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The effectiveness of positive psychology-based interventions in prisons on well-being: a systematic review and meta-analysis

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ABSTRACT

Positive psychology-based interventions (PPIs) have shown promising evidence for improving psychological well-being in a variety of contexts and are consistent with calls for strengths-based interventions in correctional settings. While these interventions have been tested in prison settings, no study has empirically assessed effectiveness of PPIs for improving psychological well-being in prisons. In this study, we conducted a systematic review and meta-analysis on the effects of PPIs on psychological well-being in prisons. 9 studies (4 RCTs) were included, representing 662 participants. We found large, significant effects on psychological well-being in comparison with control arms (Hedge's $g = 0.76$). Additionally, we found large, significant within-group effects (Hedge's $g = 0.66$) on psychological well-being. The overall quality of included studies was poor, however, limiting the certainty of these findings. Our findings indicate that positive psychology-based interventions can significantly improve psychological well-being in prison settings.

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KEYWORDS

Meta-analysis; prisons; corrections; positive psychology interventions; rct; well-being



Introduction


The United States incarcerates nearly 1.8 million people in its prison systems (2024). It employs more than 312,000 correctional officers, spending approximately \$80.7 billion with some estimates indicating spending across state and federal correctional systems can approximate nearly 1 trillion dollars (Sawyer & Wagner, 2024). Furthermore, more than 610,000 incarcerated people return to their community each year (Sawyer & Wagner, 2020) with many of them struggling with employment, housing, and psychological well-being. A report released in December 2021 by the Bureau of Justice Statistics (BJS) indicated that 33% of offenders who were released from prison and tracked over four years found no employment, with many offenders pre- and post-incarceration lacking opportunities and stable job opportunities (Carson, 2010).

While incarcerated, people can be exposed to stressful events (e.g. physical and sexual violence, interpersonal conflict with inmates and officers, lockdowns) and environments (e.g. lack of natural light, access to outdoor spaces, social and economic deprivation) with demonstrated negative effects on psychological well-being (Bierie, 2012; Van Ginneken et al., 2019; Wright et al., 2023). Chronic exposure to

incarceration has also been associated with reductions in psychological well-being (Sundaresh et al., 2020). Poor psychological health can have dramatic implications for recidivism or the phenomenon of returning to incarceration after release. Estimates for the rate of recidivism have approximated 82% over a 10-year period (Antenangeli & Durose, 2021). Positive mental health status has been identified as a predictor of recidivism, while poor mental health has been associated with higher rates of recidivism (Wallace & Wang, 2020). Furthermore, 44% of people who are incarcerated may experience clinical levels of mental health problems, and report worse psychological and physical health when compared to the general population (Binswanger et al., 2009).

Traditionally, research in correctional rehabilitation has been primarily deficit-focused, identifying critical psychosocial deficits and expending resources to improve them (see 'Risk-Need-Responsivity' Model (Bonta & Andrews, 2007), rather than understanding conditions and interventions that consistently psychological health and well-being (Bierie, 2012). Recently, research efforts have expanded to include understanding and intervening with new research suggesting that

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positive, strength-based approaches to corrections may offer new pathways for intervention (Morse et al., 2022; Peterson, 2006).

Positive psychology-based interventions (PPIs)

Positive psychology has over two decades of evidence supporting positive psychology-based interventions (PPI's) that evaluate, design, and monitor the components of well-being and positive functioning (Donaldson et al., 2023). Over the past 20 years, positive psychology has developed not only in theory and research but also in its application in organizations, institutions, and individuals. Prior research examining rigorous high-quality randomized controlled trials (RCT) of positive psychology interventions (PPIs), or interventions that grow the building blocks of well-being, have found that PPIs on average have a small to medium-sized effect on well-being outcomes (Donaldson et al., 2021). These interventions typically include practicing identifying and expressing positive emotions, discovering strengths, practicing flow, promoting optimism, hope, self-compassion, and gratitude, completing acts of kindness, and practicing mindfulness (Drozd et al., 2014; Feicht et al., 2013; Ivztan et al., 2016; Schotanus-Dijkstra et al., 2015). Evidence of the impact of PPIs on well-being outcomes is promising, though the majority of the research to date has been on WEIRD (western, educated, industrial, rich, and democratic) populations with very few studies including non-WEIRD or otherwise marginalized populations. Thus, the impact of PPIs on psychological well-being in marginalized and/or non-WEIRD populations is less understood.

Although well-being programming for offenders as well as correctional officers (e.g. mindfulness programmes, peer support, and employee assistance programming) is starting to emerge, there is limited empirical research in understanding the effectiveness of PPIs in prison settings. Typical psychosocial interventions in prisons may include individualized or group psychotherapy, therapeutic communities, physical exercise programs, education programs, and creative arts programs. The evidence for the effectiveness of these interventions varies greatly, as do their feasibility and scalability in different prison systems. Despite nearly 20 years of research and calls for understanding the utility of positive psychology-based interventions in new contexts, few studies have investigated the effectiveness of positive psychology-based interventions in prisons. Thus, this review aims to make an initial characterization of positive psychology-based interventions in prison as well as a preliminary evaluation of their effectiveness improving psychological well-being.

Methods

This systematic review and meta-analysis were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines (Page et al., 2021).

Information sources and search strategy

A systematic search was conducted in eight databases: PsycInfo, MEDLINE, CINAHL, PubMed, Web of Science, SCOPUS, EMBASE, and ProQuest. No time restrictions were placed on publication data, though it was noted that the positive psychology movement began in 1998. The search was conducted in March 2024. The search strings included terms referring to incarcerated people, psychological well-being, strengths-based interventions, and positive psychology (see Appendix 1). Search strings were slightly modified for each database as needed to correct Boolean operators. We also hand-searched through articles found from backwards and forwards citation tracing of reviews in related areas and web searching for programmes that met inclusion criteria and had published peer-reviewed evaluations.

Eligibility criteria and study selection

The search aimed to identify PPIs in prison settings, regardless of clinical or lay populations. Due to the existing evidence base of certain types of well-being-oriented interventions in prison settings such as yoga, physical activity, and mindfulness-based stress reduction programmes, we adopted eligibility criteria developed by Carr et al., (2021) focusing on positive psychology-based interventions (Carr et al., 2021). Thus, studies were eligible if they 1) had a population of incarcerated people over the age of 18, 2) evaluated the effectiveness of an intervention or program of interventions that were group-based, psychoeducational in nature, and target positive psychological constructs (e.g. well-being, strengths, self-efficacy, or hope). We included faith-based programmes, creative development programmes (e.g. art, writing, or music programmes) as long as they met the other eligibility criteria.

To focus on the specific benefit of positive psychology-based interventions for general prison populations, we excluded populations diagnosed with psychotic disorders, externalizing disorders, or complex mental health problems. We also excluded individual or group psychotherapy, there is established evidence for psychotherapeutic interventions in prison settings (Yoon et al., 2017). Finally, we excluded acute crisis management interventions and other interventions focusing on

episodic risk behaviors. The search was limited to peer-reviewed articles in English. No study design was excluded, though pre- and post-intervention data was needed to carry out the meta-analysis.

Studies were independently double screened at all stages by MK, KS, and TB (title/abstract, full-text, extraction, and quality assessment). Disagreements were discussed until consensus was reached. Initial interrater reliability was moderate, indicating moderate agreement (Cohen's kappa = 0.50, $N = 3950$), in part due to the small final set of included studies ($n = 9$).

Data extraction and outcomes

Demographic information (e.g. population mean age, gender, and country), study characteristics (e.g. sample size, study design, and outcome measures), intervention characteristics (e.g. content structure, intervention duration, and delivery mode), and intervention outcome data (standardized mean differences or other effect size measures) were extracted.

Primary outcomes were any measure of psychological well-being, including subjective well-being, happiness, or life satisfaction at the end of the intervention. Reduction of symptoms of anxiety and/or depression were used if psychological well-being was not explicitly measured in the study.

Risk of bias

The nine studies were assessed using the ROB2 (for randomized study designs) and ROBINS-I tool (for non-randomized designs) (J. A. Sterne et al., 2016; J. A. C. Sterne et al., 2019). For randomized studies, domains of bias include bias arising from the randomization process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in measuring the outcome, and bias in selecting the reported result. For non-randomized studies, the domains of bias include bias due to confounding variables, selection of participants, in classification of interventions, due to deviations from intended interventions, due to missing data, in measurement of outcomes, and in selection of reported results. One study, Mak & Chan (2018) was treated as non-randomized because randomization only occurred between the two treatment arms; the control group was not randomized but still used for pre/post-intervention comparisons. Signaling questions were used in all of the domains to assess bias judgments. Two of the authors performed risk-of-bias assessments independently. Disputes were resolved by consensus with a third author.

Meta-analysis

For all included studies, the means and/or mean differences, standard deviations, number of participants, and test statistics of well-being outcomes were extracted. Within-group effect sizes for the intervention groups were calculated by standardizing mean change scores using the statistics present in each paper. Where reported, the mean and standard deviation of change scores within the intervention group were used to calculate Cohen's d_z (Lakens, 2013). When the standard deviation of change scores was not directly reported, test statistics or p-values from paired t-tests comparing the change between the beginning and end of the intervention were used to calculate d_z instead.

Effect sizes for controlled studies were re-calculated using a similar procedure. Where reported, the means of change scores were used and the standard deviations of change scores in the intervention and control groups were pooled to calculate Cohen's d . When necessary, test statistics or p-values from F-tests or t-tests comparing performance across groups were used to calculate d . When a study had multiple intervention groups that each participated in the PPI, those results were first pooled before comparing against the control group. For both analyses, in cases where p-values were given as a range (e.g. $p < 0.01$), the p-value was conservatively assumed to equal the maximum possible value. Hedge's g was calculated for both within-groups effects and between-group effects due to small sample size (Cumming, 2013).

Effect sizes were analyzed in R using a random-effects model to properly account for possible impacts arising due to differences in experimental methodology between studies. Due to small study size and limited reporting within studies, subgroup analyses were not performed. Effect sizes were interpreted as small (0–0.32), moderate (0.33–0.55), and large (0.56–1.20) (Lipsey & Wilson, 1993). To assess the presence and extent of heterogeneity, Q tests were performed and I (Sawyer & Wagner, 2024) values were calculated (Lipsey & Wilson, 1993). Publication bias was assessed by visual observations of funnel plots. Funnel plots were created for between-group effects and within-group effects, and were created by plotting mean effect size and study size, where asymmetrical distribution indicates an absence of publication bias (J. A. C. Sterne et al., 2000).

Results

Included studies

The search yielded 6,334 studies and 3,950 remained after deduplication (Figure 1). After title and abstract screening, 3,863 were excluded. After studies were

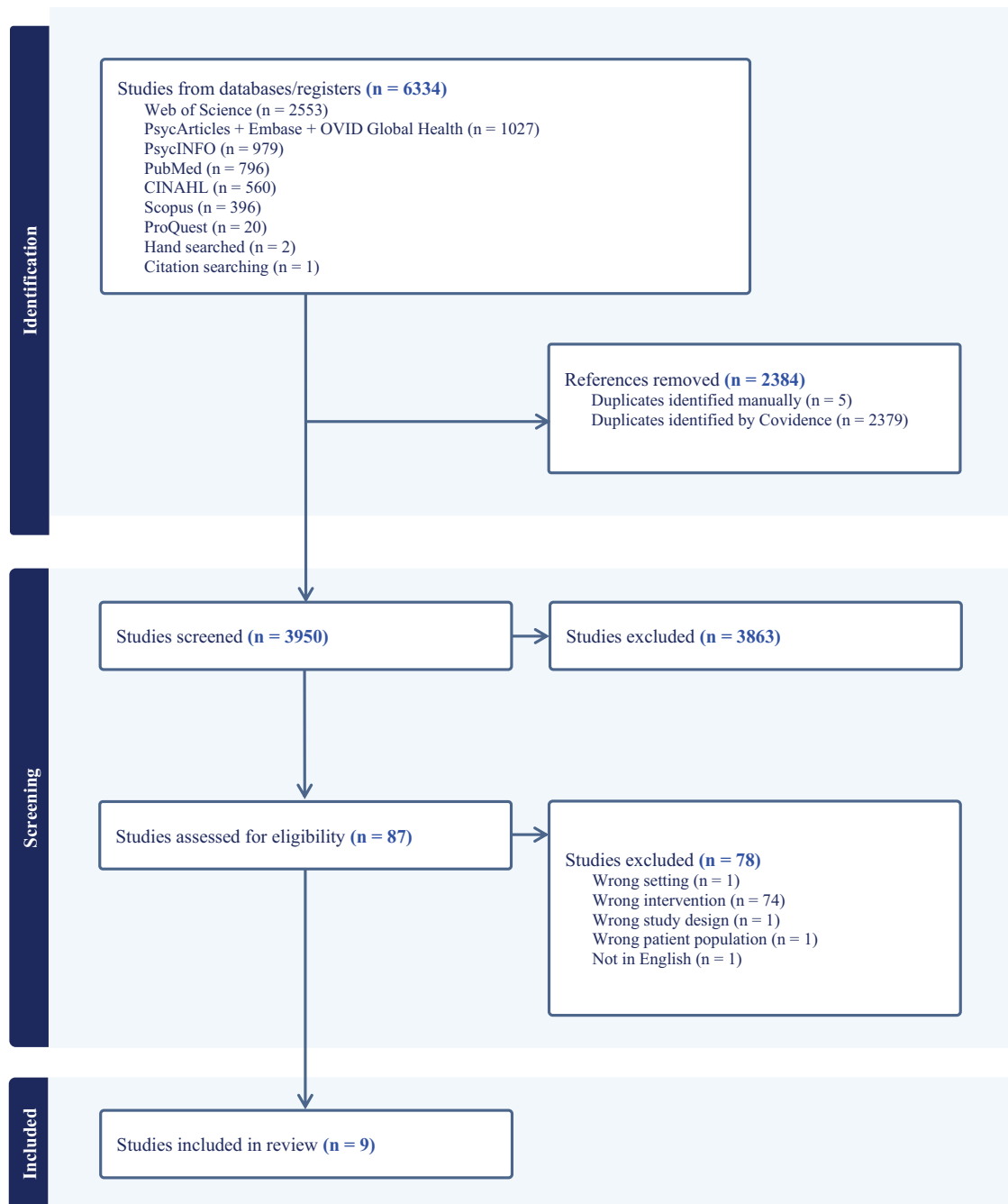


Figure 1. PRISMA flow diagram.

assessed for eligibility, 9 studies were included. 1 study (Sinaga et al., 2020) was included in the systematic review but excluded from the meta-analysis due to insufficient reporting of outcome data.

Study characteristics

The nine studies contained a total of 662 participants; 428 were in PPI groups and 234 were in control groups. All nine studies were published in peer-reviewed journals between 2015 and 2021 in five

countries with one carried out in the USA (Huynh et al., 2015b), five in China (Deng et al., 2019; Mak & Chan, 2018; Mak et al., 2018; Peng et al., 2022; Yang et al., 2018), one in Iran (Tabatabaee et al., 2016), one in Indonesia (Sinaga et al., 2020) and one in Australia (Lo et al., 2020). Two were carried out in Western countries (Huynh et al., 2015b; Lo et al., 2020) and seven were carried out in other non-Western countries (Deng et al., 2019; Mak & Chan, 2018; Mak et al., 2018; Peng et al., 2022; Sinaga et al., 2020; Tabatabaee et al., 2016; Yang et al., 2018).

Sample characteristics

Five of the studies were with male offenders (Deng et al., 2019; Huynh et al., 2015b; Peng et al., 2022; Tabatabaee et al., 2016; Yang et al., 2018) and four were with female offenders (Lo et al., 2020; Mak & Chan, 2018; Mak et al., 2018; Sinaga et al., 2020). Participant ages ranged from 18–61 years. To sample participants, 1 study used proportionate stratified random sampling with adult offenders who had a criminal history, were currently diagnosed with mild to moderate depression, and were willing to participate in the research (Lo et al., 2020). Two studies used random sampling (Tabatabaee et al., 2016; Yang et al., 2018). Six studies used self-selection (Deng et al., 2019; Huynh et al., 2015b; Lo et al., 2020; Mak & Chan, 2018; Mak et al., 2018; Peng et al., 2022).

Two studies included participants that met the criteria of moderate to high emotional needs, moderate to high gender-specific needs, did not have psychotic symptoms at the time of the study, were able to read and write at a satisfactory level, were incarcerated for the duration of the program, and did not have additional problems that may negatively affect others in the program (Mak & Chan, 2018; Mak et al., 2018). One study only included violent criminals who were not suffering from mental illness at the time of the study and were capable of maintaining a journal (Deng et al., 2019). One study included participants who were able to keep personal journals, did not have a physical or mental illness during the study, were sentenced for 3–6.5 years, and had been incarcerated for 13–38 months at the time of the research (Peng et al., 2022). One study included participants who stemmed from three groups: offenders in the pre-release center (awaiting release), long-term sentenced offenders (minimum sentence of 25 years), and offenders of Aboriginal or Torres Strait Islander descent (Lo et al., 2020). One study included participants that were housed in a unique long-term medium security unit due to their history of good behavior (Huynh et al., 2015a). One study included offenders with a history of drug use (Tabatabaee et al., 2016).

Intervention characteristics

Intervention characteristics are described in Table 2. Of the nine studies, four contained a single-component PPI (Deng et al., 2019; Peng et al., 2022; Sinaga et al., 2020; Yang et al., 2018) and five were multicomponent programs (Huynh et al., 2015a; Lo et al., 2020; Mak & Chan, 2018; Mak et al., 2018; Tabatabaee et al., 2016). Full study

characteristics are reported in Table 1. Single-component PPIs included practicing gratitude (Deng et al., 2019; Peng et al., 2022) practicing hope (Huynh et al., 2015a), and practicing either gratitude or kindness (Yang et al., 2018). The multiple-component programs contained two or more PPIs and included programs such as the TechWerks Resilience Training Program which combined positive psychology interventions, elements of behavioral therapy, and mindfulness (Lo et al., 2020) the Positive Re-entry in Corrections Program, which reviewed each element of PERMA and Character Strengths (Huynh et al., 2015a) the Psychological Gymnasium (PSY GYM) programs that included elements of both positive psychology and cognitive behavioral therapy, such as mindfulness awareness training, hope, gratitude, and strengths (Mak & Chan, 2018; Mak et al., 2018) and a program focused on well-being, self-acceptance, self-esteem, and positive relationships (Tabatabaee et al., 2016). The duration of interventions ranged from 5 weeks to 8 months, with eight lasting between 4 and 12 weeks (Deng et al., 2019; Huynh et al., 2015a; Mak & Chan, 2018; Peng et al., 2022; Tabatabaee et al., 2016; Yang et al., 2018).

Outcomes

The included studies used 31 different measurement scales. Eight studies measured well-being outcomes. Three studies additionally measured changes in distress or mental health symptoms (Lo et al., 2020; Mak & Chan, 2018; Mak et al., 2018) and one study measured only changes in depression symptoms⁴¹. For well-being, the Satisfaction with Life Scale was used most commonly to measure subjective well-being (3 studies), the Gratitude Questionnaire and the Gratitude Scale were used most commonly to measure gratitude (4 studies), and the Depression and Anxiety Stress Scale (DASS) was used most commonly to measure changes in anxiety and depression symptoms (2 studies). Table 2 describes all outcome measures used across each study.

Post-test effects

An overview of total effects can be found in Table 3. In five studies that included a control group, a significant large effect on well-being ($g = 0.76, p < 0.0001, n = 469$) between the PPI or MPPI and control groups was found. Within-group effects for four studies reporting adequate data for within-groups comparisons showed a large effect on well-being ($g = 0.66, p < 0.0001, n = 180$). Low heterogeneity was observed (between-group $I^2 = 0.0, Q = 1.67, df = 4, p = 0.80$; within-group $I^2 = 0.0, Q = 0.17, df = 3, p = 0.98$), though this is likely due to a small number

Table 1. Study characteristics.

Author and Year	Country	Study Design	n	Mean Age	Population Gender	Participant Descriptions	Outcomes (Measures)	Follow-Up
Deng et al. (2019)	China	Randomized Controlled Trial	66 Int. 30 Ctrl.	Mean age of 35.49 (SD = 9.65)	Male	Participants were considered violent criminals, were not suffering from mental illness at the time of the study, and were capable of maintaining a journal.	Gratitude (Resentment and Appreciation Test) Aggression (Aggression Questionnaire) Subjective Well-Being (Satisfaction with Life Scale; Scale of Positive and Negative Experience)	Post-intervention measures were obtained immediately after completion of the intervention. No additional follow-up periods.
Huynh et al. (2015)	USA	Pre and post-test (no control)	62 Int.	Mean age of 39 (SD = 10)	Male	Participants were housed in a unique long-term medium security unit due to their history of good behavior.	Gratitude (Gratitude Questionnaire) Hope (Adult Trait Hope Scale) Life Satisfaction (Satisfaction With Life Scale)	The Positive Re-Entry in Correction Program showed to increase gratitude, life satisfaction, and hope over time.
Lo et al. (2020)	Australia	Pre and post-test (no control)	24 Int.	Mean age 37.68 (SD = 9.04)	Female	Participants stemmed from three groups: offenders in the pre-release center (awaiting release back to their communities), long-term sentenced offenders (minimum sentence of 25 years), and offenders of Aboriginal or Torres Strait Islander descent.	Psychological Distress (Kessler Psychological Distress Scale) Mental Well-Being (Modified PERMA Profiler)	The TechWerks Resilience Training program showed moderate to large effect sizes on increasing mental well-being and decreasing psychological distress.

(Continued)

Table 1. (Continued).

Author and Year	Country	Study Design	n	Mean Age	Population Gender	Participant Descriptions	Outcomes (Measures)	Follow-Up
Mak et al. (2018)	China	Pre and post-test (no control)	19 Int.	Mean age 38.05 (SD = 9.77)	Female	Participants were offenders with moderate to high emotional needs, moderate to high gender-specific needs, did not have psychotic symptoms at the time of the study, were able to read and write at a satisfactory level, were incarcerated for the duration of the program, and did not have additional problems that may negatively affect others in the program.	<p><i>Psychological Distress</i> (Depression and Anxiety Stress Scale)</p> <p><i>Attention to Positive and Negative Information</i> (Attention to Positive and Negative Information Scale)</p> <p><i>Life Satisfaction With Life Scale</i></p> <p><i>Gratitude</i> (Gratitude Scale)</p> <p><i>Hope</i> (Hope Scale)</p>	The PSY GYM Moderate Intensity Program reduced depression, anxiety, and stress symptoms, and negative attention bias, and increased hope, gratitude, and positive attention bias.

(Continued)

Table 1. (Continued).

Author and Year	Country	Study Design	n	Mean Age	Population Gender	Participant Descriptions	Outcomes (Measures)	Follow-Up
Mak and Chan (2018)	China	Pre and post-treatment with a control group	40 Int. 35 Ctrl.	- Mean age CBT Group (n = 19) 34.84 (SD = 10.21) - Mean age PPI Group (n = 21) 37.24 (SD = 8.54) - Mean age Control Group (n = 35) 33.74 (SD = 7.82)	Female	Participants were offenders with moderate to high emotional needs, moderate to high gender-specific needs, did not have psychotic symptoms at the time of the study, were able to read and write at a satisfactory level, were incarcerated for the duration of the program, and did not have additional problems that may negatively affect others in the program.	Psychological Distress (Depression and Anxiety Stress Scale) Depression (Automatic Thoughts Questionnaire-Revised) Anxiety (Anxious Self-Statements Questionnaire) Positive and Negative Outlook of Experiences (Changes in Outlook Questionnaire-Simplified Chinese Version) Life Satisfaction (Satisfaction With Life Scale) Gratitude (Gratitude Scale) Hope (Hope Scale) Strengths (Brief Strengths Scale)	The main findings highlight the effectiveness of both CBT and PPI in improving psychological well-being and reducing distress in female offenders, with the combined treatment showing the most significant benefits.
Peng et al. (2022)	China	Randomized Controlled Trial	62 Int. 62 Ctrl.	Mean age 26.17 (SD = 4.89)	Male	Participants needed to be able to keep personal journals, did not have physical or mental illness during the study, sentenced for 3–6.5 years, and had been incarcerated for 13–38 months at the time of the research.	Gratitude (Gratitude Questionnaire) Basic Need Satisfaction (Basic Need Satisfaction Scale in General) Subjective Well-Being (Subjective Well-Being Scale) Depression (Beck's Depression Inventory-II)	Gratitude intervention significantly increased gratitude and subjective well-being, and partial satisfaction of Basic Need Satisfaction.
Sinaga et al. (2020)	Indonesia	Pre and post-treatment with a control group	44 Int. 44 Ctrl.	No data	Female	Participants were adults, had a long criminal history, actively had mild to moderate depression, and were willing to participate in the research.	Depression (Beck's Depression Inventory-II)	Group-Based Hope intervention significantly lowered depression.

(Continued)

Table 1. (Continued).

Author and Year	Country	Study Design	n	Mean Age	Population Gender	Participant Descriptions	Outcomes (Measures)	Follow-Up
Tabatabaee et al. (2015)	Iran	Randomized Controlled Trial	15 Int. 15 Ctrl.	No data	Male	Participants were drug offenders from Semnan Province in Iran.	<i>Mental Well-Being</i> (Ryff Psychological Well-Being Scale)	The Positive Psychology Intervention significantly improved mental well-being.
Yang et al. (2018)	China	Randomized Controlled Trial	96 Int. 48 Ctrl.	Mean age 34.8 (SD = 9.76)	Male	Participants were offenders located in Shandong province.	<i>Positive and Negative Affect</i> (Affect Balance Scale-Modified Chinese Version) <i>Life Satisfaction</i> (Satisfaction with Life Scale) <i>Mental Well-Being</i> (General Affect and Life Satisfaction) <i>Subjective Vitality</i> (Ryan and Frederick's Subjective Vitality Scale)	Kindness and Gratitude interventions significantly improved well-being and decreased negative affect as compared to treatment as usual.

Int. = Intervention, Ctrl. = Control.

Table 2. Intervention characteristics.

Author and year	Single or Multiple Component	Length	Intervention Description	Findings
Deng et al. (2019)	Single-Component	5 week	One group completed a Blessing-Counting Daily and one group completed a Gratitude-Sharing Weekly.	Gratitude interventions significantly increased gratitude and subjective well-being, while lowering aggression as compared to the control condition.
Huynh et al. (2015)	Multiple-Component	8 or 12 weeks	Positive Re-Entry in Corrections Program, which incorporates PERMA and character strengths into activities and assignments.	The Positive Re-Entry in Correction Program showed an increase in gratitude, life satisfaction, and hope over time.
Lo et al. (2020)	Multiple-Component	5 or 9 weeks	TechWerks Resilience Training program: positive psychology interventions, Cognitive Behavioural Therapy, and Mindfulness. Focused on teaching a variety of skills within each session.	The TechWerks Resilience Training program showed moderate to large effect sizes on increasing mental well-being and decreasing psychological distress.
Mak et al. (2018)	Multiple-Component	8 months	Prison-Based Psychological Gymnasium (PSY GYM) Moderate Intensity Program is a program that holds 1–2 2.5 hour sessions per week that focus on Cognitive Behavioral Therapy (CBT) and Positive Psychology Interventions (PPI) with the aim of lowering psychological distress and criminality and increasing personal growth.	The TechWerks Resilience Training program showed moderate to large effect sizes on increasing mental well-being and decreasing psychological distress.
Mak and Chan (2018)	Multiple-Component	2–3 months	Prison-Based Psychological Gymnasium (PSY GYM) Intervention Program: 16-session program based on CBT including basic CBT steps and identifying dysfunctional thinking and replacing it with functional thinking and PPI mindfulness awareness training, hope, gratitude, and strengths.	The main findings highlight the effectiveness of both CBT and PPI in improving psychological well-being and reducing distress in female offenders, with the combined treatment showing the most significant benefits.
Peng et al. (2022)	Single-Component	4 weeks	A gratitude intervention that had participants Independently write 3–5 things they were grateful for before going to bed.	Gratitude intervention significantly increased gratitude and subjective well-being, and partial satisfaction of Basic Need Satisfaction.
Sinaga et al. (2020)	Single-Component	8 weeks	Group-Based Hope Intervention, the first four sessions were focused on group formation, four sessions were facilitator-guided on the topic of Hope, and the last four sessions were independent with leader accompaniment. 90-minute sessions.	Group-Based Hope intervention significantly lowered depression.
Tabatabaee et al. (2015)	Multiple-Component	6 weeks	12-session positive psychology intervention focusing on self-acceptance, self-esteem, empathy, psychological well-being, illogical thoughts leading to pessimism and negative self-view and view of others, and positive and negative features of others.	The Positive Psychology Intervention significantly improved mental well-being.
Yang et al. (2018)	Single-Component	6 weeks	Two intervention groups, one group focused on kindness, where participants were asked to complete three acts of kindness each day and record them in a journal. The other intervention group was asked to record three things they were grateful for each day at the end of the day in a journal.	Kindness and Gratitude interventions significantly improved well-being and decreased negative affect as compared to treatment as usual.

Table 3. Total effects on wellbeing.

Outcome measure	N	Hedges' g	95% CI	Z
Between-group effects post intervention	5	0.76	0.56; 0.96	7.53***
Within-group effects post intervention	4	0.66	0.44; 0.87	5.98***

N = No. of comparisons. CI = Confidence interval. *** $p < 0.0001$.

of studies with large standard error (Von Hippel, 2015). Between-group effects and individual effect sizes for included studies are summarized in Figures 2 and 3.

Publication bias

Figure 4 shows visual illustrations of the funnel plots. A visual inspection of the funnel plot of controlled studies shows the five studies exhibiting a slight positive correlation between effect size and standard error, though without substantial

apparent asymmetry. Egger's test corroborates this finding, revealing no evidence of significant publication bias ($t = 2.176$, $p = 0.118$). A visual inspection of the funnel plot of the non-controlled studies reveals all four studies as being clustered around the center line at the bottom of the plot. Egger's test again reveals no evidence of publication bias ($t = 1.66$, $p = 0.971$). For both analyses, small sample sizes limit the effectiveness of a quantitative publication bias assessment.

Analysis of between-group effects

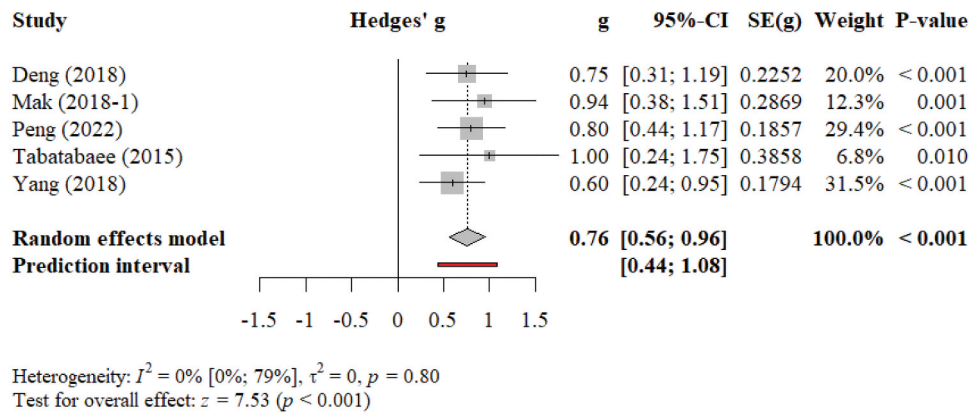


Figure 2. Forest plot of between-group effects of PPIs on psychological well-being.

Analysis of within-group effects

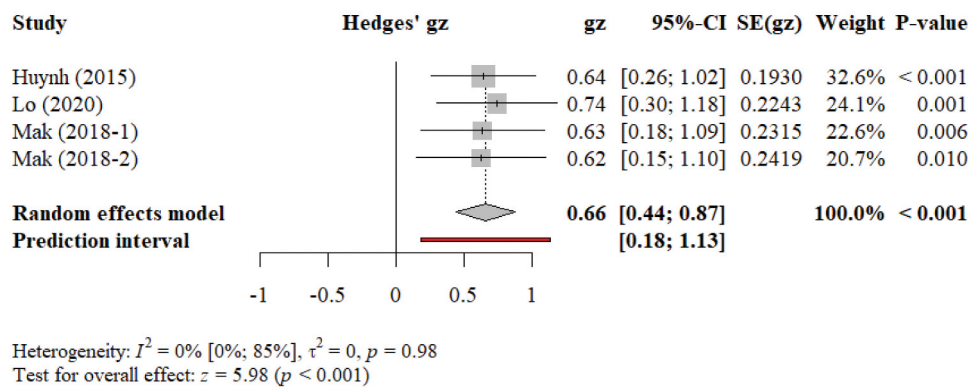


Figure 3. Forest plot of within-group effects of PPIs on psychological well-being.

Risk of bias

For studies with a randomized design ($n = 5$), the overall-risk-of-bias judgment was assessed across three ratings: low risk of bias, some concerns, and high risk of bias. All five randomized studies scored 'high' for overall risk of bias. There were some concerns for bias arising from the randomization process in all five studies, high risk of bias due to deviations from the intended intervention in three studies (60%), low risk of bias due to missing outcome data in four studies (80%), and some concerns for all five studies due to bias arising from selection of the reported result. A summary of these findings can be seen in Figure 5.

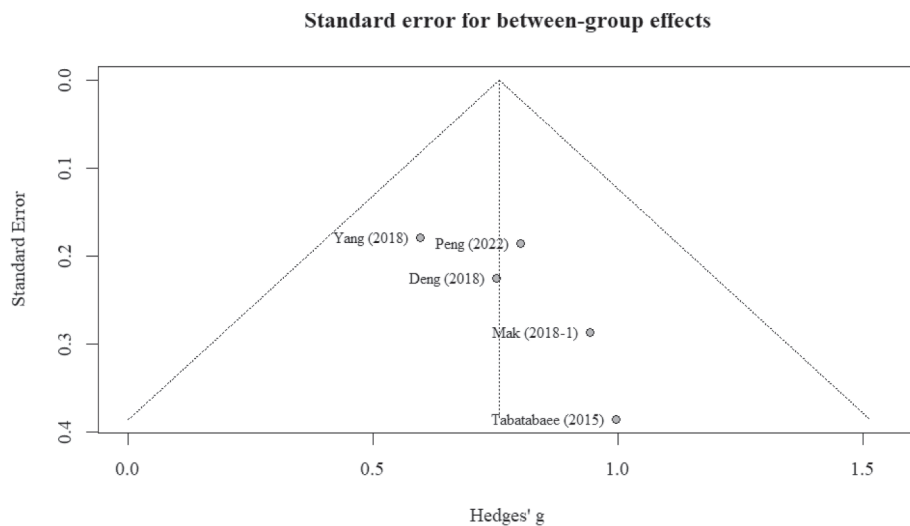
For studies that did not use a randomized design ($n = 4$), the overall risk-of-bias judgment was assessed across four ratings: low risk of bias, moderate risk of bias, serious risk of bias, and critical risk of bias. Two

non-randomized studies (50%) scored 'serious' for overall risk of bias, and two scored 'moderate' risk of bias. Two studies (50%) scored 'serious' risk of bias due to selection of participants, and all four non-randomized studies scored 'moderate' risk of bias in measurement of outcomes and selection of reported result. A full risk of bias assessment summary is presented in Appendix 2.

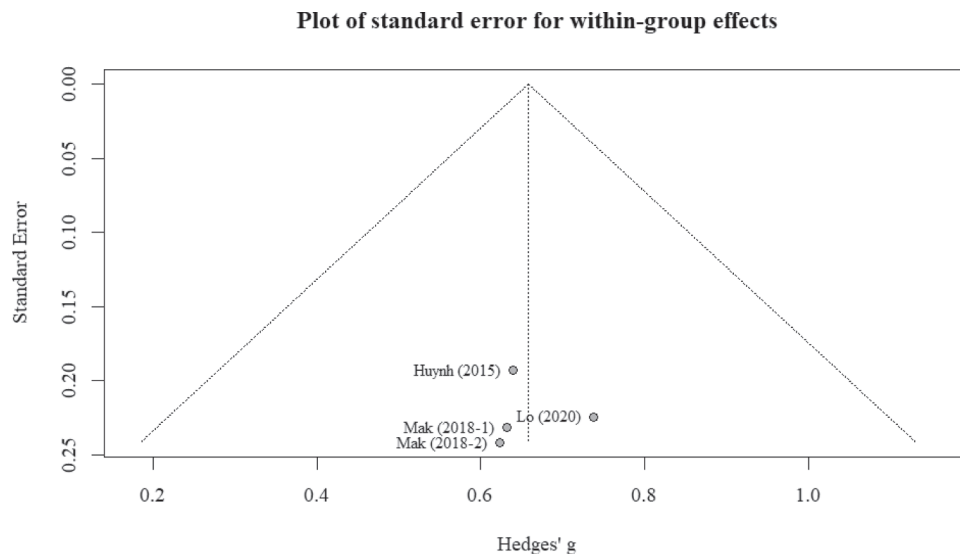
Discussion

Summary of findings

The current study aimed to explore the effects of positive psychology-based interventions on psychological well-being in prisons. Five randomized, controlled studies and four uncontrolled studies were included. The present study's findings indicate that positive



Funnel plot of between-group effects.



Funnel plot of within-group effects.

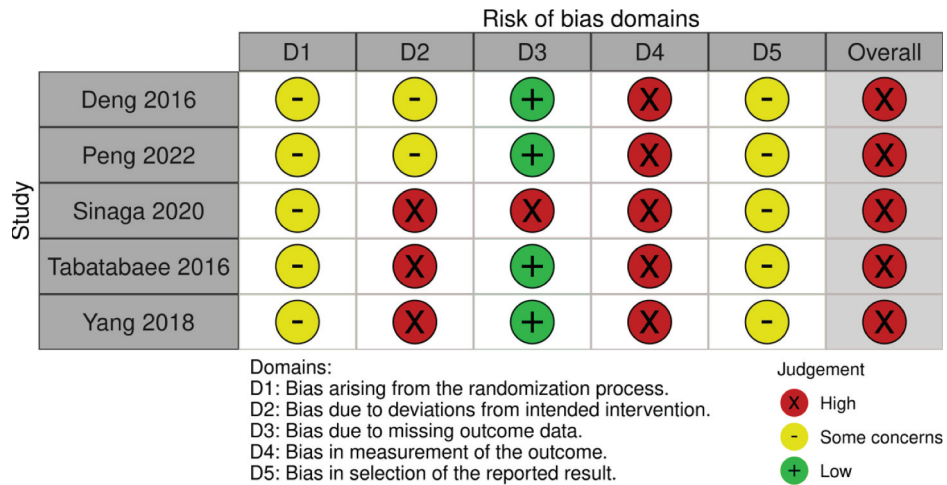
Figure 4. Between-group and within-group funnel plots.

psychology-based interventions can be effective for improving psychological well-being in prison settings, specifically subjective well-being and life satisfaction. For the five controlled studies, a significant, large effect was found between intervention and control groups for psychological well-being. Across all uncontrolled studies a significant, large effect was found for psychological well-being. Due to the small number of included studies, more complex secondary analyses (removing outliers, removing studies of low quality, calculating fail-safe N 's) were not possible. Additionally, the included studies had limitations, including poor reporting of methods and findings, lack of appropriate outcome measurement in some cases, and heterogeneous interventions. As a result, these limitations may contribute to larger effect sizes, as poorer methodological quality and large

estimated variances may inaccurately produce large effect sizes (Slavin & Smith, 2009). Thus, these findings must be interpreted with caution.

The current study does, however, have unique merit as a foundational contribution to this area of research. The effects of PPIs and MPPIs in prisons have not been reported in previous meta-analyses, in part due to the sparse implementation of these studies over the past decade. Despite this, large, robust meta-analyses have found strong evidence for the efficacy of PPIs and MPPIs in improving psychological well-being in other non-prison contexts (Carr et al., 2021; Hendriks et al., 2018). The effects of PPIs and MPPIs in prisons have not been well examined in a meta-analysis, in part due to the sparse implementation over the past decade. The present study represents the first effort to systematically evaluate positive psychology-based

Risk of bias assessment of randomized studies.



Risk of bias assessment of non-randomized studies.

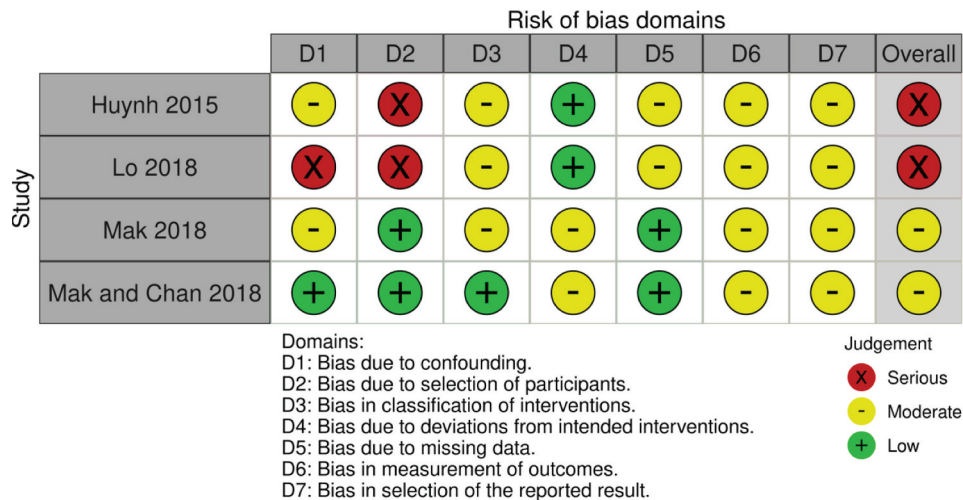


Figure 5. Risk of bias graphs.

interventions in prison populations and understand the intervention characteristics, study designs, and effectiveness across the literature. Prior evidence has indicated that PPIs may be particularly effective in non-Western settings (Hendriks et al., 2018) and the field of positive psychology has repeatedly called for research on PPIs in non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) contexts, but with limited uptake (Hendriks et al., 2019). The present study found that 78% of the studies took place in non-WEIRD settings.

The encouraging findings from this first meta-analysis may have implications for considering various approaches to correctional rehabilitation in prisons. Typically, while some correctional rehabilitation programs produce some positive benefits, availability of programs and matching population need to intervention focus are consistent barriers across intervention settings (WHAT, 2016). Depending

on their intensity, psychotherapeutic programs that require clinicians can be expensive to implement across a prison system or be highly focused on a particular mental health problem. More robust intervention models such as therapeutic communities (TCs) suffer from attrition and little evidence of sustained effects (Malivert et al., 2012) without substantial aftercare both during incarceration and after release (Beaudry et al., 2021). Prior research in other non-prison contexts has shown that positive psychology-based interventions and other similar strengths-based intervention programs can improve constructs associated with prolonged engagement in other programs such as self-efficacy, confidence, and optimism (Carr et al., 2021; Moskowitz et al., 2021). Additionally, PPIs are easily administered by lay people, can be self-administered, and have been shown to be appropriate for populations with and without mental health problems (Pan et al., 2022). Thus,

PPIs have potential to be appropriate non-specialized support for a general population that may not qualify for intensive treatments. Integrated with specialized services, PPIs could also help correctional institutions adopt a stepped-care model of psychosocial support by providing scalable, lower-level intervention (Ho et al., 2016).

Future research

First, it is imperative that future studies of positive psychology-based interventions in prison settings include clear definitions of interventions and treatment modalities, employ adequate sample sizes, and follow strict reporting guidelines of findings. Without these, the literature cannot expand inferences regarding the impact or stability of PPIs in prison settings. Second, further research should seek to conduct large-scale, rigorous randomized trials to verify the generalizability of the present findings as well as identify subgroup effects to better understand who PPIs are most effective for. Third, research should investigate the suitability of PPIs as general interventions to promote psychological wellbeing within a larger system of mental health and psychosocial support within prisons.

Limitations

The limitations of the present study warrant further description as they may identify goals to guide future positive psychology intervention research in prison settings. First, the total number of included studies was small, making it difficult to have confidence in the generalizability of the effectiveness of PPIs in future implementations. Prior work by Hendriks et al., (2019) showed in a secondary analysis of PPIs that small sample size can lead to overestimation of intervention effects. Second, the included studies had a range of methodological rigor and design quality, including heterogeneity in how positive psychology was operationalized from intervention to intervention. For example, Deng et al., (2019) and Yang et al., (2018) had unequal control and treatment groups within their respective RCTs, and Sinaga et al., (2020) did not report appropriate quantitative data to be included within a meta analysis entirely. Our risk of bias assessment additionally found that all studies had a high likelihood of susceptibility to bias across multiple domains. Third, the type and duration of PPIs and MPPIs varied, which precludes estimations about the relative effectiveness of a given intervention on subjective well-being. Some interventions included elements of therapeutic modalities such as CBT, which may further obscure PPI-specific impacts on psychological well-being.

Conclusion

There is evidence to support the effectiveness of positive psychology-based interventions in improving psychological well-being in prison settings, though with limited certainty. This first meta-analysis provides a systematic approach to understanding how PPIs can be beneficial in correctional settings. Given the robustness of PPIs in non-prison settings and the initial positive findings of this meta-analysis, future research should conduct larger randomized trials, adhere to rigorous methodology and strict reporting guidelines, as well as examine these interventions in non-WEIRD settings.

Disclosure statement

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

Authors contributions

MCK and KS conceptualized this study. MK, KS, and TB identified, reviewed, and evaluated articles. DH and MCK conducted the quantitative analyses. MCK, KS, TB, and DH drafted and edited the manuscript. All authors read and approved the final manuscript.

Ethics approval

Ethics approval was not required for this systematic review.

Open scholarship



This article has earned the Center for Open Science badge for Preregistered. The materials are openly accessible at <https://www.crd.york.ac.uk/prospero/displayrecord.php?RecordID=512161>

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