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# Autism-Specific Training for First Responders: A Systematic Review of Training Components and Outcomes

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## Abstract

# Purpose

This systematic review identifies features of training development and delivery that support well-designed autism-specific training for FRs (first responders), while highlighting the remaining gaps in the literature.

# Methods

The initial search included seven databases and Google Scholar using search terms synonymous to and including: autism and related diagnoses, training or education, and FR professions. Twelve studies (*N* = 1,214) met inclusion criteria.

# Results

Common themes of training development, delivery, and outcomes were identified throughout articles. Professionals informed training development in 11 studies, FRs in nine, and the autism community in seven. Studies often trained a single discipline, primarily law enforcement. Lecture and video were the most common formats, and five trainings included practice through roleplay, simulation, or virtual reality. Regardless of training design, studies reported statistically significant gains in knowledge, confidence, comfort, and training satisfaction and fit.

# Conclusion

Autism specific training for FR varied widely in development, delivery, and evaluation. Most studies trained a single discipline, and none assessed real-world outcomes. Promising components include incorporating key perspectives as well as opportunities for practical skill development. Future research should prioritize rigorous evaluation of standardized training across disciplines.

## Introduction

Autism spectrum disorder is a rising public health concern, showcased by the increase in diagnoses over the past 20 years, with prevalence now reaching 1 in 31 (Shaw et al., 2025). Differences in social communication, combined with high rates of co-occurring conditions and challenging behaviors, such as meltdowns and elopement, make people with autism more likely to interact with first responders (FRs), including law enforcement officers (LEOs), emergency medical services (EMS) personnel, and firefighters (Lai et al., 2019; Liu et al., 2017; McIlwain & Fournier, 2017). Elopement alone poses significant dangers as nearly half of autistic children attempt to elope (Anderson et al., 2012) with 17% of instances resulting in death and 13% requiring medical attention due to injury or environmental exposure (McIlwain & Fournier, 2017). People with autism are also more likely to experience victimization than their non-autistic peers, further increasing likelihood of FR interaction (Douglas & Sedgewick, 2024; Trundle et al., 2023; Weiss & Fardella, 2018). As a result, LEO contact is common, with approximately half of autistic adults reporting an average of at least four lifetime police encounters and 20% having been stopped and questioned by police by age 21 (Rava et al., 2017; Salerno & Schuller, 2019).

Although research on autism training for FRs has focused largely on law enforcement (Railey et al., 2020; Sreckovic et al., 2023), EMS and fire rescue personnel play an equally critical role in emergencies involving autistic people. People with autism utilize emergency departments four times more than their non-autistic peers, with a growing share of visits involving mental health crises (Liu et al., 2017). Autistic people also experience elevated rates of various physical health conditions such as gastrointestinal distress, neurological issues (e.g., epilepsy) (Ward et al., 2023), and face a higher risk of early death as a result of suicide, seizures, and injuries such as suffocation and drowning (Forsyth et al., 2023; Guan & Li, 2017). In these emergencies, EMS personnel and firefighters often play a critical role on scene, making their preparedness to support autistic people essential.

Characteristics of autism can also increase risk during emergencies. Atypical social behaviors such as limited eye contact, unusual body language, or repetitive behaviors are often misinterpreted as suspicious, indicative of intoxication, or intentionally resistant and can lead to arrest (Rava et al., 2017; Salerno & Schuller, 2019). Sensory features of emergency response, including flashing lights, sirens, and physical contact, can be significant stressors and in turn increase the likelihood of meltdowns, aggression, and emotional dysregulation (Kaundinya & Kaku, 2025; Lewis & Stevens, 2023; Salerno & Schuller, 2019; Yalim & Mohamed, 2023).

Overall, emergency situations often rely on rapid compliance and clear communication, which may be most difficult for autistic people during high-stress situations. Autistic people and their families therefore consistently report dissatisfaction with FRs' limited understanding of autism and a fear of disclosing diagnosis due to stigma (Gibbs & Haas, 2020; Nevill et al., 2026; Parry & Huff, 2022; Salerno & Schuller, 2019). These concerns are rooted in a long history of harm and fatalities as a result of emergency response, particularly involving LEOs (Chatman, 2024; Fry, 2024). These fears can have serious consequences such as reluctance to call 911 which places autistic people at greater risk (Lewis & Stevens, 2023; Nevill et al., 2026).

Given these risks, it is essential that FRs receive effective training on autism, yet many FRs report receiving none. In one survey, 72% of LEOs reported no formal training for interacting with autistic people, although those with prior training reported feeling more prepared for autism-related calls (Gardner et al., 2019). Previous research with non-autistic adults also demonstrates that familiarity with autism shapes perspective and that an understanding of autistic traits and diagnostic disclosure can improve first impressions (Sasson & Morrison, 2019). However, familiarity does not necessarily mean that FRs understand autism or respond more effectively. For example, among EMS personnel, autism training and resources were associated with greater comfort

with autistic people but not greater knowledge (Wachob & Pesci, 2017), and among LEOs, prior autism-specific training was associated with higher confidence but not higher knowledge, and confidence was unrelated to call outcomes such as use of force (Gardner & Campbell, 2020).

Despite this need, little is known about how to successfully develop and evaluate autism training for FRs. Variability in content, format, and delivery may contribute to differences in outcomes, yet these features have not been compared across studies. Several features of training development and delivery warrant consideration such as the perspectives that inform training. There is a growing movement to prioritize the voices of those with lived experience as autistic people, family members, or caregivers in the development of training (Suhrheinrich et al., 2024), yet it is unclear the extent to which this has been accomplished. Including autistic perspectives in training has improved police custody staff's perceived knowledge and behavioral intentions (Holloway et al., 2022), while including the perspectives of those with mental health concerns has reduced stigmatizing attitudes among police officers (Wittmann et al., 2021).

FR perspectives are also important because much of FR training happens through peer-to-peer learning. New police officers complete field training under the guidance of experienced officers (Shoulberg, 2025), and peer feedback is used to improve police practice (Dahl et al., 2023). EMS education similarly relies on preceptors and on shadowing practicing clinicians during field experiences (National Highway Traffic Safety Administration [NHTSA], 2021), and firefighters describe learning largely through hands-on experience and stories shared among colleagues (Russell et al., 2026; Sommer & Njå, 2011). Train-the-trainer programs build on this by preparing EMS, LEO, and rescue personnel to teach colleagues within their own agencies, allowing training to reflect local needs (Hedberg et al., 2024).

Beyond incorporating key perspectives into autism training, it is also important to consider who receives training and how it is delivered. Emergencies often require multidisciplinary response units working in tandem, yet much of the available training focuses on law enforcement; training that brings these disciplines together may better reflect the coordinated nature of emergency response. Multidisciplinary programs have been used to prepare EMS, LEO, and rescue personnel for joint responses (Hedberg et al., 2024), and national EMS education standards note that training alongside other FRs enhances understanding of each discipline's role (NHTSA, 2021). Training format may also shape how FRs engage with and apply what they learn. Many FRs report preferring hands-on training (74% of fire, EMS, and emergency communications personnel, 66% of LEOs) and scenario-based training (46% and 43%, respectively) (Vector Solutions, 2023a, 2023b), though many empirically evaluated autism trainings center on lecture (e.g., Al-Wathinani et al., 2023; Love et al., 2020; McGonigle et al., 2014; Shah et al., 2020). As scenario-based exercises and simulation are standard components of FR training (Dupont et al., 2007; NHTSA, 2021; Reaves, 2016), understanding how it is used to teach autism can identify potential future training program improvements.

Prior reviews have begun to synthesize research on autism training for FRs, but none have examined how these features of development and delivery are reflected across training. Railey et al. (2020) identified two studies evaluating autism training for law enforcement and noted that the role of officers' personal experience with autism had not been examined. A subsequent scoping review identified five studies, most reporting short-term improvements in officers' knowledge, perceived preparedness, and confidence (Sreckovic et al., 2023). Both reviews focused on law enforcement and on whether training improved outcomes. The current review builds on this work in two ways. One, it spans FR disciplines, including LEOs, EMS personnel, firefighters, and more. Two, it examines how training is developed and delivered, including participants' prior experiences with autism, the perspectives that informed training, the disciplines trained, and training format, alongside the outcomes reported.

## Method

# Search Procedure

The reporting of this systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Page et al., 2021). The electronic databases PubMed, CINAHL, APA PsycINFO, Web of Science, ERIC, Psychology and Behavioral Sciences Collection, Academic Search Complete, and Google Scholar were searched in June 2025. Titles and abstracts were searched using key terms combined via Boolean operators. Search terms were developed with an academic librarian and included synonyms of the terms (1) autism and related diagnoses, (2) training or education, and (3) FR professions (see Table A1).

Articles were manually screened and reviewed in Rayyan (Ouzzani et al., 2016), an online platform designed to facilitate large-scale screening for reviews and meta-analyses. Following duplicate removal, four authors (Richardson, Eby, Majji, Dubois) independently conducted a title and abstract screen, achieving 88% inter-rater agreement. Discrepancies were resolved through group consensus, with final decisions made by the senior author. Subsequently, five authors (Richardson, Eby, Majji, Dubois, Pham) independently performed a full-text screen, reaching 92% inter-rater agreement. Disagreements were similarly resolved via group consensus, with final decisions again made by the senior author.

## Inclusion and Exclusion Criteria

Articles were included if the following criteria were met: (1) the study was published in English; (2) the article was published in a peer-reviewed academic journal; (3) the training focused on a population that included people with autism; (4) the study delivered and evaluated a training, intervention, or educational approach; and (5) the intervention was delivered to FRs, defined as personnel in law enforcement, EMS, firefighting or fire and rescue, including trainees and volunteers. Studies evaluating training solely for emergency department staff, inpatient or outpatient medical staff, therapists, or caregivers were excluded; studies that included these alongside FRs were eligible. No restrictions on publication date were imposed.

## Data Extraction

The following data were extracted from included studies: study design, sample size, participant disciplines, participant demographics, participants' prior experiences with autism, training topic(s), training format, duration of training, key perspectives into training development or delivery, outcome measures, and study outcomes. Statistical power and effect size were recorded when reported by study authors.

## Operational Definitions of Key Constructs

To ensure consistency, we operationally defined the key components and intervention outcomes of autism-specific training (see Table 1).

Table 1
*Operational Definitions of Training Components*

| Construct | Definition |
|---|---|
| *Training components* | |
| Prior experiences with autism | Participants' previous exposure to autism: personal relationships, professional experience, or prior autism-related training |
| Inclusion of Key perspectives | Input that informed training development or delivery from (a) those with lived experience: the autism community (autistic people and caregivers) and FRs; or (b) professionals with specialized autism expertise (e.g., researchers, clinicians, educators) |
| Disciplines Trained | The FR discipline(s) represented among training participants (e.g., LEO, fire, EMS personnel) |
| Training format | Instructional methods used (e.g., lecture, video, discussion, roleplay or simulation, VR, online modules) |
| *Intervention outcomes* | |
| Knowledge of autism | Understanding of autism characteristics, behaviors, and appropriate response strategies, assessed objectively or by self-report |
| Confidence interacting with autistic people | Perceived ability to identify autism, communicate effectively, and respond in crisis situations |
| Comfort with autistic people | Sense of ease or preparedness when responding to a call involving an autistic person |
| Training satisfaction & fit | Satisfaction: Evaluation of the overall training experience (e.g., met expectations, would recommend)<br>Fit: Perceived acceptability and appropriateness of the training (e.g., feasibility of strategies, appropriateness of content) |
| *Note.* LEO = law enforcement officer; FR = first responder; EMS = emergency medical services; VR = virtual reality. | |

# Quality Assessment

The certainty of evidence for autism training was assessed by the first author using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework (Balshem et al., 2011). According to GRADE guidelines, randomized controlled trials start as high-quality evidence, while observational studies are initially rated as low quality. These initial ratings are then adjusted based on five factors: risk of bias, imprecision, inconsistency, indirectness, and publication bias. Evidence is ultimately classified into one of four quality levels: very low, low, moderate, or high. Certainty was rated separately for each outcome: knowledge, confidence, comfort, training satisfaction and quality, and skill performance.

## Results

# Study Characteristics

Our initial search yielded 980 records (see Fig. 1). After removing duplicates and conducting title/abstract and full-text reviews, 12 eligible studies were found: Al-Wathinani et al. (2023); Gardner and Campbell (2020); Gardner and Campbell (2025); Hinkle and Lerman (2023); Kenney et al. (2026); Kent and Hughes (2022); Love et al. (2020); McGonigle et al. (2014); Rascon (2022); Shah et al. (2020); Teagardin et al. (2012); and Wolf-Fordham et al. (2014). All but one were conducted in the United States (Al-Wathinani et al., 2023), which was conducted in Saudi Arabia but did not report the training delivery language.

**Figure 1**

# PRISMA Flow Diagram (modified from Page et al., 2021)

# Study Participants

There were a total of 1,214 participants across studies. Demographic characteristics including gender, age, race/ethnicity, and education level are summarized in Table 2. A substantial proportion of demographic data were missing or not reported. Among participants with reported data, most were White (84%) and male (71%).

Table 2
*Demographics of Participants (N = 1,214)*

| Characteristic | *n* | % | Min | Max |
|---|---|---|---|---|
| *Gender* | | | | |
| Female | 257 | 21.2 | | |
| Male | 639 | 52.6 | | |
| Not reported or missing | 318 | 26.2 | | |
| *Age* | | | | |
| Range (years) | -- | -- | 18 | 69 |
| Not reported or missing | 372 | 30.6 | | |
| *Race and ethnicity* | | | | |
| White or Caucasian | 219 | 18.0 | | |
| Hispanic or Latinx | 4 | 0.3 | | |
| American Indian or Alaska Native | 2 | 0.2 | | |
| Asian or Asian American | 2 | 0.2 | | |
| Black or African American | 27 | 2.2 | | |
| Two or more races | 5 | 0.4 | | |
| Other | 1 | 0.1 | | |
| Not reported or missing | 954 | 78.6 | | |
| *Highest Education Level Reached* | | | | |
| High school diploma or GED | 132 | 10.9 | | |
| Apprenticeship or certification | 1 | 0.1 | | |
| Some college or associate degree | 93 | 7.7 | | |
| Bachelor's degree | 141 | 11.6 | | |
| Graduate school | | | | |
| Some graduate school | 7 | 0.6 | | |
| Graduate degree | 28 | 2.3 | | |
| Other | 22 | 1.8 | | |
| Not reported or missing | 790 | 65.1 | | |

## Prior Experiences with Autism

Nine studies described participants' prior experiences with autism (see Table 3). Two of these excluded participants with prior autism experience to avoid confounds in evaluating training effects: Teagardin et al. (2012) excluded those with an autistic family member and Al-Wathinani et al. (2023) required no previous relevant coursework.

Two studies examined whether prior experience with autism moderated outcomes. In Gardner and Campbell (2020), those with prior autism training displayed higher pretest confidence than those without. However, there was no difference in pretest vs. posttest knowledge or confidence gains regardless of reported autism experience. Similarly, McGonigle et al. (2014) found that this background did not affect intervention outcomes. This suggests that prior exposure may build confidence without a corresponding gain in knowledge, and that training benefits FRs regardless of prior experience.

Table 3
*Characteristics of Included Studies*

| Article | *N* | Study Design | Discipline | Prior Experience with Autism |
|---|---|---|---|---|
| Al-Wathinani et al. (2023) | 55 | Pre-experimental: single group (pretest–posttest) | EMS students | Screening: no prior training (inclusion criterion) |
| Gardner & Campbell (2020) | 157 | Pre-experimental: single group (pretest–posttest) | LEO | Personal relationship, Professional experience, Training |
| Gardner & Campbell (2025) | 259 (P = 157; P + VR = 67; P + SIM = 35) | Quasi-experimental: nonrandomized, three groups (P, P + VR, P + SIM) | LEO | Personal relationship, Training |
| Hinkle & Lerman (2023) | 27 (pilot = 3; group = 24) | Pilot: single-subject, nonconcurrent multiple baseline; Group: quasi-experimental, nonrandomized, two groups (pretest–posttest) | LEO | Professional experience, Training |
| Kenney et al. (2026) | 27 | Qualitative (posttest) | LEO, Dispatch, Fire/EMS | Personal relationship, Professional experience |
| Kent & Hughes (2022) | 27 (VR = 9; VR + video = 10; video = 8) | Experimental: randomized, three groups (VR, VR + video, video only) | LEO | Not reported |
| Love et al. (2020) | 224 | Pre-experimental: single group (pretest–posttest) | LEO, Fire/EMS | Not reported |
| McGonigle et al. (2014) | 110 | Pre-experimental: single group (pretest–posttest) | EMS & ED staff | Prior interactions, Training |
| Rascon (2022) | 51 | Pre-experimental: single group, case study (pretest–posttest) | Fire/EMS | Professional experience, Training |
| Shah et al. (2020) | 177 (pretest); 135 (posttest) | Pre-experimental: pretest–posttest | EMS | Professional experience |
| Teagardin et al. (2012) | 82 (training = 42; control = 40) | Experimental: cluster-randomization, waitlist controlled (pretest–posttest) | LEO | Screening: autistic family member (exclusion criterion) |
| Wolf-Fordham et al. (2014) | 18 | Pre-experimental: single group (pretest–posttest) | LEO, Fire/EMS, other | Not reported |

*Note.* P = training presentation; VR = virtual reality; SIM = in-vivo simulation; LEO = law enforcement officer; EMS = emergency medical services; ED = emergency department.

# Components of Autism Training for First Responders

## Inclusion of Key Perspectives

Eleven studies described key perspectives used for training development or delivery (see Table 4). The remaining study, Teagardin et al. (2012), used an existing 13-minute video produced by the Sahara Cares Foundation (2008) that covered what autism is, how to recognize it, and how to respond to autistic people. The authors did not report how the video was developed or whose input informed it. Professionals contributed in all 11 studies, FRs in nine, and members of the autism community in seven. Professional expertise was often contributed by the study authors themselves. Nine studies drew on more than one group, whereas two relied on professionals alone (Al-Wathinani et al., 2023; Gardner & Campbell, 2020).

The way key perspectives were included varied widely across studies, both in extent and in how it was integrated. Two studies gathered input before development, such as through a needs assessment of autistic individuals and families (McGonigle et al., 2014) or consultation with FRs and people with disabilities (Wolf-Fordham et al., 2014). Two revised the training after pilot testing based on feedback from FRs or an autistic consultant (Hinkle & Lerman, 2023; Kenney et al., 2026). Two used key perspectives to shape specific components, such as simulations that included autistic actors (Gardner & Campbell, 2025) or a training video created by a fire chief that featured parents' perspectives (Rascon, 2022). Studies with and without input from those with lived experience as a FR or member of the autism community reported similar patterns of improvement (see Table 4).

## Disciplines Trained

LEOs were the most represented discipline (*n* = 8), followed by EMS personnel (*n* = 7), firefighters (*n* = 4), and emergency communications (*n* = 1) (see Table 3). Eight studies focused on a single discipline: five on LEOs and three on EMS. Four included participants from more than one discipline (Kenney et al., 2026; Love et al., 2020; Rascon, 2022; Wolf-Fordham et al., 2014). Outcomes did not appear to differ by discipline, with studies reporting similar improvements (see Table 4).

## Training Format

Lecture was the most commonly utilized format (*n* = 9), followed by video (*n* = 8), group discussion (*n* = 4), roleplay or simulation (*n* = 4), VR (*n* = 2), and one training was delivered as an online, asynchronous course (Wolf-Fordham et al., 2014) (see Table 4). Eight trainings combined two or more formats and the remaining four used a single format. Three studies compared formats directly. Adding VR or in-vivo simulation to a presentation did not improve knowledge or confidence above and beyond the presentation alone when implemented with law enforcement (Gardner & Campbell, 2025). Another study comparing the

effects of VR, video, or both failed to find an advantage of a single format in improving de-escalation responses (Kent & Hughes, 2022). In contrast, lecture plus roleplay produced better observed performance than lecture alone (Hinkle & Lerman, 2023). Across the remaining studies, significant improvements in outcomes were reported regardless of format.

# Training Outcomes

## Knowledge of Autism

Eight studies measured knowledge (see Table 4). Seven found statistically significant gains, and one (Rascon, 2022) found that 98% of participants self-reported learning about autism. Only two studies reported effect sizes, both of which were large (Gardner & Campbell, 2025, $\eta_p^2 = .37$; Wolf-Fordham et al., 2014, $d = 1.40$). In Teagardin et al. (2012), while significant gains in knowledge were reported from pre to post-training, participants only answered about half of the post-training questions correctly, which the authors interpreted as a lack of content mastery.

Knowledge was typically assessed using investigator-developed surveys rather than standardized instruments. Consequently, measures were highly variable, limiting comparability across studies. Love et al. (2020) adapted items from the Autism Stigma and Knowledge Questionnaire (ASK-Q) (Harrison et al., 2017) and added an item for which participants rated their overall perceived autism knowledge using a 5-point scale ranging from very little knowledge about autism to very familiar. Gardner and Campbell (2020, 2025) used a modified version of the Knowledge of Autism (KOA) 16-item true/false measure (Campbell & Barger, 2011). Rascon (2022) asked participants on the pretest to rate their perceived knowledge of autism and, on the posttest, whether their knowledge had increased. Al-Wathinani et al. (2023) assessed a single autism specific question. Teagardin et al. (2012) used 10 short answer questions. McGonigle et al. (2014) developed identical pre and post measures for their study with items answered using a 5-point Likert scale (strongly disagree to strongly agree).

## Confidence

Five studies measured confidence, and all found significant increases after training (see Table 4). In Gardner and Campbell (2020), female officers' confidence increased more than male officers', and in Gardner and Campbell (2025), confidence gains were large ($\eta_p^2 = .45$) and did not differ across training conditions. Rascon (2022) assessed confidence only after training, with 73% of participants agreeing they could successfully interact with an autistic person.

As with knowledge, all confidence measures were investigator-developed and had not been psychometrically validated. Love et al. (2020) used a single item asking participants to rate their confidence working with autistic people on a 5-point Likert scale. Gardner and Campbell (2020) developed a five-item measure of confidence in self-monitoring one's response along with a six-item measure of confidence in responding to calls involving autistic people, which they used again in their 2025 study. Teagardin et al. (2012) used two 5-point Likert items assessing confidence in identifying and interacting with autistic people.

## Training Satisfaction and Fit

Five studies reported training satisfaction and fit, and ratings were consistently favorable (see Table 4). Participants in Love et al. (2020) rated the training as meeting their expectations, helpful, and clearly presented (*M*s = 4.61–4.72 on a 5-point scale). In Wolf-Fordham et al. (2014), 97% of participants rated the course content and activities positively, 94% found the content logical and clear and would recommend the course to a colleague, and all reported that its difficulty and depth were appropriate. Participants in Hinkle and Lerman (2023) rated the lecture and roleplay practice as helpful and the recommended strategies as highly acceptable, and those who received roleplay practice reported larger gains in preparedness. The remaining two studies reported feedback qualitatively. Officers in Kenney et al. (2026) praised the presenters, described the training as time well spent, and viewed the content as realistic and feasible. Officers in Kent and Hughes (2022) viewed the training as applicable to their work because it was filmed in their own town and responded more positively to training that included VR.

## Comfort with Autistic People

Four studies assessed how training increased FRs' comfort in interacting with autistic people and all found significant increases (see Table 4). Three measured comfort before and after training using Likert-type items and found significant gains (Love et al., 2020; McGonigle et al., 2014; Shah et al., 2020). In the fourth, participants rated their preparedness as higher after training, although this change was not statistically evaluated (Hinkle & Lerman, 2023).

Table 4

*Training Characteristics and Main Findings*

| Article | Training Topics | Training Format | Duration | Key Perspectives | Study Outcomes |
|---|---|---|---|---|---|
| Al-Wathinani et al. (2023) | Sensory processing and communication differences | Lecture (virtual) | Not reported | Professionals | Significant improvements in knowledge ($M$ = 5.75, $SD$ = 2.08; $Mdn$ = 6; $z$ = − 3.52, $p$ = .001) |
| Gardner & Campbell (2020) | Recognizing autism, Adapting response | Lecture, Elective roleplay | 4 h (optional 4 h SIM) | Professionals | Significant improvements in knowledge ($M$ = 14.16, $SD$ = 1.3; $F(1, 122) = 100.37$, $p < .001$), confidence in responding ($M$ = 18.90, $SD$ = 3.1; $F(1, 122) = 64.15$, $p < .001$), and in self-monitoring ($M$ = 16.35, $SD$ = 2.7; $F(1, 122) = 21.13$, $p < .001$) |
| Gardner & Campbell (2025) | Recognizing autism, De-escalation skills | Lecture, Video, Discussion, VR, In-vivo simulation | 3–4 h | Autism community, Professionals, FRs | Significant improvements in knowledge (posttest $M$: P = 13.67, P + SIM = 13.50, P + VR = 14.23; Time: $F(1, 208) = 123.38$, $p < .001$, $\eta_p^2 = .37$; Time × Condition: $F(2, 208) = 1.74$, $p = .18$, $\eta_p^2 = .02$) and confidence (posttest $M$: P = 18.88, P + SIM = 19.40, P + VR = 19.38; Time: $F(1, 223) = 183.66$, $p < .001$, $\eta_p^2 = .45$; Time × Condition: $F(2, 223) = 1.29$, $p = .28$, $\eta_p^2 = .01$); no differences between conditions |
| Hinkle & Lerman (2023) | Recognizing autism, Increasing compliance, Strategies for interacting with caregivers | Lecture, Video, Roleplay | Pilot (lecture + roleplay): 1 h 40 min − 2 h 38 min; Group: Lecture: Not reported, Roleplay: 30 min | Professionals, FRs | Pilot: post training accuracy 78%–98%; Group: significant improvements for lecture + roleplay ($M$ = 81%, $t(11) = 10.28$, $p < .001$) and lecture only ($M$ = 60%, $t(11) = 6.22$, $p = .001$); lecture + roleplay outperformed lecture only post training ($t(21.67) = 4.01$, $p < .001$); lecture, roleplay, steps rated helpful and acceptable ($M$s = 4.1–5.0); preparedness on 5-point scale increased (lecture only: 2.0 to 3.6; lecture + roleplay: 1.8 to 4.3) |
| Kenney et al. (2026) | Supporting autistic people | Lecture, Video, Roleplay | 4 h | Autism community, Professionals, FRs | Qualitative: Officers reported training was socially important, felt better prepared, more knowledgeable, and viewed strategies as feasible. |
| Kent & Hughes (2022) | Interacting with autistic people, De-escalation skills | VR, Video | Video: 10 min, VR: Not reported | Professionals, FRs | No significant change in de-escalation responses in any condition; lower negative effects in VR (one-way ANOVA, $p = .02$); officers responded more positively to training that included VR |
| Love et al. (2020) | Recognizing autism, Supporting autistic people | Lecture, Discussion, Video | 2 h | Autism community, Professionals, FRs | Significant improvements in knowledge (objective: $M$ = 9.45, $SD$ = 0.72, $t(197) = 6.96$, $p < .001$; self-rated: $M$ = 4.17, $SD$ = 0.66, $t(214) = 18.38$, $p < .001$), confidence ($M$ = 4.21, $SD$ = 0.75, $t(210) = 11.06$, $p = .001$), and comfort ($M$ = 4.24, $SD$ = 0.72, $t(213) = 9.46$, $p < .001$). Training met expectations ($M$ = 4.61, $SD$ = 0.61), was helpful ($M$ = 4.70, $SD$ = 0.60), and was presented clearly ($M$ = 4.72, $SD$ = 0.58) |
| McGonigle et al. (2014) | Recognizing autism, Comorbidities, Providing emergency care | Lecture, Discussion, Video | 1–3 h | Autism community, Professionals, FRs | Significant improvements in knowledge ($M$ = 3.94, $p = .004$) and comfort ($M$ = 3.81, $p = .001$; one-tailed paired $t$ tests) |
| Rascon (2022) | Autism awareness, Interacting with autistic people, Community awareness and safety | Lecture, Discussion, Video | 75 min | Autism community, Professionals, FRs | 98% reported learning about autism (a lot: 55%; a little: 43%); 73% felt able to successfully interact with autistic people (posttest only) |
| Shah et al. (2020) | Sensory processing information, Sensory tool education | Lecture | 30 min | Autism community, Professionals, FRs | Significant improvement in comfort ($Mdn$ = 7.5 to 8.0; Wilcoxon $p = .006$); 27.4% used sensory tools within 3 months |
| Teagardin et al. (2012) | Recognizing autism | Video | 13 min | Not reported | Significant improvements in knowledge (trained vs. waitlist control: $t(80) = 5.83$, $p < .001$; all after training: $t(80) = 11.79$, $p < .001$; posttest accuracy 53% [training group] and 47% [waitlist group]) and in confidence after training (identifying autistic people: $t(80) = 4.28$, $p < .001$; interacting with autistic people: $t(80) = 2.48$, $p = .15$) |

*Note.* VR = virtual reality; FR = first responder; P = training presentation; SIM = in-vivo simulation. Wolf-Fordham et al. (2014) results reflect conservative analysis to account for missing responses. In cases of data discrepancies, the article's table values were used.

| Article | Training Topics | Training Format | Duration | Key Perspectives | Study Outcomes |
|---|---|---|---|---|---|
| Wolf-Fordham et al. (2014) | Emergency planning and response for people with disabilities | Online (asynchronous) | Self-paced: 1–5 h | Autism community, Professionals, FRs | Significant improvements in knowledge ($M$ = 70.22%, $SD$ = 12.36, $p$ < .001, $d$ = 1.40), mapping skill ($M$ = 76.39%, $SD$ = 26.39, $p$ = .001, $d$ = 1.40), and total score ($p$ < .001, $d$ = 2.30); 97% rated content and activities positively, 94% found content logical and clear, 100% found difficulty and depth appropriate |

*Note.* VR = virtual reality; FR = first responder; P = training presentation; SIM = in-vivo simulation. Wolf-Fordham et al. (2014) results reflect conservative analysis to account for missing responses. In cases of data discrepancies, the article's table values were used.

# Quality of Evidence

Quality of evidence across studies was low for knowledge and very low for confidence, comfort, and training satisfaction and fit. Knowledge was the only outcome supported by a randomized controlled comparison (Teagardin et al., 2012), and while findings were consistent across studies, quality was downgraded due to study designs increasing risks of bias, including cohort-level randomization and imprecision due to a single trial. All other outcomes relied primarily on nonrandomized studies without comparison groups and were further downgraded due to risk of bias and imprecision.

## Discussion

To synthesize the current evidence and identify components of autism-specific training for FRs, this review examined consistency in training development and evaluation. While previous reviews have summarized training outcomes (Railey et al., 2020; Sreckovic et al., 2023), the current review contributes a novel focus on training design and delivery, addressing an important gap in the literature. Additionally, this review extends prior work by integrating findings across multiple FR disciplines rather than focusing exclusively on LEOs.

Consistent with prior reviews (Railey et al., 2020; Sreckovic et al., 2023), this review found that the literature on autism-specific training for FRs remains limited in both scope and methodological rigor. Although inclusion criteria were intentionally broad, relatively few studies met eligibility requirements, and LEOs were the most represented group. Only one study (Teagardin et al., 2012) included a comparison group. This imbalance among disciplines and evaluation limits the generalizability of findings and suggests that existing training programs may not adequately address the learning needs of real-world emergency response teams.

Several factors recur across studies and may contribute to effective training: key perspectives, training multiple FR disciplines, and training format. However, no study compared training with and without these components, and studies reported similar improvements regardless of whether they were present. Their potential value therefore rests on indirect evidence from the included studies and on the broader literature, which we discuss below.

# Inclusion of Key Perspectives

Nearly all training drew on professional expertise and most incorporated lived experience from FRs and the autism community, although implementation descriptions were inconsistent and often incomplete.

Two trainings were developed using professional expertise alone (Al-Wathinani et al., 2023; Gardner & Campbell, 2020), whereas nine also incorporated lived experience, all from FRs and seven from autistic people or caregivers (see Table 4). This pattern matters because professional expertise and lived experience offer different kinds of knowledge. Autistic people and their families can identify what goes wrong in encounters with FRs and which responses help or harm. Limited integration of lived autistic experience represents a missed opportunity to enhance training relevance and effectiveness (Suhrheinrich et al., 2024).

Additionally, FRs know the operational realities that determine whether recommended strategies are realistic. For example, FR consultation led Hinkle and Lerman (2023) to remove a strategy that conflicted with officer training. Officers also valued training that reflected their locality (Kent & Hughes, 2022), included realistic scenarios of people with autism (Kenney et al., 2026) and autistic actors in simulations (Gardner & Campbell, 2025). Each of these further expose officers to experiences and perspectives unique to the lived autistic experience. More broadly, involving FRs, autistic people, and caregivers in training development can help identify challenges that might otherwise be overlooked.

# Disciplines Receiving Autism Training

No studies directly compared discipline-specific training with multidisciplinary training, and most delivered training to either law enforcement or fire rescue and EMS personnel. Although four studies crossed discipline lines, it is unclear whether these groups were trained together, and in one study participants trained individually online (Wolf-Fordham et al., 2014). Furthermore, the literature disproportionately focused on LEOs, despite the high rates of emergency medical needs among autistic people (Liu et al., 2017). This limited interdisciplinary focus is inconsistent with the realities of emergency response, where collaboration across agencies is essential. Training models that emphasize collaboration and communication across professions may better prepare FRs to navigate complex situations involving autistic people. Additionally, this approach may help people with autism and their families anticipate more consistent responses, as inconsistent responding, repeated questioning, and disjointed arrival times have been identified as exacerbating distress among autistic people (Nevill et al., 2026).

## Training Format and Opportunities for Practice

Training format varied widely across studies and no single format emerged as superior based on self-reported outcomes, suggesting that effectiveness may depend more on content quality and instructional design. However, Hinkle and Lerman (2023) measured observed performance and found that roleplay produced significantly better results than lecture alone. This suggests the benefits of practice-based formats may be specific to skill performance, which self-report measures are not designed to capture.

Interactive approaches such as roleplay and simulation offer unique benefits by allowing participants to practice skills and receive feedback in a controlled environment before applying them in the field. Rehearsal with feedback is a core component of behavioral skills training (Parsons et al., 2012) and mirror current standards of FR training (CIT International, n.d.; NHTSA, 2021). Yet these approaches were included in only five of the 12 autism trainings, and only one study measured whether practice improved performance (Hinkle & Lerman, 2023).

## Measurement and Methodological Rigor

A major finding of this review is the lack of standardization across studies in training development, delivery, and evaluation. Training programs varied substantially in duration, content, instructional strategies, and outcome measures. Studies were also rarely powered to detect or quantify effects. Samples ranged from 18 to 259 participants, only one study reported a power analysis (Wolf-Fordham et al., 2014), and only two reported effect sizes (Gardner & Campbell, 2025; Wolf-Fordham et al., 2014). Limited demographic reporting and predominantly White, male samples further restrict conclusions about whether training is equally relevant across FRs of different backgrounds.

Follow-up was similarly limited, Shah et al. (2020) was the sole study to assess some outcomes after a meaningful delay (3 months), so the sustainability of training effects remains largely unknown. Moreover, outcome measures were primarily investigator-developed and relied on self-report surveys assessing knowledge, confidence, and comfort. Observed performance was only measured by Hinkle and Lerman (2023), through scored roleplay, and none assessed whether training changed FRs' behavior during actual calls.

Measuring real-world performance, however, poses distinct challenges. The spontaneous and emergent nature of 911 calls creates major challenges in detecting behavior change live. Further, many FR agencies are unable or unwilling to share incident report documentation as a method to detect performance changes, and there are inherent challenges with confirming the validity of information written in these reports. Identifying feasible and valid methods for assessing performance change after training is therefore an important next step for this research.

## Strengths and Limitations

This review had several strengths. The search methodology was comprehensive and reproducible, involving seven databases and Google Scholar, and search terms developed in collaboration with an academic librarian. Inclusion and exclusion criteria were established a priori, and studies were independently screened by multiple authors with high inter-rater agreement. Additionally, by including multiple FR disciplines, this review expands upon previous findings from reviews on this topic (Railey et al., 2020; Sreckovic et al., 2023).

Despite these strengths, several limitations should be acknowledged. First, the definition of FRs and the search terms may have excluded relevant studies as they did not include some roles, such as corrections officers, school resource officers, or dispatcher specific terms. It is possible that programs focused on these audiences may include additional considerations regarding training design and implementation that are worth considering for future applications. Second, the review was limited to peer-reviewed studies published in English. Third, the search was specific to autism-specific trainings meaning studies evaluating broader developmental disability or neurodevelopmental disorder training could have been missed.

## Future Research

Given the limited and methodologically variable evidence base, future research is warranted. There is a need for the development and evaluation of standardized, evidence-based training frameworks that incorporate components identified in this review. These frameworks should be inclusive across FR disciplines while maintaining consistency in key content and instructional strategies. Greater emphasis should be placed on incorporating lived experience from autistic individuals and their families as well as FRs to enhance training relevance and effectiveness. A shared core informed by professionals and those with lived experience would promote consistent need-based responses across agencies, which may reduce distress for autistic people in crisis (Nevill et al., 2026). Additionally, future studies should prioritize rigorous, adequately powered designs with standardized measures to strengthen the certainty of evidence.

Finally, future research should prioritize the inclusion of objective and behavioral outcome measures. Potential approaches may include observational measures, performance-based assessments, or analysis of field data (e.g., incident reports, body cam footage) to examine how training influences real-world interactions. Additionally, studies should examine long-term training effects and the role of continuing education in maintaining skills over time. Differences in training needs across urban and rural settings should also be explored to ensure that programs are adaptable and contextually relevant as resources, staffing, and the types of calls FRs receive may differ across populations and environments (Hedberg et al., 2024; Skubby et al., 2013).

### Conclusion

This systematic review highlights components of successful autism training programs for FRs and the substantial gaps within the current evidence base, including inconsistencies in design, delivery, and evaluation. Several components such as key perspectives, training multiple disciplines, and using formats that align with established FR training practices appear promising in promoting positive training outcomes. However, with the increasing prevalence of autism and the high likelihood of interactions between autistic individuals and FRs, developing and implementing rigorous, evidence-based training is essential. Future research should prioritize the creation and evaluation of standardized frameworks that incorporate professional and lived experience input,

interdisciplinary collaboration, and utilize objective outcome measures. Advancing this area of research is crucial to improving FR preparedness, enhancing the safety and well-being of autistic individuals, and fostering more effective and equitable emergency response systems.

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## Appendix

Table A1
*Databases and Search Terms*

| Database | Search Syntax | Number of Articles Found |
|---|---|---|
| Web of Science | (EMS OR first aid OR prehospital OR paramedic* OR emergency medical technician* OR emergency responder* OR first responder* OR rescue person* OR firefighter* OR fire fighter* OR police* OR crisis intervention*)<br><br>AND (autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilit*)<br><br>AND (train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop*) | 264 |
| PubMed | "first aid"[mesh] OR "emergency treatment"[mesh:noexp] OR "Emergency Responders"[Mesh] OR "Crisis Intervention"[Mesh]) OR (police*[Title/Abstract] OR firefighter[Title/Abstract] OR "fire fighter"[Title/Abstract] OR "emergency medical technician*"[Title/Abstract] OR EMS[Title/Abstract] OR first aid[Title/Abstract] OR prehospital[Title/Abstract] OR paramedic*[Title/Abstract] OR emergency responder*[Title/Abstract] OR first responder*[Title/Abstract] OR rescue person*[Title/Abstract] OR crisis intervention*[Title/Abstract]<br><br>AND "Neurodevelopmental Disorders"[Mesh] OR "child development disorders, pervasive"[Mesh]) OR (autism[Title/Abstract] OR autistic*[Title/Abstract] OR asperger*[Title/Abstract] OR neurodevelopmental disorder*[Title/Abstract] OR development disabilit*[Title/Abstract]<br><br>AND Education[sh] OR Education[mesh] OR "Computer Simulation"[Mesh] OR "Internet-Based Intervention"[Mesh]) OR (train*[Title/Abstract] OR educat*[Title/Abstract] OR lesson*[Title/Abstract] OR learn*[Title/Abstract] OR course*[Title/Abstract] OR teach*[Title/Abstract] OR program*[Title/Abstract] OR lecture*[Title/Abstract] OR simulat*[Title/Abstract] OR workshop*[Title/Abstract] | 245 |
| CINAHL | ( (MH “education+”) OR (MH “computer simulation+”) OR (MH “internet based intervention+”) ) OR XB ( train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop* )<br><br>AND ( (MH “mental disorders diagnosed in childhood+”) OR (MH “child development disorders, pervasive+”) ) OR XB ( autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilit* )<br><br>AND ( MH "Emergency Responder+” ) OR XB ( EMS OR first aid OR prehospital OR paramedic* OR emergency medical technician* OR emergency responder* OR first responder* OR rescue person* OR firefighter* OR fire fighter* OR police* OR crisis intervention* ) | 181 |
| APA PsycINFO | MA ( child development disorders, pervasive OR mental disorders diagnosed in childhood ) OR XB ( autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilit* )<br><br>AND MA ( education OR computer simulation OR internet based intervention ) OR XB ( train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop* )<br><br>AND MA ( Emergency Responder ) OR XB ( police* OR firefighter OR “fire fighter” OR "emergency medical technician*" OR EMS OR first aid OR prehospital OR paramedic* OR emergency responder* OR first responder* OR rescue person* OR crisis intervention* ) | 173 |
| Academic Search Complete | XB (autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilit*)<br><br>AND XB (EMS OR first aid OR prehospital OR paramedic* OR emergency medical technician* OR emergency responder* OR first responder* OR rescue person* OR firefighter* OR fire fighter* OR police* OR crisis intervention*)<br><br>AND XB (train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop*) | 59 |
| ERIC | (train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop*)<br><br>AND (autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilit*)<br><br>AND (EMS OR first aid OR prehospital OR paramedic* OR emergency medical technician* OR emergency responder* OR first responder* OR rescue person* OR firefighter* OR fire fighter* OR police* OR crisis intervention*) | 38 |
| Psychology and Behavioral Sciences Collection | XB (autism OR autistic* OR asperger* OR neurodevelopmental disorder* OR development disabilt*)<br><br>AND XB (EMS OR first aid OR prehospital OR paramedic* OR emergency medical technician* OR emergency responder* OR first responder* OR rescue person* OR firefighter* OR fire fighter* OR police* OR crisis intervention*)<br><br>AND XB (train* OR educat* OR lesson* OR learn* OR course* OR teach* OR program* OR lecture* OR simulat* OR workshop*) | 18 |
| Google Scholar | “Autism training” for “first responders” | 2 |

## Figures

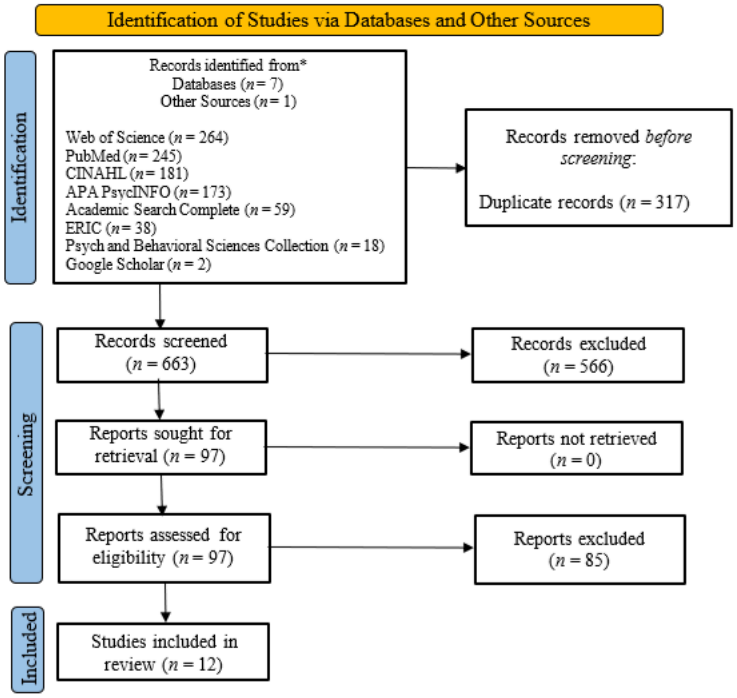



**Figure 1**

*PRISMA Flow Diagram (modified from Page et al., 2021)*