



Evidence-based interventions targeted at behavioral inhibition, shyness, and anxious withdrawal during the preschool years: A rapid review

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Abstract

High and stable behavioral inhibition (BI) during early childhood may place individuals at increased risk of experiencing anxiety during the COVID-19 crisis. Prior knowledge syntheses showed that selective prevention interventions were effective in reducing child BI and anxiety. However, the effectiveness of preschool-based universal and selective prevention interventions targeted at BI to improve child social outcomes remains unclear. Due to the vulnerability of highly inhibited children, this rapid review aimed to (1) synthesize the characteristics of evidence-based interventions targeted at BI, and (2) summarize intervention outcomes in domains of child individual and social functioning. Randomized controlled trials (RCTs), published between January 1991 and December 2021, conducted with highly inhibited children aged 3 to 5 years, were included in the review. Thirteen RCTs on four evidence-based interventions targeted at BI were retained. Most studies were conducted in samples of married/cohabitating and highly educated mothers and almost half of them described parent-only interventions. Three pilot RCTs on child-only and multimodal interventions found significant post-intervention improvements in observed child social competence and positive peer interactions. Pre-to-post intervention changes in parent and teacher ratings on child social outcomes were less consistent across studies. Further large-scale RCTs with medium-to-long term follow-ups are needed to examine intervention outcomes in domains of child social functioning, using a multi-informant and multi-method approach. After the COVID-19 crisis, preschool-based universal interventions targeting BI may enhance the engagement of inhibited children from diverse communities and contribute to the generalization of intervention effects to naturalistic peer settings.

Keywords Behavioral inhibition · Social withdrawal · Shyness · Evidence-based psychological interventions · Preschool children

The COVID-19 has led to deepen changes in children's daily routines (Prime et al., 2020). During the lockdown phases, preschool children only had their parents around them to promote a positive development and new learning experiences (Spinelli et al., 2020). Furthermore, contact with teachers and peers were not allowed (Spinelli et al., 2020). Even with the advances in vaccination, the re-opening phases have continued to be associated with uncertainty for preschool children who had to deal with new routines and

restrictions in early childhood and care services (Sette et al., 2022, 2023).

However, the stressful disruptions related to the COVID-19 pandemic outbreak may have a differential impact on children's socioemotional adjustment, depending on pre-existing vulnerabilities (Prime et al., 2020). High and stable behavioral inhibition (BI) during early childhood is one of the best predictors of later anxiety (Sandström et al., 2020) and may place individuals at increased risk of experiencing such emotional problems when confronted with stressful events characterized by high levels of uncertainty, like the COVID-19 pandemic crisis (Zeytinoglu et al., 2021). In fact, this temperamentally based wariness is characterized by high levels of caution, fearfulness, and vigilance in front of novel persons, situations, and activities (Fox et al., 2023). The developmental-transactional framework (Rubin & Chronis-Tuscano, 2021) establishes that highly inhibited

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preschoolers are more likely to experience shyness. This increased fearfulness and heightened self-consciousness during social interactions with unfamiliar peers (Rubin et al., 2009) may generalize to the preschool classroom (Rubin et al., 2018). Within this context, shy-inhibited preschoolers are more likely to display anxious withdrawn behaviors, that is, to isolate themselves from the peer group (Rubin et al., 2009).

Nevertheless, developmental-transactional theory and research acknowledges that parent, peer, and child factors may protect highly inhibited preschoolers against adverse socioemotional outcomes (Rubin & Chronis-Tuscano, 2021; Rubin et al., 2009). Within the family context, warm and sensitive parenting behaviors contribute to enhance children's independence and emotion-regulation (Smith et al., 2019), reducing children's avoidance in future social situations (Chronis-Tuscano et al., 2018). Highly inhibited preschoolers growing up in such family contexts are more likely to engage positively with peers (Smith et al., 2019) and to capitalize important developmental opportunities during peer interactions that can enhance their socioemotional skills (Rubin et al., 2018). This may place them in healthier developmental pathways (Rubin & Chronis-Tuscano, 2021; Rubin et al., 2009).

Narrative reviews have highlighted that there has been an increasing interest in evidence-based interventions targeted at BI/AW during the recent years (Chronis-Tuscano et al., 2018). Drawing from developmental theory and research on the transactional influences between parent, child, and peer factors (Rubin & Chronis-Tuscano, 2021; Rubin et al., 2009), these interventions may capitalize early neuroplasticity and prevent the occurrence of chronic emotional problems and comorbidities (Bayer et al., 2018; Chronis-Tuscano et al., 2018). Most interventions have focused on the promotion of children's socioemotional skills in a peer group of inhibited preschoolers and/or have involved parents in face-to-face or online programs to modify their ways of thinking, behaving, and responding to their children's needs (Ooi et al., 2022).

Few knowledge syntheses, using systematic review methods, have been conducted on currently available evidence-based interventions targeted at BI during the preschool years. Vallis et al. (2020) conducted a systematic review and meta-analysis about the effectiveness of individual, group, in-person, and online cognitive-behavioral interventions targeted at BI, anxiety symptoms and disorders during the preschool years. The authors identified four selective prevention interventions targeted at BI during the preschool years, published until September 2019: (1) the parent education program *Cool Little Kids*, delivered in-person (Rapee et al., 2005) and online (Morgan et al., 2016, 2017); (2) the combination of the *Cool Little Kids* with children's socioemotional skills training (*Social Skills Facilitated Play Program*), delivered in-person (Lau et al., 2017); (3) the

multicomponent *Turtle Program* (Chronis-Tuscano et al., 2015), combining Parent–Child Interaction Therapy adapted to anxiety problems with an extension of *Social Skills Facilitated Play*, delivered in-person; and (4) a parent home intervention, designed by LaFreniere and Capuano (1997). This study concluded that individual and group child-only, parent-only and parent–child cognitive-behavioral interventions were effective in reducing children's BI and anxiety during the preschool years. However, Vallis et al. (2020) found that online interventions were heterogeneous in terms of therapist support and technological drawbacks and less effective when compared with in-person interventions. More recently, Ooi et al. (2022) conducted a meta-analysis to summarize the effectiveness of psychological interventions targeted at inhibited preschoolers, published until March 2021. In this meta-analysis, the same intervention programs identified by Vallis et al. (2020) were retained. The authors concluded that these intervention programs are effective at reducing BI, anxiety symptoms and diagnosis, when reported by parents and teachers, but not by observers.

Notwithstanding their contribution, prior systematic reviews, and meta-analyses (Ooi et al., 2022; Vallis et al., 2020) have essentially examined the effectiveness of available early interventions in the reduction of children's negative individual emotional outcomes (i.e., BI, anxiety symptoms and diagnoses, or internalizing problems). The effectiveness of available interventions to improve negative (such as, non-social peer play) and positive domains of social functioning (such as, social engagement with peers, or social competence) needs to be clarified. In fact, children who display a stable pattern from BI to shyness and anxious withdrawal during the preschool years are more likely to be identified as “easy targets” by peers and to experience later peer victimization and exclusion (Rubin et al., 2018). Social disruptions in contacts with teachers and peers during the lockdown (Spinelli et al., 2020) and reopening phases (Sette et al., 2022, 2023) of the COVID-19 crisis highlight the need to examine the effectiveness of available interventions targeted at BI in child social domains of functioning. Furthermore, prior reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020) have excluded universal preschool-based interventions with targeted elements for shy-inhibited preschoolers. Universal preschool-based interventions may be useful to counteract parent mental-health help-seeking barriers for internalizing problems (Johnson et al., 2023). In fact, this type of interventions has the advantages to be more accessible, to focus on the whole classroom, to reduce stigmatization and to be implemented in a naturalistic setting, where the vulnerabilities of highly inhibited preschoolers are particularly impairing (Coplan et al., 2018).

To overcome extant limitations, new knowledge syntheses, using systematic review methods, are needed. Recent research found that a stable pattern of BI during early

childhood predicted greater worry dysregulation and, in turn, greater anxiety among young adults during the COVID-19 pandemic (Zeytinoglu et al., 2021). Furthermore, few studies also found that children's shyness was positively associated with self-reported social anxiety, depression, and loneliness during the reopening stage after the first COVID-19 lockdown (Sette et al., 2022, 2023). The heightened vulnerability associated with BI during stressful events, like the COVID-19 pandemic crisis (Zeytinoglu et al., 2021), justifies the need to conduct a rapid review. In this type of knowledge synthesis, systematic review methods are streamlined and accelerated to provide evidence to decision makers and practitioners in due course (Garritty et al., 2021).

This rapid review was guided by the research question “Which psychological interventions have been effective in improving the socioemotional outcomes of inhibited, shy, and anxious withdrawn preschoolers in different settings?”. The specific study objectives were: (1) to synthesize the main characteristics of the studies (i.e., design, sample size and characteristics, screening procedures, intervention outcomes and measures) that examined the effectiveness of currently available interventions targeted at BI, shyness and anxious withdrawal during the preschool years; (2) to synthesize the main intervention characteristics (i.e., type, delivery mode, setting, number and time interval between the sessions, therapeutic approach, and intervention providers); and (3) to summarize the intervention effectiveness in reducing children's negative individual and social outcomes and in improving children's positive domains of social functioning.

Methods

Study eligibility criteria

Abstract inclusion followed a set of inclusion and exclusion criteria. Studies were included in the review if they met the following criteria: (1) Randomized Controlled Trial (RCT) design (including pilot RCT, cluster RCT); (2) participants included preschool children (between 3 and 5 years); (3) participants were inhibited, shy or socially-anxious withdrawn preschool children, as assessed using recognized measures; (4) evidence-based targeted psychological interventions, evidence-based selective preventive psychological interventions, or evidenced-based universal preventive psychological interventions with targeted elements for behavioral inhibition, shyness and/or anxious withdrawal; (5) control group without any type of intervention, treatment as usual, waitlist control group, or active control group; (6) studies published in the last 30 years (January 1991 to December 2021); (7) studies published in English; (8) published primary research studies.

No restrictions were established concerning intervention therapeutic approach, intervention therapeutic setting and the geographical location of the studies. Studies that were based on non-randomized controlled designs (quasi-experimental designs), descriptive, observational, and case studies were excluded. All kinds of reviews, protocols, book chapters, editorial letters, guidelines, websites were excluded. The main outcomes were child behavioral inhibition, shyness, social withdrawal, internalizing behaviors, anxiety symptoms, anxiety diagnoses, social skills, social behaviors, social engagement, assessed using validated instruments (teacher and parent questionnaires or diagnostic interviews, laboratory, or naturalistic observations). No secondary outcomes were considered, due to the scope of the review (i.e., rapid review).

Eligibility criteria were limited to primary research studies describing RCTs, published in English during the last 30 years and excluded other types of study designs, due to the scope of review (i.e., rapid review) that was conducted in the present study (Garritty et al., 2021). Inclusion criteria related to the population were established in accordance with the study specific objectives. Inclusion criteria related to the type of interventions (namely, the inclusion of universal preventive interventions with targeted elements for behavioral inhibition, shyness or anxious withdrawal) were defined to overcome existing gaps in previous literature reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020).

Search strategy

This rapid review was conducted in accordance with the guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2021). The guidelines of the International Prospective Register of Systematic Reviews (PROSPERO) were also considered. The protocol was registered and published in PROSPERO (Registration Number: CRD42021290615).

A systematic search was implemented in the PsycINFO, Web of Science, Scopus, and PubMed databases. The search strategy included the following combination of terms (combined with Boolean terms): “behavioral inhibition” OR “behavioural inhibition” OR “shyness” OR “social withdrawal” OR “anxious withdrawal” OR “social reticence” AND “preschool children” OR “preschoolers” OR “kindergarten children” AND “intervention” OR “intervention program” AND “randomized controlled trial” OR “pilot randomized controlled trial” OR “cluster randomized controlled trial” AND “internalizing behaviors” OR “anxiety symptoms” OR “anxiety diagnoses” OR “social skills” OR “social engagement” OR “social behaviors”. In addition, we applied filters for English language and publication date (January 1991 to December 2021).

The primary search strategy was preliminarily validated by the last author, by testing if known relevant records were

retrieved and by checking errors of spelling, operator usage and line number combinations (Kleerings et al., 2023).

Study selection

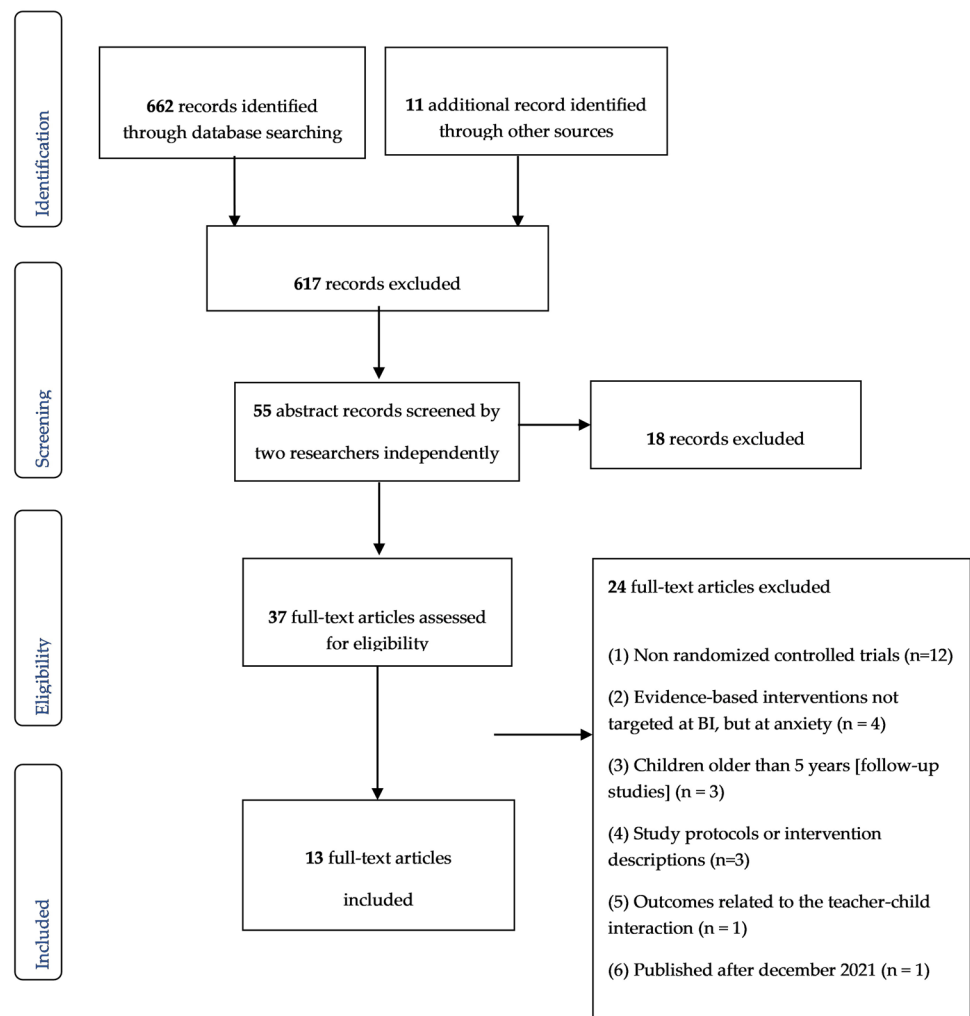
Search results are synthesized in the PRISMA flowchart (Fig. 1). The systematic data search identified a total of 662 records, and 11 additional records were identified via a review of references in the articles that were retrieved. The research team developed and tested screening forms based on the inclusion and exclusion criteria. Prior to the screening process, a calibration exercise was undertaken to pilot and refine the screening form. Two authors independently screened each of the retrieved titles and abstracts against the inclusion and exclusion criteria. Reasons for exclusion were recorded. The remaining 37 articles were read in full to determine their eligibility. Any discrepancy in inclusion decisions was resolved by consensus, with the help of a last author. Thirteen articles

met eligibility criteria and were included in the present rapid review

Data Extraction

The two first authors extracted information about (1) the main studies' characteristics (i.e., name of the authors, country, intervention name, study design, sample characteristics, screening procedures, child intervention outcomes and measures), and (2) the main interventions' characteristics (i.e., type of intervention, delivery mode, intervention setting, targeted groups, number and time interval between the sessions, therapeutic approach, intervention provider, intervention integrity). No software was used for data extraction. However, an extraction form was developed by the research team to record the aforementioned criteria. Disagreements between the two first authors were solved through consensus, with the help of the last author.

Fig. 1 PRISMA Flowchart: This flowchart displays the number of records in the identification, screening and eligibility phases and the number of the records included in the rapid review



Results

Study characteristics

The characteristics of the included studies are presented in Table 1. The 13 studies were published between 1997 and 2021.

Interventions and geographical location

Practically half of the studies were conducted in Australia ($n=7$) and assessed the efficacy of the *Cool Little Kids (CLK)* and its adaptations. Two studies were conducted in Canada on a parent home intervention (LaFreniere & Capuano, 1997) and on the *Social Skills Facilitated Play (SSFP)*. Two studies were conducted in China on the *SSFP* when implemented alone and in combination with the *CLK*. Two studies on the *Turtle Program (TP)* were conducted in the USA.

Study designs

With respect to study designs, most studies ($n=9$) were pilot RCT or large-scale RCT, with waiting-list control conditions. The other studies used usual care ($n=1$), monitoring ($n=1$) and active ($n=1$) control conditions. In one study, the type of control group condition was not specified (LaFreniere & Capuano, 1997). Five studies on the *TP*, *SSFP* and parent home intervention (LaFreniere & Capuano, 1997) included only pre- and post-treatment assessments. The remaining studies included pre-treatment and short-term follow-up assessments (ranging from 2 months to one year).

Study samples

Sample sizes ranged from 16 to 545 children. Most studies ($n=7$) included more girls than boys. Four studies included more boys than girls. In two studies, the proportion of girls and boys was equal. Six studies reported on caregivers' living arrangements or marital status. These studies revealed that most children lived with both parents and most caregivers were married/cohabitating. Nine studies reported caregivers' education. In these studies, the majority of caregivers (either mothers, fathers, or both) hold a university degree.

Screening procedures

With respect to screening procedures, most studies ($n=9$) only used heterogeneous parent-rated questionnaires to identify child high BI, shyness, or anxious withdrawal. Two studies combined parent-rated questionnaires with

laboratory assessments. One study combined parent-rated questionnaires with teacher ratings. One study only used teacher ratings. In two studies, children were included if at least one parent was diagnosed with an anxiety disorder ($n=1$) or reported clinically significant internalizing symptoms ($n=1$). Most studies excluded children with a known diagnosis of developmental disorders ($n=8$) or whose parent ratings revealed suspected autism spectrum disorders ($n=2$). Four studies excluded families, when parents did not have conversational or reading English skills.

Child intervention outcomes

With respect to child intervention outcomes, nine studies assessed child anxiety symptoms, inhibited-withdrawn and internalizing behaviors, using parent-rated questionnaires. Two studies only relied on parent-rated questionnaires. Six studies combined parent-rated questionnaires with structured diagnostic interviews conducted with caregivers to assess anxiety diagnoses. Five studies used teacher ratings on child anxiety symptoms, non-social and socially competent behaviors. Three studies used classroom observations on child non-social and socially competent behaviors.

Parent-rated and teacher-rated questionnaires, structured diagnosis interviews and classroom observation measures were quite heterogeneous across studies (see Table 1).

Intervention Characteristics

Table 2 displays the main characteristics of the interventions.

CLK

Eight studies focused on the *CLK* that is based on cognitive-behavioral therapy (CBT). In these studies, the *CLK* was mostly delivered in group ($n=5$) and in face-to-face ($n=6$) formats. Facilitators hold academic qualifications in psychology. Three studies used adaptations of the *CLK*. Two of them combined the *CLK* with children's activities, drawn from the *SSFP* ($n=1$) or the Parent-Child Interaction Therapy (PCIT, $n=1$). Four studies on the face-to-face *CLK* reported that the intervention was implemented either in a university clinic ($n=2$) or preschool ($n=2$) settings. However, studies on the *CLK* were heterogeneous in terms of group size (from 5 to 16 caregivers), number (from 6 to 11) and time interval (weekly, or fortnightly) of the sessions. Two studies focused on the *CLK*, delivered *online* in an individual and self-administered format.

SSFP

Two studies focused on the *SSFP*, delivered in a group of inhibited preschoolers. In both studies, the *SSFP* was

Table 1 Summary of Studies' Main Characteristics

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Barstead et al. (2018) (USA)	<i>Turtle Program (TP)</i>	Pilot RCT with a WLC control group Pre- and post-treatment assessments	40 children and their parents (CG: 22, IG: 18)	Children: Aged 42 to 60 months 44% boys, 56% girls, aged 42 to 60 years, mostly White (54%) Mothers: Mean age = IG 39.7 years (<i>SD</i> = 3.9), CG 34.4 years (<i>SD</i> = 4.1) Marital status: 93% married Maternal educational level: mostly tertiary degree (IG: 86%; CG: 94%) Families' income: M = \$125,000; < \$100,000 (20%)	High BI, measured with the parent-rated <i>Behavioral Inhibition Questionnaire</i> Exclusion of children with autism (measured with the parent-rated <i>Social Communication Questionnaire</i>)	Observed social behaviors during free play measured with the <i>Play Observation Scale</i> Teacher-rated social behaviors, measured with <i>Child Behavior Scale</i>
Bayer et al. (2018) Australia	<i>Cool Little Kids (CLK)</i>	RCT with usual care control group Pre-treatment and 1-year follow-up assessments	545 children and their caregivers (CG: 280, IG: 265)	Children: 52% boys, 48% girls, with an average age of 5.8 years (<i>SD</i> = 0.40), mostly born in Australia/New Zealand IG: 75.5%; CG: 72.1%) Caregivers: Age mean: IG 37.5 years (<i>SD</i> = 4.4), CG 37.6 years (<i>SD</i> = 4.4) Marital status: mostly married/cohabitating (IG: 91.3%, CG: 92.9%) Educational level: mostly tertiary degree (IG: 64.8%, CG: 65.6%) Families' income: mostly > \$88,400 (IG: 60.8%; CG: 58.7%)	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> Exclusion of parents with insufficient English and children with major health or developmental problems	Parent-rated internalizing behaviors, measured with the Emotional subscale of the <i>Strengths and Difficulties Questionnaire</i> Parent-rated fears and worries, measured with the <i>Children's Moods, Fears and Worries Questionnaire</i> Anxiety diagnoses, assessed with the <i>Anxiety Disorders Interview Schedule for DSM-IV – Child and Parent Versions</i>

Table 1 (continued)

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Chronis-Tuscano et al. (2015) USA	TP	Pilot RCT with a WLC control group Pre- and post-treatment assessments	40 children and their parents (CG: 22, IG: 18)	<p>Children: 42.5% boys, 57.5% girls, aged 42 to 60 years, mostly White (IG: 55.6%, CG: 50%)</p> <p>Mothers: Mean age = IG: 35.6 years (SD = 4.7), CG 38.5 years (SD = 4.1) Marital status: 94.4% married</p> <p>Maternal educational level: mostly tertiary degree (IG: 88.9%; CG: 77.2%) Families' income: M = IG \$115,118 (SD = \$56,227), CG \$137,733 (SD = \$67,832)</p>	High BI, measured with the parent-rated <i>Behavioral Inhibition Questionnaire</i> Exclusion of children with autism, measured with the parent-rated <i>Social Communication Questionnaire</i>	Anxiety diagnoses, assessed with the <i>Preschool Age Psychiatric Assessment</i> Parent-rated internalizing problems, measured with the <i>Child Behavior Checklist</i> Parent-rated anxiety symptoms, measured with the <i>Preschool Anxiety Scale</i> Teacher-rated anxiety symptoms, measured with the <i>School Anxiety Scale</i>
Coplan et al. (2010) Canada	<i>Social Skills Facilitated Play Program (SSFP)</i>	Pilot RCT with a WLC control group Pre- and post-treatment assessments	22 children (CG: 11, IG: 11)	<p>Children: Average age: 56.25 months (SD = 5.99), 14 boys and 14 girls, mostly White (72%)</p> <p>Caregivers: Maternal and paternal educational level: mostly college/university degree (59% and 54% for mothers and fathers, respectively)</p>	High BI, measured with the parent-rated <i>Behavioral Inhibition Questionnaire</i> Exclusion of children with scores above the established 'borderline' range on the conduct problems and hyperactivity-inattention subscales of the parent-rated <i>Strengths and Difficulties Questionnaire</i> Exclusion of children with known developmental or other psychiatric disorder;	Observed social behaviors during free play measured with the <i>Play Observation Scale</i> Teacher-rated social behaviors, measured with <i>Child Behavior Scale</i>

Table 1 (continued)

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Doyle et al. (2021) Australia	Adaptation of CLK	RCT with a WLC control group Pre-treatment and 6-months follow-up assessments	86 children and their mothers (CG: 42, IG: 44)	<u>Children:</u> Aged 41 to 57 months ($M=47.26$ months, $SD=3.97$), 48% boys, 52% girls (CG: 40% boys, IG: 60% girls), 100% Oceanic <u>Mothers:</u> Family SES (based on annual household income): mostly middle to high	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> Exclusion of mothers that didn't have good conversational English	Observed behavioral inhibition, assessed with the BI laboratory assessment Anxiety diagnoses, assessed with the <i>Anxiety Disorders Interview Schedule for DSM-IV – Parent Versions</i> Parent-rated anxiety symptoms, measured with the <i>Preschool Anxiety Scale</i>
Kennedy et al. (2009) Australia	CLK	RCT with a WLC control group Pre-treatment and 6-months follow-up assessments	71 children and their parents (CG: 36, IG: 35)	<u>Children:</u> Aged 36 to 58 months ($M=47.07$ months, $SD=7.05$), 42% boys and 58% girls; CG: 49% boys and 51% girls), mostly Anglo-Celtic <u>Mothers:</u> Family SES (based on annual household income): mostly middle to upper middle	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> and the BI laboratory assessment At least one parent was required to meet DSM-IV criteria for diagnosis of an anxiety disorder, using <i>Anxiety Disorders Interview</i> <i>Schedule for DSM-IV-Lifetime Version</i> Exclusion of children with a diagnosed developmental disorder or a severe language delay in the child or parents who were unable to complete questionnaires in English	Parent-rated behavioral inhibition, measured with <i>Behavioral Inhibition Questionnaire</i> Parent-rated anxiety symptoms, measured with <i>Preschool Anxiety Scale – Revised</i> Anxiety diagnoses, assessed with the <i>Anxiety Disorders Interview Schedule for DSM-IV – Parent Versions</i> Parent-rated anxiety interference, assessed with the <i>Children's Anxiety Life Interference Scale – Preschool Version</i>

Table 1 (continued)

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
LaFreniere and Capuano (1997) Canada	Not Reported	RCT with a control group without specification Pre- and post-treatment assessments	43 Children and their parents (CG:22; IG:21)	Children: Aged 31 to 70 months (M = 53.4 months) 20 boys and 23 girls; Mothers: Mother's age: IG: 34.05; CG: 32.00; Mother's edu- cation (years): IG: 13.71; CG: 13.41 Family earnings: <\$39,999 (%) IG: 71.4; CG: 72.7 CG: 13.41 Marital status: biparental— IG: 47.6; CG: 63.6	High anxious withdrawal, using the teacher <i>Social Competence and Behavior Evaluation</i>	<i>Laboratory task</i> : "grocery task" Gauvain and Rogoff: enthusiasm and interest Teacher-rated anxious withdrawal and social competence with <i>Social Competence and Behavior Evaluation (SCBE)</i>
Lau et al. (2017) Australia	CLK + SSFP	RCT with a WLC control group Pre-treatment and 6-months follow-up assessments	72 children and their parents (CG: 33, IG: 39)	Children: Aged 36 to 65 months (M = 52.1 months), 53% boys, 47% girls No more information provided	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> Inclusion of children with at least one parent with clinically significant scores on the <i>Depression Anxiety Stress Scales</i> Exclusion of children with a known diagnosis of any severe develop- mental disorders and whose parents were not able to complete ques- tionnaires in English	Parent-rated behavioral inhibition, measured with <i>Behavioral Inhibition Ques- tionnaire</i> Parent-rated anxiety symp- toms, measured with <i>Preschool Anxiety Scale – Revised</i> Anxiety diagnoses, assessed with the <i>Anxiety Disorders Interview Schedule for DSM-IV – Parent Versions</i> Parent-rated anxiety interfer- ence, assessed with the <i>Children's Anxiety Life Interference Scale – Pre- school Version</i>

Table 1 (continued)

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Li et al. (2016) China	SSFP	Pilot RCT with a WLC control group Pre- and post-treatment assessments, two months follow-up	16 children (CG: 8, IG: 8)	Children: Aged 4 to 5 years ($M = 4.68$ years, $SD = 0.28$), 50% boys, 50% girls <u>No more information</u> provided	High shyness, measured with the parent-rated Shyness subscale of the <i>Children's Behavior Questionnaire – Short Form</i> + nomination by classroom teacher as shy (top 5 in class) Exclusion of children with a known developmental or other psychiatric disorder	Observed social behaviors during free play measured with the <i>Play Observation Scale</i>
Luke et al. (2017) China	CLK	RCT with a WLC control group Pre-treatment and 6-months follow-up assessments	57 children and their parents (CG: 28, IG: 29)	Children: 61% boys and 39% girls, aged 36 to 63 months ($M = 3.91$ years, $SD = 0.60$) Caregivers: Maternal educational level: university degree (21.1%), high school degree (35.1%) Paternal educational level: university degree (19.3%), high school degree (36.8%)	High BI, measured with the parent-rated <i>Behavioral Inhibition Questionnaire</i> Exclusion of children with a known childhood or developmental disorder receiving any service for learning disabilities	Teacher-rated shyness, measured with the <i>Anxious Shyness and Regulated Shyness subscales of the Chinese Shyness Scale</i> Teacher-rated and parent-rated social competence, measured with the <i>Social Initiative subscale of the Social Competence Inventory</i> Teacher-rated internalizing problems, measured with the <i>Asocial with Peers and Anxious-Fearful subscales of the Child Behavior Scale</i>

Table 1 (continued)

Author (Year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Morgan et al. (2016) Australia	<i>CLK Online</i>	Pre-post trial with random allocation to two active intervention arms (clinician support vs. no clinician support) Pre- and post-treatment assessments	51 children and their parents (CG: 31, IG: 20)	Children: 51% boys and 49% girls, aged 3 to 6 years ($M=4.7$ years, $SD=0.8$), mostly living with both parents (92.2%) Caregivers: Age mean = 36 years ($SD=4.7$), mostly college/university degree: 58%	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> Exclusion of children who were reported to have cerebral palsy, an intellectual disability, or severe autism, whose parents were not resident of Australia and didn't have a printer	Parent-rated anxiety symptoms, measured with <i>Preschool Anxiety Scale – Revised</i> Parent-rated internalizing behaviors, measured with the Emotional subscale of <i>Strengths and Difficulties Questionnaire</i> Parent-rated anxiety interference, assessed with the <i>Children's Anxiety Life Interference Scale – Preschool Version</i>
Morgan et al. (2017) Australia	<i>CLK Online</i>	RCT with a WLC control group Pre-treatment and 6-months follow-up	433 children and their parents (CG: 218, IG: 215)	Children: IG: 45.1% boys and 54.9% girls; CG: 49.5% boys and 50.5% girls, aged 3 to 6 years ($M=4.8$ years, $SD=1$), mostly living with both parents (92.2%) Caregivers: Age mean = 36 years ($SD=4.7$), mostly college degree: 58% Families' income: <\$75,000 (21%)	High BI, measured with the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> Exclusion of children who were reported to have cerebral palsy, an intellectual disability, or severe autism and whose parents were not resident of Australia	Parent-rated anxiety symptoms, measured with <i>Preschool Anxiety Scale – Revised</i> Parent-rated internalizing behaviors, measured with the Emotional subscale of <i>Strengths and Difficulties Questionnaire</i> Parent-rated anxiety interference, assessed with the <i>Children's Anxiety Life Interference Scale – Preschool Version</i>

Table 1 (continued)

Author (year) Country	Intervention name	Study design	N	Sample characteristics	Screening procedures	Child intervention outcomes and measures
Rapee et al. (2005) Australia	CLK	RCT with a control group (monitor condition) Pre-treatment and 1-year follow-up	146 children and their mothers (CG: 73, IG: 73)	<p>Children: IG: 40% boys and 60% girls; CG: 51% boys and 49% girls; aged 36 to 62 months ($M = 46.8$ months)</p> <p>Caregivers: Mothers' age mean = IG 35 years ($SD = 5.3$), CG 35 years ($SD = 4.2$) Fathers' age mean = IG 37.9 years ($SD = 5.2$), CG 37.5 years ($SD = 4.9$)</p> <p>Maternal and paternal educational level: mostly university degree (43.8% for mothers, 43.9% for fathers)</p> <p>Mothers' race/ethnicity: mostly Anglo Saxon (IG: 75.8%; CG: 69.1%) Father's race/ethnicity: mostly Anglo Saxon (IG: 85.7%; CG: 69.7%)</p>	High BI, measured the parent-rated Approach subscale of the <i>Short Temperament Scale for Children</i> and the BI laboratory assessment	Anxiety diagnoses, assessed with the <i>Anxiety Disorders Interview Schedule for DSM-IV – Parent Version</i> Parent-rated approach behavior, measured with the Approach subscale of the <i>Short Temperament Scale for Children</i> Parent-rated social inhibition, measured with the <i>Tempera- ment Assessment Battery for Children – Revised</i> BI laboratory assessment

RCT refers to Randomised Controlled Trial. WLC refers to Waiting-List Condition. CG refers to Control Group. IG refers to Intervention Group. BI refers to Behavioral Inhibition. CLK refers to *Cool Little Kids*. TP refers to *Turtle Program*. SSFP refers to Social Skills Facilitated Play

Table 2 Main Characteristics of the Interventions

Author (year) Country	Intervention name	Intervention type	Delivery mode	Intervention setting	Targeted group	Number and time interval between the sessions	Therapeutic approach	Intervention providers	Intervention integrity
Barstead et al. (2018) (USA)	<i>TP</i>	Group (5–6 families)	Face-to-face	University clinic setting	Parents + Children	8 weekly sessions of 90 min	PCIT + Extension of SSFP	Trained facilitators	Not reported in the paper
Bayer et al. (2018) Australia	<i>CLK</i>	Group (6–16 caregivers)	Face-to-face	Preschools in the local community setting	Parents	6 sessions of 90 min Sessions 1–2: weekly Sessions 3–5: fortnightly Session 6: one month after the 5th session	CBT	Trained facilitators (clinical psychologists and postgraduate clinical psychology interns)	Content checklists to monitor session delivery and participants’ attendance, completed by facilitators
Chronis-Tuscano et al. (2015) USA	<i>TP</i>	Group (5–6 families)	Face-to-face	University clinic setting	Parents + Children	8 weekly sessions of 90 min	PCIT + Extension of SSFP	Trained facilitators (therapists)	Not reported in the paper
Coplan et al. (2010) Canada	<i>SSFP</i>	Group (6–7 children)	Face-to-face	Community setting	Children	7 weekly sessions of 1 h + 1 booster session (one month later)	SSFP	Trained facilitators (previous education and working backgrounds in early childhood education)	Regular meetings to review the videotapes of the sessions
Doyle et al. (2021) Australia	Adaptation of <i>CLK</i>	Individual	Face-to-face	Not reported	Parents + Children	11 weekly sessions: 7 mother-only sessions, 2 mother–child sessions	CBT + PCIT	Trained facilitators (clinical psychologists or postgraduate trainee psychologists who attended weekly supervision)	Weekly supervision
Kennedy et al. (2009) Australia	Adaptation of the <i>CLK</i>	Group (6 caregivers)	Face-to-face	Not reported	Parents	8 weekly sessions of 90 min	CBT	Not reported	Not reported in the paper
LaFreniere and Capuano (1997) Canada	Not Reported	Individual	Face-to-face	Home setting	Parents + Children	20 sessions divided into four phases, spread over a 6-month period	Attachment, attributional, and behaviorist perspectives	Trained facilitators (advanced graduate students)	Extensive individual and group supervision at regular intervals

Table 2 (continued)

Author (year) Country	Intervention name	Intervention type	Delivery mode	Intervention setting	Targeted group	Number and time interval between the sessions	Therapeutic approach	Intervention providers	Intervention integrity
Lau et al. (2017) Australia	<i>CLK + Modified SSFP</i>	Group (5–7 families)	Face-to-face	University clinic setting	Parents + Chil- dren	6 sessions of 90 min Sessions 1–4: weekly Session 5: two weeks after the 4th session Session 6: one month after the 5th session	CBT + Modified SSFP	Not reported	Review of session recordings and weekly meet- ings to provide feedback and suggestions
Li et al. (2016) China	<i>SSFP</i>	Group (group size not specified)	Face-to-face	Preschool setting	Children	14 biweekly ses- sions of 60 min	SSFP	Trained facilita- tor (education and working backgrounds in early childhood education)	Regular meetings to review the videotapes of the sessions
Luke et al. (2017) China	<i>CLK</i>	Group (group size not specified)	Face-to-face	Preschool setting	Parents	6 weekly sessions of 90 min	CBT	2 Trained facilita- tors (a univer- sity psychology lecturer and researcher; a trainer with a master's degree in parenting education)	Training checklist, completed by each facilitator to ensure that all topics were covered in each session
Morgan et al. (2016) Australia	<i>CLK Online</i>	Individual	Online	Online	Parents	6 sessions (par- ticipants were given 10 weeks to access the program)	CBT	Trained facilita- tors	Online diary, com- pleted by parents to monitor their progress
Morgan et al. (2017) Australia	<i>CLK Online</i>	Individual	Online	Online	Parents	8 online modules (participants were given 6 months to access the program)	CBT	Trained facilitator (provisionally registered psy- chologist with prior experi- ence delivering the Cool Little Kids parenting group program)	Not reported in the paper

Table 2 (continued)

Author (year) Country	Intervention name	Intervention type	Delivery mode	Intervention setting	Targeted group	Number and time interval between the sessions	Therapeutic approach	Intervention providers	Intervention integrity
Rapee et al. (2005) Australia	CLK	Group (6 caregivers)	Face-to-face	University clinic setting	Parents	6sessions of 90 min Sessions 1–4: weekly Session 5: two weeks after the 4th session Session 6: one month after the 5th session	CBT	Trained Facilitator (clinical psychologist with experience in running treatments for anxious children)	Not reported in the paper

CLK refers to *Cool Little Kids*. TP refers to *Turtle Program*. SSFP refers to *Social Skills Facilitated Play*. CBT refers to *Cognitive-Behavioral Therapy*. PCIT refers to *Parent–Child Interaction Therapy*

delivered in a face-to-face format and in preschool settings by trained facilitators with qualifications in education. Nevertheless, these studies differed in terms of the number (from 7 to 14) and time interval (weekly, or biweekly) of the sessions.

TP

Two studies focused on the TP, delivered in parallel groups of parents and children. In these studies, the TP was delivered in a face-to-face format and in a university clinic setting. Both studies reported that the TP consists of eight weekly sessions with 5–6 families, drawn on PCIT and SSFP principles.

Parent home intervention

One study focused on a face-to-face individual home parent intervention (LaFreniere & Capuano, 1997). This intervention was delivered by trained graduate students. The therapeutic approach was based on attachment, attributional and behaviorist therapeutic perspectives. It consisted of 20 sessions, spread over 6 months.

Summary of intervention outcomes in domains of child individual and social functioning

Table 3 summarizes the main intervention outcomes in domains of child positive and negative individual and social functioning, using heterogeneous methods and informants.

Parent reports

Studies on the CLK and the TP consistently found a significant reduction in parent-rated BI, shyness, anxiety symptoms, anxiety interference, internalizing or emotional problems from pre-treatment to immediate post-treatment or short-term (e.g., 6 months, 1-year) follow-ups. These intervention effects were identified in studies involving waiting-list (Chronis-Tuscano et al., 2015; Kennedy et al., 2009; Lau et al., 2017; Luke et al., 2017; Morgan et al., 2017) and usual care (Bayer et al., 2018) control groups.

The only exceptions were the studies of Luke et al. (2017), Doyle et al. (2021) and Rapee et al. (2005) on the CLK. These studies didn't find significant reductions in parent-rated internalizing problems, anxiety symptoms and behavioral inhibition from pre-treatment to follow-ups, respectively.

In the pilot study of the CLK online (Morgan et al., 2016), significant reductions in parent-reported children's anxiety, emotional symptoms, and anxiety interference were found in both intervention conditions (clinician support vs. no clinician support) from pre- to post-treatment.

Table 3 Intervention Outcomes in Domains of Child Socioemotional Functioning

Author (year) Country	Intervention name	Key findings
Barstead et al. (2018) (USA)	<i>TP</i>	<ul style="list-style-type: none"> - Both children from the intervention and WLC groups demonstrated relatively high increases in observed peer play interactions from pre- to post-treatment - Children from the intervention group demonstrated a high increase in observed initiations to peers as well as a moderate decrease in teacher-rated fearful and anxious behaviors from pre- to post-treatment when compared with the WLC condition
Bayer et al. (2018) Australia	<i>CLK</i>	<ul style="list-style-type: none"> - Little difference in clinician-rated anxiety disorders diagnoses between the intervention and control arms from pre- to 1-year follow-up treatment - Significant reduction in parent-rated internalizing problems in the intervention arm from pre- to 1-year follow-up treatment when compared with the usual care control condition
Chronis-Tuscano et al. (2015) USA	<i>TP</i>	<ul style="list-style-type: none"> - Significant beneficial effects on maternal-reported anxiety symptoms, of medium to large magnitude in the IG from pre- to post-treatment relative to the WLC - Large effects on parent-reported BI in the IG from pre- to post-treatment relative to the WLC - Medium to large effects on teacher-rated anxiety symptoms in the IG from pre- to post-treatment relative to the WLC
Coplan et al. (2010) Canada	<i>SSFP</i>	<ul style="list-style-type: none"> - Significantly greater decrease in observed socially wary behaviours at preschool (namely, reticent and solitary behaviours, interactions with teachers, and overt demonstrations of anxiety) in the IG from pre- to post-treatment relative to the WLC - Greater increase in observed social and socially competent behaviours at preschool in the IG from pre- to post-treatment relative to the WLC - No significant differences in teacher-rated child anxiety or prosocial behaviours in the WLC and IG from pre to post-treatment
Doyle et al. (2021) Australia	Adaptation of <i>CLK</i>	<ul style="list-style-type: none"> - Significantly fewer clinician-rated child anxiety disorders and fewer mother-reported child anxiety symptoms from pre-intervention to 6-months follow-up in the IG. This change was not significantly different from the change observed in the WLC
Kennedy et al. (2009) Australia	Adaptation of the <i>CLK</i>	<ul style="list-style-type: none"> - Significantly greater reduction in clinician-rated anxiety disorders and less parent-rated anxiety interference in the IG than in the WLC from pre- to 6-months follow-up - Greater reductions in parent-rated and laboratory observed measures of BI in the IG relative to children in the WLC from pre- to 6-months follow-up
LaFreniere and Capuano (1997) Canada	Not reported	<ul style="list-style-type: none"> - Increase in children's cooperation and enthusiasm during a problem-solving task with mother from pre- to post-intervention in the IG relative to the CG - Teacher-rated social competence and anxious-withdrawn behavior improved from pre- to post-intervention in the IG relative to the CG, although only the former was significant
Lau et al. (2017) Australia	<i>CLK</i> + <i>SSFP</i>	<ul style="list-style-type: none"> - Significantly greater reductions in clinician-rated anxiety disorders, total clinician-rated severity of anxiety, and maternal-rated child anxiety symptoms and anxiety interference in the IG relative to children in the WLC from pre- to 6-months follow-up
Li et al. (2016) China	<i>SSFP</i>	<ul style="list-style-type: none"> - Significantly greater frequencies of observed peer interactions (e.g., group play and peer conversation) and prosocial behaviours (e.g., cooperation, sharing and making/accepting social initiations) during unstructured free play with novel peers in the IG relative to children in the WLC from pre- to post-treatment and 2-months follow-up - Significantly better social-communicative competence during a speech task in the IG relative to children in the WLC from pre- to post-treatment, but not at 2-months follow-up
Luke et al. (2017) China	<i>CLK</i>	<ul style="list-style-type: none"> - Significant reductions in teacher-rated anxious shyness with a large effect size, but not regulated shyness in the IG relative to WLC from pre- to 6-months follow-up - No significant changes on teacher-rated social initiative and internalizing problems (i.e., asocial with peers and anxious-fearful) from pre- to 6-months follow-up
Morgan et al. (2016) Australia	<i>CLK Online</i>	<ul style="list-style-type: none"> - Medium-to-large reductions in parent-reported anxiety symptoms and emotional symptoms, clinician-rated child anxiety diagnoses, and improvements in parent-rated anxiety interference in both groups (clinician support vs. no clinician support) from pre- to post-treatment

Table 3 (continued)

Author (year) Country	Intervention name	Key findings
Morgan et al. (2017) Australia	<i>CLK Online</i>	Significant small to moderate improvement in parent-rated child anxiety symptoms in the IG relative to WLC from pre-intervention to 6-months follow-up Greater reductions in parent-reported anxiety interference and lower clinician-rated anxiety disorders in the IG relative to WLC from pre-intervention to 24-weeks follow-up
Rapee et al. (2005) Australia	<i>CLK</i>	- Significantly greater decrease in clinician-rated anxiety diagnoses in the IG relative to WLC from pre-intervention to 1-year follow-up - No significant intervention effects on parent-rated and laboratory measures of inhibition/withdrawal from pre-intervention to 1-year follow-up

CLK refers to *Cool Little Kids*. TP refers to *Turtle Program*. SSFP refers to Social Skills Facilitated Play. IG refers to Intervention Group. WLC refers to Waiting-List Condition. CG refers to Control Group

Clinician-rated anxiety diagnoses, using structured interviews with parents

Four studies on the *CLK* and the *TP* found a significant reduction in clinician-rated anxiety disorders from pre-treatment to immediate post-treatment or short-term (i.e., 6-months, 1 year) follow-ups. These intervention effects were found in studies involving either waiting-list or monitoring control group conditions (Chronis-Tuscano et al., 2015; Kennedy et al., 2009; Lau et al., 2017; Rapee et al., 2005).

However, two studies on the *CLK* diverged from these findings. Bayer et al. (2018) only found minor differences from pre-treatment to 1-year follow-up in clinician-rated anxiety disorders in the intervention group when compared with usual care control group. Doyle et al. (2021) found that the reduction in clinician-rated anxiety disorders from pre-treatment to 6-months follow-up was similar in the intervention and waiting-list conditions.

Laboratory assessments

The few studies that used laboratory measures to assess the intervention effects of the *CLK* in BI found inconsistent findings. Kennedy et al. (2009) found a significant reduction in laboratory-assessed BI from pre- to 6-months follow-up in the intervention group when compared to a waiting-list condition. Conversely, Rapee et al. (2005) didn't find a significant reduction in laboratory-assessed BI from pre- to 6-months follow-up in the intervention group when compared to a monitoring condition.

Teacher reports

The two studies assessing the *TP* (Barstead et al., 2018; Chronis-Tuscano et al., 2015) and one study on the *CLK* (Luke et al., 2017) found comparable findings, using teacher-rated reports. These studies found a reduction in teacher-rated school anxiety, fearful and anxious

behaviors from pre to immediate post-treatment and 6-months follow-up assessment. In contrast, one study on the *SSFP* (Coplan et al., 2010) and the study on the parent home intervention (LaFreniere & Capuano, 1997) didn't find significant intervention effects in teacher-rated anxiety and anxious withdrawal from pre to immediate post-treatment assessment.

With respect to socially competent behaviors, LaFreniere and Capuano (1997) found a significant improvement in teacher-rated social competence from pre- to post-treatment. Conversely, one study on the *SSFP* (Coplan et al., 2010) and one study on the *CLK* (Luke et al., 2017) didn't find significant improvements in teacher-rated prosocial behaviors and social initiative from pre to immediate post-treatment and 6-months follow-up assessment.

Classroom observations

Two studies on the *SSFP* and one study on the *TP* found consistent findings concerning children's non-social and social behaviors. Trained and blind observers reported significant improvements in peer play interactions, peer initiations (Barstead et al., 2018), observed socially competent and prosocial behaviors (Coplan et al., 2010; Li et al., 2016) from pre- to post-treatment and short-term follow-up (2 months). Coplan et al. (2010) also found significant reductions in observed socially wary behaviors from pre- to post-treatment.

Discussion

Overall, our rapid review identified 13 pilot and large-scale RCTs, published between 1997 and 2021, on selective prevention interventions targeted at BI during the preschool years.

Study characteristics

Our findings show that most reviewed studies were conducted in North America and Australia, with the exception of two studies conducted in China (Lau et al., 2017; Li et al., 2016). These findings are consistent with the conclusions of the narrative review of Chronis-Tuscano et al. (2018), showing that selective prevention interventions targeted at BI during the preschool years need to be evaluated in other cultural contexts. These conclusions converge with the central tenets of the bioecological developmental framework (Bronfenbrenner & Morris, 2006) that establishes that cultural norms may shape the way how parents and peers think, feel, and respond to children's social behaviors, such as shy-inhibited behaviors.

With respect to samples' composition, we found that the reviewed studies involved a greater proportion of girls living in intact families, whose caregivers hold university degrees and middle to high incomes. The findings concerning the representation of child sex diverge from the conclusions of the systematic review of Doey et al. (2014) that didn't reveal differences in the percentages of shy girls and boys but concluded that shy-inhibited behaviors may carry increased negative socioemotional costs for boys when compared with girls. Furthermore, our findings support the conclusions of prior research (Barstead et al., 2018; Chronis-Tuscano et al., 2018) that highlighted the need of partnering with preschools serving more diverse populations in terms of family structure, education, and income. Our findings also show that only a minority of studies provided information on the sociodemographic characteristics of both mothers and fathers. These findings are in line with the meta-analysis of Carnes et al. (2019), showing that most studies only included or reported results on mothers in childhood anxiety treatment. These conclusions are noteworthy, because meta-analyses found that fathers' overprotective parenting is at least as important as mothers' and that paternal, but not maternal challenging parenting is associated with less child anxiety (Möller et al., 2016).

From a methodological standpoint, our rapid review reveals that most studies were small-scale pilot RCTs with pre- to post-intervention and/or short-term follow-up assessments and used waiting-list control group conditions. These findings converge with the conclusions of the meta-analysis of Ooi et al. (2022), showing that only half of the studies were rated as having adequate sample sizes and having a trial that is long enough to assess longer-term outcomes (6 months or more).

Our findings also indicate that screening procedures and intervention outcomes assessment relied, to a large extent, on parent reports and used a wide range of measures across studies. These findings support the conclusions of the meta-analysis of Ooi et al. (2022), showing that inhibited, shy,

and anxious withdrawn behaviors are conceptualized and operationalized in a heterogenous way across studies. Parent reports are often considered a fast and economical method of obtaining information on child BI in literature (Bishop et al., 2003). However, these findings warrant attention, because prior research found that parents typically display difficulties in identifying children's internalizing problems (Johnson et al., 2023) and in seeking help for anxiety-related problems, especially in a preventive manner (Mian, 2014). Furthermore, the meta-analysis of Ooi et al. (2022) concluded that parent reports need to be interpreted with caution, since parents were not blind to the condition allocation to which their children were assigned to, due to their active involvement in the intervention in most studies.

Intervention characteristics

The 13 studies that were retained on our rapid review focused on four evidence-based selective prevention interventions targeted at BI: *Cool Little Kids* (CLK, Rapee et al., 2005), *Social Skills Facilitated Play* (SSFP, Coplan et al., 2010), the *Turtle Program* (TP, Chronis-Tuscano et al., 2015) and an intensive parent home intervention (LaFreniere & Capuano, 1997). These four interventions were comparable to those retained in prior systematic reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020) and featured two main intervention traditions.

Seven of the 13 studies featured the first intervention tradition that was described in the meta-analysis of Ooi et al. (2022), that is, parent-only education programs. This intervention tradition converges with developmental research, showing that sensitive parenting may enhance the emotion-regulation skills, independence and social engagement of inhibited preschoolers and place them in healthier developmental pathways (Fox et al., 2023; Hane et al., 2008; Lewis-Morrarty et al., 2012). With only one exception (LaFreniere & Capuano, 1997), all studies from this intervention tradition focused on the CLK (Bayer et al., 2018; Luke et al., 2017; Morgan et al., 2016, 2017; Rapee et al., 2005). A noteworthy number of studies on the CLK carefully described facilitators' training and intervention integrity monitoring. Nevertheless, our findings show that the implementation of the CLK was heterogenous across studies in terms of the intervention type (i.e., group vs. individual), delivery mode (i.e., face-to-face vs. online), group sizes, intervention setting, number, and time interval of the sessions. These results are noteworthy, since the intervention characteristics can be moderators of the intervention effects (Ooi et al., 2022).

Consistent with previous systematic reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020), our findings reveal that the CLK was the only selective prevention intervention targeted at inhibited preschoolers that was adapted to and tested in an *online* format (Morgan et al.,

2016, 2017), until december 2021. Intervention monitoring showed that the take-up of clinician support (i.e., support call) in the *CLK Online* was surprisingly low (Morgan et al., 2017). Limitations in the take-up of clinician support in the *CLK Online* converge with recent efforts to introduce more intensive *online* individual and group-based parenting interventions for anxious (Comer et al., 2021) and inhibited preschoolers (Guedes et al., 2023), drawn on PCIT, CBT and videoconferencing. These findings warrant attention, because the meta-analysis of Vallis et al. (2020) found that the heterogeneity of *online* interventions for anxious and inhibited preschoolers, in terms of clinician support, may influence intervention outcomes.

Two studies (Coplan et al., 2010; Li et al., 2016) featured the second intervention tradition described in the meta-analysis of Ooi et al. (2022), that is, child-only interventions working directly with inhibited preschoolers in a peer group with similar difficulties. This intervention tradition, represented by the *SSFP*, converges with developmental theory and research, showing that peer interactions enhance the development of children's age-appropriate social and socio-cognitive skills that place inhibited preschoolers in healthier developmental pathways (Rubin et al., 2018). However, prior studies on the *SSFP* acknowledged that this intervention remains to be adapted for use as a teacher-delivered classroom-based universal prevention program (Li et al., 2016).

No universal prevention program with targeted elements for inhibited preschoolers was retained for inclusion in our rapid review. These findings diverge from the central tenets of the bioecological developmental framework (Bronfenbrenner & Morris, 2006) that establishes that children's characteristics (such as, BI) and contextual proximal factors (such as, teacher and peer responses) shape the bidirectional interactions with peers and teachers in the preschool classroom. To the best of our knowledge, only the *INSIGHTS* encompasses a teacher-delivered universal classroom-based intervention component with targeted elements for shyness for kindergarten children living in urban low-income areas (O'Connor et al., 2014). Notwithstanding its contribution, the large-scale RCT on the *INSIGHTS* have primarily examined the intervention effects on children's early literacy skills (McCormick et al., 2018; O'Connor et al., 2014) rather than on children's emotional and social domains of functioning. This explains why the studies on the *INSIGHTS* were not retained for inclusion in our study.

Four studies that were included in our review combined the two intervention traditions that were identified in the meta-analysis of Ooi et al. (2022), that is, both parent-focused and child-focused approaches. These multimodal intervention approaches encompass diverse adaptations of the *CLK* to enhance child involvement (Doyle et al., 2021; Lau et al., 2017) and the *Turtle Program* (Barstead et al., 2018; Chronis-Tuscano et al., 2015). Multimodal

intervention approaches converge with the central tenets of the developmental-transactional framework (Rubin & Chronis-Tuscano, 2021), establishing that the transactional child, parent, and peer influences shape the developmental pathways of inhibited preschoolers.

Intervention outcomes

Our findings show that the *CLK* and the *TP* were effective in reducing child negative individual outcomes (i.e., anxiety symptoms and diagnoses) at immediate post-intervention assessment, according to parents, teachers, and clinician ratings. Similar conclusions emerged in prior systematic reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020). However, teacher, parent, and clinician-reported improvements in favor to intervention conditions were less consistent in studies on the parent intensive home intervention (LaFreniere & Capuano, 1997), on the *CLK* (Bayer et al., 2018; Rapee et al., 2005) and its adaptations outside Australia (Doyle et al., 2021; Luke et al., 2017) that examined the intervention outcomes at short-term follow-ups (i.e., 6-months and 1-year). It is possible that selective prevention interventions targeted at BI contribute to modify the more transient expressions of anxiety (Ooi et al., 2022), especially when focusing mainly on parents and on the parent-child relationship. More specifically, children's wariness, emotional reactivity and avoidance when confronted with unfamiliar persons, situations, and activities (Fox et al., 2023) may remain unchanged (Ooi et al., 2022) and revert to more typical ways of responding across time. The inconsistent changes that were found in the few studies on the *CLK* that used laboratory assessments of BI appear to support this idea. Comparable conclusions were drawn from the meta-analysis of Ooi et al. (2022) that didn't find intervention changes in BI, using laboratory assessments. However, inconsistent findings need to be interpreted with caution, due to the heterogeneity of methodological (e.g., measures, assessment times, control groups) and intervention (e.g., number and time interval of the sessions, targeted groups) features across studies.

Our rapid review extends prior systematic reviews and meta-analyses (Ooi et al., 2022; Vallis et al., 2020), by synthesizing the intervention outcomes in children's positive and negative domains of social functioning. Three small-scale pilot RCTs on the *TP* (Barstead et al., 2018) and the *SSFP* (Coplan et al., 2010; Li et al., 2016) found significant short-term improvements in children's socially wary behaviors, social competence, prosocial behaviors, and positive peer interactions, using classroom observations conducted by trained and blind researchers. In both programs, the intervention sessions took place in a playroom that is as similar as possible to a preschool setting (Coplan et al., 2010; Li et al., 2016). It is possible that this type of intervention

programs that promotes age-appropriate play and social skills enhances the generalization of intervention effects to the preschool classroom (Druskin et al., 2023). However, these promising findings need to be interpreted with caution, due to the methodological characteristics (i.e., small sample sizes, short-term assessments) of the studies.

Our findings reveal that pre-to-post intervention changes in teacher ratings on child positive domains of social functioning (i.e., social competence, or prosocial behaviors) were inconsistent across studies (Coplan et al., 2010; LaFreniere & Capuano, 1997; Luke et al., 2017). Intervention changes were only identified in the study on an intensive home parent intervention (LaFreniere & Capuano, 1997), but not in studies on the *SSFP*, either implemented alone (Coplan et al., 2010) or in combination with the *CLK* (Luke et al., 2017). These inconsistent findings may be related to the heterogeneity in the conceptualization and operationalization of child positive domains of social functioning across studies. Moreover, the intervention dosage was higher in the study on the intensive home parent intervention (i.e., 20 weeks, LaFreniere & Capuano, 1997) than in the studies on the *SSFP* (i.e., 6 to 8 sessions, Coplan et al., 2010; Luke et al., 2017). Also, teachers may be more concerned with disruptive behaviors in the classroom rather than with noticing children coping positively when facing affective and emotional challenges and have multiple children to compare with (Fernandes et al., 2020). This may contribute to the non-significant results in teachers' reports of child positive domains of social functioning.

Strengths and limitations

To advance the current state-of-art knowledge, this rapid review aimed to provide a comprehensive synthesis of the characteristics of RCTs that examined the effectiveness of evidence-based interventions targeted at inhibited preschoolers. Furthermore, the main features of currently available interventions, including universal preventive classroom-based interventions, were synthesized. Instead of focusing only on child individual negative emotional functioning, this rapid review summarizes the intervention outcomes in child positive and negative domains of social functioning.

However, some limitations need to be acknowledged. This rapid review only focused the systematic search in four databases, in studies drawing on pilot or large-scale randomized controlled designs and published in English, between 1991 and 2021. The strategy search was preliminarily validated, but rapid reviews searches may be characterized by a more reduced sensitivity when compared with systematic reviews that aim to find all known relevant records (Kleerings et al., 2023). The review only identified thirteen pilot and large-scale randomized controlled trials assessing the effectiveness

of evidence-based interventions targeting BI in children's positive and negative socioemotional outcomes. In most studies, samples consisted of highly educated mothers, who were married/cohabitating and hold medium-to-high incomes, from North American and Australian contexts. Sample compositions limit the generalizability of the findings on the effectiveness of interventions targeted at inhibited preschoolers to fathers and more diverse populations in terms of family structure, education, income, and culture. Studies were heterogeneous in terms of methods (i.e., instruments, control groups, intervention assessments) and intervention characteristics (i.e., number and time interval of sessions, delivery mode and targeted groups), which makes it difficult to compare and interpret the findings. Due to the scope of the present review (i.e., rapid review), the risk of bias and the quality of the evidence were not evaluated.

Conclusions, recommendations, and future directions

Overall, thirteen pilot and large-scale RCTs on four evidence-based interventions targeted at BI were retained in the present rapid review. Most studies were conducted in samples of married/cohabitating and highly educated mothers and almost half of them focused on parent-only interventions. Only three pilot RCTs on a child-focused approach and on a multimodal intervention found significant post-intervention improvements in observed child social competence and positive peer interactions. Pre-to-post intervention changes in teacher ratings of child social outcomes were less consistent across studies.

This rapid review has implications for future research to overcome existing limitations in the current state-of-art knowledge. Further pilot RCTs need to be conducted in cultural contexts that differ from those where the intervention programs were initially developed. Cross-cultural studies may inform cultural tailoring that may be needed before implementing evidence-based interventions targeted at inhibited preschoolers in new cultural groups (Gonzales et al., 2016). Minor modifications in the way how intervention activities and materials are presented to inhibited-withdrawn preschoolers and their caregivers may be needed to enhance their acceptability (Guedes et al., 2019a, b, 2021). Moreover, large-scale RCTs, with active or usual care control groups and more diverse samples in terms of child sex, family structure, education, and income are needed to examine the generalizability of intervention effects in families who face sociodemographic adversity. The perspectives of both mothers and fathers need to be included or reported, because fathers' parenting is at least as important as mothers for child anxiety (Möller et al., 2016). The moderating role of child (e.g., sex) and family (e.g., education, income) in the intervention effects need to be examined.

From a methodological standpoint, medium to-long-term follow-up assessments need to be included to examine the maintenance of the intervention effects across time, using a multi-informant (e.g., parents, teachers, clinicians, trained observers), multi-method (e.g., observations of parenting and child social behaviors in naturalistic and laboratory contexts, questionnaires, and diagnostic interviews) and a multi-domain (positive and negative child emotional and social outcomes) approach. Intervention process assessments (e.g., intervention monitoring, integrity, or dosage) need to be conducted to explore the moderating role of intervention characteristics and implementation in the intervention effects. For online interventions, large-scale RCTs need to examine the intervention effects, depending on the clinician support model. For multimodal interventions, the single or additive effects of parent, child, parent–child, or teacher modules need to be examined to clarify for whom more intensive interventions are needed (Chronis-Tuscano et al., 2015, 2022).

From a clinical standpoint, these findings have implications for further intervention developments after the COVID-19 pandemic crisis, due to the heightened vulnerability associated with BI. This rapid review suggests that novel approaches in community-based intervention strategies and/or add-on motivational modules are needed to enhance parent engagement in underserved communities. Screening procedures at preschools may be particularly useful after the COVID-19 crisis for the early identification of highly inhibited preschoolers. Furthermore, the adaptation of peer-play interventions to a teacher classroom-based format and the development of universal preschool interventions with targeted elements for BI may improve the accessibility of interventions for inhibited children living in underserved communities. Online interventions may also be useful to overcome accessibility barriers. However, clinician alternative support models that can enhance the therapist-client alliance need to be introduced in internet-delivered interventions and their intervention effects need to be explored.

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Data availability The manuscript has no associated data.

Declarations

Ethics approval This study was approved by the ISPA Ethics Committee (I-063–11-2021).

Consent to participate This manuscript didn't involve human participants and/or animals and did not require informed consent.

Informed consent The manuscript did not require informed consent.

Conflict of interest The authors report there are no competing interests to declare.

Research involving human participants and/or animals This manuscript didn't involve human participants and/or animals.

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