A Systematic Review of Positive Psychology Interventions (PPIs) to Improve the Health Behaviours, Psychological Wellbeing and/or Physical Health of Police Staff

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Abstract

This review aimed to assess the use of positive psychology interventions (PPIs), such as using positive mantras, expressive writing, or gratitude diaries, to improve the health behaviours, psychological wellbeing and/or physical health of police staff. The review was registered on PROSPERO before 16 electronic databases were searched for published articles between January 1999 and February 2022. Included studies offered PPIs to improve the physical health (body mass index, blood pressure), psychological well-being (stress, anxiety, mood, emotion, depression, self-efficacy), or health behaviours (physical activity, sitting times, dietary habits, alcohol, or tobacco use) of police staff. The mixed methods appraisal tool (MMAT) was used to assess the risk of bias of included papers. The initial search yielded 4560 results; with 3385 papers remaining after duplicates were removed. Of these, 15 studies were included in the final review. Intervention types included mindfulness-based resilience training ($n=11$), physical or wellness practice classes ($n=1$), role-play and scenario-based interventions ($n=2$) and expressive writing ($n=1$). Mindfulness-based interventions improved many psychological wellbeing facets such as anxiety, depression, negative affect and quality of life. Limited improvements were observed for some health behaviours such as alcohol consumption and in self-reported general health. Expressive writing and role-play-based interventions were effective in reducing stress and anxiety, however, improvement in depression scores were inconsistent across studies. Positive psychology interventions are promising to support the health and wellbeing of police staff. Future research should investigate their mechanisms of action to support future innovation in support for police wellbeing.

Keywords Police · Positive psychology · Intervention · Health · Wellbeing · Gratitude · Mantra · Stress

Introduction

Police staff are considered a high-risk group for developing and living with mental health problems mainly due to the trauma-related nature of some of their work (Van Der Velden

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et al. 2013). Interventions designed to promote police wellbeing commonly focus on equipping employees with the necessary skills to cope with work-related stress or stressful situations and to use interpersonal skills to de-escalate. These interventions typically use psycho-educational methods such as stress awareness training (Patterson 2003; van der Meulen et al. 2018; Wilson et al. 2001), stress management and coping workshops (Wilson et al. 2001), social skills or problem-solving skills training (Aremu 2006).

Resilience enhancement or stress management training sessions can be used to reduce the potentially negative impact on the psychological wellbeing of police staff (Andersen et al. 2015). Such interventions included the Heartmath® stress techniques (McCraty et al. 2009), mental imaging training (Arnetz et al. 2009) and resilience training (Devilly and Varker 2013) and aim to teach coping skills to police staff that could be used when preparing for or experiencing a stressful event. These interventions are often small

group-based, intensive 2–3-day training sessions. However, research has been inconsistent, with some showing no significant differences on stress levels, resilience or coping between the intervention and passive comparison group (Patterson 2003; van der Meulen et al. 2017). In contrast, adopting positive coping strategies following trauma can help to develop resilience for future incidents and thus may have a protective effect for developing post-traumatic stress disorder (PTSD) (Hartley et al. 2013; Singh 2017). Interventions often incorporate relaxation exercises using positive, energizing cue words and positive self-affirmations (Shipley and Baranski 2002), which could be considered the first step towards positive psychology-based methods.

Positive psychology has created a shift, from preoccupation with repairing the worst things in life, to building and embracing the positive things (Csikszentmihalyi and Seligman 2000). The field highlights the importance of subjective experiences, of contentment and satisfaction in the past, hope and optimism for the future, and flow and happiness in the present (Csikszentmihalyi and Seligman 2000). Positive cognitions and a positive outlook are associated with protective health behaviours such as exercising regularly, not smoking, eating fruit/vegetables, and avoiding fatty foods (Grant et al. 2009; Cook and Chater 2010). Those with a positive outlook on life are significantly less likely to be immunosuppressed and are, as a result, less susceptible to viral infections (Danner et al. 2001; Cohen et al. 2006). Positive psychology interventions (PPIs) aim to increase positive cognitions, feelings and behaviours (Sin and Lyubomirsky 2009), which may be particularly useful in a high-stress environment such as policing to improve and maintain employee wellbeing.

PPIs that build on Seligman's theory of well-being (Seligman 2011) have been shown to improve employee well-being, lower absenteeism and turnover intent, and improve organisational commitment (Laschinger 2012). The Civility, Respect, and Engagement in the Workplace (CREW) intervention for nurses in a hospital setting has utilised positive psychology to facilitate team building by promoting positive interactions on the unit, eradicating negative communication that stems from the stressful work environment and poor resources as well as improving conflict management skills (Laschinger 2012). Nurses in the intervention group experienced significant increases in feelings of empowerment, reported higher organisational commitment, job satisfaction, and improved mental and physical health (Laschinger et al. 2009).

There is good evidence of the efficacy of PPIs in enhancing psychological wellbeing and reducing depression (Bolier et al. 2013; Sin and Lyubomirsky 2009). Interventions include setting personal goals (Green et al. 2006; Sheldon et al. 2002), using personal strengths (Seligman et al. 2005), expressing gratitude (Seligman et al. 2005; Sheldon and Lyubomirsky 2006), counting your blessings (Emmons and Mc Cullough 2003; Seligman et al. 2005) and practising kindness (Otake et al. 2006). While much of the past research involving PPIs has been conducted in clinical populations, there is no current synthesis of the evidence conducted in policing settings. The present review aimed to evaluate the use of PPIs with police staff and report their effectiveness to improve health behaviour, psychological wellbeing and/or physical health.

Method

Design

This systematic review is reported using the PRISMA (Page et al. 2021) guidelines. The protocol was registered on PROSPERO 2019 CRD42019159626 (Chater et al. 2019).

Eligibility Criteria

Inclusion Criteria

Eligible studies had to be conducted in a policing/law enforcement setting, either with operational or non-operational staff and include a PPI. Studies that used PPIs to improve health behaviours (eating, physical activity, sitting, alcohol consumption, substance use), mental wellbeing (through either reducing stress levels (general and/or work-related), anxiety, depression or negative affect or improving low mood, positive affect or self-efficacy) or physical health outcomes (body mass index (BMI), cholesterol levels, glucose, sleep) were eligible.

Exclusion Criteria

Studies that were not written in the English language, that included pharmacological therapies, included those aged 17 or younger or those that did not meet the inclusion criteria were excluded.

Information Sources

The following databases were searched for publications between January 1999 and February 2022: PubMed/MEDLINE, PsycINFO, EMBASE, Scopus, Google Scholar, CINAHL, Applied Social Sciences Index and abstracts (ASSIA), Health Technology Assessment (HTA) Programme, British Nursing Index (BNI), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane systematic review database, Database of Abstracts of Reviews of Effects (DARE), published systematic reviews of physical activity interventions as a source of Randomised Controlled Trials (RCT), unpublished (grey literature), NIHR portfolio

(recently completed or ongoing studies), current controlled trials register, system for information on grey literature (SIGLE) and OpenGrey. The reference sections of relevant articles were also hand searched to identify any relevant articles that may not have been retrieved at the initial searches.

Search Strategy

Search terms used the PICOS framework: P (Population): *Police OR 'Law Enforce'*;* AND I (Intervention): *Positive OR 'Positive Psych*' OR 'Behavio* Change' OR Mindfulness OR 'Three Good Things' OR Gratitude OR Mantras OR Affirmation* OR Happ* OR 'Expressive writing';* C (Comparator): *no specification;* O (Outcomes): *(Psychological): Stress OR Distress OR Anxiety OR Affect OR Emotion* OR Depression OR Mood OR Mental Health OR Wellbeing // (Physical health): Physical Health OR Weight OR Overweight OR Obesity OR BMI OR Hypertension OR Blood Pressure OR Heart Disease OR Cardiovascular OR Cardiac Health OR Cholesterol OR Glucose OR Musculoskeletal/ (Behavioural) Physical Activit* OR Activity OR Exercise OR Sitting OR Diet OR Fruit intake OR Vegetable intake OR Sleep OR Alcohol OR Drinking OR Smoking OR Tobacco OR Drug;* S (Study design): *RCT OR Trial* OR Intervention* OR Stud* OR Program* OR Qualitative OR quantitative OR mixed methods.*

Selection Process Once the searches were completed, DK moved all citations to RefWorks (2022) and removed duplicates. All title and abstracts were independently screened for clear violations of inclusion criteria by DK and GWS, any discrepancies were screened by JW, with agreement from AMC. Full texts were then screened independently by the first reviewer (DK) and the second reviewer (JW). Discrepancies were discussed by DK and JW initially, and confirmed by AMC.

Data Collection Process and Data Items

Study characteristics and results of all included papers were extracted and added to an Excel data extraction sheet by DK, and checked by AMC. Characteristics included demographic data (age, job titles), intervention characteristics (type, duration, intervention content, control group), outcome measures and follow-up time points (see Table 1).

Study Risk of Bias Assessment

Risk of bias was assessed using the Mixed Methods Appraisal Tool (MMAT: Hong et al. 2018). The MMAT is a critical appraisal tool to assess the methodological quality of empirical studies. This tool was chosen as it can appraise five different types of study designs (qualitative, randomised

controlled trial, nonrandomised, quantitative descriptive and mixed methods studies) and the present study included all study designs (Hong et al. 2018). To ensure the validity of the risk of bias assessment, DK and JW independently rated all papers and resolved any discrepancy through discussion. Studies are rated by answering five study-design specific methodological questions (criteria) for each study; rating may range from 1 to 5 (for criteria met), or from 20% (one criteria met) to 100% (5 criteria met).

Synthesis Methods

A narrative synthesis (Popay et al. 2006) was used, whereby findings from multiple studies were synthesised using text to summarise and explain the findings, with tables of study characteristics, participant and intervention details, settings and outcomes presented (Table 1).

Results

Study Selection

A total of 3385 titles and abstracts were screened, resulting in 127 for full-text review. Of these, 15 eligible studies were included in the final review. Reasons for exclusion are displayed in Fig. 1.

Intervention Descriptions

Descriptions of the included interventions (Table 1) was guided by the Template for Intervention Description and Replication (TIDieR; Hoffman et al. 2014) checklist. This checklist includes 12 description items: (1) Brief name/ phrase to describe intervention, (2) rationale, theory, or goal behind the intervention, (3) and (4) Materials and procedures, (5) Provider of the intervention, (6) Mode of deliver, (7) Location of delivery, (8) Frequency of intervention delivery, (9) Tailoring or personalisation, (10) Modifications of intervention method, (11) and (12) Planned or Actual fidelity assessment.

Study Characteristics

Seven studies were RCTs (Christopher et al. 2018; Chitra and Karunanidhi 2018; Grupe et al. 2021; Ireland et al. 2007; Liakopoulou et al. 2020; McCraty and Atkinson 2012; Shipley and Baranski 2002; Trombka et al. 2021), three were single-arm trials (Bergman et al. 2016; Grupe et al. 2019; Jetelina et al. 2022) of which one offered a qualitative evaluation (Jetelina et al. 2022), two were RCT feasibility studies (Ranta and Sud 2008; Ranta 2009), one was a mixed design (Krick and Felfe 2020), and one study employed a descriptive investigation

Table 1 Characteristics of included studies in the review of positive psychological interventions for police staff

Author and year	Country	Study design	Data collection	Demographics	Intervention	Outcomes	p	Effect size	Results
Acquadro Maran et al. (2018)	Italy	Descriptive investigation; non-randomised multi-course intervention	Self-report	N=105 36 M, 69 F Age: 26–60 years (M=48.2; SD=5.9)	Physical practice (PP n=49) Wellbeing practice (WP n=56) Duration: 8 months BL, PI (1 year)	General mental health Distress Substance use	.00 (PP) .00 (WP) .00 (PP) .00 (WP) .00 (PP) .005 (WP)		Improved mental health Reduced distress Reduced substance use
Bergman et al. (2016)	USA	Single-arm trial	Self-report	N=47 30 M, 17 F Age: 30–61 years (M=42.7; SD=7.2)	Mindfulness-based resilience training No control group Duration: 8 weeks BL, PI	Operational stress Organisational stress			Reduced operational stress Reduced organisational stress
Chitra and Karunanidhi (2018)	India	RCT	Self-report	N=63 (Female POs only) Age: 23–41 years (M=27)	Mindfulness-based resilience training (n=33) No treatment control (n=30) Duration: 2 months BL, PI, 2 M	Work-related stress Psychological wellbeing	.01 PI .01 PI	.28 -.49 (η_p^2) .27 -.50 (η_p^2)	Improved occupational stress Improved psychological wellbeing
Christopher et al. (2018)	USA	RCT	Self-report	N=61 54 M, 7 F Age (M=43.9; SD=6.0)	Mindfulness-based resilience training (n=33) No treatment control (n=30) Duration: 2 months BL, PI, 3 M	Organisational stress Alcohol use Sleep Disturbance Operational stress Depression Anxiety	.05 PI ns 3 M .02 PI ns 3 M ns	.52 (d) .37 (d) ns	Reduced organisational stress Reduced alcohol use Sleep disturbance Operational stress Depression Anxiety

Table 1 (continued)

Author and year	Country	Study design	Data collection	Demographics	Intervention	Outcomes	p	Effect size	Results
Grupe et al. (2019)	USA	Single Arm Trial	Self-report	N = 30 14 M, 16 F Age (M = 38.4; SD = 7.7)	Mindfulness-based resilience training (n = 33) No treatment control (n = 30) Duration: 2 months BL, PI, 2 M	Positive/Negative affect Anxiety Psychological wellbeing, Depression Sleep quality Operational stress Organisational stress	.01 .001 .036 ns	-.52 (d) PI -0.86 (d) PI -0.76 (d) 5 M -.39 (d) PI ns	Reduced negative affect Reduced anxiety Improved psychological wellbeing Depression Improved sleep quality Reduced operational stress Reduced organisational stress
Grupe et al. (2021)	USA	RCT	Self-report biological measures	N = 114 47 F, 67 M Age (M = 40; SD = 8.3)	Mindfulness-Based Stress Reduction (MBSR) (n = 57) Waitlist control (n = 57) Duration: 8 weeks BL, PI, 3 M	Perceived stress Anxiety Depression Sleep quality Sleep disturbance Sleep duration Operational stress Organisational stress Physical health Health Behaviours	.02 .02 .02 .02 .05 .05 .01 ns	-.34 (d) 3 M -.34 (d) PI -.35 (d) 3 M -.36 (d) 3 M -.30 (d) 3 M -.29 (d) PI -.41 (d) 3 M ns	Reduced stress (perceived) Reduced anxiety Reduced depression Improved sleep quality Reduced sleep disturbance Operational police stress Organisational police stress Improved physical Health behaviours
Ireland et al. (2007)	Australia	RCT	Self-report	N = 129 82 M, 47 F Age (M = 38.8, SD = 8.6)	Expressive writing (n = 65) No intervention control (n = 64) Duration: 3 weeks BL, PI	Anxiety Depression Stress	.05 .001 .01		Reduced anxiety (n = 67 completed) Reduced depression Reduced stress

Table 1 (continued)

Author and year	Country	Study design	Data collection	Demographics	Intervention	Outcomes	p	Effect size	Results
Jetelina et al. (2022)	USA	Single-arm trial	Semi-structured interviews	N=22 19 M, 3 F Age (M=36.4; SD=10.6)	Two intervention components: A 1-min meditation breathing, the Calm app™ Duration: 30 days PI (qualitative)	Anxiety Acute stress Sleep duration/ disturbance Heart rate	No statistical findings		Breathing exercises worked in reducing real-time, acute stress. POs preferred briefer (5 s – 1 min breathing) or 10-min physical exercises
Krick and Felfe (2020)	Germany	Mixed design	Self-report physical measures	N=267 210 M, 57 F Ages 19–47 years (M=25.9, SD=5.5)	Mindfulness and resource-based worksite training (n=126), No intervention control (n=141), BL, PI Duration: 6 weeks	Negative affect Health complaints	.001 PI .001 PI	.08 (η^2) .07 (η^2)	Improved negative affect Reduced health complaints
Liakopoulou et al. (2020)	Greece	RCT	Self-report	N=54 42 M, 12 F Ages 20–60 years (M=34.5; SD=7.8)	Pythagorean Self- Awareness Intervention (PSAI) (n=27) No treatment (n=27) Duration: 8 weeks BL, PI	Police stress Positive and negative affect	.05 ns	ns	Reduced negative affect Positive affect Organisational stress Operational stress
McCraty and Atkinson (2012)*	USA	RCT	Self-report, interviews, biological measures	N=65 55 M, 10 F Ages 24–55 years (M=39)	Coherence Advantage Stress Resilience and Performance Enhancement Program (Heartmath) (n=28) waiting control group (n=31) Duration: 16 weeks BL, PI	Depression Negative affect Positive affect Sleep Anxiety	.05 .01 ns	ns	Reduction in negative emotions Improvement in depression Positive emotion Sleeplessness Anxiety

Table 1 (continued)

Author and year	Country	Study design	Data collection	Demographics	Intervention	Outcomes	p	Effect size	Results
Ranta and Sud (2008)	India	RCT	Self-report	$N=80$ Police officers	Multidimensional stress management intervention–physical relaxation training only control BL, PI	Police stress	.001		Reduced stress
Ranta (2009)	India	RCT	Self-report	$N=80$ Police officers	Multidimensional Stress Management Intervention—Physical relaxation training only control BL, PI	Police Stress	.001		Reduced stress
Shipley and Baranski (2002)	Canada	RCT	Self-report instructor evaluation	$N=54$ 40 M, 14 F Age ($M=27$), police college graduates	Visuo-motor Behaviour Rehearsal ($n=26$) no treatment control ($n=28$) BL, PI	Anxiety	.05		Reduced cognitive state anxiety
Trombka et al. (2021)	Brazil	RCT	Self-report	$N=170$ 43 M, 127 F Ages 24–60 years ($M=42.2$, $SD=7.7$) civil police	Mindfulness -based health promotion ($n=88$) Waitlist control ($n=82$) Duration: 8 weeks BL, PI, 6 M	Quality of life General health Depression Anxiety	.01 .001 .001 .01 .001 .001 .001 .001	.72 PI .74 6 M .70 PI .62 6 M −.97 PI −.60 6 M −.73 PI −.51 6 M	Improved quality of life Improved general health Improvement in depression Improvement in anxiety

BL baseline, *PI* post-intervention, *6 M* 6 months follow-up, *5 M* 5 months follow-up, *3 M* 3 months follow-up, *2 M* 2 months follow-up, *ns* non-significant

Fig. 1 PRISMA diagram describing the selection of included studies for the review of positive psychology interventions in police staff
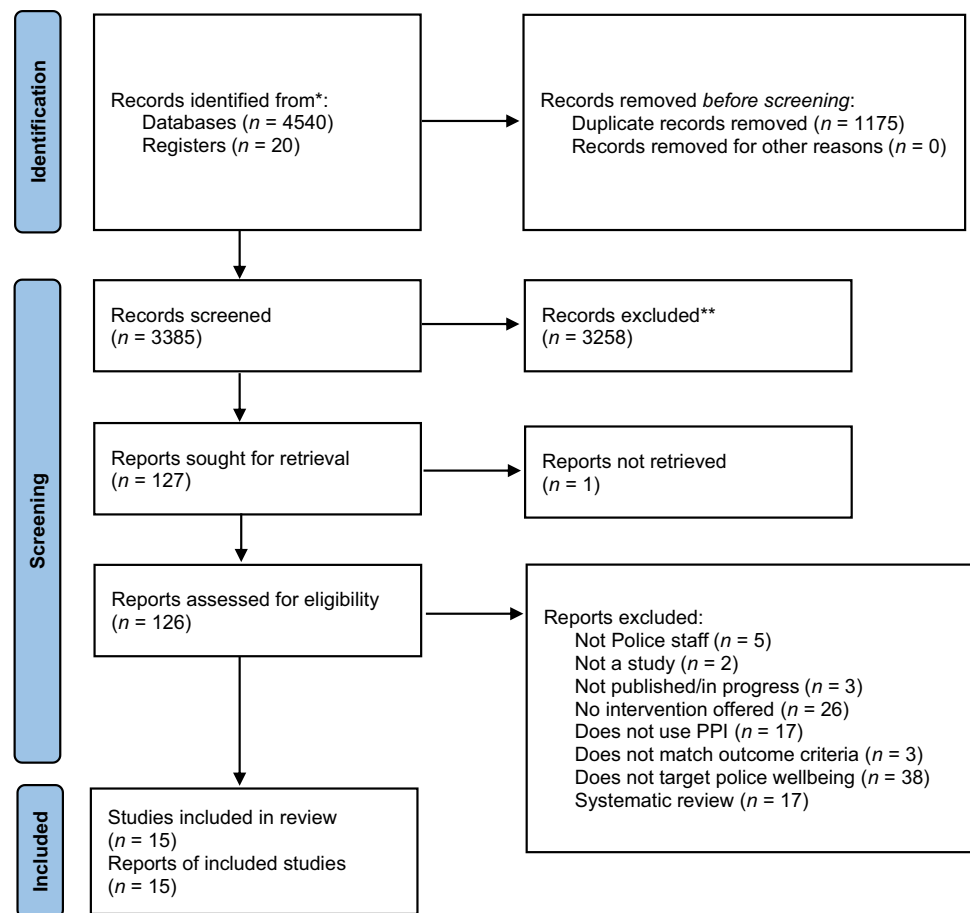
design (Acquadro Maran et al. 2018). Studies were conducted in the USA (*n*=6: McCraty and Atkinson 2012; Bergman et al. 2016; Christopher et al. 2018; Grupe et al. 2019; Grupe et al. 2021; Jetelina et al. 2022), India (*n*=3: Ranta and Sud 2008; Ranta 2009; Chitra and Karunanidhi 2018), Australia (*n*=1: Ireland et al. 2007), Germany (*n*=1: Krick and Felfe 2020), Brazil (*n*=1: Trombka et al. 2021), Canada (*n*=1: Shipley and Baranski 2002), Greece (*n*=1: Liakopoulou et al. 2020) and Italy (*n*=1: Acquadro Maran et al. 2018).

Study Participant Demographics

Studies included a total of 1341 participants, comprised of 692 male and 489 female police staff (*n*=160 sex not disclosed). Sample sizes ranged from 22 (Jetelina et al. 2022) to 267 (Krick and Felfe 2020). The mean age of participants across studies was 32.2 (*SD*=5.02). Two studies did not report sex and age (Ranta and Sud 2008; Ranta 2009). Length of service was only reported in five studies, with means of 18.23 years (*SD*=6.83) (Christopher et al. 2018), 14.05 years (*SD*=8.1) (Grupe et al. 2021), 13.83 years (*SD*=7.52) (Bergman et al. 2016), 10.8 years (*SD*=7.5) (Grupe et al. 2019) and 8.83 years (SD=4.9) (Jetelina et al. 2022).

Intervention Types

Seven studies (Bergman et al. 2016; Chitra and Karunanidhi 2018; Christopher et al. 2018; Grupe et al. 2019, 2021; Krick and Felfe 2020; Trombka et al. 2021) used mindfulness-based health promotion or resilience training, including breathing exercises, body scanning, stretching, mindful movement, cognitive education (i.e., knowledge of the stress process and resources), group discussions focusing on the challenges and achievements of mindfulness practices and mandatory homework. Five studies used progressive relaxation training and mood management for stress management including homework (Ranta and Sud 2008; Ranta 2009; Chitra and Karunanidhi 2018; Grupe et al. 2019, 2021). Acquadro Maran et al. (2018) employed a choice of two types of training including Physical Practice (PP: postural gymnastic, tai chi chuan, total body conditioning) or Wellbeing Practice (WP: autogenic training, yoga, or dynamic meditation) once a week for 8 months. Jetelina et al. (2022) provided police officers with a smart watch that they had to wear for 30 days. The watch came with built in 1-min meditation breathing exercise and the Calm app™, which provided a mix of guided meditations and mindfulness exercises. Participants were

randomly allocated to a threshold group (50, 60, 70%, or 80% higher than their resting heart rate). As participants' heart rates reached their threshold for 10 min or longer, the watch notified the wearer through vibration and participants could choose to perform a 1-min meditation breathing exercise or meditation through the Calm app™.

Ireland et al. (2007) offered an expressive writing intervention that instructed participants to write about their strong positive or negative emotions, and what they plan to do when these emotions appear, with participants being asked to perform this behaviour for at least four consecutive shifts for 15 min each time. Two studies used progressive relaxation psychoeducation; techniques combined with scenario-based role-play following training to equip police staff with better mood-management and self-regulation methods in stressful circumstances (McCraty and Atkinson 2012; Shipley and Baranski 2002). One study (Liakopoulou et al. 2020) used a Pythagorean Self-Awareness Intervention (PSAI), which aimed to help participants practise a form of self-monitoring and self-evaluation. Participants were instructed to recall their entire day before bedtime and after waking up, in chronological order, choose the most significant events, and remember them in detail. The participant then had to evaluate their behaviour in that chosen situation in terms of what went well and what went not so well, followed by a behavioural evaluation. Based on this evaluation, the participants set behavioural goals for the next day.

Delivery of Interventions

Most interventions employed certified professionals to deliver sessions, such as psychologists (Chitra and Karunanidhi 2018) and mindfulness trainers (Christopher et al. 2018; Grupe et al. 2019, 2021; Ranta and Sud 2008; Ranta 2009; Trombka et al. 2021). While scenario-based interventions used police officers as instructors (McCraty and Atkinson 2012; Shipley and Baranski 2002). Most of these interventions were delivered face to face (Chitra and Karunanidhi 2018; Grupe et al. 2019; McCraty and Atkinson 2012; Ranta and Sud 2008; Ranta 2009; Shipley and Baranski 2002; Trombka et al. 2021). In some cases, the researchers provided initial instructions and then participants were required to follow those in their own time. However, these intervention methods did not necessarily require trained instructors or face-to-face sessions (Ireland et al. 2007; Jetelina et al. 2022).

Tailoring of Interventions

The included studies did not modify the intervention during the delivery; however, many studies tailored their intervention at the onset to fit the specific needs of the police population more closely including the language and content (Acquadro Maran

et al. 2018; Bergman et al. 2016; Chitra and Karunanidhi 2018; Christopher et al. 2018; Grupe et al. 2019, 2021). Christopher et al. (2018) conducted a pilot assessment and the intervention was modified based on the qualitative feedback from participants. Grupe et al. (2019) tailored session content and delivery based on interactions with officers during in-services. While Jetelina et al. (2022) allowed participants to choose their activity that they felt suited them the most.

Outcome Measures

The included studies reported on several outcomes of interest including anxiety and depression (Christopher et al. 2018; Grupe et al. 2019, 2021; Ireland et al. 2007; Jetelina et al. 2022; McCraty and Atkinson 2012; Shipley and Baranski 2002; Trombka et al. 2021), operational and organisational police stress (Bergman et al. 2016; Christopher et al. 2018; Chitra and Karunanidhi 2018; Grupe et al. 2019), perceived stress (Grupe et al. 2021; Ireland et al. 2007; Jetelina et al. 2022), negative affect (Grupe et al. 2019; Krick and Felfe 2020; Liakopoulou et al. 2020; McCraty and Atkinson 2012), quality of life (Trombka et al. 2021), alcohol use (Christopher et al. 2018), substance use (Acquadro Maran et al. 2018), blood pressure (Grupe et al. 2019; McCraty and Atkinson 2012), sleep quality (Christopher et al. 2018; Grupe et al. 2019, 2021; Jetelina et al. 2022) and psychological wellbeing (Chitra and Karunanidhi 2018).

Risk of Bias in Studies

Over a third (40%) of the included studies met all five criteria on the MMAT, meaning that these studies were deemed as high quality. The remaining 60% of studies met 4 out of 5, which still constitutes fairly high quality (Table 2).

Synthesis of Results by Outcome

The results from the included studies are presented by outcome of interest; the psychological wellbeing factors (organisational and operational stress, perceived stress, anxiety, depression, quality of life), behavioural outcomes (alcohol use) and physical health outcome (blood pressure) with the assigned effect size and corresponding significance levels.

Psychological Wellbeing

Stress Levels

Mindfulness-based resilience training (Christopher et al. 2018) yielded a significant reduction post-intervention in

Table 2 Study quality rating using MMAT tool (Hong et al. 2018)

Author	Study design	MMAT score
Acquadro Maran et al. (2018)	Descriptive study	80
Bergman et al. (2016)	Single-arm trial	100
Chitra and Karunanidhi (2018)	RCT	100
Christopher et al. (2018)	RCT	80
Grupe et al. (2019)	Single-arm trial	100
Grupe et al. (2021)	RCT	100
Ireland et al. (2007)	RCT	80
Jetelina et al. (2022)	Single-arm trial/qualitative	100
Krick and Felfe (2020)	Mixed design	80
Liakopoulou et al. (2020)	RCT	80
McCraty et al. (2012)	RCT	80
Ranta and Sud (2008)	RCT	80
Ranta (2009)	RCT	80
Shipley and Baranski (2002)	RCT	80
Trombka et al. (2021)	RCT	100

organisational stress ($p < 0.05$; $d = 0.52$); however, these differences diminished over time at 3-month follow-up. Grupe et al. (2019) did not use a control group, and the intervention showed no statistically significant reduction in organisational stress; however, it was noted that a decline was more pronounced in male police officers than female officers at post-intervention ($p < 0.05$; $d = -0.37$). Likewise, operational stress did not show significant changes; however, it was noted that less-experienced officers had lower levels of operational stress at post-intervention ($p < 0.05$; $d = -0.42$). Baseline differences across experience levels were not reported. Within-group intervention effects in Bergman et al. (2016) reported reductions in organisational and operational stress from baseline to post-intervention; however, p values were not reported for these reductions.

Occupational stress showed a significant ($p < 0.01$; $\eta_p^2 = 0.28–0.49$) decrease in the intervention group in Chitra and Karunanidhi (2018). Occupational stress in the intervention group stemmed from external factors ($p < 0.001$, $\eta_p^2 = 0.16$), hazards of occupation ($p < 0.05$; $\eta_p^2 = 0.08$), physical working conditions ($p < 0.001$; $\eta_p^2 = 0.17$), supervisory stress ($p < 0.001$; $\eta_p^2 = 0.12$) and women-related stress ($p < 0.001$; $\eta_p^2 = 0.17$). Women-related stress in this study referred to stress that is experienced uniquely by women police staff, such as being on duty during menstruation, and under-estimation of their physical and mental abilities. Further decrease was indicated in occupational stress at follow-up; however, this was not significant. In Ranta and Sud (2008) and Ranta (2009) job stress showed significant between-group differences following relaxation-based

resilience and stress management training ($p < 0.001$). The expressive writing intervention (Ireland et al. 2007) also facilitated a significant decrease in perceived stress ($p < 0.01$), compared to the control group post-intervention. Perceived stress levels during the previous week also significantly reduced post-intervention for both Physical Practice ($p < 0.001$) and Wellness Practice ($p < 0.001$) in Acquadro Maran et al. (2018). Grupe et al. (2021) found significant decline in perceived stress levels, however only at the 3-month follow-up ($p < 0.02$; $d = -0.34$).

Qualitative findings also support these quantitative findings in terms of stress reduction, with participants stating 'It was helpful [wearing the watch], but you kind of feel your heart rate or your pulse going up [without the watch] but I guess the watch would remind you. The watch may catch your pulse going up maybe before you do and maybe you can start to de-escalate when you're notified' (Jetelina et al. 2022, pp. 5). Another stated that the visualisation of their stress levels (based on heart rate) that the smart watch provided them was helpful; 'I tried to be more in the moment and you know thinking about if my stress level is high. So, I think [visualizing the stress continuum] did help' (Jetelina et al. 2022, pp. 5). Police officers found breathing exercises useful in de-escalating their stress response; 'I saw the stress level spike up, so I was just like, 'Let me try [breathing]' and it actually worked' and 'My heart rate would start to elevate, whether it was because I was getting irritated, or in anticipation of whatever it was, or whatever the feeling was, and then it was kind of interesting to sit and do some different types of breathing to see if I can make it come back down and then how low I could make it go just sitting there.' (Jetelina et al. 2022, pp. 6).

Anxiety and Depression

Anxiety scores significantly improved in the intervention group post-intervention in Trombka et al. (2021) ($p < 0.001$; $d = -0.73$), in Grupe et al. (2019) ($p < 0.001$; $d = -0.86$), Ireland et al. (2007) ($p < 0.05$), Shipley and Baranksi (2002) ($p < 0.05$) and in Grupe et al. (2021) ($p < 0.05$; $d = -0.34$). These changes were maintained at the 6-month follow-up with slight decline ($p < 0.001$; $d = -0.51$) in Trombka et al. (2021), similarly in Grupe et al. (2019) at 5-month follow-up ($p < 0.001$; $d = -0.76$) and in Grupe et al. (2021) at 3-month follow-up ($p < 0.02$; $d = -0.35$). There were no significant changes in anxiety in McCraty and Atkinson (2012) and in Christopher et al. (2018).

Depression scores improved in Trombka et al. (2021) post-intervention ($p < 0.001$; $d = -0.97$), and at 6-month follow-up ($p < 0.001$; $d = -0.60$). McCraty and Atkinson (2012) also reported a significant reduction in depression scores ($p < 0.01$) in the intervention group. However, no significant changes in depression scores were found in Grupe et al. (2019),

Ireland et al. (2007) and Christopher et al. (2018). Depression scores showed significant decline only at 3-month follow-up ($p < 0.05$; $d = −0.36$) in Grupe et al. (2021).

Affect, Psychological Wellbeing and Quality of Life

Negative affect reduced post-intervention in Krick and Felfe (2020) ($p < 0.001$; $\eta^2 = 0.08$), in Grupe et al. (2019) ($p < 0.01$; $d = −0.52$), in Liakopoulou et al. (2020) ($p < 0.05$) and in McCraty and Atkinson (2012) ($p < 0.05$). However, there was no significant change in positive affect in Grupe et al. (2019) and McCraty and Atkinson (2012). There were no significant changes in positive emotion in McCraty and Atkinson (2012) or Liakopoulou et al. (2020). Psychological wellbeing increased post-intervention in Chitra and Karunanidhi (2018) ($p < 0.01$; $\eta_p^2 = 0.27–0.50$) and was maintained at 2-month follow-up ($p < 0.01$; $\eta_p^2 = 0.27$ to 0.51). General mental health improved in Acquadro Maran et al. (2018) for both, Physical Practice ($p < 0.001$) and Wellness Practice participants ($p < 0.001$). Only Trombka et al. (2021) assessed quality of life (QoL); which was significantly increased post-intervention ($p < 0.01$; $d = 0.72$) and further improved at 6-month follow-up ($p < 0.001$; $d = 0.74$).

Physical Health

The general health facet of QoL in Trombka et al. (2021) yielded significant post-intervention improvements ($p < 0.001$, $d = 0.70$), that were maintained at 6-month follow-up ($p < 0.01$; $d = 0.62$). While Krick and Felfe (2020) reported some reduction in health complaints in intervention participants ($p < 0.001$; $\eta^2 = 0.07$) compared to control participants.

Alcohol Use

Only Christopher et al. (2018) assessed alcohol use in their sample. There was a significant group-by-time interaction, however a nonsignificant pre- to post-MBRT effect on alcohol use relative to the control group was observed at 3-month follow-up. Acquadro Maran et al. (2018) reported a significant reduction in substance use both in Physical Practice ($p < 0.001$) and Wellness Practice participants ($p < 0.01$).

Sleep Quality

A trend towards a decrease in sleeplessness was shown post-intervention in the experimental group in McCraty and Atkinson (2012) ($M_{RT} = 1.96$, $SD_{RT} = 0.16$) compared to control ($M = 2.20$, $SD = 0.15$). A similar trend was observed in Christopher et al. (2018) post-intervention ($M_{MBRT} = 47.40$,

$SD_{MBRT} = 6.93$) compared to control ($M = 51.25$, $SD = 5.83$). Within-group differences in Grupe et al. (2019) supported these observations between baseline ($M_{MT} = 14.8$, $SD_{MT} = 3.1$) and post-intervention ($M_{MT} = 14.1$, $SD_{MT} = 3.5$). Sleep quality significantly improved in Grupe et al. (2021) however only at 3-month follow-up ($p < 0.05$; $d = −0.30$); moreover, sleep disturbances also decreased at post-intervention ($p < 0.05$; $d = −0.29$) and further declined at 3-month follow-up ($p < 0.01$; $d = −0.41$).

Intervention Content

The interventions included here, had several different target behaviours, including practicing mindfulness and expressive writing, to enhance outcomes. As the target behaviours for both the intervention and outcome behaviours were diverse across studies in this review, Behaviour Change Techniques could not be reliably coded. A behaviour change technique (BCT) is a replicable active component of an intervention designed to change behaviour (Michie et al. 2013). Therefore, individual contributions of these techniques to the overall effectiveness of the interventions cannot be explored in this review.

Descriptively, interventions often included psychoeducation around stress and its effects, which would be coded as the BCT 'information about health consequences' and 'information about emotional consequences' of practicing PPI techniques. Mindfulness sessions incorporated the BCTs 'instruction on how to perform the behaviour', 'demonstration of the behaviour', 'behavioural practice/rehearsal' and 'habit formation'. Participants were initially taught during the intervention sessions how to use mindfulness and the instructed behaviours were repeated in every session with additional assignments and homework included. Mindfulness interventions further facilitated practical learning through peer support in the form of group discussions about challenges and facilitators of practising mindfulness using 'problem-solving' and 'social support'. The expressive writing intervention encouraged BCTs 'self-monitoring of outcome of behaviour' and 'goal setting'; as police staff were asked to write about their emotions and what they intend to do as a result of those emotions in the future. The role-play-based interventions used BCTs 'feedback on behaviour' and 'biofeedback', as participants received feedback on their performance and behaviour during scenarios from their instructors, however, one study was also monitoring blood pressure, heart rate and heart wave right after the scenario (McCraty and Atkinson 2012).

Retention Rates

Retention rates across studies were relatively high at post-intervention, ranging from 100% (Acquadro Maran et al. 2018; Bergman et al. 2016; Krick and Felfe 2020), 90–96.2%

(Grupe et al. 2021; McCraty and Atkinson 2012; Shipley and Baranski 2002; Ranta and Sud 2008, Ranta 2009) 75.2–80.9% (Chitra and Karunanidhi 2018, Jetelina et al. 2022; Trombka et al. 2021) and the lowest being 51.9% (Ireland et al. 2007). Follow-up showed slightly higher drop-out with 80.3% retained at 3-month follow-up (Christopher et al. 2018), 93.3% retained at 5 months (Grupe et al. 2019) and 71.1% retained at 6 months (Trombka et al. 2021). Some studies reported a high initial dropout rate such as mindfulness-based interventions (MBI) attrition ranging between 16 and 29% (Khoury et al. 2013; Nam and Toneatto 2016). Common reasons for drop out were the demanding, changeable nature of policing work, particularly changing schedules, and lack of time (Bergman et al. 2016; Chitra and Karunanidhi 2018; Christopher et al. 2016; Grupe et al. 2019; McCraty and Atkinson 2012; Trombka et al. 2021). However, in some cases, participants dropped out due to not accepting the condition that they had been randomised into (Chitra Karunanidhi 2018; Christopher et al. 2016).

Adherence and Fidelity

Only four studies reported on intervention adherence, and in these, adherence rates were generally high (Christopher et al. 2018; Grupe et al. 2019, 2021; Trombka et al. 2021). Grupe et al. (2019) reported 85% session adherence rate (officers missing no more than 3 classes out of 8) at post-intervention and 91% adherence to out-of-class practice (43 of 56 days). At 5-month follow-up, 79% continued with weekly practice. Similarly, Christopher et al. (2018) reported a 79% class adherence rate at post-intervention. Grupe et al. (2021) reported an overall class attendance of 80.3%. In Trombka et al. (2021) of 84 intervention participants 82.1% attended at least four sessions, and 69% at least six sessions. Chitra and Karunanidhi (2018) assessed intervention fidelity to avoid type-I and type-II errors; however, the method of this was not described. In Christopher et al. (2018), all sessions were audio-recorded and six randomly selected sessions were rated by two doctoral students and one clinical psychologist.

Discussion

This review examined the use of positive psychology interventions with police staff that aimed to improve health behaviours, psychological wellbeing, and physical health. Mindfulness-based interventions were mostly effective in reducing perceived and occupational stress; however, effect sizes were generally medium or low and not maintained at follow-up time points. Some of these studies found significant effect only at follow-up assessment, which may indicate that practicing mindfulness for a longer period could produce meaningful differences in stress levels. Adherence to practice after the intervention was only reported by Grupe

et al. (2019) and did not display significant group differences in stress at 5-month follow-up. However, follow-up assessment in this study used a small sample size and no other studies have reported on long-term adherence, therefore the effects of long-term adherence to mindfulness practice remains inconclusive for the police population.

Improvement in some specific facets of mindfulness contributed to a reduction of police stress in Bergman et al. (2016); in particular 'acting with awareness' contributed to the reduction of organisational stress. 'Non-judging' contributed similarly to lower operational stress, suggesting a potential impact of officers' judgements of self and others on operations. This is further supported by Hoeve et al. (2021); police staff members who reported increases in 'acting with awareness', 'non-judging' and observation skills facet showed more significant decreases in general and physical stress. It was theorised that increases in these facets collectively improve emotional regulation hence stress levels reduce (Lindsay and Creswell 2017). Participants reporting improvements in 'acting with awareness' and non-judging' facets moreover tended to experience cognitive diffusion (Hayes et al. 2012), recognising that thoughts are 'just thoughts' and by accepting those negative thoughts instead of trying to change or avoid them may result in these thoughts expiring quicker allowing more positive, thoughts to come forth (Lindsay and Creswell 2017). However, other included studies did not assess the moderating effects of mindfulness facets.

The findings of a qualitative evaluation of a single-arm intervention (Jetelina et al. 2022) suggested that using technology in stress-reduction interventions may be beneficial, particularly the visualisation function, that allows the user to see their stress levels and heart rate in real time, prompting them to act for their wellbeing. Additionally, using such technology also can offer a solution to the user in real time besides prompting action. Mindfulness-based interventions showed a more promising potential in reducing anxiety, than depression, and these changes, though still significant, slightly declined at follow-up. These interventions bring people into the present and showed potential in improving psychological wellbeing, quality of life and sleep quality, although psychological wellbeing and quality of life were only assessed by 3 studies and changes in sleep quality were not statistically significant. Mindfulness has been shown to be effective for other emergency personnel such as firefighters, increasing resilience and positive affect, which was greater over time with increased out-of-class practice (Denkova et al. 2020; Eysenbach et al. 2019).

Other PPIs, such as expressive writing showed encouraging results in reducing anxiety, depression and perceived stress (Ireland et al. 2007). Expressive writing showed similarly promising results in terms of reducing stress, anxiety, depressed mood, sleep disturbances in other high-stress occupations

such as palliative health workers (Cosentino et al. 2021) and in healthcare workers during the COVID-19 pandemic in hospitals in middle and south Italy (Procaccia et al. 2021). The effectiveness of expressive writing and diary-based interventions in improving psychological wellbeing may be due to emotional exposure, as directly confronting an emotional event can result in habituation and extinction (Pennebaker and Stone 2003). However expressive writing may also work as a form of cognitive restructuring (Pennebaker and Stone 2003); by helping the individual label, structure and organise emotional or traumatic events. Expressive writing can help to understand an event better, recognise and label accompanying emotions and possibly plan an appropriate reaction (Pennebaker and King 1999).

The Pythagorean Self Awareness Intervention (PSAI) may be effective in improving psychological wellbeing for similar reasons. Like expressive writing, PSAI employs metacognitive processes (awareness and evaluation of one's own thought processes and an understanding of the patterns behind them) (Metcalfe and Shimamura 1994) where recalling events play a central role in facilitating effective self-judgment. Due to its potential in facilitating self-judgement, PSAI have been linked to improvements in health behaviour, in depressive symptoms, negative affect, perceived stress and sleep quality (Charalampopoulou et al. 2020; Psarraki et al. 2021; Slagter et al. 2011). Although studies employing expressive writing or PSAI did not assess health behaviours, both studies reported significant improvements either in negative affect (Liakopoulou et al. 2020) or anxiety and depression (Ireland et al. 2007).

Limitations

The reviewed studies were generally rated as high quality; however, many have used small sample sizes. This has the potential for type II error (the null hypothesis is incorrectly accepted); and/or outliers in these small samples could also affect the overall group means resulting in a Type I error (Field 2017). This may have been evidenced by medium effect sizes for non-significant outcomes or where mean group differences were small. Some studies did not perform a follow-up assessment, moreover, most of the included studies did not assess adherence to the practice or sessions during or after the intervention, thus fidelity was unclear. Practice or training fidelity is important as it could act as a confounding variable and affect participant outcomes (McGee et al. 2018). Furthermore, this review is limited by the generalisability of its findings. This is due to the different outcome measures used, different measurement tools, and the scarcity of research in this area. Future studies should incorporate pre-post assessments and/or longitudinal designs, particularly assessing fidelity of the delivery of

the intervention and the long-term adherence/maintenance of performing the intended behaviour after the intervention has ended. Larger sample sizes, with randomised-controlled study designs are also recommended to advance the science in this area. To enable generalizability further, future research should consider different cadres of police, varying cultural contexts, police staff demographics to include experience, education, gender and religious beliefs, and the context in which they work in relation to crime rates and types of crime, which all may interplay on their psychological wellbeing and coping mechanisms.

Conclusion and Future Directions

Studies of positive psychology interventions to improve police behaviour, psychological wellbeing and health are promising, particularly for reducing anxiety, depression and negative affect. The interventions included in this review seem to have achieved these effects through changing police staff members' metacognitive processes, making them more aware of the way they think about events, their own actions and their bodily reactions. Improvements in these cognitive processes could be highly beneficial for police staff considering that their roles require a high level of self-awareness, resilience and situational judgement abilities. However, more evidence is needed that accounts for or improves upon the limitations discussed in this review. Moreover, mindfulness, diary of self-awareness-based interventions may seem too time-consuming in a fast-paced environment such as policing, which was evidenced in the initial dropout rates in some of the studies. The psycho-education element of these interventions may need to include education around implementing and maintaining these practices efficiently in their daily lives. This review has extended the knowledge in this area, offering intervention designers and the police suggestions of areas for consideration for future PPIs and intervention approaches that draw on positive psychology.

Declarations

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