly took place on public websites and with flyers in public spaces, most participants were university students, making findings less generalizable to the general population. Moreover, the female-only sample limits generalizations to other genders. Since current data do not suggest a lasting effect of the intervention on life meaning, distress outcomes assessed in the laboratory are more clearly attributable to elevated post-intervention life meaning than diary and follow-up outcomes. Also, not correcting for multiple testing to avoid Type II errors might have resulted in risking Type I errors. Hence, inferences need to be drawn cautiously. Furthermore, lifetime stressors were not assessed and might have affected the outcome measures. However, past (traumatic) stressors might have been reflected in elevated baseline distress as well as post-stressor distress (Brewin et al., 2000; Hogg et al., 2023; Ozer et al., 2003). Since the groups did not significantly differ on these measures and random allocation should result in comparable groups, systematic bias between groups due to prior stressors is unlikely.

9.4. Clinical implications and directions for future research

Current findings suggest that this short, online meaning intervention may counteract the effects of a stressor on anxiety, but only momentarily. Since acute reactions to traumatic experiences predict subsequent PTSD (for a review, see Bryant, 2005), ameliorating acute distress may benefit adaptation. The effect size of the current intervention on state anxiety was comparable to that of previous early post-stressor interventions on PTSD symptoms such as intrusions (Asselbergs et al., 2023), but the current intervention did not affect intrusions. However, unlike some other interventions, the current meaning intervention does not incur costs, is scalable, and is accessible on any internet-receiving device. Since effective interventions early post-stressor are needed (e.g. as pointed out by Asselbergs et al., 2023), future studies might consider using more intense meaning interventions consisting of several sessions as in previous studies which demonstrated longer-lasting effects on distress (for a meta-analysis, see Vos & Vitali, 2018). Moreover, the interpersonal encounter between client and therapist has been deemed important in life meaning interventions (Guerrero-Torrelles et al., 2017), potentially suggesting in-person delivery in future studies. Additionally, implementing life meaning interventions in the context of real-world (traumatic) stressors would offer highly relevant additional information about the distress-preventing role of early post-stressor life meaning interventions. Moreover, investigating the role of life meaning in PTSD treatment and treatment outcomes, and studies on meaning therapies assessing trauma-specific distress (e.g. PTSD symptoms) would be important contributions. Current findings do not suggest implementing a short, online meaning intervention post-trauma to alleviate distress beyond momentary general, not trauma-specific distress. Furthermore, since the ethicality of this paradigm relies on the assumption that the elicited distress is non-severe and transitory (e.g. see Stirling et al., 2023), research involving the trauma film paradigm may benefit from longer-term assessments. This would help ensure that the distress completely subsides, such as through the use of the Reaction to Research Participation Questionnaire (Newman et al., 2001).

9.5. Conclusion

In sum, the current study investigated the effects of a short, online life meaning intervention in an analogue trauma study on subsequent distress. Our findings showed that, compared to controls, participants receiving the life meaning intervention experienced lower post-intervention state anxiety and higher life meaning. However, no differences were found in intrusions in the laboratory session and over a week. Moreover, conditions did not differ in life meaning, depression, anxiety, and PTSD at follow-up. Therefore, it appears that the intervention had positive, short-lived effects on general, but not PTSD symptoms. Future studies may benefit from employing more intense life meaning interventions or involving meaning-making of stressors, which might extend effects.

Acknowledgements

We would like to thank Lara, Liana, and Carolina for their involvement in data collection.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

A version of the data associated with this study is available from the corresponding author, L. J. Seidel-Koulaxis, upon reasonable request.

ORCID

Lea Jasmin Seidel-Koulaxis http://orcid.org/0000-0002-0000-2378
Judith K. Daniels http://orcid.org/0000-0001-6304-2310
Brian D. Ostafin http://orcid.org/0000-0001-9739-2757

References

Armstrong, R. A. (2014). When to use the Bonferroni correction. *Ophthalmic and Physiological Optics*, *34*(5), 502–508. https://doi.org/10.1111/opo.12131

Arnaudova, I., & Hagenaars, M. A. (2017). Lights … action: Comparison of trauma films for use in the trauma film paradigm. *Behaviour Research and Therapy*, *93*, 67–77. https://doi.org/10.1016/j.brat.2017.02.007

Asmundson, G. J. G., Thorisdottir, A. S., Roden-Foreman, J. W., Baird, S. O., Witcraft, S. M., Stein, A. T., Smits, J. A. J., & Powers, M. B. (2019). A meta-analytic review of cognitive processing therapy for adults with posttraumatic stress disorder. *Cognitive Behaviour Therapy*, *48*(1), 1–14. https://doi.org/10.1080/16506073.2018.1522371

Asselbergs, J., van Bentum, J., Riper, H., Cuijpers, P., Holmes, E., & Sijbrandij, M. (2023). A systematic review and meta-analysis of the effect of cognitive interventions to prevent intrusive memories using the trauma film paradigm. *Journal of Psychiatric Research*, *159*, 116–129. https://doi.org/10.1016/j.jpsychires.2023.01.028

Bech, P., Rasmussen, N.-A., Olsen, L. R., Noerholm, V., & Abildgaard, W. (2001). The sensitivity and specificity of the major depression inventory, using the present state examination as the index of diagnostic validity. *Journal of Affective Disorders*, *66*(2–3), 159–164. https://doi.org/10.1016/S0165-0327(00)00309-8

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y., … Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: Results from the World Mental Health Survey Consortium. *Psychological Medicine*, *46*(2), 327–343. https://doi.org/10.1017/S0033291715001981

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, *28*(6), 489–498. https://doi.org/10.1002/jts.22059

Boreham, I. D., & Schutte, N. S. (2023). The relationship between purpose in life and depression and anxiety: A meta-analysis. *Journal of Clinical Psychology*, *79*(12), 2736–2767. https://doi.org/10.1002/jclp.23576

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*(5), 748–766. https://doi.org/10.1037/0022-006X.68.5.748

Brown, L., Ospina, J. P., Celano, C. M., & Huffman, J. C. (2019). The effects of positive psychological interventions on medical patients' anxiety: A meta-analysis. *Psychosomatic Medicine*, *81*(7), 595–602. https://doi.org/10.1097/PSY.0000000000000722

Bryant, R. A. (2005). Predicting posttraumatic stress disorder from acute reactions. *Journal of Trauma & Dissociation*, *6*(2), 5–15. https://doi.org/10.1300/J229v06n02_02

Bryant, R. A. (2021). A critical review of mechanisms of adaptation to trauma: Implications for early interventions for posttraumatic stress disorder. *Clinical Psychology Review*, *85*, Article 101981. https://doi.org/10.1016/j.cpr.2021.101981

Burback, L., Brémault-Phillips, S., Nijdam, M. J., McFarlane, A., & Vermetten, E. (2024). Treatment of posttraumatic stress disorder: A state-of-the-art review. *Current Neuropharmacology*, *22*(4), 627–705. https://doi.org/10.2174/1570159X21666230428091433

Classen, C. C., Kraemer, H. C., Blasey, C., Giese-Davis, J., Koopman, C., Palesh, O. G., Atkinson, A., DiMiceli, S., Stonisch-Riggs, G., Westendorp, J., Morrow, G. R., & Spiegel, D. (2008). Supportive–expressive group therapy for primary breast cancer patients: A randomized prospective multicenter trial. *Psycho-Oncology*, *17*(5), 438–447. https://doi.org/10.1002/pon.1280

Disabato, D. J., Kashdan, T. B., Short, J. L., & Jarden, A. (2017). What predicts positive life events that influence the course of depression? A longitudinal examination of gratitude and meaning in life. *Cognitive Therapy and Research*, *41*, 444–458. https://doi.org/10.1007/s10608-016-9785-x

Dworkin, E. R., Jaffe, A. E., Bedard-Gilligan, M., & Fitzpatrick, S. (2023). PTSD in the year following sexual assault: A meta-analysis of prospective studies. *Trauma, Violence, & Abuse*, *24*(2), 497–514. https://doi.org/10.1177/15248380211032213

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*(4), 319–345. https://doi.org/10.1016/S0005-7967(99)00123-0

Feder, A., Ahmad, S., Lee, E. J., Morgan, J. E., Singh, R., Smith, B. W., Southwick, S. M., & Charney, D. S. (2013). Coping and PTSD symptoms in Pakistani earthquake survivors: Purpose in life, religious coping and social support. *Journal of Affective Disorders*, *147*(1–3), 156–163. http://doi.org/10.1016/j.jad.2012.10.027

Fischer, I. C., Shanahan, M. L., Hirsh, A. T., Stewart, J. C., & Rand, K. L. (2020). The relationship between meaning in life and post-traumatic stress symptoms in US military personnel: A meta-analysis. *Journal of Affective Disorders*, *277*, 658–670. https://doi.org/10.1016/j.jad.2020.08.063

Foa, E. B., Hearst-Ikeda, D., & Perry, K. J. (1995). Evaluation of a brief cognitive-behavioral program for the prevention of chronic PTSD in recent assault victims. *Journal of Consulting and Clinical Psychology*, *63*(6), 948–955. https://doi.org/10.1037/0022-006X.63.6.948

Forbes, D., Nickerson, A., Alkemade, N., Bryant, R. A., Creamer, M., Silove, D., McFarlane, A. C., Van Hooff, M., Fletcher, S. L., & O'Donnell, M. (2015). Longitudinal analysis of latent classes of psychopathology and patterns of class migration in survivors of severe injury. *The Journal of Clinical Psychiatry*, *76*(9), 1193–1199. https://doi.org/10.4088/JCP.14m09075

Forstmeier, S., Zimmermann, S., van der Hal, E., Auerbach, M., Kleinke, K., Maercker, A., & Brom, D. (2023). Effect of life review therapy for holocaust survivors: A randomized controlled trial. *Journal of Traumatic Stress*, *36*(3), 628–641. https://doi.org/10.1002/jts.22933

Friesen, E., Michael, T., Schäfer, S. K., & Sopp, M. R. (2022). COVID-19-related distress is associated with analogue PTSD symptoms after exposure to an analogue stressor. *European Journal of*

Psychotraumatology, *13*(2), 2. https://doi.org/10.1080/20008066.2022.2127185

George, L. S., & Park, C. L. (2016). Meaning in life as comprehension, purpose, and mattering: Toward integration and new research questions. *Review of General Psychology*, *20*(3), 205–220. https://doi.org/10.1037/gpr0000077

George, L. S., & Park, C. L. (2017). The multidimensional existential meaning scale: A tripartite approach to measuring meaning in life. *The Journal of Positive Psychology*, *12*(6), 613–627. https://doi.org/10.1080/17439760.2016.1209546

Guerrero-Torrelles, M., Monforte-Royo, C., Rodríguez-Prat, A., Porta-Sales, J., & Balaguer, A. (2017). Understanding meaning in life interventions in patients with advanced disease: A systematic review and realist synthesis. *Palliative Medicine*, *31*(9), 798–813. https://doi.org/10.1177/0269216316685235

Hirsh, J. B., Mar, R. A., & Peterson, J. B. (2012). Psychological entropy: A framework for understanding uncertainty-related anxiety. *Psychological Review*, *119*(2), 304–320. https://doi.org/10.1037/a0026767

Hogg, B., Gardoki-Souto, I., Valiente-Gómez, A., Rosa, A. R., Fortea, L., Radua, J., Amann, B. L., & Moreno-Alcázar, A. (2023). Psychological trauma as a transdiagnostic risk factor for mental disorder: An umbrella meta-analysis. *European Archives of Psychiatry and Clinical Neuroscience*, *273*(2), 397–410. https://doi.org/10.1007/s00406-022-01495-5

Holland, J. M., Currier, J. M., & Neimeyer, R. A. (2014). Validation of the integration of stressful life experiences scale-short form in a bereaved sample. *Death Studies*, *38*(4), 234–238. https://doi.org/10.1080/07481187.2013.829369

Jaffe, A. E., DiLillo, D., Hoffman, L., Haikalis, M., & Dykstra, R. E. (2015). Does it hurt to ask? A meta-analysis of participant reactions to trauma research. *Clinical Psychology Review*, *40*, 40–56. https://doi.org/10.1016/j.cpr.2015.05.004

Jakobsen, J. C., Gluud, C., Wetterslev, J., & Winkel, P. (2017). When and how should multiple imputation be used for handling missing data in randomised clinical trials – A practical guide with flowcharts. *BMC Medical Research Methodology*, *17*(1). https://doi.org/10.1186/s12874-017-0442-1

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma*. The Free Press.

Jericho, B., Luo, A., & Berle, D. (2022). Trauma-focused psychotherapies for post-traumatic stress disorder: A systematic review and network meta-analysis. *Acta Psychiatrica Scandinavica*, *145*(2), 132–155. https://doi.org/10.1111/acps.13366

Kashdan, T. B., & Kane, J. Q. (2011). Post-traumatic distress and the presence of post-traumatic growth and meaning in life: Experiential avoidance as a moderator. *Personality and Individual Differences*, *50*(1), 84–89. https://doi.org/10.1016/j.paid.2010.08.028

King, L. A., & Hicks, J. A. (2021). The science of meaning in life. *Annual Review of Psychology*, *72*(1), 561–584. https://doi.org/10.1146/annurev-psych-072420-122921

Kissane, D. W., Grabsch, B., Clarke, D. M., Smith, G. C., Love, A. W., Bloch, S., Snyder, R. D., & Li, Y. (2007). Supportive-expressive group therapy for women with metastatic breast cancer: Survival and psychosocial outcome from a randomized controlled trial. *Psycho-Oncology*, *16*(4), 277–286. https://doi.org/10.1002/pon.1185

Krause, N. (2007). Evaluating the stress-buffering function of meaning in life among older people. *Journal of Aging and Health*, *19*(5), 792–812. https://doi.org/10.1177/0898264307304390

Lejuez, C. W., Hopko, D. R., & Hopko, S. D. (2001). A brief behavioral activation treatment for depression. Treatment manual. *Behavior Modification*, *25*(2), 255–286. https://doi.org/10.1177/0145445501252005

Lindauer, R. J. L., Gersons, B. P. R., van Meijel, E. P. M., Blom, K., Carlier, I. V. E., Vrijlandt, I., & Olff, M. (2005). Effects of brief eclectic psychotherapy in patients with posttraumatic stress disorder: Randomized clinical trial. *Journal of Traumatic Stress*, *18*(3), 205–212. https://doi.org/10.1002/jts.20029

Manco, N., & Hamby, S. (2021). A meta-analytic review of interventions that promote meaning in life. *American Journal of Health Promotion*, *35*(6), 866–873. https://doi.org/10.1177/0890117121995736

Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology*, *31*(3), 301–306. https://doi.org/10.1111/j.2044-8260.1992.tb00997.x

Martela, F., Ryan, R. M., & Steger, M. F. (2018). Meaningfulness as satisfaction of autonomy, competence, relatedness, and beneficence: Comparing the four satisfactions and positive affect as predictors of meaning in life. *Journal of Happiness Studies*, *19*(5), 1261–1282. https://doi.org/10.1007/s10902-017-9869-7

Martela, F., & Steger, M. F. (2016). The three meanings of meaning in life: Distinguishing coherence, purpose, and significance. *The Journal of Positive Psychology*, *11*(5), 531–545. https://doi.org/10.1080/17439760.2015.1137623

Maslahati, T., Schultebraucks, K., Galve Gómez, M., Hellmann-Regen, J., Otte, C., Wingenfeld, K., & Roepke, S. (2023). Effects of oral contraceptives on intrusive memories: A secondary analysis of two studies using the trauma film paradigm in healthy women. *European Journal of Psychotraumatology*, *14*(2), 1–11. https://doi.org/10.1080/20008066.2023.2282003

Michael, T., & Ehlers, A. (2007). Enhanced perceptual priming for neutral stimuli occurring in a traumatic context: Two experimental investigations. *Behaviour Research and Therapy*, *45*(2), 341–358. https://doi.org/10.1016/j.brat.2006.03.012

Mohr, D. C., Spring, B., Freedland, K. E., Beckner, V., Arean, P., Hollon, S. D., Ockene, J., & Kaplan, R. (2009). The selection and design of control conditions for randomized controlled trials of psychological interventions. *Psychotherapy and Psychosomatics*, *78*(5), 275–284. https://doi.org/10.1159/000228248

Moulds, M. L., Bisby, M. A., Wild, J., & Bryant, R. A. (2020). Rumination in posttraumatic stress disorder: A systematic review. *Clinical Psychology Review*, *82*, Article 101910. https://doi.org/10.1016/j.cpr.2020.101910

Newman, E., Willard, T., Sinclair, R., & Kaloupek, D. (2001). Empirically supported ethical research practice: The costs and benefits of research from the participants' view. *Accountability in Research*, *8*(4), 309–329. https://doi.org/10.1080/08989620108573983

Noé, G. (Director). (2002). *Irréversible*.

Ostafin, B. D., & Proulx, T. (2020). Meaning in life and resilience to stressors. *Anxiety, Stress, & Coping*, *33*(6), 603–622. https://doi.org/10.1080/10615806.2020.1800655

Ostafin, B. D., & Proulx, T. (2023). A brief life-purpose intervention reduces trauma-film anxiety and

rumination. *The Humanistic Psychologist*, *51*(4), 397–406. https://doi.org/10.1037/hum0000298

Ostafin, B. D., Papenfuss, I., & Vervaeke, J. (2022). Fear of the unknown as a mechanism of the inverse relation between life meaning and psychological distress. *Anxiety, Stress, & Coping*, *35*(4), 379–394. https://doi.org/10.1080/10615806.2021.1994556

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, *129*(1), 52–73. https://doi.org/10.1037/0033-2909.129.1.52

Park, C. L. (2010). Making sense of the meaning literature: An integrative review of meaning making and its effects on adjustment to stressful life events. *Psychological Bulletin*, *136*(2), 257–301. https://doi.org/10.1037/a0018301

Raghuraman, S., Stuttard, N., & Hunt, N. (2021). Evaluating narrative exposure therapy for post-traumatic stress disorder and depression symptoms: A meta-analysis of the evidence base. *Clinical Psychology & Psychotherapy*, *28*, 1–23. https://doi.org/10.1002/cpp.2486

Resick, P. A., Monson, C. M., & Chard, K. M. (2017). *Cognitive processing therapy for PTSD: A comprehensive manual*. Guilford Press.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., Robertson, L., Lewis, C., & Bisson, J. I. (2019). Multiple session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews*, *2019*(8). https://doi.org/10.1002/14651858.CD006869.pub3

Rombold, F., Wingenfeld, K., Renneberg, B., Hellmann-Regen, J., Otte, C., & Roepke, S. (2016). Influence of the noradrenergic system on the formation of intrusive memories in women: An experimental approach with a trauma film paradigm. *Psychological Medicine*, *46*(12), 2523–2534. https://doi.org/10.1017/S0033291716001379

Schnell, T., & Krampe, H. (2020). Meaning in life and self-control buffer stress in times of COVID-19: Moderating and mediating effects with regard to mental distress. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.582352

Schnyder, U., Ehlers, A., Elbert, T., Foa, E. B., Gersons, B. P. R., Resick, P. A., Shapiro, F., & Cloitre, M. (2015). Psychotherapies for PTSD: What do they have in common? *European Journal of Psychotraumatology*, *6*(1), 564–566. https://doi.org/10.3402/ejpt.v6.28186

Schnyder, U., Müller, J., Maercker, A., & Wittmann, L. (2011). Brief eclectic psychotherapy for PTSD: A randomized controlled trial. *The Journal of Clinical Psychiatry*, *72*(4), 564–566. https://doi.org/10.4088/JCP.10l06247blu

Seidel, L. J., Daniels, J. K., & Ostafin, B. D. (2022). The role of meaning in life in psychological distress during the COVID-19 pandemic. *Anxiety, Stress, & Coping*. https://doi.org/10.1080/10615806.2022.2113993

Seidel-Koulaxis, L. J., Daniels, J. K., & Ostafin, B. D. (2023). Psychosocial predictors of distress in East and West Germans during the COVID-19 pandemic. *Psychology & Health*. https://doi.org/10.1080/08870446.2023.2265929

Sherrill, A. M., Kurby, C. A., Lilly, M. M., & Magliano, J. P. (2019). The effects of state anxiety on analogue peritraumatic encoding and event memory: Introducing the stressful event segmentation paradigm. *Memory (Hove, England)*, *27*(2), 124–136. https://doi.org/10.1080/09658211.2018.1492619

Shin, J. Y., & Steger, M. F. (2014). Promoting meaning and purpose in life. In A. C. Parks & S. M. Schueller (Eds.), *The Wiley Blackwell handbook of positive psychological interventions* (1st ed., pp. 90–110). John Wiley & Sons. https://doi.org/10.1002/9781118315927.ch5

Sopp, M. R., Brueckner, A. H., Schäfer, S. K., Lass-Hennemann, J., & Michael, T. (2019). REM theta activity predicts re-experiencing symptoms after exposure to a traumatic film. *Sleep Medicine*, *54*, 142–152. https://doi.org/10.1016/j.sleep.2018.10.030

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Stirling, N. S. J., Nixon, R. D. V., & Takarangi, M. K. T. (2023). No more than discomfort: The trauma film paradigm meets definitions of minimal-risk research. *Ethics & Behavior*, *33*(1), 1–17. https://doi.org/10.1080/10508422.2021.1997603

Streb, M., Conway, M. A., & Michael, T. (2017). Conditioned responses to trauma reminders: How durable are they over time and does memory integration reduce them? *Journal of Behavior Therapy and Experimental Psychiatry*, *57*, 88–95. https://doi.org/10.1016/j.jbtep.2017.04.005

Vos, J., Craig, M., & Cooper, M. (2015). Existential therapies: A meta-analysis of their effects on psychological outcomes. *Journal of Consulting and Clinical Psychology*, *83*(1), 115–128. https://doi.org/10.1037/a0037167

Vos, J., & Vitali, D. (2018). The effects of psychological meaning-centered therapies on quality of life and psychological stress: A metaanalysis. *Palliative and Supportive Care*, *16*(5), 608–632. https://doi.org/10.1017/S1478951517000931

Weidmann, A., Conradi, A., Gröger, K., Fehm, L., & Fydrich, T. (2009). Using stressful films to analyze risk factors for PTSD in analogue experimental studies – which film works best? *Anxiety, Stress & Coping*, *22*(5), 549–569. https://doi.org/10.1080/10615800802541986

Winger, J. G., Adams, R. N., & Mosher, C. E. (2016). Relations of meaning in life and sense of coherence to distress in cancer patients: A meta-analysis. *Psycho-Oncology*, *25*, 2–10. https://doi.org/10.1002/pon.3798

Yunitri, N., Chu, H., Kang, X. L., Wiratama, B. S., Lee, T.-Y., Chang, L.-F., Liu, D., Kustanti, C. Y., Chiang, K.-J., Chen, R., Tseng, P., & Chou, K.-R. (2023). Comparative effectiveness of psychotherapies in adults with posttraumatic stress disorder: A network meta-analysis of randomised controlled trials. *Psychological Medicine*, *53*(13), 6376–6388. https://doi.org/10.1017/S0033291722003737