

A Meta-analysis of the Psychological Treatment of Anger: Developing Guidelines for Evidence-Based Practice

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There is no clear evidence to guide mental health professionals in assessing and treating angry clients. Recent reviews have considered cognitive and behavioral approaches to the treatment of anger, but little is known about the potential effectiveness of other treatment modalities. A meta-analytic review was conducted to examine the effects of treating dimensions of anger by using various psychological treatments found in the scientific literature. The final analysis included 96 studies and 139 treatment effects. The nine types of psychological treatments included cognitive, cognitive behavior therapy, exposure, psychodynamic, psychoeducational, relaxation-based, skills-based, stress inoculation, and multicomponent. The overall weighted standardized mean difference across all treatments was 0.76 (95% confidence interval [CI], 0.67–0.85, $Q = 403.13$, $df\ 138$, $p < .001$, $I^2 = 65.76$), which suggests that psychological treatments are generally effective in treating anger. The results also suggest a considerable degree of variability in the effect sizes of specific treatments for anger. The results show that at least some of the variability may be explained by the number of treatment sessions offered to participants, the use of manuals to guide delivery of the treatment, the use of fidelity checks, the setting of the research, and whether the study was published or unpublished. This review builds on previous evidence of the effectiveness of psychological treatments of maladaptive anger, and it provides the basis for developing evidence-based guidelines for specific populations with anger problems.

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Little attention has been given to maladaptive anger over the years in comparison to other emotional disorders. There is no clear consensus regarding the best ways to define, assess, and treat various dimensions of anger,¹ as it is often camouflaged² within definitions of violence, hostility, and aggression. G. Stanley Hall³ first lamented more than a century ago that there was a lack of literature about anger and that there was “no comprehensive memoir on this very important and interesting subject” (Ref. 3, p 516). He envisioned that mental health professionals would move toward creating a more precise definition and understanding of anger to help clarify the ambiguity surrounding this phenomenon.

Anger is an internal state involving various degrees of, and interactions among, physiological, affective,

cognitive, and verbal components.⁴ It is considered to be a common human experience expressed on a continuum of healthy-disturbed, adaptive-maladaptive, constructive-destructive, and pragmatic-problematic. It has been correlated with different forms of aggressive behaviors, including assault,^{5,6} violence,^{7–9} and property damage.¹⁰ It has also been connected with increased health risks, including coronary heart disease, heart attacks, high blood pressure, and high cholesterol.¹¹

Despite the prevalence of and the problems created by maladaptive anger, anger disorders are not currently recognized by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR).¹² Anger is sometimes viewed as a residual of other diagnosable mental health problems, such as borderline personality disorder, antisocial personality disorder, and conduct disorder.^{13,14} Others view anger as a cluster of symptoms that are distinguished by the severity, frequency, and nature of anger episodes and patterns.¹⁵ Some have identified several ways that people express anger, including direct expression, reciprocal com-

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munication, thinking before responding, taking a self time-out, physical assault of people, physical assault of objects, negative verbal expression, keeping it in, controlling it, taking corrective action, diffusion or distraction, passive-aggressive sabotage, and relationship victimization.^{16,17} The diversity of these expressions causes further confusion when attempting to isolate the core characteristics of anger and to distinguish it and disentangle it from other emotional and behavioral disorders.

Anger is generally conceptualized as a multifaceted construct.¹⁸ Different measures have been developed to distinguish its various dimensions,⁴ which generally include levels of anger, anger control (ability to control angry feelings), person-specific anger (feelings of anger toward another), anger expression (linked to aggressive violence), anger state (distinct episodes of anger), anger trait (frequency of angry episodes), and angry driving. Anger is often defined psychometrically (e.g., by cutoff scores) rather than by a theoretical model.¹⁹ Therefore, most treatments have been developed to address elevated levels of maladaptive anger.

Although there is no clear conceptual framework for distinguishing functional and dysfunctional anger, treatments for anger continue to be utilized across many mental health disciplines.¹⁴ Since it is both common and debilitating,¹⁹ it is incumbent on psychiatrists and other mental health professionals to be informed of the current evidence regarding the potential efficacy of various treatment modalities.

Glancy and Saini¹ completed a comprehensive review of the literature regarding the psychological treatments of anger and aggression, including five meta-analytic reviews,^{15,19,20–22} and they concluded that there is no consensus in the literature regarding the best ways to treat and reduce anger and aggression. Most reviews focused on treatments containing components of cognitive and behavioral therapies or a combination of the two. Other modalities, such as psychodynamic and psychoeducational have not been included in previous reviews. Although there is good evidence that treating anger generally works,²³ more information is needed to guide forensic psychiatrists and other mental health professionals in making evidence-based decisions when choosing from the various treatment modalities. The purpose of this meta-analytic review was to complete a systematic and exhaustive search of all relevant studies, to in-

clude a greater variety of psychological approaches to the treatment of anger.

This meta-analysis supports the potential integration of psychological and pharmacological treatments of maladaptive anger. Glancy and Knott^{24–26} completed a three-part series on the use of pharmacology to treat anger and aggression. Based on their analysis, they introduced an algorithm to provide clinicians with an evidence-based model for treating anger and aggression with medication. They strongly suggest that pharmacologic agents are most effective when used with adjunctive psychosocial therapy. Very few studies have combined pharmacological and psychological interventions in treating anger. There also is no consensus among mental health professionals and researchers on the most effective ways to treat anger by using psychological interventions, and so the present meta-analysis is a good first step toward integrating psychological and pharmacological treatments.

The Role of the Forensic Psychiatrist

Within the current demand for evidence-based practice (EBP), there is an increased onus on forensic psychiatrists to become more sophisticated in the areas of risk assessment and management²⁷ and more capable of distinguishing effective treatments from inadequate and harmful approaches. Accurate scientific evidence about the various effects on anger of different psychological treatments and the influences of moderator variables on effectiveness and relevance of treatments on various and specific populations have significant consequences for the forensic psychiatrist practicing within an EBP environment.

Evidence-based guidance on how best to treat and manage anger is important for forensic psychiatrists, especially because working with angry clients is as common as working with those who are anxious or depressed.²⁸ Forensic psychiatrists should be informed about anger because their work often involves individuals with angry relational problems, families in high conflict, medical patients struggling with hypertension, offenders with histories of violence, and people with trauma and substance abuse histories.²⁹ DiGiuseppe and Tafrate³⁰ observed that mental health professionals are generally less comfortable working with angry clients than with those who are experiencing anxiety or depression. Anger directed at the mental health professional is considered to be a major stressful situation, second only to

threats of suicide.^{31–33} This discomfort may be due to a lack of knowledge regarding how best to intervene to ensure the safety of both the client and the professional.³⁰ Despite the difficulties of working with angry clients, there remains less guidance in the literature for working with clients who are experiencing episodes of anger than for treating those with depression and anxiety. Kassinove and Sukhodolsky,³⁴ for example, found 10 articles on depression and 7 on anxiety for every 1 on anger. The lack of attention given to anger^{1,19} leaves substantial room for growth.

In expanding the current state of evidence regarding anger, it is imperative to move beyond simple or narrowly focused approaches⁴ and address it in a comprehensive way, to consider its various dimensions and the many treatments that have been used in an attempt to remedy its problematic forms. Psychiatrists working with angry clients should consider the range of options available. With sufficient specification about the characteristics of effective treatments, psychiatrists are in a better position to consider the overall fit between treatments and clients. Evidence is needed, therefore, to guide treatment selection so that connections can be made between client characteristics and factors in various settings.

Current Evidence on the Treatment of Anger and Aggression

As mentioned earlier, there have been five meta-analytic reviews of the treatment of anger.^{15,19,20–22} In the first, Tafrate²² explored the effects of cognitive relaxation-based, skills training, and multicomponent treatments in 17 studies, with effect sizes ranging from 1.82 to 1.16. Bowman-Edmondson and Cohen-Conger²¹ considered the results of the cognitive, cognitive-relaxation, social skills, and relaxation therapies reported in 18 studies and found effect sizes ranging from 0.64 to 0.80. Beck and Fernandez²⁰ expanded their inclusion criteria to include unpublished doctoral dissertations and single-group designs, which resulted in the inclusion of 50 studies. They found that cognitive behavioral therapy had a 76 percent success rate in reducing anger scores. DiGiuseppe and Tafrate¹⁹ aggregated 230 effect sizes from 57 published and unpublished studies, and found an overall mean effect size of 0.71, with no significant main effect for the different treatment models. Del Vecchio and O'Leary¹⁵ narrowed their meta-analytic review to include studies that primarily

addressed anger, thereby excluding studies that were predominantly about aggression or hostility. Based on their 27 studies, the mean weighted effect size ranged from 0.61 to 0.90.

The reviews demonstrate overall mean effect sizes ranging from 0.64 to 1.16, which is considered to be moderate to strong. Based on these results, there is evidence that the psychological treatment of anger is effective. The range of the overall effect sizes, however, suggests that other factors may influence the variability of effects among the reviews. These factors may include the retrieval process of included studies, the inclusion of diverse populations, different treatment modalities, and the effects of various outcomes for anger and the influence of moderator variables. Exploration of these differences can contribute to a more comprehensive understanding of both the assessment and treatment of anger (see also Glancy and Saini¹).

Retrieval of Included Studies

Other meta-analytic reviews have not provided sufficient details about their information retrieval strategies. Inclusion of information regarding search terms, databases searched, term limiters and expanders used, and other methods of retrieving potential studies provides a transparent process so that the information retrieval strategies can be scrutinized based on the sensitivity and specificity of the searches. A comprehensive search for all potential studies is important, given that meta-analyses with fewer than 50 studies tend to report higher effect sizes.³⁵ In addition, Bowman-Edmondson and Cohen-Conger,²¹ and Tafrate²² did not include unpublished studies. It is important to include unpublished studies in a meta-analysis, because failing to do so can introduce a bias toward favorable outcomes,³⁶ as other reviews suggest that unpublished studies are likely to have lower overall effects.^{37,38}

Separating the Influence of Diverse Populations

Some reviews included children, adolescents, and adults in the same analysis, and thus failed to consider age differences and the role of development in treating problems related to anger.¹⁹ Combining children and adults in the same review can camouflage potential differences by treating these different populations the same. For example, by pooling the effects in their review, Beck and Fernandez²⁰ risked the assumption that the effects are similar for differ-

ent populations including abusive parents, violent and resistant juvenile offenders, inmates in detention facilities, and aggressive school children. Until further testing is completed, in considering the potential variability between adults and children, it is best to complete separate analyses and to treat these groups as if they were different.

Within adult populations, the meta-analytic reviews provide evidence that treating anger is effective across diverse groups including persistently violent male prisoners, adults with intellectual and learning disabilities, forensic patients, angry parents, female batterers, mental health patients, undergraduate students, incarcerated male juveniles, male batterers, aggressive drivers, faculty members, Vietnam War combat veterans, and patients with schizophrenia. These results must be viewed with caution, given that these broad groups are not homogenous and their influence on the variability of effect sizes remains unknown. Further analysis is particularly needed in this area, given that there is an overrepresentation of undergraduate student volunteers, thereby limiting the generalizability of the findings to other populations.

Toward a Comprehensive List of Treatment Modalities

A range of treatments has been considered, but most interventions have been based on cognitive, behavioral, or cognitive-behavioral models, and there may not be sufficient variability in the treatment approaches to produce noticeable differences.¹ Other treatment modalities, such as psychodynamic and psychoeducational have not been included in previous reviews, despite some preliminary evidence suggesting the potential benefits of these treatments in reducing anger in various populations.^{39–42}

Anger as the Primary Outcome

Because anger is often disguised by other negative behaviors, such as aggression, hostility, and violence, it is important to explore it separately and as an independent primary outcome. With the exception of Del Vecchio and O'Leary,¹⁵ reviews have mixed outcomes that include both anger and aggression, and little attention has been directed toward distinguishing these to explore possible differences. As they point out, the anger construct is considered distinct from the concepts of hostility, aggression, and violence and therefore merits separate analysis.

Considering Differences in Effect Sizes for Various Anger Outcomes

Bowman-Edmondson and Cohen-Conger²¹ provided the first meta-analysis to demonstrate that differences in effect sizes could be attributed to the use of specific treatment modalities for specific dimensions of anger (e.g., anger control, anger expression). They found that changing the expression of anger was best achieved by relaxation treatment (1.19). Whereas relaxation treatment had the largest effect size (0.79) for self-reported anger, behavior and social skills training had the largest effect size (1.13) for the observation and assessment of angry behavior. To change physiological anger, relaxation-based therapies had the largest effect size (1.21) compared with cognitive-relaxation (0.76), cognitive (0.57), and social skills training (0.58). Although the design of the study precluded statistical analysis of these findings based on a small number of included studies, it was an important step toward a more robust analysis of the potential moderator variables that may influence the range of effect sizes. DiGiuseppe and Tafrate¹⁹ and Del Vecchio and O'Leary¹⁵ also clustered effect sizes according to the type of outcome measure used for each intervention; however, judgments made regarding the similarity and dissimilarity between effect sizes were not determined statistically, because in many cases, the effect sizes were derived from fewer than five studies, which would result in an inaccurate statistical comparison.

The Influence of Moderator Variables

Not all reviews considered the potential influence of moderator variables, and most had too few studies for meaningful statistical analysis. The moderator analysis by Del Vecchio and O'Leary¹⁵ revealed an overall positive relationship between session length and treatment outcomes. DiGiuseppe and Tafrate¹⁹ found significant positive relationships between the use of manuals and fidelity checks and treatment outcomes. They also found positive effects for individual treatment formats, publication status, and type of participant. The number of sessions, participants' sex, and allocation to groups all failed to predict the effect size of treatment outcomes. Further research is needed to explore the influences of moderator variables that are specific to anger treatment outcomes.

Rationale for the Current Review

Despite preliminary evidence supporting psychological treatments of anger, there is still no clear consensus among mental health professionals and researchers on the best way to treat angry clients. Kobayashi and Norcross state, "Without a consensus on the identified phenomenon, we will continue to disagree on the proper psychotherapy of anger disorders" (Ref. 33, p 277). To develop evidence-based guidelines, it is important to consider both the absolute effects of treating anger and the relative effects of each treatment type. Moderator variables can provide additional information for mental health professionals when setting up and conducting treatments to reduce anger. Factors such as setting, location, type of participants, characteristics of participants, number of sessions, and use of manuals can augment the applicability and relevance of treatment, thereby increasing the likelihood that the treatment will be effective.

Methods

A meta-analysis is a quantitative procedure for evaluating treatment effectiveness by the calculation of effect sizes derived from individual studies for the purpose of integrating the findings.^{43,44} The larger the effect size, the stronger the effect or the greater the degree of effectiveness of the treatment.⁴⁵

Search Strategy for Study Selection

The information retrieval strategy included a search of 12 electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, PsychInfo, EMBASE, DARE, ASSIA, ERIC, 95% CINAHL, IBSS, Social Work Abstracts, Social Sciences Abstracts, and Social Service Abstracts), references of previous reviews, and unpublished studies (dissertations and gray literature).

The search terms used in OVID (and modified according to the electronic database) included: (anger control or anger or angry or aggression or hostility or anger-related disorders or aggressive driving behavior) and (anger management or treatment or intervention or counseling or cognitive behavior therapy or psychotherapeutic techniques or psychological psychotherap* or psychodynamic or group psychotherap* or exposure therapy* or eye movement desensitization therapy or relaxation therapy or therapeutic group or mental health services or treatment effectiveness evaluation) not (child* or youth).

Criteria for Study Selection

Studies were eligible for inclusion in the review if the population included men and/or women over the age of 18 years. Studies that included children and youth were excluded from the review, to avoid additional heterogeneity between studies. Because the main objective of this review was to compare psychological treatments of anger, pharmacological interventions were excluded. (For a comprehensive evidence-based review of published literature on the psychopharmacology of anger and aggression, see the three-part review by Glancy and Knott,²⁴⁻²⁶ mentioned earlier in the article). Outcome measures included the different constructs of anger (general, control, person specific, expression, state, and trait) and angry driving (see Table 2). Two reviewers independently categorized each outcome into a predetermined list; all disagreements were resolved by consensus.

Studies were eligible if they included experimental, two-group quasi-experimental designs or within-group designs with at least pre- and post-treatment scores. The comparison group could include no treatment, minimal treatment, other treatment, or a wait list comparison. Methods of constructing the comparison groups varied in the use of statistical controls to reduce the threat of selection bias, and these differences were coded to explore their influences on results during data synthesis. Included studies had to report an effect size for the intervention or contain sufficient data to calculate an effect size.

Data Analysis

Comprehensive Meta-Analysis software, version 2⁴⁶ was used for all statistical analyses. This software can produce Cohen's *d*, Hedge's *g*, *Q* values, confidence intervals, fixed effects, random effects, and heterogeneity testing results. An examination of the internal and external validity of this meta-analysis was accomplished using multiple linear regression of the continuous and dummy categorical moderator variables in SPSS.

The standardized mean difference effect size statistic^{47,48} was used to record intervention effects. The standardized mean difference, Cohen's *d*, the most widely known effect size formulation for meta-analytic purposes, was used to measure effect sizes in cases in which both the means and standard deviations were reported.⁴⁸ Cohen's *d* reflects the differ-

ences between the post-treatment means of the treatment group and the control group, divided by the pooled standard deviation, adjusted for sample size or, in the case of a study that did not use a control group, d reflects the difference between the pre- and post-treatment scores, divided by a pooled standard deviation. Thus, d represents differences in means expressed in standard deviation units. According to Cohen,⁴⁹ effect sizes of 0.20, 0.50, and 0.80 refer to, respectively, small, moderate, and large effects. When possible, d was calculated directly from the means and standard deviations, because it is the most precise method. If this method was not possible, d was calculated from F - or t values.

A random-effects model was used for pooling results if significant statistical heterogeneity was present and if there were substantial between-study variations. Statistical heterogeneity in the outcome measures were assessed using the Q statistic and the associated p -value for each analysis and the I^2 statistic.⁵⁰ A significant Q statistic suggests heterogeneity within a set of studies and the need for moderator analyses. The I^2 statistic determines the percentage of variability that is due to heterogeneity, where a value greater than 50 percent suggests moderate heterogeneity.

Typically, studies reported results on multiple outcome constructs (e.g., general anger, anger expressions, and anger control). All effect sizes that assessed anger that could be extracted from a study were coded but were analyzed using the overall mean of anger scores or sequential placement of outcomes to ensure statistical independence.⁴⁸ Within each data file, extreme values were tested and corrected as recommended by Lipsey and Wilson.⁴⁸ Correcting for extreme values in quantitative reviews is consistent with the purpose of meta-analyses, specifically to “arrive at a reasonable summary of the quantitative findings of a body of research studies” (Ref. 48, p 107).

Results

Studies Included in the Review

Based on the information retrieval strategy, 4,438 titles were retrieved. Of these, 879 were excluded because they were duplicates, 550 were excluded because they focused on children or youth, and 898 were excluded because they focused on pharmacol-

ogy. The remaining 2,111 titles were screened by two independent raters. Cohen’s κ formula was used to calculate inter-rater reliability between the two raters during the initial screen. Based on the initial screen of 2,111 titles, the raters included 232 titles with a Cohen’s κ of 0.81. Based on the second screen of full text articles, 96 studies passed to the third phase for data extraction and inclusion in the meta-analytic review.

Characteristics and Frequencies of the Selected Studies

A breakdown of the characteristics of the studies selected for the meta-analysis is presented in Table 1. These characteristics have the potential to influence the effect sizes obtained from the studies.

Most studies were completed in the United States, involved fewer than 50 participants, and did not distinguish between males and females in their analyses. Although one-third of the studies included college or university settings, there was good representation from community treatment programs, correctional facilities, and general hospital settings. Participants included students in college or university, health care patients, incarcerated offenders, and mental health clients. Most treatment modalities included a group format, and many administered treatment with the help of manuals and fidelity checks. Although 76 percent of studies used a random assignment to the treatment and comparison group, there were differences in the types of comparison groups used. Many comparison groups received alternative, other, or minimal treatment during the period of the studies. Fewer received no treatment (including 26% who did not receive treatment because they were assigned to a wait list).

Mean Effects of Anger Outcomes

The 96 eligible studies generated 139 standardized mean difference effect sizes for the treatment of anger. Most studies generated more than one effect size for the anger outcome including anger control, anger expression, anger situation, anger symptom, angry driving, general anger, state anger, and trait anger. Table 2 shows the anger outcomes and examples of instruments used to measure them.

To create a set of independent effect sizes for analysis, a combination of procedures was used. First, each anger outcome was treated and analyzed separately. When studies reported results on different

Table 1 Frequencies of Variable Characteristics for Included Studies ($n = 96$)

Characteristic	N	%
Source		
Form of publication		
Unpublished	24	25
Published (peer review)	72	75
Design		
Type of design		
Random	73	76
Nonrandom-matching	11	11
Nonrandom-equivalent	1	1
Nonrandom-different	7	7
No comparison	4	4
Comparison group		
Minimal treatment	7	7
No control group	7	7
No treatment	16	16
Other treatment	41	42
Wait list	25	26
Sample size (tx + ct)		
Under 50	61	63
51 to 100	14	14
101 to 150	1	1
151 and over	7	7
Participants		
Gender mix		
Both	52	54
Female	8	8
Male	36	37
Location of studies		
Australia	4	4
Canada	5	5
Europe	8	8
Japan	1	1
Israel	1	1
United Kingdom	1	1
United States	76	79
Setting of studies		
College or university	31	32
Community treatment	31	32
Correctional facility	12	12
General hospital	12	12
Police academy	2	3
Psychiatric facility	8	8
Delivery of treatment		
Treatment format		
Group	91	94
Individual	5	5
Number of sessions		
3 or less	3	3
4 to 7	23	24
8 to 11	48	50
12 to 15	10	10
16 or more	12	12
Delivery personnel		
Faculty	6	6
Graduate student	39	40
Psychiatrist	9	9
Psychologist	16	16
Therapist	26	27
Manuals used		
No	37	38
Yes	59	61
Fidelity checks used		
No	47	49
Yes	49	51

types of anger, an overall mean of anger scores for each treatment effect was calculated. In addition, analysis was performed using the sequential placement of outcomes so that one outcome from each study was used in the analysis. A crude analysis is reported in Table 3, but should be considered with caution as the overall effect is not independent.

The overall effect size across all types of dependent variables was 0.76 (CI = 0.67–0.85) indicating that participants in the treatment groups had significantly lower anger scores than the comparison groups after participating in the various treatment models. Analysis of the homogeneity of variance of effect size values was significant ($Q = 403.1$, $df 138$, $p < .001$), suggesting the presence of heterogeneity and the need to consider moderator variables. The I^2 statistic of 65.75 suggests more than moderate heterogeneity. Significant homogeneity of variance of effect sizes was also noted for specific outcomes of anger including general anger, anger situation, anger symptom, state anger, and trait anger.

Type of Treatment for Anger at Post-test

Table 4 reports the effect sizes by treatment type and the homogeneity of variance of effect sizes. A Kruskal-Wallis H-test for one-way analysis of variance ($H = 18.00$, $p < .05$) indicates that the values of effect sizes are different across treatment groups. To inspect differences between two groups, Mann-Whitney U-tests were used and revealed significantly larger effect sizes for multicomponent compared with cognitive behavioral therapy ($U = 149.00$, $p < .05$), psychoeducational ($U = 5.00$, $p < .05$), relaxation-based ($U = 167.50$, $p < .05$), and stress inoculation ($U = 33.00$, $p < .05$). Larger effect sizes were found for cognitive compared with cognitive behavioral ($U = 66.00$, $p < .05$) and psychoeducational ($U = 66.00$, $p < .05$) therapies, but psychodynamic therapy had larger effects than did cognitive ($U = 4.50$, $p < .05$). No other differences between groups were significant.

Binomial Effect Size

Based on the recommendations of Rosenthal⁵⁶ and Cohen,⁴⁷ the binomial effect size display (BESD) was computed to compare those who participated in treatment with those who were included in the comparison groups. BESD is reported in Table 5.

Meta-Analysis of Psychological Treatment of Anger

Table 2 Anger Outcomes

Anger Outcome	Description	Example of Instruments
Anger control	The extent that an individual attempts to control the outward expression of anger	Multidimensional Anger Inventory: anger (Siegel ⁵¹) State-Trait-Anger Expression-Inventory (STAXI): anger control (Spielberger, <i>et al.</i> ¹⁸)
Anger expression	Outward expression towards individuals, or objects through physical or verbal behaviors	Multidimensional Anger Inventory: anger out (Siegel ⁵¹) State-Trait-Anger Expression-Inventory (STAXI): anger out (Spielberger, <i>et al.</i> ¹⁸)
Anger situation	Anger in response to the individual's most intense source of ongoing anger	Anger situation rating (Hazaleus and Deffenbacher ¹⁰)
Anger symptom	Anger-related physiological arousal	Anger symptom (Hazaleus and Deffenbacher ¹⁰)
Driving anger	Anger provoked while driving	Driving anger scale (Deffenbacher, Oetting and Lynch ⁵²) Driving anger expression inventory (Deffenbacher, Lynch, Oetting, Swaim ⁵³)
General anger	Anger in response to a wide range of potential provocations	Anger inventory (Novaco ⁵⁴) Anger log (Deffenbacher and Stark ⁵⁵)
State anger	Emotional response that is composed of cognitions of perceived injustice	State-Trait-Anger Expression-Inventory (STAXI): state anger (Spielberger, <i>et al.</i> ¹⁸)
Trait anger	Stable and consistent pattern of behavior in responding with feelings of anger	State-Trait-Anger Expression-Inventory (STAXI): trait anger (Spielberger, <i>et al.</i> ¹⁸)

Anger Outcome Within Each Treatment Type

The effect sizes for anger control were moderate across all treatment groups, ranging from 0.26 to 0.83. Anger expression (e.g., anger outward) had relatively small effect sizes for all treatments, ranging between 0.18 and 0.61. For anger situation (e.g., situations that may provoke anger), exposure therapy had significantly larger effect sizes with an average of 1.09 and 95% CI between 0.71 and 1.47. For those with a tendency to suppress anger in (e.g., anger inwards), moderately strong effect sizes were found for multicomponent therapies (0.74), and moderate effects for cognitive therapies and cognitive behavioral therapies. Cognitive and multicomponent therapies also produced large overall effect sizes for anger symptoms out-

comes (0.94). Relaxation-based and stress inoculation therapies were the only two treatments found that explored angry driving. Both of these treatments produced large effect sizes, ranging from 1.27 to 1.89. For general anger, only psychoeducational therapy produced below moderate effect sizes, as all other treatments produced effect sizes above 0.76. Psychodynamic therapy had the largest effect size for general anger based on only two studies (1.43). For state anger (e.g., how angry the respondent is feeling), relaxation-based (0.97), and cognitive (0.83) both had large effects. Finally, for trait anger (e.g., anger response patterns), multicomponent therapies (1.046) had the largest effect sizes based on six studies, followed by cognitive (0.98) and relaxation-based (0.65) therapies.

Table 3 Overall Effect Sizes for Outcome Measures

Type of Anger	ES	95% CI	N	Heterogeneity Statistic
Overall anger*	0.76	0.67–0.85	139	$Q = 403.1, df 138, p < 0.001$
Anger control	0.47	0.38–0.57	39	$Q = 43.75, df 38, p = 0.2$
Anger expression	0.41	0.33–0.49	59	$Q = 64.54, df 58, p = 0.25$
Anger situation	0.75	0.62–0.88	31	$Q = 43.96, df 30, p < 0.05$
Anger symptom	0.75	0.61–0.90	26	$Q = 38.75, df 25, p < 0.05$
Driving anger	1.35	0.94–1.77	7	$Q = 9.05, df 6, p = 0.17$
General anger	1.09	0.88–1.13	80	$Q = 200.19, df 79, p < 0.001$
State anger	0.56	0.40–0.71	37	$Q = 67.29, df 36, p < 0.01$
Trait anger	0.64	0.50–0.78	66	$Q = 211.96, df 65, p < 0.001$

* Based on an overall mean score of anger for each treatment effect. Overall anger represents the overall mean of anger scores for each treatment effect. The preceding anger outcomes are presented in crude analysis format for visual comparisons for descriptive purposes only as these are not independent (which explains why the total number of studies for each type of outcome exceeds 139). For all other analyses, an overall mean of anger scores for each treatment effect was calculated or sequential placement of outcomes was performed so that one outcome from each study was used in the analyses to ensure independence. ES, effect size; CI 95%, confidence interval; N, number of studies included in each of these meta-analyses.

Table 4 Overall Mean Effect Sizes for Types of Treatments

Type of Treatment	ES	95% CI	N1	N2	Heterogeneity Statistic
Cognitive	0.83	0.56–1.09	7	160	$Q = 2.28, df 6, p = 0.892$
Cognitive behavioral therapy*	0.60	0.50–0.69	42	1,846	$Q = 129.09, df 41, p < 0.001$
Exposure therapy	0.60	0.30–0.89	5	173	$Q = 7.22, df 4, p = 0.12$
Multicomponent	0.93	0.84–1.01	17	2,651	$Q = 81.01, df 16, p < 0.001$
Psychodynamic therapy	1.40	1.14–1.72	2	188	$Q = 1.07, df 1, p = 0.3$
Psychoeducational treatment	0.37	0.14–0.59	4	74	$Q = 1.29, df 3, p = 0.7$
Relaxation-Based therapy	0.67	0.56–0.78	37	1,297	$Q = 45.74, df 36, p = 0.12$
Skills training	0.85	0.70–1.01	13	822	$Q = 48.25, df 12, p < 0.001$
Stress inoculation	0.58	0.30–0.85	10	229	$Q = 26.54, df 9, p < 0.01$

Based on an overall mean score of anger for each treatment effect. ES, effect size; CI 95 %, confidence interval; N1, number of studies; N2, number of subjects (treatment plus control).

* Two effects were removed due to extreme scores beyond 3.00.

Analysis of Moderator Effects

Analysis of the homogeneity of variance of effect sizes was significant ($Q = 403.1, df 138, p < .001$), suggesting the presence of heterogeneity and the need to consider moderator variables. The I^2 statistic of 65.75 suggested above-moderate heterogeneity. Analysis of moderator effects was explored to consider the variability in the effect sizes across the different studies. Results show that published studies (0.837, 95% CI = 0.78–0.89) had larger effect sizes than unpublished studies (0.54, 95% CI = 0.43–0.66) as indicated by the independent-samples t test ($t = 2.05, p < .05$). There were no differences between within- and between-group designs or other study design details, including the type of comparison, sample size, and location of the study.

The setting of the research had a significant influence on the overall effect sizes at post-test ($F = 2.784, p < .05$). Colleges and universities (0.86, 95% CI = 0.77–0.95) and community treatment programs (0.88, 95% CI = 0.80–0.95) had larger effects than did correctional facilities (0.058, 95% CI = 0.44–0.72), psychiatric facilities (0.50, 95% CI = 0.33–0.68), and general hospitals (0.65, 95% CI = 0.52–0.79). Manuals (0.812, 95% CI =

0.074–0.877) and fidelity checks (0.85, 95% CI = 0.78–0.92) both produced larger effect sizes than did treatments that did not involve the use of manuals (0.76, 95% CI = 0.69, 0.83) and fidelity checks (0.73, 95% CI = 0.67, 0.79), but these differences were just over the statistically significant cutoff of $p = .05$ ($p = .059$ and $p = .090$, respectively).

The mean number of treatment sessions was 8.5 (SD 3.72), with the number of sessions ranging from 3 to 40. To determine the relationship of the number of treatment sessions on the overall mean effect of anger at post-test, a meta-regression was completed. For the slope, the z -value was 2.189 ($p < .05$). Figure 1 depicts the line of the slope, which demonstrates that the number of sessions affects the overall magnitude of the effect sizes.

Publication Bias

The existence of publication bias was explored by a funnel plot.⁴⁸ In addition, a fail-safe N for the average effect size was computed in CMA. This meta-analysis incorporated data from 139 treatment effects, which yielded a z -value of 29.197 and corresponding two-tailed $p = .000$. The fail-safe N is 30,709, meaning that an additional 30,709 null

Table 5 Binomial Effect Size Display of Each Treatment Group

Type of Treatment	% Treatment Success Rate	% Comparison Success Rate	% Absolute Difference
Cognitive	69.2	30.7	38.5
Cognitive behavioral therapy	65.7	35.2	30.5
Exposure therapy	65.4	34.6	30.8
Multicomponent	70.4	29.5	40.9
Psychodynamic therapy	78.8	21.1	57.7
Psychoeducational treatment	59.2	40.8	18.4
Relaxation-based therapy	66.7	33.3	33.4
Skills training	71.5	28.5	43.0
Stress inoculation	69.3	30.6	38.7

Meta-Analysis of Psychological Treatment of Anger

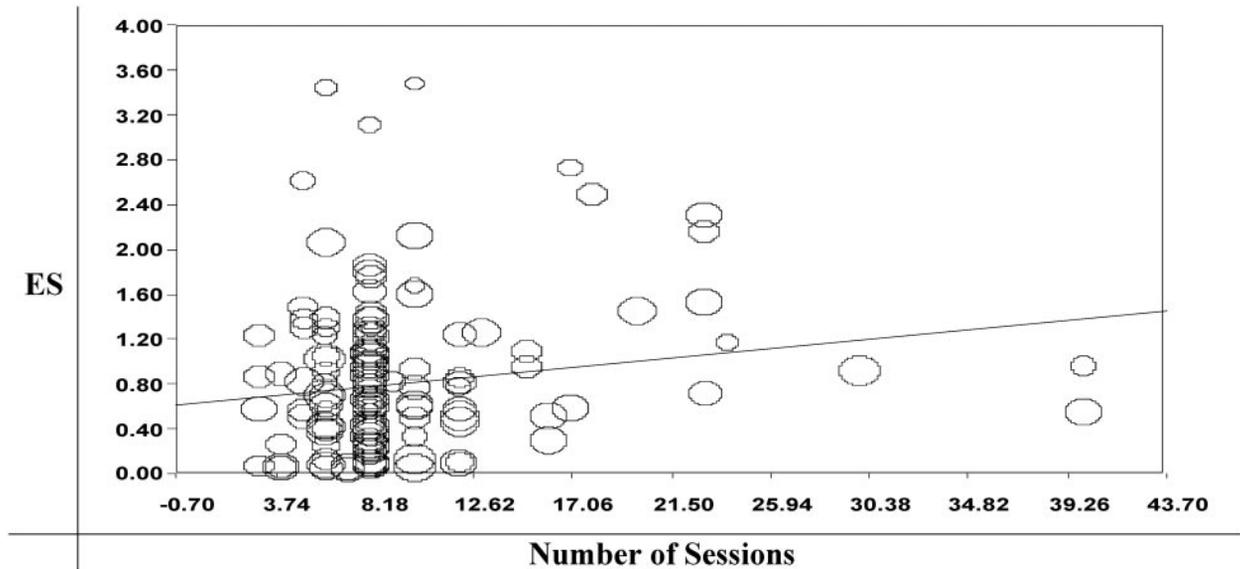


Figure 1. Regression of sessions on overall mean effect sizes for anger.

studies would have to be located and included for the combined two-tailed p to exceed .05.

Follow-up Studies

Fifty-nine treatment effects were calculated from follow-up data and are displayed in Figure 2. The most common follow-up period was between 4 and 8 weeks ($n = 54$). At 12 to 16 weeks, only seven follow-ups were completed. At the one-year mark, 10 treatment effects were recorded. The Q statistic indicated a nonsignificant test result for overall effect sizes of follow-up data and for each identified period. This finding suggests that the variability of the effects found at post-test were not maintained at follow-up. The change is most likely due to the decreased number of studies involved in the follow-up data compared with post-test data. The results show a slight decrease in the overall effect sizes between 4 and 16 weeks (0.59) with an increase at the one-year point

similar to the overall effect size recorded at post-test (0.76). It is important to note that the studies included at the one-year follow-up were homogenous. All 10 studies included undergraduate students in either cognitive behavioral therapy or skills-based training. More research is needed before any assertion can be made about this interesting finding.

Conclusions

There is strong evidence that psychological treatment of anger is moderately successful at reducing anger problems across various dependent variables. The results of the meta-analysis support previous reviews. The accumulation of results from these reviews suggests a consistent message that psychological treatments generally work with various populations to redress maladaptive anger. The magnitude of the gains found in this study is comparable

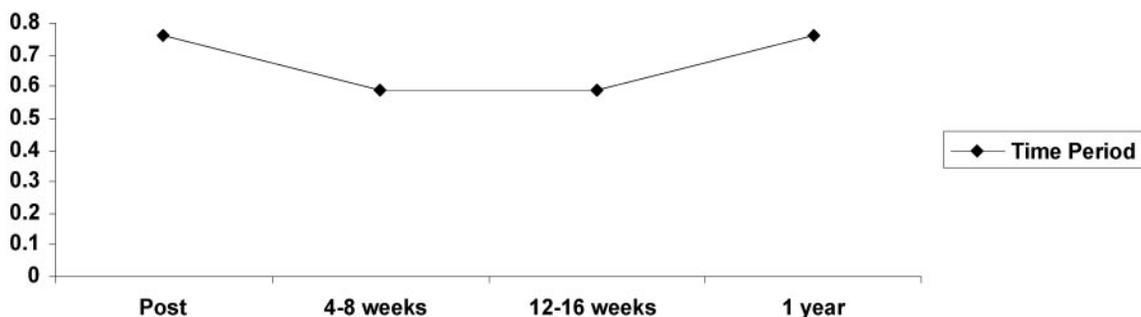


Figure 2. Mean effect sizes of follow-up periods.

with those reported in other meta-analytic reviews completed in the past 20 years.^{15,19,20–22} An overall mean effect of 0.76 was found for the studies, which was robust enough to be unaffected by unpublished null results. The findings are similar to the mean effects of 0.71 found by DiGiuseppe and Tafrate¹⁹ and within the range of 0.61 to 0.90 found by Del Vecchio and O'Leary.¹⁵

The overall effect sizes were generally maintained at 4 to 8 weeks, 12 to 16 weeks, and one year. Similar to the results in the study by Bowman-Edmondson and Cohen-Conger,²¹ some effects on anger actually improved more at follow-up than at post-test. DiGiuseppe and Tafrate³⁰ suggest that effects maintained over time may tend to incorporate multiple interventions into one protocol. The effects maintained in this review were based mostly on undergraduate students, and so caution must be used in generalizing beyond the limits of these studies. More research is needed to explore whether these effects are maintained over time in this population and to determine whether similar maintenance of effects could be achieved in other populations.

Although other outcomes related to anger have been shown to have positive gains after treatment,^{19,21} it was important for this review to clarify the anger outcome by separating dimensions of anger from other similar constructs, such as aggression. As our understanding of anger improves, it is important to carefully consider the various dimensions of anger and to consider symptom-and-treatment modality matching by targeting specific elements of anger without further complicating this matching process by including other constructs.

This review suggests that findings from meta-analyses are worth considering as a part of what works in the treatment of anger by offering comparative information on how well different interventions work. Unlike previous reviews, significant differences were found for different treatment modalities. The strong showing of multicomponent therapies is consistent with the results in Tafrate,²² who reported an effect size of 1.00 for multicomponent therapies, and with the focus of DiGiuseppe¹⁷ on a multi-theoretical and comprehensive package of anger treatments. In 2001, DiGiuseppe and Tafrate³⁰ presented a comprehensive treatment model for working with a wide variety of clients with anger problems. There is evidence that suggests the merit of pursuing a comprehensive approach. Future work to

coalesce treatments should follow systematic procedures so that relative influences of various treatment components can be identified, isolated, and assessed for the influence on the variability of effect sizes. It is imperative to determine the parts of therapeutic programming that work and to vet out factors that are found to be ineffective.

The results of the moderator variables on the use of manuals and fidelity checklists are consistent with those found by DiGiuseppe and Tafrate.¹⁹ In this study, manuals and fidelity checklists were used in more than half of all studies, and their use produced increased effect sizes. DiGiuseppe and Tafrate¹⁹ suggest that therapists who participate in studies may have higher compliance rates when using manuals than those not involved in research. The findings support a more broad use of both manuals and fidelity checks.

The evidence also supports eight sessions as an adequate amount of treatment to demonstrate positive results to reduce anger problems. As treatments increase in the number of sessions beyond the average mean of eight, so too does the attrition rate, creating a higher number of withdrawals from the study.¹ Beck and Fernandez²⁰ suggested that in planning treatment for anger, cost-effective strategies should be considered alongside outcome efficacy. The results of this review clearly show that treating angry clients beyond eight sessions has a limited influence on the overall effects of treatment.

The strength of this review is the extent of the literature that was included in the information retrieval process. The strategy included over 4,000 titles, screened down to 96 studies by following a transparent and comprehensive level of screening protocol. In addition, a specific effort was made to include unpublished studies. Despite this comprehensive approach to information retrieval, the majority of the studies were completed in the United States and one-third were completed by college or university students. Even so, the comprehensive search across a wide range of literature helped to contextualize the research, and a process emerged for in-depth analysis. Another strength of this review is the inclusion of additional treatment modalities to provide a broader perspective regarding the relative merits of various treatments of anger.

Interpreting the results of meta-analytic reviews and comparing the relative magnitude of effects for treatment is not without its limitations. Studies in-

cluded in the review were identified based on the inclusion criteria of whether the study reported on a treatment modality for anger. The criteria did not include a discernable assessment based on psychiatric diagnosis or psychometric measures, so generalizing results to psychiatric populations and those diagnosed with anger-related problems should be made with caution. Second, the review used broad definitions of anger. As a result, there was considerable statistical heterogeneity in the results of outcome categories, which indicates that caution should be used in combining the effects and interpreting the findings. Finally, the differentiation of treatment categories had good inter-rater reliability based on the categories created for this review; however, no other tests were performed to ensure the validity of these categories. Although differences in treatment allocation would not influence the overall results, differences found among treatment classifications must be considered with caution. As the evidence continues to accumulate and improve, future reviews should include additional moderator variables to explore the quality of research designs, and more attention should be directed toward critically appraising the evidence beyond allocation, sample sizes, and types of comparisons.

Implications for Developing Evidence-Based Guidelines

Treatments of anger have been used around the world for many years. There is a growing body of evidence that treatments are effective at improving a variety of anger-related problems. These positive effects are found within diverse populations, settings, and locations. The effect of treatment of anger is relatively smaller than that of treatments for anxiety and depression.¹⁹ Mental health professionals conducting at least eight sessions of treatment, using manuals to guide treatment, and using fidelity checks to ensure consistency are likely to improve outcome scores. Treatment of anger should therefore be supported as a unique approach and should not remain in the shadow of treatments for aggression, hostility, and violence.

Overall, treating anger with psychological treatments is beneficial. Some prudence is required, as there is some variation of treatment effect according to sample setting. When implementing a treatment program, mental health professionals should routinely evaluate and critically monitor to ensure that

the client is receiving the perceived benefits and to verify that the approach is consistent with the client's expectations, values, and judgments, to avoid imposing evidence-based guidelines rather than following the procedures for evidence-based practice. The meta-analysis described in this review adds weight to the growing body of evidence. However, the variation of the impact of treatments, combined with the differences among the treatments themselves, makes it difficult to offer specific guidelines for choosing specific treatments without further research and analysis.

This meta-analysis supports the potential integration of psychological treatments and pharmacological agents to treat maladaptive anger. Glancy and Knott²⁶ found several pharmacological agents to be efficacious in managing maladaptive anger. Careful assessment of the patient to detect underlying major psychiatric conditions is the first necessity, as these conditions may impede positive gains from psychological treatment alone. In that case, psychiatrists would follow the algorithm presented by Glancy and Knott to address mental health status with appropriate pharmacological agents. Further research is needed to determine whether pharmacological algorithms can be complemented with the combination of psychological interventions according to mental health status. Although this meta-analysis included only psychological treatments for anger, future studies including pharmacological approaches, with and without psychological interventions, are needed for consideration in the development of evidence-based guidelines for the treatment of anger.

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Appendix

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