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Categories of Training to Improve Empathy: A Systematic Review and Meta-Analysis

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Due to the vital role of empathy in promoting prosocial behaviors and nurturing social bonds, there is a growing interest in cultivating empathy. Yet, the effectiveness of existing training methods on empathy, especially on different dimensions of empathy (i.e., affective, cognitive, motivational, and behavioral empathy), varies tremendously, and the underlying causes for this heterogeneity remain insufficiently explored. To address this issue, we categorized various training methods into three distinct approaches based on the premise that empathy can be influenced by factors associated with the subject, the object, and their relationship. Respectively, these are Subject-Oriented, Object-Oriented, and Socially Oriented approaches. To examine the effects of training and sustainability of these approaches on different dimensions of empathy, we conducted a meta-analysis encompassing 110 eligible studies with 32, 44, 39, 39, and 91 samples for affective, cognitive, motivational, behavioral, and composite empathy, respectively. Results showed that trainings produced small and unsustainable effects on affective empathy, moderate and unsustainable effects on cognitive empathy, small and sustainable effects on motivational empathy, and moderate and sustainable effects on behavioral empathy. The effects of training on composite empathy were robust but decreased over time. Among the three training approaches, Socially Oriented approaches were the most effective in improving all dimensions of empathy. Subject-Oriented and Object-Oriented approaches were effective only in improving cognitive and composite empathy. Altogether, our study offers practical guidance for selecting appropriate training approaches and proposes theoretical principles for developing optimal training strategies in both basic research and clinical applications.

Public Significance Statement

Empathy is essential for building strong social connections and encouraging positive behaviors toward others. This meta-analytic review reveals that while affective empathy (emotional resonance) is hard to train, cognitive (perspective taking), motivational (caring), and behavioral empathy (empathetic actions) are more easily enhanced. Approaches aiming to improve social relationships are the most effective in enhancing empathy, offering practical insights for training on empathy in educational, clinical, and community settings to foster a more empathetic and cohesive society.

Keywords: training approaches, cognitive empathy, affective empathy, motivational empathy, behavioral empathy

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in conceptualization. Su-Chen Yao played a supporting role in formal analysis, investigation, methodology, and writing—review and editing. Xue-Jing Lu played a supporting role in conceptualization, formal analysis, funding acquisition, and writing—review and editing. Yu-Qing Zhou played a supporting role in writing—review and editing. Ya-Zhuo Kong played a supporting role in conceptualization, funding acquisition, project administration, and writing—review and editing. Li Hu played a lead role in funding acquisition, project administration, supervision, and writing—review and editing and a supporting role in conceptualization and visualization.

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Empathy, the capacity to emotionally understand and share others' feelings, plays a vital role in human interactions (Decety & Meyer, 2008; Hillis, 2014). Empathy encompasses at least four distinct subprocesses: sharing or being affectively aroused by others' emotional state, knowing what others are feeling by considering their perspective, having the intention to respond compassionately, and engaging in corresponding empathetic behaviors (Decety & Jackson, 2004; Morse et al., 1992). Consequently, empathy can be categorized into four dimensions: affective, cognitive, motivational, and behavioral (Decety, 2015; Mercer & Reynolds, 2002; Zaki & Ochsner, 2012). Affective empathy (e.g., affective sharing, emotional contagion) reflects the capacity to share or become affectively aroused by others' emotions. Cognitive empathy (e.g., perspective taking [PT]) is the ability to consciously place oneself in others' mindset and understand what they are thinking or feeling. Motivational empathy (e.g., empathic concern [EC], prosocial concern, sympathy) refers to the desire or motivation to help others, closely associated with prosocial behaviors. Behavioral empathy (e.g., communicating and understanding responses) encompasses the expression of empathetic responses in various forms. It could be reflected in positive attitudes toward diverse groups, such as the elderly (Arrogante et al., 2022; Fernández-Gutiérrez et al., 2022; Gholamzadeh et al., 2018), individuals with dementia (Hattink et al., 2015; Kimzey et al., 2019), and those experiencing poverty (Phillips et al., 2020). It could also be seen in improved relationships (du Vaure et al., 2017; Jütten et al., 2018), increased prosocial behaviors (Brady et al., 2023; Halton & Cartwright, 2018; Han & Kim, 2022), decreased conflicts (Chen-Bouck et al., 2023), and diminished discriminations (Gür & Yilmaz, 2020).

Recognized as an important personal trait, empathy has the potential to be actively promoted, thus fostering prosocial tendencies and altruism (Decety et al., 2016; Wu & Lu, 2021). Consequently, there has been a growing interest in recent years to promote empathy through various innovative interventions. Since the 1970s (Anthony & Wain, 1971; Bierman et al., 1972) when this approach emerged, interventions aiming to promote empathy gained worldwide popularity (Supplemental Figure S1), yielding numerous impressive outcomes. These studies have demonstrated the effectiveness of empathy promotion in building harmonious relationships, enhancing social circumstances (Bodner & Bergman, 2017; Jütten et al., 2018; Schweller et al., 2017), reducing prejudices (Bodner & Bergman, 2017), providing support to individuals facing difficulties (Enav et al., 2019; Joss et al., 2020), preventing misbehaviors (Man-Ging et al., 2015), and deterring recidivism (Marlow et al., 2012; Romero-Martínez et al., 2016, 2019; Zhou et al., 2018).

Numerous training strategies have been developed to promote empathy that encompass a wide range of methods, contents, and frameworks. Specifically, there are a rich variety of training methods: role-play (Shaffer-Hudkins et al., 2022), virtual reality (Sapkaroski et al., 2022), lecture (Kipper & Ben-Ely, 1979), feedback (Damen et al., 2021; Sripada et al., 2011), meditation (Kemper & Khirallah, 2015), physical activity (Pozo Rosado et al., 2022), and even spending time with dying patients (Hojat et al., 2020). There are also diverse training contents: poetry (Gabriel et al., 2018; Irish, 2021), literary fiction (Pino & Mazza, 2016), movie (Ahmadzadeh et al., 2019), and reflection (Daryazadeh et al., 2020). Moreover, trainers employ various frameworks to guide the training process. Stoic training originates from Stoicism, a philosophy of personal ethics,

and encourages individuals to focus their attention only on things within their control and manage their emotions (Brown et al., 2022). This framework helps individuals improve themselves without becoming emotionally entangled, while still empathizing with others (Becker, 2004). Another example is contact-based training, which is rooted in the belief that intergroup interactions foster empathy and diminish prejudice toward members of other groups (Pettigrew et al., 2011; Vaghee et al., 2018). However, the effects of training varied dramatically across different studies, with some demonstrating large effects (Larti et al., 2018; Lecce et al., 2015; Romosiou et al., 2019) and others showing no discernible effects (Ren et al., 2018; Webster, 2010; Yang & Yang, 2013). Crucially, similar training methods or contents may yield entirely different outcomes (Carpio de los Pinos, 2020; Kim et al., 2020; Schonert-Reichl et al., 2012; Soliman et al., 2021; Yamada et al., 2018).

Previous meta-analyses ($k = 13$ – 22 , k refers to the number of studies) attempted to illustrate the extent to which empathy could be promoted and explored the underlying factors contributing to the diverse effects of training (Paulus & Meinken, 2022; Teding van Berkhout & Malouff, 2016; Winter et al., 2020). Notably, all meta-analyses affirmed a significant, medium effect size of training. Teding van Berkhout and Malouff (2016), focusing on randomized controlled trials ($k = 18$), found that the type of trainee (e.g., health professional or child), training compensation (i.e., academic credit, monetary rewards, or none), scope of empathy measures (i.e., narrow, broad, or mixed), and measurement methods (i.e., objective or self-report) could influence the training effect. Winter et al. (2020) investigated the sustainability of training effect ($k = 22$) and found a small but still significant effect persisting after 12 weeks (within 12 weeks: $k = 6$; beyond 12 weeks: $k = 4$). Chua et al. (2021), focusing on simulation-based trainings among health care students ($k = 16$), found that empathy measures (i.e., self-report, simulated patients-report, observer-report) and training methods (i.e., role-play, simulated patients, disease-state simulation) could influence the training effect as well. Paulus and Meinken (2022), focusing on training methods and contents ($k = 13$), concluded that no individual training method or content has a decisive effect on the efficacy of the training. These inconclusive findings may suggest the existence of additional influential factors that could affect training outcomes. Additionally, previous training studies and meta-analyses primarily focused on whether empathy was promoted and training details to promote empathy. As highlighted by Bas-Sarmiento et al. (2020), many current training programs overlooked theoretical models and the multidimensional nature of empathy. Therefore, it is also crucial to explore the effects of training on various dimensions of empathy and determine which dimension is more susceptible to change.

The contradictory training outcomes could be interpreted from the perspective of psychological theories of empathy. Adopting a theoretical standpoint would facilitate a more comprehensive understanding of empathy promotion. Empathy theory encompasses several models and frameworks that provide valuable insights into the nature and mechanisms of empathy. One prominent model is the perception–action model proposed by Preston and de Waal (2002), which suggests that empathy involves perceiving the state of an object (i.e., the primary individual experiencing the emotion/state), activating corresponding representations in the subject (i.e., the individual understanding and secondarily experiencing the emotion/state of the object), and eliciting somatic and autonomic responses.

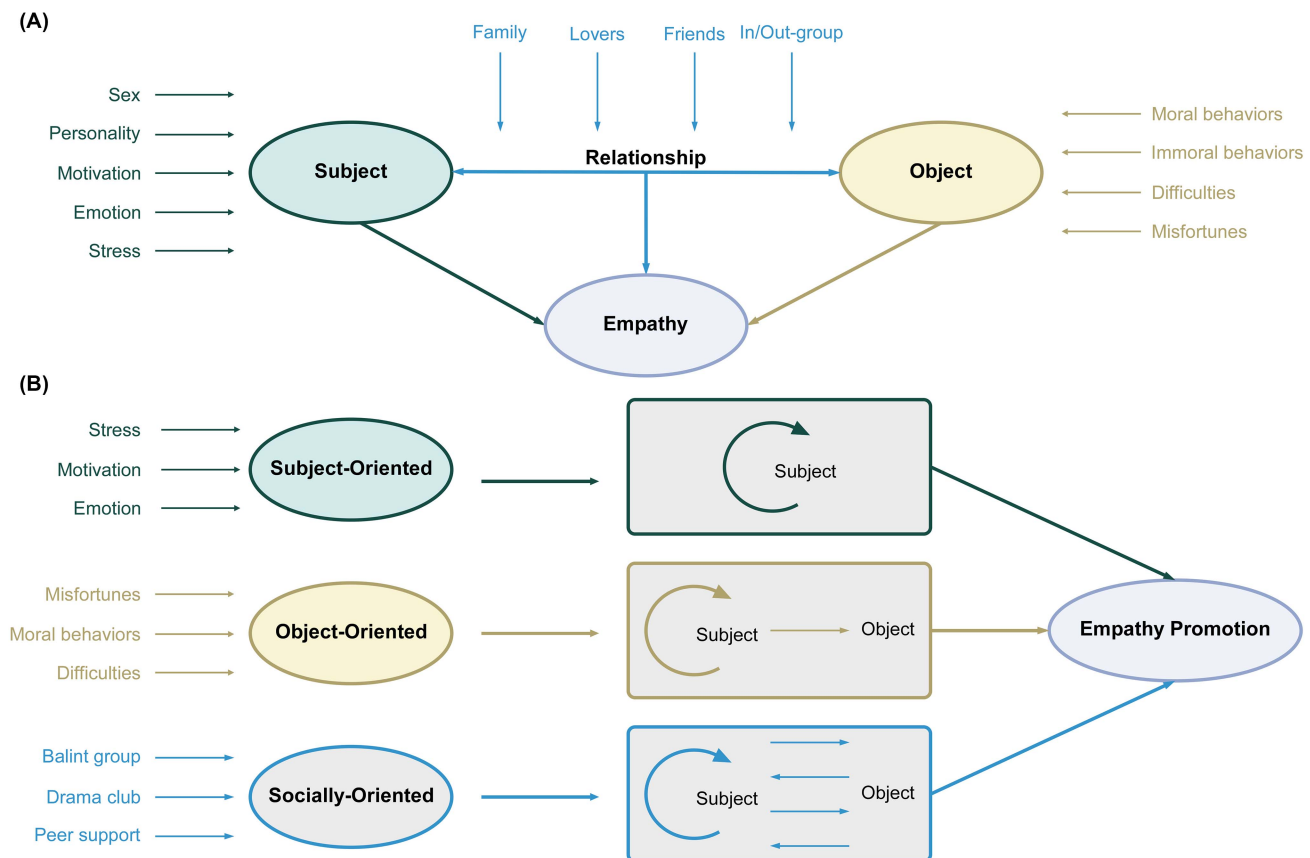
With perception–action model, empathy is a dyadic interaction between the subject and the object. Decety and Meyer (2008) expanded this model by emphasizing that empathy involves both bottom-up (i.e., direct matching between perception and action) and top-down (i.e., regulation and control) information processing. These processes are interrelated through shared representations between the subject and the object. Later, Heyes (2018) proposed a dual system model of empathy in which empathy comprises an automatic process that instinctively captures the emotions of others and controlled processes that involve interpretation and understanding of those emotions. Based on the definition of empathy and theories of empathy (Ellingsen et al., 2023; Motomura et al., 2015; Yu et al., 2023), it is evident that the subject, the object, and their relationship play crucial roles in formulating empathy (Figure 1A). Therefore, to effectively promote empathy, interventions or training approaches should be tailored to target amenable factors associated with the subject, the object, and their relationship.

Various factors associated with the subject (i.e., the one experiencing empathy) could influence different dimensions of

empathy. For example, previous studies suggested that differences in biological sex existed in affective empathy but not in cognitive and motivational empathy (Wu, Lu, et al., 2023), executive function showed a stronger correlation with cognitive empathy compared to affective empathy (Yan et al., 2020), and stress exhibited a negative correlation with cognitive and motivational empathy, but a positive correlation with affective empathy (Duan et al., 2022; Park et al., 2015). Although inherent characteristics (e.g., sex and race) are immutable, certain extrinsic characteristics (e.g., stress) are amenable, and modulating them could potentially lead to empathy modulation. For instance, some mindfulness techniques have been shown to reduce stress (E. Yang, Schamber, et al., 2018), which in turn promotes cognitive and motivational empathy (Kemper & Khirallah, 2015). In contrast, individuals experiencing elevated stress levels might be more prone to emotional involvement in others' distress. It is important to note that a lack of empathy toward others may stem from unwillingness rather than inability (Weisz & Zaki, 2017). Thus, emphasizing the importance of empathy, moral values, and assertiveness may inspire the subject's empathy

Figure 1

Influential Factors of Empathy (A) and Training Approaches to Promote Empathy (B)



Note. Based on the definition of empathy and theories of empathy, it is evident that the subject, the object, and their relationship, each of which is influenced by several factors (e.g., subject's sex, object's misfortune, and friends vs. strangers), play crucial roles in the process of empathy (A). Accordingly, different training approaches tailored to target amenable factors associated with the subject, the object, and their relationship were proposed to effectively promote empathy (B). Specifically, Subject-Oriented, Object-Oriented, and Socially Oriented approaches prioritize modulating the subject's amenable characteristics, gaining more empathy-beneficial information about the object, and strengthening the social relationship between the subject and the general population or specific objects, respectively. See the online article for the color version of this figure.

motivation and, subsequently, promote empathy (Garcia-Lopez & Gutierrez, 2015; Han & Kim, 2022; Kang et al., 2024).

The object's (i.e., the one being empathized with) characteristics also have an impact on the empathy experienced by the subject. For example, empathy decreased in response to blamable behaviors of the object (Decety et al., 2010; Guo et al., 2022) and increased in the presence of the object's misfortune, good behaviors, and trustworthiness (Decety et al., 2010; Singer et al., 2006; Stevens et al., 2021). In this way, gaining more empathy-beneficial information about the object could lead to a significant promotion of empathy (Eritz et al., 2016; Gholamzadeh et al., 2018; Yu et al., 2021). Trainings, such as listening to the unfortunate life story of the object or experiencing their difficulties by simulation kits or virtual reality, could help the subject gain a better understanding of the object. Doing so enables the subject to comprehend the object's thoughts and feelings more accurately and may even inspire the subject's prosocial motivation in response to the object's difficult situations (Kagawa et al., 2023; Shao et al., 2018; Simko et al., 2021; Stavroulia & Lanitis, 2019).

The relationship between the subject and the object, such as in-group/out-group, friendship, and perceived closeness, could also greatly influence empathy (Grynberg & Konrath, 2020; Han, 2018; Motomura et al., 2015; Sun et al., 2018). Although inherent relationships between the subject and the object (e.g., families, lovers, and friends) are unlikely to be changed through trainings, generalized social relationships between them could be modulated to promote empathy (Durán Gisbert & Vázquez Rivas, 2021; Kemper & Khirallah, 2015), often achieved directly through positive social interactions with others and indirectly through the development of better social interaction skills (e.g., communication skills; Jovanović et al., 2019; Kingsbury & Hong, 2020; Sherbourne & Stewart, 1991). Improving social relationships could not only strengthen the social bond between the subject and the object, but also deepen the subject's understanding of the object and provide some positive effects on the subject directly, such as pleasure or stress reduction (Jao et al., 2018; Wu, Wang, et al., 2023). Various approaches can be employed to enhance social relationships, including peer support, care from peers, and trainings on theoretical and practical communication skills, all of which could contribute to the promotion of empathy (Alhassan, 2019; Cai et al., 2019; D'souza et al., 2020; Larti et al., 2018; Mehta et al., 2021).

Building upon the aforementioned theories and empirical evidence on empathy promotion, we propose three distinct training approaches that prioritize (a) modulating the subject, (b) gaining more empathy-beneficial information about the object, and (c) strengthening the social relationship between the subject and the object, respectively (Figure 1B and Table 1). Accordingly, training approaches in previous studies could be categorized as follows: (a) Subject-Oriented approaches, which aim to regulate the characteristics of the subject, who serves as the participant in the training process; (b) Object-Oriented approaches, which focus on acquiring more information about the object, who is the target of the participant's empathy; and (c) Socially Oriented approaches (i.e., Social Relationship-Oriented), which concentrate on enhancing the participant's social relationship between the subject and general population or specific objects. Notably, possible combinations of these approaches were also considered in the present study.

With distinct underlying principles, these training approaches and their combinations may yield diverse effects on promoting empathy,

Table 1
Examples of Training Details in Different Training Approaches

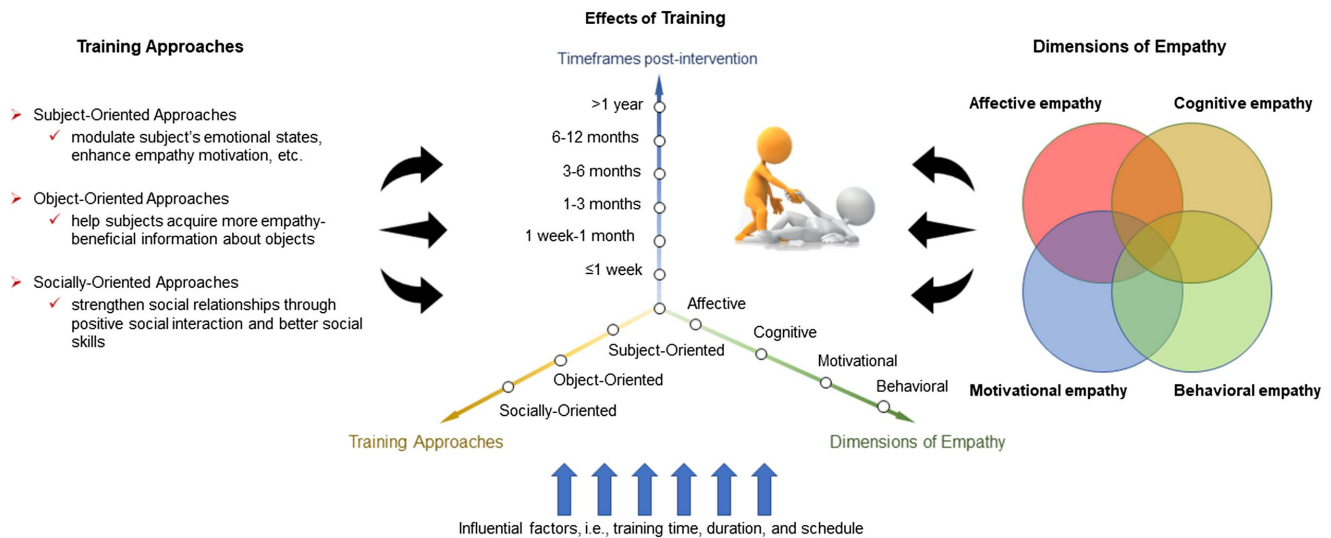
Training approach	Training detail
Subject-Oriented	• Regulate the emotion: body-focused mindfulness, meditation, enhance resilience, enhance emotion management, stress reduction mindfulness, enhance stress management, safety assurance training • Inspire empathy motivation: lecture about the importance of empathy, compassion/love/kindness-based mindfulness, narrative medicine education, design products to help others successfully, self-reflection • Enhance cognition skills: intentionally practicing emotion recognition, cognitive ability practice with feedback
Object-Oriented	• Acquire more empathy-beneficial information about objects: watch movies depicting the object's difficulties, discuss someone's dream with him, storytelling from patients, reflective practice from others' perspective, 360° footage of child refugees • Experience misfortunes or difficulties: simulation kit or virtual reality to experience life as patients, older people, and poor people
Socially Oriented	• Enhance social skills: theoretical and practical communication skills training • Enjoy positive social interaction: peer support, Balint group, delightful role-plays, share dream with others, communicate with objects in a positive way, drama club

which has not been thoroughly explored in previous meta-analyses. Moreover, several crucial questions remain unanswered:

1. Are the effects of training different across different dimensions of empathy (i.e., affective, cognitive, motivational, and behavioral empathy)?
2. How long do the effects of training persist in a more precise timescale?
3. Would the training time/duration/schedule impact the effects of training?

To address these issues, we conducted a systematic evaluation and comparison of the effects of different training approaches on different dimensions of empathy, while considering various influential factors in the present study. Specifically, we assessed the effects of three training approaches (i.e., Subject-Oriented, Object-Oriented, and Socially Oriented) on the four dimensions of empathy (i.e., cognitive, affective, motivational, and behavioral empathy) at six different time spans postintervention (i.e., within 1 week, 1 week–1 month, 1–3 months, 3–6 months, 6–12 months, and beyond 1 year; Figure 2). As some studies did not quantify the effects of training on specific dimensions of empathy but measured empathy as a whole (e.g., the total score of a questionnaire assessing multiple dimensions of empathy), we also included a category called “composite empathy” to encompass findings derived from data that measured more than one dimension of empathy. Moreover, we examined the potential influence of total training time/duration and training schedule (i.e., whether training was conducted in a

Figure 2
Systematic Evaluation of Training Effectiveness on Empathy Promotion



Note. The effects of three training approaches (i.e., Subject-Oriented, Object-Oriented, and Socially Oriented) on four dimensions of empathy (i.e., cognitive, affective, motivational, and behavioral empathy) with an additional “composite empathy” accounting for measuring multiple dimensions of empathy, at six different postintervention time spans (i.e., within 1 week, 1 week–1 month, 1–3 months, 3–6 months, 6–12 months, and beyond 1 year), were comprehensively assessed in the present study. Moreover, the potential influence of total training time/duration and training schedule (i.e., whether training was conducted in a condensed or distributed manner) on the effects was evaluated. See the online article for the color version of this figure.

condensed or distributed manner) on the effects of training. To ensure a larger sample size, the effects of training were mainly evaluated using the comparison between post- and pretest in the intervention group, considering the variations in control conditions across studies (Caputi et al., 2021; Lecce et al., 2014; Sterkenburg & Vacaru, 2018). The obtained results were further validated using (a) data subset with the most widely used empathy measurement in the data set, (b) data after trim-and-fill correction, and (c) data set that compared posttests between the intervention group and the control group.

Method

Literature Search

A comprehensive literature search was conducted across four electronic databases: PubMed, Web of Science (core collection, individual databases are detailed in the [Supplemental Materials](#)), APA PsycInfo, and Chinese Science Citation Database. The search period spanned from the inception of each database to April 8, 2023. The search strategy employed a combination of the index term and free terms. The index term of keyword was “empathy,” and it was combined with the following free terms: “intervention” OR “education” OR “training” OR “program” OR “improv*” OR “enhanc*” OR “promot*.” A detailed search strategy is provided in the [Supplemental Materials](#) (Search Strategy). Duplicate records were removed, and the remaining records were imported into EndNote, a bibliographic citation management tool provided by Clarivate Analytics. Articles were independently screened by the first two authors to select qualified studies. Discrepancies in article selection between the two authors were resolved through team meetings, where a consensus was reached among all team members.

In addition, we identified relevant records from previous meta-analyses (Chua et al., 2021; Paulus & Meinken, 2022; Teding van Berkhout & Malouff, 2016), systematic reviews (Bas-Sarmiento et al., 2020; Lee et al., 2022; Maximiano-Barreto et al., 2022), and reference lists of included studies, provided they met the inclusion criteria (see below).

Study Selection

The nonduplicate articles underwent further screening based on the following inclusion criteria: (a) the availability of the full text, (b) being written in either English or Chinese, (c) having the objective of enhancing empathy, (d) utilizing the same empathy measurements in both pretest and posttest sessions, (e) employing well-validated empathy measurement tools, and (f) providing necessary data for effect size calculation, such as sample size, mean, and standard deviation. Moreover, in cases where duplicate data were identified across multiple studies, only the initial published study was included. In cases where two samples underwent similar training, but one sample received complete training while the other received partial training, only the sample that received complete training was included. In cases where the same training approach was applied to both low-empathy and high-empathy groups and no significant changes in empathy scores between the pretest and posttest sessions were observed for the high-empathy group, data from the low-empathy group were exclusively utilized to eliminate potential influences of a “ceiling effect” in the high-empathy group.

Additionally, studies meeting any of the following criteria were excluded from the analysis: (a) targeted at children and adolescents (<18 years); (b) targeted at some special populations, such as patients, young adults with a history of childhood maltreatment, parents of

children with illness, offenders, and parolees; (c) employed non-psychosocial-based training methods; (d) completed the posttest in a time range longer than 1 month for different individuals; (e) lacked detailed information regarding the training protocol; (f) had a long time interval (6 months) between successive training sessions (e.g., a 6-month gap between Session 1 and Session 2); and (g) utilized non-self-report questionnaires for affective, cognitive, and motivational empathy. Notably, criterion (g) was not applied to behavioral empathy. Given the observability of certain behaviors, questionnaires scored or reported by others were also considered for behavioral empathy.

Data Extraction and Coding

The extraction and coding of the included studies were performed by the first author and reviewed by the second author for accuracy. Any necessary corrections were verified by the first author, resulting in a full consensus. Both descriptive and quantitative information were retrieved from all included studies. Descriptive information included sample information, training details, participant occupations, and empathy measurements. Quantitative information included sample size, mean and standard deviation in pretests and posttests, as well as timing information of posttests, total training time, and total training duration. Notably, training approaches were determined based on training details (Table 1), and dimensions of empathy (i.e., cognitive, affective, motivational, behavioral, and composite empathy) were derived from empathy measurements according to the following rules (Table 2 and Supplemental Table S1):

- Regarding the Jefferson Scale of Empathy (JSE; Hojat et al., 2001), the PT subscale was utilized to measure cognitive empathy, and the Compassionate Care (CC) subscale was used to quantify motivational empathy. It is worth noting that within the JSE, empathy was primarily defined as a cognitive attribute because cognitive empathy in patient care is always beneficial, contrasting with the potentially detrimental effects of affective empathy

(Hojat & Gonnella, 2017). Although some researchers suggested that CC subscale represented affective empathy (Blanco et al., 2018; Serrada-Tejeda et al., 2021), CC subscale was interpreted as representing motivational empathy in this study. This interpretation aligns with the perspective of the questionnaire's developers, who suggested that the CC subscale integrates elements of both empathy and sympathy (Hojat & LaNoue, 2014).

- Regarding the Interpersonal Reactivity Index (IRI; Davis, 1980), the Personal Distress (PD) subscale, PT subscale, and EC subscale were used to quantify affective, cognitive, and motivational empathy, respectively.
- Regarding the Toronto Empathy Questionnaire (Spreng et al., 2009), empathy is primarily defined as an emotional process. Therefore, its total score was used to quantify affective empathy.
- Scores derived from measurements assessing multiple dimensions of empathy (e.g., total score of JSE, IRI, and Basic Empathy Scale) were coded as "composite empathy."

Additional coding schemes related to sustainability, training schedule, and total training time/duration were applied as follows:

- The time span between the end of the intervention and the posttest was coded into six categories: (a) within 1 week (≤ 1 week), (b) 1 week–1 month (> 1 week and ≤ 1 month), (c) 1–3 months (> 1 month and ≤ 3 months), (d) 3–6 months (> 3 months and ≤ 6 months), (e) 6–12 months (> 6 months and ≤ 12 months), and (f) beyond 1 year (> 1 year).
- The training schedule was coded into two categories: (a) condensed manner (training conducted at once, e.g., three continuous hours or three continuous days) and (b) distributed manner (training conducted over a period of time, e.g., 2 hr per week for 5 weeks).

Table 2

Summary of Main Empathy Measurements and Sample Sizes After Excluding Outlying Effect Sizes for Different Dimensions of Empathy

Dimension	Scale–subscale	Abbreviation	Sample size
Affective empathy	Interpersonal Reactivity Index–Personal Distress	IRI-PD	14
Affective empathy	Toronto Empathy Questionnaire	TEQ	6
Affective empathy	Balanced Emotional Empathy Scale	BEES	3
Cognitive empathy	Jefferson Scale of Empathy–Perspective Taking	JSE-PT	19
Cognitive empathy	Interpersonal Reactivity Index–Perspective Taking	IRI-PT	17
Motivational empathy	Jefferson Scale of Empathy–Compassionate Care	JSE-CC	18
Motivational empathy	Interpersonal Reactivity Index–Empathic Concern	IRI-EC	16
Behavioral empathy	Kogan's Attitudes Toward Old People Scale	KAOP	5
Behavioral empathy	Consultation and Relational Empathy Measure	CARE	2
Behavioral empathy	Conflict Behavior Questionnaire	CBQ	1
Behavioral empathy	Age Discrimination Attitude Scale	ADAS	1
Behavioral empathy	Prosocialness Scale	PS	1
Behavioral empathy	Active Empathic Listening Scale	AELS	1
Composite empathy	Jefferson Scale of Empathy (Total Score)	JSE-Total	71
Composite empathy	Interpersonal Reactivity Index (Total Score)	IRI-Total	5
Composite empathy	Kiersma–Chen Empathy Scale	KCES	4
Composite empathy	Empathic Scale by Dokmen	ESD	3

- When the study did not provide specific information about the duration of training in days and training time in hours, the following conversion schemes were applied: (a) 1 semester = 4 months, (b) 1 month = 30 days, (c) 1 full day = 8 hr, and (d) 1 class hour = 40 min.

Publication Bias, Outlying Effect Sizes, and Sensitivity Analyses

To ensure robust estimation and mitigate potential publication bias, the following actions were taken during the literature research stage. First, all studies identified in previous meta-analyses and systematic reviews were tracked (details in the Literature Search section). Second, the reference lists of included studies were reviewed. Third, non-peer-reviewed studies (e.g., conference papers and books) were considered if they met the inclusion criteria. Nevertheless, no non-peer-reviewed studies met the inclusion criteria, and consequently, none were included in this meta-analysis ultimately.

To identify outlying effect sizes, studentized residuals and Cook's distances were examined. As recommended by [Viechtbauer and Cheung \(2010\)](#), studies with studentized residuals larger than the $100 \times (1 - 0.05/(2 \times k))^{\text{th}}$ percentile of a standard normal distribution were considered potential outliers (i.e., using Bonferroni correction with two-sided $\alpha = .05$ for k studies included in the meta-analysis). Effect sizes with Cook's distances larger than the median plus six times the interquartile range of Cook's distances were considered overly influential. Studies with outlying effect sizes (i.e., outliers or overly influential cases) were carefully reviewed again, and studies were excluded from subsequent analyses if they (a) lacked generalizability (e.g., selective inclusion of highly motivated participants), (b) employed distinct empathy measurements, and (c) provided questionable data (e.g., conflicting statistical results). If none of the above issues were found in the study, sensitivity analysis using the "leave-one-out" method ([Viechtbauer & Cheung, 2010](#)) was conducted. The effect size would be included in further analyses if the "leave-one-out" analysis yielded a difference within 0.1; otherwise, it would be excluded. Furthermore, studies were deemed as potential outliers if the participants were experiencing unique circumstances (such as men anticipating first-time fatherhood) or if conflicting results were presented within the same study.

After excluding outlying effect sizes, possible publication bias was evaluated by a contour-enhanced funnel plot. Begg's rank correlation test ([Begg & Mazumdar, 1994](#)) and Egger's regression test ([Rothstein et al., 2005](#)), using the standard error of the observed outcomes as a predictor, were performed to assess funnel plot asymmetry. Duval and Tweedie's trim-and-fill correction ([Duval & Tweedie, 2000a, 2000b](#)) was also conducted to validate the results.

The methodological quality of each included study was assessed using the Medical Education Research Study Quality Instrument, which contains 10 items to assess the study design, sampling, type of data, validity of evaluation instrument, data analysis, and level of outcomes ([Reed et al., 2007](#)). The Medical Education Research Study Quality Instrument scores range from 5 to 18, and any study scoring below 50% would be excluded from further analyses ([Levett-Jones et al., 2019](#)).

Statistical Analyses

The effect size of empathy training was assessed using Hedges' g (i.e., the bias-corrected standardized mean difference) and 95% confidence interval (CI) calculated by comparing the sample size, mean value, and standard deviation between the posttest and pretest in the intervention group. A positive g was set to indicate that the training increased empathy (e.g., reductions of conflict behavior are a positive result). Interpretations of mean effect sizes were categorized as small ($g = 0.20$), medium ($g = 0.50$), and large ($g = 0.80$), according to previously established criteria ([Cohen, 1988, 1992](#)).

To account for variations in effects across studies, random-effects models were adopted to estimate the mean effect size (M_g) of trainings. Unlike the fixed-effect model, which assumes a common effect size for all studies in the analysis, the random-effects model acknowledges a distribution of true effect sizes for individual studies ([Borenstein et al., 2010](#)). The heterogeneity among the studies was assessed using Cochran's Q ([Cochran, 1954](#)), I^2 ([Higgins & Thompson, 2002](#)), and τ^2 , obtained through the restricted maximum-likelihood estimator ([Viechtbauer, 2005](#)). I^2 values of 25%, 50%, and 75% suggest low, moderate, and high heterogeneity, respectively ([Higgins et al., 2003](#)). Tests and CIs were computed using the Knapp and Hartung method ([Knapp & Hartung, 2003](#)). To ensure the reliability of the results, subgroup and subset analyses were conducted only when there were at least four effect sizes ([Bakermans-Kranenburg et al., 2003](#); [Emslander & Scherer, 2022](#)).

First, the sustainability of effects of training was assessed by subgroup analyses to calculate the effect size at different postintervention timeframes (i.e., within 1 week, 1 week–1 month, 1–3 months, 3–6 months, 6–12 months, and beyond 1 year) for each dimension of empathy (i.e., cognitive, affective, motivational, behavioral, and composite empathy). Additionally, we treated the timeframe as a moderator in metaregression analyses to explore whether the time between the training and the measurement of empathy moderates the effects of training. To validate the results, effect sizes were also calculated in subgroup analyses using (a) data subset with the most widely used empathy measurements only, (b) data after trim-and-fill correction, and (c) data generated by comparing posttests between the intervention and control group. Second, subset and moderator analyses were performed on subsets with different training approaches (i.e., Subject-Oriented, Object-Oriented, and Socially Oriented) for different dimensions of empathy at different postintervention timeframes. Third, the moderation effects of total training time and total training duration were evaluated using metaregression analyses, which were conducted in subsets encompassing every dimension of empathy at different postintervention timeframes and "within 1 week" of employing different training approaches. For the metaregression, β is the coefficient assigned to the predictor and SE is the standard error. R^2 , used to test the fit of the metaregression model, quantifies the percentage of the heterogeneity variance of the model in relation to the total heterogeneity ([Paulus & Meinken, 2022](#)). Last, subset analyses were performed on studies with condensed and distributed training schedules separately.

Please note that the studies were categorized into three distinct training approaches based on their primary aspects of the training strategy. A more detailed categorization was applied considering that some studies used a combination of these training approaches. Specifically, subset analyses were performed on seven categories of

training approaches (i.e., Subject-Oriented, Object-Oriented, Socially Oriented, Subject-Oriented + Object-Oriented, Subject-Oriented + Socially Oriented, Object-Oriented + Socially Oriented, and Subject-Oriented + Object-Oriented + Socially Oriented). It is important to note that the assessment of the effects of combined training approaches was solely performed on “composite empathy” due to limited sample sizes in certain dimensions of empathy (i.e., affective, cognitive, motivational, and behavioral empathy; Supplemental Table S2).

Data analysis was carried out using R, Version 4.2.0 (R Core Team, 2020), and the *metafor* package, Version 3.4.0 (Viechtbauer, 2010) in the present study.

Transparency and Openness

We adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 (Page et al., 2021) and meta-analysis

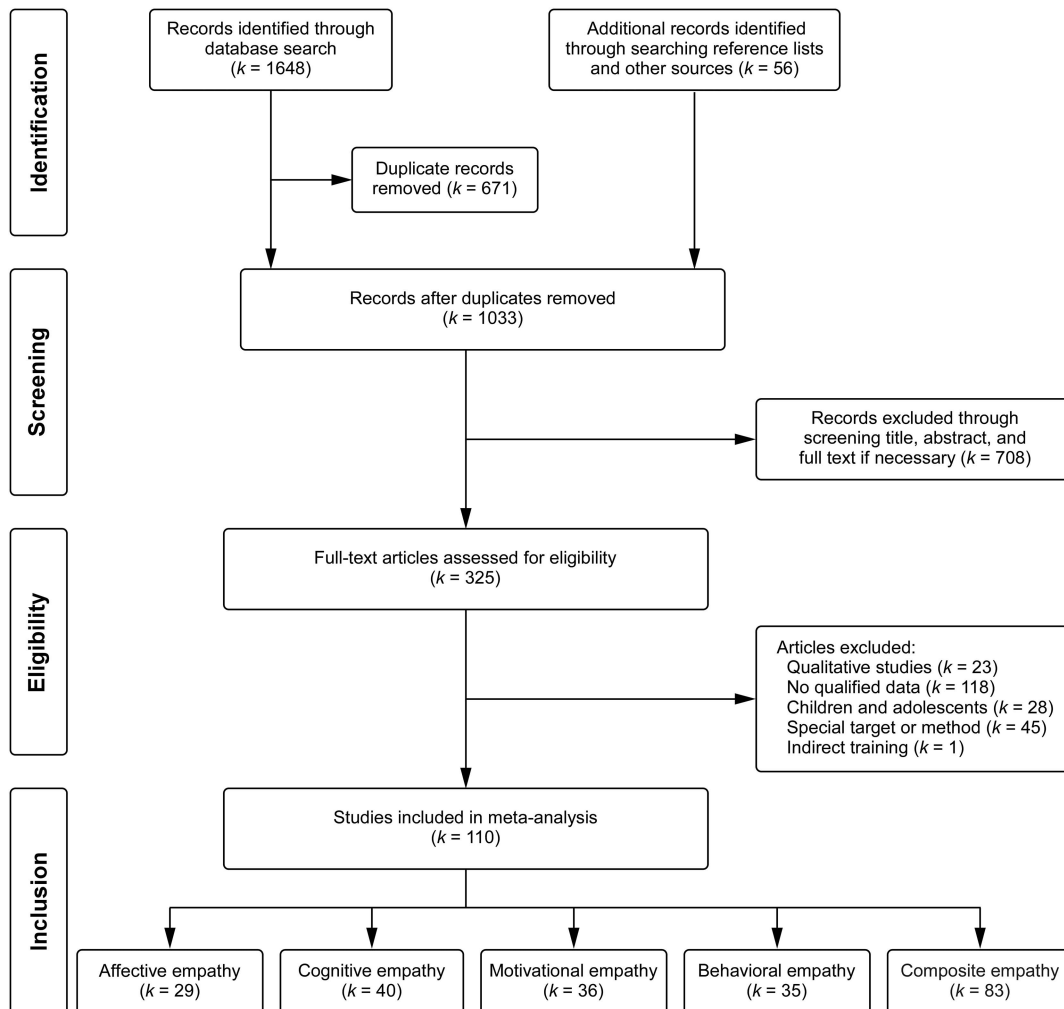
reporting standards (Appelbaum et al., 2018) guidelines for meta-analytic reporting. This systematic review with meta-analysis was registered at an international database of prospectively registered systematic reviews (<http://www.crd.york.ac.uk/PROSPERO>, registration number: CRD42023416521). Please note that we conducted an additional search on APA PsycInfo, which was not stated in the preregistration. All meta-analytic data, analysis code, and research materials (including detailed coding scheme) are available at <https://osf.io/84rup> (Wu, 2024).

Results

Description of the Included Studies

In total, 110 studies that met the inclusion criteria were included in this meta-analysis (Figure 3 and Supplemental Table S3). These studies, conducted from 1990 to 2023, were primarily based in

Figure 3
Flowchart of Article Selection



Note. Based on the four-phase Preferred Reporting Items for Systematic Reviews and Meta-Analyses, a total of 110 studies were included in the meta-analyses, in which 29, 40, 36, 35, and 83 studies were finally considered for the promotion of affective, cognitive, motivational, behavioral, and composite empathy, respectively (k = the number of studies).

Asia (36.4%), North America (31.8%), and Europe (26.4%). In contrast, only a few studies were carried out in Africa, South America, and Oceania (see [Supplemental Figure S1](#) for details). Among these, 29 (32 samples, 1,583 participants), 40 (44 samples, 2,670 participants), 36 (39 samples, 2,310 participants), 35 (39 samples, 1,971 participants), and 83 (91 samples, 6,720 participants) studies measured affective, cognitive, motivational, behavioral, and composite empathy, respectively. All included studies utilized self-report questionnaires to evaluate empathy, except for behavioral empathy. The age of participants in the included studies was 18–60 years old. After excluding outlying effect sizes (detailed in the Possible Outliers and Outlying Effect Sizes section), 28, 40, 34, 37, and 89 samples were retained for further analyses for affective, cognitive, motivational, behavioral, and composite empathy, respectively. Affective empathy was mainly measured using the IRI-PD scale (14 out of 28 samples), cognitive empathy was primarily assessed using the JSE-PT (19 out of 40 samples) and IRI-PT scales (17 out of 40 samples), motivational empathy was mainly measured using the JSE-CC (18 out of 34 samples) and IRI-EC scales (16 out of 34 samples), and composite empathy was dominantly quantified using the JSE-Total scale (71 out of 89 samples). In contrast, there was no single questionnaire that dominated for measuring behavioral empathy. Details of empathy measurements and sample sizes were provided in [Table 2](#) and [Supplemental Table S1](#).

The sample sizes in each subset (i.e., different dimensions of empathy, different postintervention timeframes, and different training approaches) are provided in [Supplemental Tables S4 and S5](#). In accordance with the rule that effect sizes were calculated only when the sample size equaled or exceeded four, the effects of training were assessed as follows: “within 1 week” and “1–3 months” for all dimensions of empathy; “1 week–1 month” for cognitive, motivational, behavioral, and composite empathy; “3–6 months” for behavioral and composite empathy; and “beyond 1 year” for composite empathy only. Furthermore, the effects of training for different training approaches were assessed as follows: “within 1 week” for all dimensions of empathy; “1 week–1 month,” “1–3 months,” “3–6 months,” and “beyond 1 year” for Socially Oriented approaches on composite empathy; and “1–3 months” for Socially Oriented approaches on cognitive, motivational, and behavioral empathy. In addition, there were 10, 16, 16, 14, and 35 effect sizes calculated by comparing posttests in the intervention group and control group for affective, cognitive, motivational, behavioral, and composite empathy “within 1 week,” respectively.

Possible Outliers and Outlying Effect Sizes

During the evaluation of effects of training, certain effect sizes were identified as outliers based on studentized residuals or Cook’s distances. After manual confirmation, the following studies were excluded from further analysis: [Erera \(1997\)](#), [Fenn et al. \(2022\)](#), [Kakaşçı et al. \(2022\)](#), [Kuang et al. \(2019\)](#), [Ramezani et al. \(2020\)](#), [Rodríguez-Nogueira et al. \(2020\)](#), and [Romosiou et al. \(2019\)](#). In addition, partial results from [Brady et al. \(2023\)](#), [Gholamzadeh et al. \(2018\)](#), [Haley et al. \(2017\)](#), and [Shao et al. \(2018\)](#) were excluded. Explanations regarding these exclusions were provided in the [Supplemental Materials](#) (Identification of Possible Outlying Effect Sizes).

The assessment of the methodological quality showed an overall moderate quality for the included studies, with a mean Medical

Education Research Study Quality Instrument score of 11.95 (66.39% on a scale of 100, see details in [Supplemental Table S3](#)). No study was rated below 50%, so none were excluded due to methodological quality. Detailed results of the methodological quality are provided in the [Supplemental Materials](#) (Methodological Quality Components).

Publication Bias

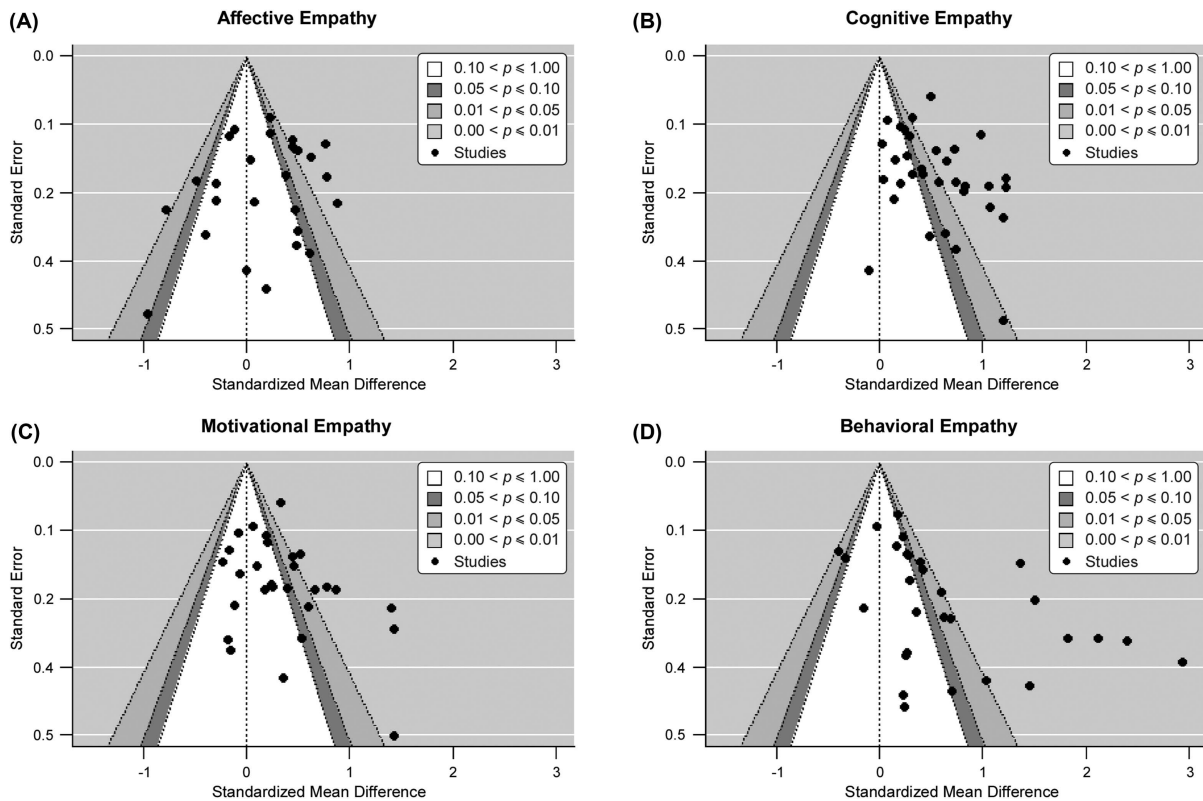
As depicted in [Figure 4](#) and [Supplemental Figure S2](#), publication bias was assessed using contour-enhanced funnel plots. Begg’s test and Egger’s test indicated no significant asymmetry in the plots for most cases ([Table 3](#)). To address potential publication bias, a trim-and-fill correction was performed. The analysis indicated one to four missing studies for some subsets (i.e., four missing studies for cognitive empathy “within 1 week,” one missing study for behavioral empathy “1 week–1 month,” two missing studies for motivational empathy “1–3 months,” three missing studies for composite empathy “1–3 months,” one missing study for behavioral empathy “3–6 months,” and four missing studies for composite empathy “3–6 months”). No substantial differences in effect sizes were observed after trim-and-fill correction. Additionally, high heterogeneity was observed among studies measuring empathy “within 1 week” postintervention (affective empathy: $I^2 = 76.62\%$, $Q = 93.44$ with $p < .001$, $\tau^2 = 0.14$; cognitive empathy: $I^2 = 72.95\%$, $Q = 105.09$ with $p < .001$, $\tau^2 = 0.09$; motivational empathy: $I^2 = 77.86\%$, $Q = 94.72$ with $p < .001$, $\tau^2 = 0.12$; behavioral empathy: $I^2 = 92.87\%$, $Q = 261.03$ with $p < .001$, $\tau^2 = 0.57$; composite empathy: $I^2 = 85.93\%$, $Q = 456.41$ with $p < .001$, $\tau^2 = 0.18$), indicating the need for subsequent subset and moderator analyses.

Effects of Training and Their Sustainability

A positive effect of training on affective empathy was observed in studies testing the effect of intervention “within 1 week” ($M_g = 0.188$, 95% CI [0.004, 0.372], $p = .046$, $k = 26$; [Table 3](#) and [Figure 5](#)), but a negative effect was observed “1–3 months” after training ($M_g = -0.35$, 95% CI [−0.58, −0.11], $p = .015$, $k = 5$). Interventions targeting cognitive empathy were effective, showing significant improvements for up to 3 months: A medium effect size was observed “within 1 week” ($M_g = 0.52$, 95% CI [0.39, 0.65], $p < .001$, $k = 33$), and a small effect size was maintained “1–3 months” ($M_g = 0.20$, 95% CI [0.04, 0.36], $p = .020$, $k = 9$). Trainings demonstrated a small effect on motivational empathy “within 1 week,” which remained for up to 3 months (“within 1 week”: $M_g = 0.34$, 95% CI [0.17, 0.50], $p < .001$, $k = 28$; “1 week–1 month”: $M_g = 0.42$, 95% CI [0.14, 0.69], $p = .010$, $k = 7$; “1–3 months”: $M_g = 0.135$, 95% CI [0.001, 0.268], $p = .049$, $k = 8$). Effects of training on behavioral empathy were evident “within 1 week” with a medium effect size but were not robust after 1 week (“within 1 week”: $M_g = 0.66$, 95% CI [0.35, 0.97], $p < .001$, $k = 29$; “1 week–1 month”: $M_g = 0.66$, 95% CI [−0.42, 1.74], $p = .149$, $k = 4$; “1–3 months”: $M_g = 0.28$, 95% CI [−0.37, 0.94], $p = .333$, $k = 7$; “3–6 months”: $M_g = 0.59$, 95% CI [−0.50, 1.68], $p = .182$, $k = 4$). The effect sizes largely varied among studies, and more tests are needed to reach a definitive conclusion. Regarding the promotion of composite empathy, which measures multiple dimensions of empathy, interventions had a medium effect size

Figure 4

Contour-Enhanced Funnel Plots of the Effects of Training “Within 1 Week” on Affective (A), Cognitive (B), Motivational (C), and Behavioral (D) Empathy



Note. Positive effect sizes indicate that the training increases empathy in the intervention group.

“within 1 week” ($M_g = 0.57$, 95% CI [0.46, 0.68], $p < .001$, $k = 76$), and the effects remained for up to 6 months (“1 week–1 month”: $M_g = 0.42$, 95% CI [0.18, 0.67], $p = .003$, $k = 14$; “1–3 months”: $M_g = 0.39$, 95% CI [0.30, 0.49], $p < .001$, $k = 16$; “3–6 months”: $M_g = 0.31$, 95% CI [0.13, 0.48], $p = .004$, $k = 9$).

Importantly, these results were fully validated through the following strategies: (a) only including data subsets with the most widely used measurements for affective (IRI-PD), cognitive (JSE-PT), motivational (JSE-CC), behavioral (KAOP), and composite empathy (JSE-Total; Supplemental Table S6); (b) conducting a trim-and-fill correction to address potential publication bias (Supplemental Table S7); and (c) using data generated by comparing posttests between the intervention group and control group (Supplemental Table S8). As detailed in Table 3 and Supplemental Tables S6–S8, no significant differences were observed among almost all results obtained from the four statistical strategies. A notable exception is that for affective empathy “within 1 week,” no significant effect of training was observed in studies using IRI-PD ($M_g = -0.08$, 95% CI [-0.39, 0.22], $p = .558$, $k = 13$), whereas a significant small effect size was observed in studies without using IRI-PD ($M_g = 0.43$, 95% CI [0.30, 0.55], $p < .001$, $k = 13$). Metaregression analysis demonstrated a significant difference between studies using and not using IRI-PD, $t(24) = -3.50$, $p = .002$.

To test whether the time between the training and the measurement of empathy moderated the effects, we also treated

the time span as a moderator in metaregression analyses. The results confirmed that the effects of training on affective, cognitive, and composite empathy significantly decreased over time (affective: $k = 33$, $\beta = -0.17$, $p = .040$; cognitive: $k = 53$, $\beta = -0.11$, $p = .008$; composite: $k = 121$, $\beta = -0.08$, $p = .005$), as well as a nonsignificant but decreasing trend for motivational and behavioral empathy (motivational: $k = 47$, $\beta = -0.07$, $p = .110$; behavioral: $k = 45$, $\beta = -0.11$, $p = .258$).

Effects of Training by Different Approaches

For training approaches targeting different dimensions of empathy at different postintervention timeframes, sample sizes were summarized in Supplemental Table S5, and the effects of training were summarized in Table 4 and Figure 5. Moreover, forest plots describing their effects of training “within 1 week” were depicted in Supplemental Figures S3–S7. For affective empathy, Socially Oriented approaches produced a small effect size ($M_g = 0.34$, 95% CI [0.14, 0.53], $p = .002$, $k = 15$), whereas Object-Oriented approaches and Subject-Oriented approaches showed no significant training effect (Object-Oriented: $M_g = -0.09$, 95% CI [-0.78, 0.60], $p = .752$, $k = 6$; Subject-Oriented: $M_g = -0.13$, 95% CI [-0.43, 0.17], $p = .296$, $k = 5$). For cognitive empathy, all three approaches were found to be effective. Specifically, Subject-Oriented approaches yielded a nearly small effect size

Table 3
Effects of Training at Different Postintervention Timeframes on Different Dimensions of Empathy

Dimension	Within 1 week	1 week–1 month	1–3 months	3–6 months	Beyond 1 year
Affective empathy	$k = 26$ $M_g = 0.188$ [0.004, 0.372] $I^2 = 76.62\%$, $\tau^2 = 0.14$ Begg's $p = .512$ Egger's $p = .260$	$k = 0$	$k = 5$ $M_g = -0.35$ [-0.58, -0.11] $I^2 = 0.00\%$, $\tau^2 < 0.001$ Begg's $p = 1.000$ Egger's $p = .745$	$k = 2$	$k = 0$
Cognitive empathy	$k = 33$ $M_g = 0.52$ [0.39, 0.65] $I^2 = 72.95\%$, $\tau^2 = 0.09$ Begg's $p = .028$ Egger's $p = .053$	$k = 7$ $M_g = 0.40$ [-0.14, 0.94] $I^2 = 86.46\%$, $\tau^2 = 0.29$ Begg's $p = .239$ Egger's $p = .250$	$k = 9$ $M_g = 0.20$ [0.04, 0.36] $I^2 = 48.65\%$, $\tau^2 = 0.02$ Begg's $p = .612$ Egger's $p = .921$	$k = 2$	$k = 2$
Motivational empathy	$k = 28$ $M_g = 0.34$ [0.17, 0.50] $I^2 = 77.86\%$, $\tau^2 = 0.12$ Begg's $p = .030$ Egger's $p = .046$	$k = 7$ $M_g = 0.42$ [0.14, 0.69] $I^2 = 50.95\%$, $\tau^2 = 0.05$ Begg's $p = .069$ Egger's $p = .241$	$k = 8$ $M_g = 0.135$ [0.001, 0.268] $I^2 = 21.65\%$, $\tau^2 = 0.01$ Begg's $p = .399$ Egger's $p = .631$	$k = 2$	$k = 2$
Behavioral empathy	$k = 29$ $M_g = 0.66$ [0.35, 0.97] $I^2 = 92.87\%$, $\tau^2 = 0.57$ Begg's $p = .002$ Egger's $p = .014$	$k = 4$ $M_g = 0.66$ [-0.42, 1.74] $I^2 = 90.83\%$, $\tau^2 = 0.40$ Begg's $p = 1.000$ Egger's $p = .514$	$k = 7$ $M_g = 0.28$ [-0.37, 0.94] $I^2 = 92.02\%$, $\tau^2 = 0.45$ Begg's $p = .030$ Egger's $p = .415$	$k = 4$ $M_g = 0.59$ [-0.50, 1.68] $I^2 = 90.83\%$, $\tau^2 = 0.42$ Begg's $p = .750$ Egger's $p = .423$	$k = 1$
Composite empathy	$k = 76$ $M_g = 0.57$ [0.46, 0.68] $I^2 = 85.93\%$, $\tau^2 = 0.18$ Begg's $p = .001$ Egger's $p = .035$	$k = 14$ $M_g = 0.42$ [0.18, 0.67] $I^2 = 68.77\%$, $\tau^2 = 0.12$ Begg's $p = .079$ Egger's $p = .376$	$k = 16$ $M_g = 0.39$ [0.30, 0.49] $I^2 = 0.01\%$, $\tau^2 < 0.001$ Begg's $p = .757$ Egger's $p = .644$	$k = 9$ $M_g = 0.31$ [0.13, 0.48] $I^2 = 26.52\%$, $\tau^2 = 0.01$ Begg's $p = .045$ Egger's $p = .056$	$k = 5$ $M_g = 0.11$ [-0.17, 0.39] $I^2 = 51.09\%$, $\tau^2 = 0.03$ Begg's $p = 1.000$ Egger's $p = .520$

Note. Mean effect size (M_g) and 95% CI [lower limit, upper limit] are reported. Positive effect sizes indicate that the training increases empathy in the intervention group. No statistics are reported when $k < 4$. CI = confidence interval.

Figure 5

The Effects of Training and Their Sustainability of Different Training Approaches on Affective Empathy (A), Cognitive Empathy (B), Motivational Empathy (C), Behavioral Empathy (D), and Composite Empathy (E)



Note. The top timeline indicates the postintervention timeframes. The mean effect size is used to demonstrate the effects of training. A significantly large effect size is color-coded as purple, a significantly medium effect size is color-coded as green, a significant effect size less than medium is color-coded as olive, a nonsignificant effect is color-coded as cyan, and a significantly negative effect size is color-coded as rose. The pale gray box indicates missing data due to insufficient samples available. Positive effect sizes indicate that the training increases empathy in the intervention group. See the online article for the color version of this figure.

($M_g = 0.18$, 95% CI [0.00, 0.36], $p = .046$, $k = 7$). Object-Oriented approaches and Socially Oriented approaches resulted in a medium effect size (Object-Oriented: $M_g = 0.61$, 95% CI [0.23, 0.99], $p = .007$, $k = 8$; Socially Oriented: $M_g = 0.59$, 95% CI [0.43, 0.75], $p < .001$, $k = 18$). Pairwise moderator analyses demonstrated that Socially Oriented approaches yielded a significantly better effect

than Subject-Oriented approaches, $t(23) = 2.74$, $p = .012$; Object-Oriented approaches yielded a marginally significant better effect than Subject-Oriented approaches, $t(13) = 2.02$, $p = .065$; but no significant difference was observed between Socially Oriented and Object-Oriented approaches, $t(24) = 0.04$, $p = .967$. Regarding motivational empathy, only Socially Oriented approaches were

Table 4

Effects of Training “Within 1 Week” on Different Dimensions of Empathy for Different Approaches

Dimension	Subject-Oriented	Object-Oriented	Socially Oriented
Affective empathy	$k = 5$, $M_g = -0.13$ [-0.43, 0.17] $I^2 = 0.00\%$, $\tau^2 < 0.001$ Begg's $p = .817$, Egger's $p = .470$	$k = 6$, $M_g = -0.09$ [-0.78, 0.60] $I^2 = 89.82\%$, $\tau^2 = 0.36$ Begg's $p = .272$, Egger's $p = .078$	$k = 15$, $M_g = 0.34$ [0.14, 0.53] $I^2 = 68.16\%$, $\tau^2 = 0.08$ Begg's $p = .328$, Egger's $p = .207$
Cognitive empathy	$k = 7$, $M_g = 0.181$ [0.004, 0.359] $I^2 = 0.00\%$, $\tau^2 < 0.001$ Begg's $p = .773$, Egger's $p = .604$	$k = 8$, $M_g = 0.61$ [0.23, 0.99] $I^2 = 82.68\%$, $\tau^2 = 0.16$ Begg's $p = .548$, Egger's $p = .175$	$k = 18$, $M_g = 0.59$ [0.43, 0.75] $I^2 = 66.47\%$, $\tau^2 = 0.06$ Begg's $p = .004$, Egger's $p = .027$
Motivational empathy	$k = 7$, $M_g = 0.12$ [-0.09, 0.34] $I^2 = 19.80\%$, $\tau^2 = 0.01$ Begg's $p = 1.000$, Egger's $p = .479$	$k = 7$, $M_g = 0.44$ [-0.13, 1.02] $I^2 = 88.90\%$, $\tau^2 = 0.29$ Begg's $p = .136$, Egger's $p = .066$	$k = 14$, $M_g = 0.39$ [0.15, 0.64] $I^2 = 79.17\%$, $\tau^2 = 0.12$ Begg's $p = .127$, Egger's $p = .431$
Behavioral empathy	$k = 5$, $M_g = 0.09$ [-0.46, 0.64] $I^2 = 67.59\%$, $\tau^2 = 0.13$ Begg's $p = .817$, Egger's $p = .311$	$k = 9$, $M_g = 0.63$ [-0.08, 1.34] $I^2 = 95.35\%$, $\tau^2 = 0.74$ Begg's $p = .025$, Egger's $p = .339$	$k = 15$, $M_g = 0.86$ [0.42, 1.30] $I^2 = 91.87\%$, $\tau^2 = 0.56$ Begg's $p = .002$, Egger's $p = .012$
Composite empathy	$k = 8$, $M_g = 0.36$ [0.04, 0.67] $I^2 = 58.22\%$, $\tau^2 = 0.08$ Begg's $p = .905$, Egger's $p = .468$	$k = 12$, $M_g = 0.53$ [0.25, 0.81] $I^2 = 84.91\%$, $\tau^2 = 0.18$ Begg's $p = .947$, Egger's $p = .930$	$k = 56$, $M_g = 0.60$ [0.47, 0.74] $I^2 = 87.58\%$, $\tau^2 = 0.20$ Begg's $p < .001$, Egger's $p = .010$

Note. Mean effect size (M_g) and 95% CI [lower limit, upper limit] are reported. Positive effect sizes indicate that the training increases empathy in the intervention group. CI = confidence interval.

Table 5
Effects of Training “Within 1 Week” on Composite Empathy for Different Approaches and Their Combinations

Training approach	M_g [95% CI]	p	Sample size
Subject-Oriented	0.36 [0.04, 0.67]	.032	8
Object-Oriented	0.57 [0.25, 0.90]	.003	10
Socially Oriented	0.49 [0.33, 0.66]	<.001	20
Subject-Oriented + Object-Oriented			2
Subject-Oriented + Socially Oriented	0.56 [0.30, 0.83]	<.001	14
Object-Oriented + Socially Oriented	0.50 [0.25, 0.75]	.002	8
Subject-Oriented + Object-Oriented + Socially Oriented	0.85 [0.43, 1.28]	<.001	14

Note. Mean effect size (M_g) and 95% CI [lower limit, upper limit] are reported. Positive effect sizes indicate that the training increases empathy in the intervention group. CI = confidence interval.

found to be effective with a small effect size ($M_g = 0.39$, 95% CI [0.15, 0.64], $p = .004$, $k = 14$). For behavioral empathy, once again, only Socially Oriented approaches were found to be effective with a large effect size ($M_g = 0.86$, 95% CI [0.42, 1.30], $p < .001$, $k = 15$). For composite empathy, all approaches were able to produce a small–medium effect size (Subject-Oriented: $M_g = 0.36$, 95% CI [0.04, 0.67], $p = .032$, $k = 8$; Object-Oriented: $M_g = 0.53$, 95% CI [0.25, 0.81], $p = .002$, $k = 12$; Socially Oriented: $M_g = 0.60$, 95% CI [0.47, 0.74], $p < .001$, $k = 56$), and no significant difference was observed among them (all $p > .05$). Notably, no significant differences in the results were observed after conducting the trim-and-fill correction (Supplemental Table S9). Please note that the effect sizes varied largely among studies (i.e., large confidence intervals) for training affective, motivational, and behavioral empathy when using Object-Oriented approaches. Thus, more tests are needed to reach a robust conclusion.

The effects of training “within 1 week” on composite empathy for different approaches and their combinations were summarized in Table 5. Notably, studies incorporating all three approaches (i.e., Subject-Oriented + Object-Oriented + Socially Oriented approaches) yielded the largest effect size ($M_g = 0.85$, 95% CI [0.43, 1.28], $p < .001$, $k = 14$) among all combinations of training approaches.

Relationship Between Effects of Training and Training Time/Durations/Schedules

As summarized in Supplemental Tables S10 and S11, significant positive correlations were observed between the total training time and the effects of training on composite empathy “1 week–1 month” ($p = .003$, $R^2 = 67.50$, $\beta = 0.10$, $SE = 0.03$, $k = 14$) and motivational empathy “1–3 months” ($p = .045$, $R^2 = 100.00$, $\beta = 0.04$, $SE = 0.02$, $k = 8$). Also, a marginally significant positive correlation was observed on cognitive empathy “1 week–1 month” ($p = .083$, $R^2 = 46.30$, $\beta = 0.10$, $SE = 0.05$, $k = 7$). Moreover, a significant positive correlation was observed between the total training time and the effects of training on composite empathy “within 1 week” when using Subject-Oriented approaches ($p = .036$, $R^2 = 100.00$, $\beta = 0.02$, $SE = 0.01$, $k = 8$). Regarding the total training duration, a significant positive correlation was observed with motivational empathy “within 1 week” when using Object-Oriented approaches ($p = .030$, $R^2 = 64.75$, $\beta = 0.01$, $SE = 0.00$, $k = 7$). Regarding the effects of different training schedules, when utilizing Object-Oriented approaches, the condensed training schedule generated

significant effects of training for composite empathy “within 1 week” ($M_g = 0.42$, 95% CI [0.17, 0.67], $k = 8$, $p = .005$), whereas the distributed training schedule did not ($p = .106$; Supplemental Tables S12 and S13).

Discussion

In the present study, we used a novel strategy to categorize training approaches based on how empathy is promoted and conducted a comprehensive meta-analysis of different training approaches to evaluate their effects and sustainability on affective, cognitive, motivational, behavioral, and composite empathy. Results showed that trainings produced weak and unsustainable effects on affective empathy, moderate and unsustainable effects on cognitive empathy, small and sustainable effects on motivational empathy, and moderate and sustainable effects on behavioral empathy. The effects of training on composite empathy were robust but decreased over time. Among the three training approaches, Socially Oriented approaches were the most effective, showing a large effect size on behavioral empathy, medium effect sizes on cognitive and composite empathy, and small effect sizes on affective and motivational empathy. Subject-Oriented and Object-Oriented approaches demonstrated effectiveness in promoting cognitive and composite empathy, with small–medium effect sizes. Crucially, the training strategy incorporating all three approaches yielded the largest effect size in improving composite empathy “within 1 week” among all combinations of approaches. Moreover, we found a significant positive correlation between total training time and the effects of training on cognitive, motivational, and composite empathy. When Object-Oriented approaches were adopted, condensed trainings showed more pronounced improvements on composite empathy compared to distributed trainings. Altogether, our study provided a systematic evaluation of how empathy was effectively promoted, the extent to which it was enhanced, and the duration of the effects. These findings would be of great significance in selecting appropriate training approaches and guiding the development of more optimal training strategies in future basic and clinical studies.

Effects of Training on Different Dimensions of Empathy

Empathy encompasses four distinct yet interconnected dimensions: affective, cognitive, motivational, and behavioral empathy. Affective empathy develops early in life and involves automatically sharing the feelings of others through bottom-up emotion processing (Decety & Meyer, 2008; Heyes, 2018). Cognitive empathy refers to

the ability to recognize and understand others' mental states by adopting their perspectives, and motivational empathy pertains to the motivation to care for others' welfare (Decety, 2015). Cognitive and motivational empathy, developing later than affective empathy, involve controlled top-down information processing regulated by higher cognitive executive functions, such as inhibitory control (Singer, 2006; Yan et al., 2020). These three dimensions of empathy not only differ in their definitions but also engage in distinct brain regions and neural circuits (Banissy et al., 2012; Eres et al., 2015; Fan et al., 2011; Kogler et al., 2020). Consistent with these disparities, our findings demonstrated distinct effects of training on these dimensions of empathy (e.g., stronger effects on cognitive and motivational empathy, but weaker effects on affective empathy). In essence, empathy, especially cognitive and motivational empathy, can be cultivated as a learned ability or skill, leading to more enriched and fulfilling personal interactions (Bianco et al., 2021; Brady et al., 2023). These dimensions of empathy, which rely on controlled processes, are more amenable to improvement through appropriate training approaches. Specifically, cognitive and motivational empathy, involving top-down processing, can be acquired through various training strategies, such as enjoyable social interactions, and once acquired, they can be maintained, akin to other cognitive abilities (e.g., reasoning and problem-solving), over an extended period (e.g., 3 months in our study). In contrast, affective empathy, driven by automatic bottom-up processes, is more resistant to change, making it challenging to train or acquire. Notably, in health care settings, potential risks associated with feeling the same emotions as others should be considered when promoting affective empathy. In practice, the training for affective empathy should emphasize the importance of sharing and understanding emotions without necessarily experiencing them identically (Bas-Sarmiento et al., 2020).

In addition to affective, cognitive, and motivational empathy, behavioral empathy, defined as the interpersonal processes in the expression of empathy, such as helping behaviors and empathetic behaviors, could also be cultivated by some training approaches (Larson & Yao, 2005; Tamayo et al., 2016). In the context of the patient–physician relationship, behavioral empathy includes effective communication and a considerate social style, (e.g., warmth, sensitivity, a positive outlook, and even temper; Larson & Yao, 2005; Tamayo et al., 2016). Whereas affective, cognitive, and motivational empathy are inherent psychological processes in the subject, behavioral empathy is externally observable by others. Because of this difference, our study only included self-report questionnaires for the first three dimensions of empathy but also included other-report and other-rated questionnaires for assessing behavioral empathy. Our results revealed moderate effects of training on behavioral empathy; notwithstanding, these effects showed a nonsignificant but decreasing trend over time. The discrepancy in how training affects empathy over time (i.e., affective and cognitive empathy vs. motivational and behavioral empathy) could be attributed to the distinction between their “self-oriented” and “other-oriented” properties. Empathy dimensions (i.e., resonating with other's emotions, adopting others' perspectives, concerning others, and engaging in empathetic behaviors) would transition from being focused on oneself (“self-oriented”) to being focused on others (“other-oriented”). It seems that the effects of training on “self-oriented” empathy may be less sustained compared to “other-oriented” empathy.

Effects of Training by Different Approaches

Based on the definition of empathy and theories surrounding it, the roles of the subject, the object, and their relationship are crucial in the empathy process. Effective interventions or training approaches should consider these elements and target amenable factors associated with them, which as noted can be achieved by enhancing the subject's empathic abilities, gathering more information about the object, and fostering more positive interpersonal connections. Due to their distinct underlying principles, different training approaches would yield diverse effects on promoting empathy. Indeed, Socially Oriented approaches demonstrated superior performance in promoting all dimensions of empathy, Object-Oriented approaches provided suboptimal effects of training, and Subject-Oriented approaches generated the least pronounced effects. It is well known that empathy plays a crucial role in social functioning and is often referred to as the “social glue” in peer interactions (Baron-Cohen & Wheelwright, 2004). Its development primarily occurs through experiences during social interactions (Heyes, 2018). Bailey et al. (2008) revealed that older adults with fewer social activities exhibit lower cognitive empathy compared to younger adults. Lamm et al. (2018) pointed out that reduced exposure to social interaction is believed to be an important reason contributing to the age-related decline in cognitive empathy. Therefore, it is not surprising that Socially Oriented approaches that strengthen social ties through positive social interactions or improved social skills produced the optimal effects of training. Moreover, Socially Oriented approaches have the benefit of adjusting the subject's emotional state and fostering a deeper understanding of the object, resulting in superior training outcomes. Both Subject-Oriented and Object-Oriented approaches that aim to enhance personal empathic abilities and acquire more information about others, respectively, would also enhance social interaction by, for instance, promoting mutual understanding and avoiding miscommunications (Ahmadzadeh et al., 2019; Gholamzadeh et al., 2018; Kipper & Ben-Ely, 1979; Mueller et al., 2018). Therefore, both types of training can promote empathy, but in a relatively indirect way to strengthen social ties compared to Socially Oriented approaches. For this reason, it is not surprising that Subject- and Object-Oriented training approaches, focusing on individual skills and knowledge acquisition rather than directly enhancing social relationships, provided suboptimal effects of training in improving empathy compared to Socially Oriented approaches. Interestingly, we observed that studies incorporating all three approaches (i.e., Subject-Oriented + Object-Oriented + Socially Oriented approaches) yielded the largest effect size among all combinations of training approaches. This observation may suggest that different training approaches, each with its distinct rationale for fostering empathetic capabilities, could complement each other in improving empathy.

Moderators in Effects of Training

Moderator analyses revealed positive correlations between the improvements in cognitive, motivational, and composite empathy and the total training time at “1 week–1 month” or “1–3 months” postintervention. In other words, prolonged training can enhance the effectiveness of interventions in improving empathy over time. Thus, longer training time provides individuals with more opportunities to engage in the training, thereby extending the sustainability of empathy improvement. Therefore, allocating sufficient time for

training is recommended to maximize the effects of training. Interestingly, when employing Object-Oriented training, the condensed training schedule was proved to be more effective in promoting composite empathy compared to the distributed training schedule. In other words, for Object-Oriented training, conducting training in a condensed manner, with focused and intensive sessions, yielded better outcomes in enhancing empathy than training in a distributed manner, with more sessions. For instance, a large effect size could be achieved by very short training time (i.e., 0.5 hr), when employing Object-Oriented approaches (Arrogante et al., 2022; Yu et al., 2021). This result might be attributed to mitigating the potential impact of compassion fatigue that can arise from repeatedly acquiring information about others. Notably, previous studies have reported that persistent exposure to patients' suffering and death could increase the risk of compassion fatigue among health professionals (Erbe, 2022; Shi et al., 2022). Overall, our findings emphasize the importance of considering appropriate time allocation and training schedules when implementing different training approaches to promote empathy.

Additionally, we conducted a qualitative analysis on studies with large effect sizes ($g > 0.80$) and identified additional variables crucial for the training effect (see Qualitative Analysis of the Effects of Training and Supplemental Tables S14). For instance, participants' characteristics (e.g., baseline level of empathy and motivation) play a crucial role in training outcomes. Several studies have indicated challenges in improving empathy among individuals with high levels of empathy (Blagrove et al., 2021; du Vaure et al., 2017; Hojat et al., 2020; Ren et al., 2018; Yang & Yang, 2013). Conversely, some studies demonstrated exceptionally large effect sizes when participants engaged in the training voluntarily with high motivation (Fenn et al., 2022; Ramezani et al., 2020; Romosiou et al., 2019).

Non-Psychosocial-Based Training Approaches

Our study primarily focused on psychosocial-based approaches for empathy promotion. It is worth mentioning that other physical- and pharmacological-based approaches have also been explored in previous studies, albeit less frequently. As detailed in the Supplemental Materials (Non-Psychosocial-Based Training Approaches), these approaches include the administration of oxytocin (Abu-Akel et al., 2014; Barchi-Ferreira & Osório, 2021; De Dreu & Kret, 2016; Hurlemann et al., 2010), transcranial direct current stimulation (Coll et al., 2017; Mai et al., 2016; Stanton et al., 2015; Wang et al., 2014), transcranial magnetic stimulation (Jahangard et al., 2019; Li et al., 2021), and the use of substances, such as 3,4-Methylenedioxymethamphetamine (Hysek et al., 2014). It is worth noting that studies utilizing physical- and pharmacological-based approaches often emphasize temporary changes rather than sustainable effects of empathy promotion. Additionally, different parameter settings in these studies can lead to substantially different results. Nevertheless, these approaches may be valuable for clinical populations who are not suited to participate in psychosocial-based training programs.

Limitations

Though we endeavored to conduct a systematic review and comprehensive meta-analysis, it is essential to acknowledge several

noteworthy limitations. First, despite our efforts to categorize training approaches in different studies as objectively and accurately as possible, there exists a potential for misclassifications, particularly in cases where the intervention details were not thoroughly described. Second, our inclusion criteria were limited to articles written in English and Chinese, introducing the possibility of language bias, as valuable studies in other languages were not considered. Third, the studies examining empathy promotion in the elderly and children were relatively scarce, particularly when excluding studies that evaluated empathy through tasks rather than self-report questionnaires (elderly: $k = 0$, children: $k = 21$). The lack of studies significantly impeded our ability to conduct comprehensive meta-analyses across diverse age groups. Although the present study highlighted the effectiveness of training in adults, there is a need for more diverse and inclusive training programs that cater to individuals from different age groups in the future, as there is strong evidence that empathy differs among children, adults, and the elderly (Chen et al., 2014; Decety & Holvoet, 2021). Fourth, it is important to acknowledge that studies included in the present meta-analyses primarily utilized self-report measures based on well-validated empathy assessment tools. Trait empathy, which represents an individual's general characteristics of empathy, is typically assessed through self-report questionnaires (Cheng et al., 2009; Luo et al., 2018). In contrast, state empathy, reflecting an individual's empathy in a specific context or situation at a given time, is commonly evaluated using tasks (Zhao et al., 2021). Therefore, the results obtained in the present study primarily reflect the effects of training on trait empathy rather than state empathy. Although it is logical to anticipate more pronounced effects of training on the more sensitive state empathy compared to the relatively stable trait empathy, the effects on state empathy and their sustainability across different training approaches should be explored in future studies. Fifth, different from affective, cognitive, and motivational empathy, the measurement of behavioral empathy also utilized non-self-report questionnaires due to the observability of certain behaviors. Moreover, due to the broad scope of behavioral empathy, no single questionnaire has prevailed as the predominant measurement of behavioral empathy. These differences between the measurements of different dimensions of empathy should be acknowledged. Last, the records included in this study predominantly originated from countries in Asia, North America, and Europe. These countries are not typically considered underdeveloped, and consequently, the conclusions drawn from this study may not be applicable to populations in underdeveloped countries.

Future Directions

Although our meta-analysis focused on studies involving healthy participants (particularly within the health-related industry), it is plausible to consider that the findings may have potential applicability to certain clinical populations. Training to cultivate empathy is highly desirable for patients with autistic spectrum disorder and schizophrenia, as cognitive empathy deficits are consistently reported in schizophrenia patients (Vaskinn et al., 2019; Vass et al., 2018), and both cognitive and affective empathy are typically underdeveloped in autistic spectrum disorder patients (Hadjikhani et al., 2014; Pepper et al., 2018). In addition to patients with psychiatric disorders (Salo et al., 2019; Vonmoos et al., 2019), individuals with physical/psychological dysfunctions (Yildiz & Duy, 2013), such as deaf

children (Durrleman et al., 2022), visually impaired adolescents (Yildiz & Duy, 2013), depressed mothers (Salo et al., 2019), and adolescents with high trait anger (Tao et al., 2020), would also benefit from trainings to enhance empathy. Given the notable challenges in social interactions faced by these individuals, it is worth considering the potential advantages of Socially Oriented approaches in empathy promotion, especially considering that the present meta-analyses indicate that these approaches were particularly effective in enhancing empathy. Future research is needed to investigate the effectiveness and feasibility of Socially Oriented approaches in these clinical populations.

A limited number of studies delved into the neural underpinnings of empathy promotion, with only three studies investigating neural changes using functional magnetic resonance imaging before and after training (Kim et al., 2020; Klimecki et al., 2014; Kral et al., 2018). Klimecki et al. (2014) employed a contemplative technique focused on resonating with suffering to examine the neural performance during an empathy task before and after short-term training. The results revealed increased negative affect in response to videos depicting human suffering and brain activations in the anterior insula and anterior cingulate cortex. Kral et al. (2018) investigated the effects of a 2-week training with daily gameplay using a training game. Although they did not observe significant behavioral changes, they found that the training led to increased resting-state functional connectivity in empathy-related brain circuits. Kim et al. (2020) measured neural changes when subjects read text scenarios involving empathy and found that the activation in the left precentral gyrus was significantly increased after two consecutive weeks of diverse training activities. Notably, the scarcity of studies investigating the neural correlates of empathy promotion was apparent. Despite a search in PubMed with “empathy” in the title that yielded 5,486 results (as of April 19, 2023), only three studies measured neural correlates of empathy promotion. This discrepancy suggests a significant research gap that warrants further exploration. Intervention studies, which yield more solid evidence than cross-sectional studies, along with the assessment of both neural and behavioral changes from pre- to posttraining, can offer more comprehensive insights into the underlying neural mechanisms of empathy. A thorough exploration of these neural mechanisms holds the potential to enhance our understanding of theoretical models of empathy.

Conclusions

In conclusion, our study delved into how and how much empathy could be promoted; provided a comprehensive overview of the effects of training and sustainability of different approaches in improving affective, cognitive, motivational, behavioral, and composite empathy; and assessed the impact of some influential factors on the effects. We observed that cognitive and motivational empathy can be effectively trained and maintained for up to 3 months. Whereas the effects on affective empathy were weak and not sustainable, the effects on behavioral empathy were moderate and sustainable. Among the three training approaches, Socially Oriented approaches showed the greatest effectiveness in improving all dimensions of empathy, whereas Subject- and Object-Oriented approaches primarily improved cognitive and composite empathy. In practice, the optimal training approach should be chosen according to the actual situation (e.g., the underlying causes of the

empathy deficit) and be implemented with full consideration on how to appropriately address the lack of empathy. Incorporating real-life scenarios and developing interventions that can be easily implemented in participants’ daily lives (e.g., listening to peaceful music) would be needed in future studies to enhance the effectiveness of training. Altogether, our study offers recommendations for choosing the appropriate training approaches (e.g., Socially Oriented approaches and their combinations with other approaches) and provides theoretical principles (e.g., enhancing social ties through positive social interactions or improved social skills and designing interventions based on the dimensions of empathy they aim to target) to develop more effective training strategies in future basic and clinical studies.

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