Training Theory of Mind and Executive Control: A Tool for Improving School Achievement?

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ABSTRACT—In the preschool years, there are marked improvements in theory of mind (ToM) and executive functions. And, children's competence in these two core cognitive domains is associated with their academic achievement. Therefore, training ToM and executive control could be a valuable tool for improving children's success in school. This article reviews several successful training studies in preschool children showing that these two school-related competencies can be trained. We also discuss methodological factors that may be important for the effectiveness of training programs. Finally, the review outlines implications of brain research for such training interventions.

INTRODUCTION

Between 3 and 5 years of age, children improve markedly on theory of mind (ToM) tasks as well as on executive function (EF) tests. Furthermore, several studies have found positive correlations between these developmental advances. In turn, ToM and EFs provide a framework for school-related learning to occur. For example, EFs like the inhibition of impulsive behaviors or social-cognitive skills like the consideration of others' perspectives are relevant for children's school achievement. Therefore, promoting these competencies can enhance children's success in school. Indeed, a number of researchers have shown that training in the domains of social cognition/ToM and EFs can be successful. These studies provide valuable information about how to design a ToM or an executive-control training scheme and will therefore be reviewed in this article. Finally, implications of brain research for training interventions are discussed.

ToM Training Studies

ToM refers to the ability to impute mental states, such as beliefs, desires, or intentions, to oneself and to others and to predict other people's behavior on the basis of their mental states. That is, ToM refers to our everyday psychology. There is a reciprocal link between ToM understanding and interpersonal relationships (Hughes & Leekam, 2004). Everyday social interactions with parents or siblings have beneficial effects on ToM understanding (Dunn, Brown, & Beardsall, 1991; Perner, Ruffman, & Leekam, 1994; Ruffman, Perner, Naito, Parkin, & Clements, 1998), and ToM understanding has an impact on social skills (e.g., Jenkins & Astington, 2000).[1] In turn, ToM competence may be important for success in school because children's social skills are associated with their academic achievement (Chen, Rubin, & Li, 1997; Malecki & Elliot, 2002). Furthermore, knowledge about the mind may help children understand pedagogy better (see Davis-Unger & Carlson, this volume).

There are a number of studies attempting to elevate children's performance in ToM tasks with controlled training procedures. One of the first studies showing success in training children's ToM comes from Slaughter and Gopnik (1996). They trained one group of children on the concept of belief (belief training). A second group of children received training on the related concepts of perception and desire (coherence training). A control group was trained on number conservation tasks. Slaughter and Gopnik administered two training sessions over the course of 2 weeks. During these sessions, children were given the relevant tasks and provided with appropriate feedback to their responses. Both the belief training and also the coherence training improved children's performance on a false-belief posttest compared to the control group (Experiment 1). A second experiment showed that training

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on belief as well as training on desire and perception also transferred to other so-called ToM tasks like an appearance-reality task (Flavell, Flavell, & Green, 1983) or a sources of knowledge task (O'Neill & Gopnik, 1991).

Hülsken (2001) replicated the effects of the coherence training used by Slaughter and Gopnik (1996). A sample of 36 children was assigned to one of three training conditions: a coherence training, a pretense-reality training, or a number conservation control training. Children were trained two times over a period of 2 weeks. A battery of belief and appearance-reality tasks was administered at pre- and posttest. Both training conditions had similar effects on posttest tasks, but there was no improvement in the control group.

Appleton and Reddy (1996) were likewise successful in training children's performance on ToM tasks. They engaged children in conversations about false beliefs. Children in the training group watched short video clips about unexpected transfer false-belief situations. Various aspects of the video scenes were discussed, and the thoughts and actions of the video protagonists were explained. Four discussion sessions of 10–15 min, led by the experimenter, were conducted over the course of 2 weeks. During these discussions, we tried to avoid negative feedback. Instead, our emphasis was on supporting and explaining comments. A control group had four storybook-reading sessions over the same time period. The training group performed significantly better than the control group on a deceptive box task not only at an immediate posttest but also at a delayed follow-up test 2 weeks later. Also, children in the training group outperformed the control group on an unexpected transfer task given at the delayed follow-up test.

A further successful ToM training study was conducted by Slaughter (1998, experiment 2). She trained 30 children on false-belief tasks using deceptive objects (belief group), on false picture tasks (picture group), or on number conservation tasks (control group). Two training sessions providing positive and negative feedback were conducted over the course of 2–3 weeks. Each training session lasted approximately 10 min. At posttest, the belief group scored highest on ToM tests including a deceptive box test, an appearance-reality test, and a visual perspective-taking task. The picture group performed best on false picture tests, and the control group scored highest on number conservation tasks. There was no transfer between false belief tasks and false picture tasks suggesting that false belief tasks and false picture tasks assess different kinds of representational understanding (see Perner & Leekam, 2008, for further discussion of this issue).

Clements, Rustin, and McCallum (2000) conducted a training study with 91 children between 34 and 60 months of age. In each of two training sessions, children in the experimental conditions listened to a false-belief story about an unexpected transfer. In an explanation condition, children received a detailed explanation about the correctness of their answer. In the practice condition, children were only informed of whether their answer was correct or not. Children in the control condition listened to a neutral story unrelated to false beliefs. Only the explanation condition improved children's ability to predict and explain a false-belief-based action. The majority of children in the practice condition showed no improvement at all. This indicates that explaining the correct response is necessary for training effects, whereas just informing children of whether their answer was correct is not sufficient.

Similar to Clements et al. (2000), Melot and Angeard (2003) showed that experience with the relevant tasks alone has no significant training effect. They trained 93 children between the ages of 42 and 52 months: One experimental group was trained in false-belief understanding. The other experimental group was trained in the appearance-reality distinction. Children in both experimental groups were tested on the relevant tasks and given explanations and feedback on their performance in two training sessions. Children in the control group also received false-belief and appearance-reality tests but without feedback. At posttest, both types of training showed a direct effect on the trained task (false-belief or appearance-reality task) and also a transfer effect on the task that was not in training (i.e., on the appearance-reality test in the false-belief group) pointing to interdependency between these two concepts. Furthermore, both types of training also exerted transfer effects when children were trained on a task they had already mastered at pretest. Children in the control group showed no improvement suggesting that explanations are necessary for learning to occur.

In a similar vein, Amsterlaw and Wellman (2006) found that frequent and sufficient explanatory talk about false-belief events is necessary. In their microgenetic study, 24 children received a series of 24 false-belief tasks over the course of 6–9 weeks. All children received "implicit feedback" by revealing the actual outcome of the false-belief story and were asked to explain the false-belief–based action. The microgenetic group received 12 sessions of two false-belief tasks, whereas the comparison group received only 6 sessions of four false-belief tasks. Children in the microgenetic group were asked for explanations on every false-belief task, whereas children in the comparison group were asked for explanations on only half of the tasks. At posttest, the microgenetic group outperformed both the comparison group and a control group on false-belief tasks. Two further studies (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003) found that training on sentential complement syntax also improved children's false-belief understanding.

In contrast to the experiments described above, Knoll and Charman (2000) found only training effects on close transfer tasks in their ToM training study. Performance on distant transfer tasks was not improved. For example, in Experiment 1, Knoll and Charman encouraged children in the false-belief training group (n = 11) to discuss the events of various unexpected transfer scenarios. In the control group (n = 11), the experimenter read stories unrelated to ToM. Three training sessions over the course of 2 weeks were administered within groups of three or four children. At posttest, children in the false-belief training group showed a significant improvement on an unexpected transfer task but their performance did not increase on a deceptive box task. Children in the control group showed no improvement in either of these two tasks. One possible explanation for the lack of distant transfer effects may be that, in contrast to other, successful false-belief training studies, Knoll and Charman used group training schemes rather than one-to-one training sessions. It is possible that genuine ToM understanding can be more effectively trained in one-to-one training sessions.

In addition, a number of researchers have attempted to teach ToM abilities to individuals with autism. Unfortunately, a review of these training studies is beyond the scope of this article.

To summarize, various methodological factors seem to play a role in ToM training studies:

1. Training on ToM tasks seems to be effective only after a certain period of time because earlier training studies found no training effects at an *immediate* posttest (Flavell, Everett, Croft, & Flavell, 1981, experiment 3; Flavell et al., 1986, study 3; Taylor & Hort, 1990). In contrast to recent successful training studies, pretest, training, and posttest were given in a single session in all these unsuccessful training studies. This suggests that it takes time for the children to take in and integrate training experiences. Moreover, a single training session may not be sufficient for improving understanding.
2. Only transfer effects on nontrained tasks clearly show that training led to a genuine increase in understanding, whereas task-specific training effects can be explained by the acquisition of a superficial strategy. Most of the ToM training studies described above report transfer effects to other ToM tasks not incorporated in the training procedure. For example, Appleton and Reddy (1996) found that training on unexpected transfer tasks generalized to a deceptive box test. In Slaughter and Gopnik's (1996) Experiment 2, training on belief as well as training on desire and perception spread to other ToM tasks like an appearance-reality task or a sources-of-knowledge task. In contrast, Knoll and Charman (2000) found no transfer to nontrained ToM tasks, possibly due to their group training scheme.
3. Explaining the correct response may be necessary for training effects to occur. For example, Clements et al. (2000) found that only the explanation condition, in which detailed explanations about the correctness of answers were given, improved children's ability to predict and explain a false-belief–based action. Just informing children of whether their answer was right or wrong was not sufficient. Similarly, Melot and Angeard (2003) found that experience with the relevant tasks alone had no training effect.

EF Training Studies

EF is an umbrella term referring to cognitive self-regulatory control processes like inhibitory control, working memory, or attention shifting, which enable the conscious control of thought and action for the purposes of planning and executing goal-directed behavior. EFs emerge in the 1st years of life, develop in multiple stages, and undergo a slow, protracted developmental progression, not reaching full maturity until early adulthood.

Self-regulation plays a key role for children's ability to adapt to formal school settings and for their learning achievement (e.g., Blair, 2002; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). For example, in school, it is important to regulate one's own behavior in social situations, to control impulsive behaviors, to follow the teacher's instructions, and to attend to lessons. Therefore, executive control may set the ground for learning to take place.

Prior research has established associations between EFs and academic achievement. For example, Bull and Scerif (2001) found a relation between three EFs (inhibition, shifting, and working memory) and mathematics ability even after controlling for reading ability and IQ. Espy et al. (2004) report that both inhibitory control and working memory were related to mathematical skills after controlling for age, vocabulary, and maternal education; but only inhibitory control explained unique variance in mathematical ability. Furthermore, children's ability to delay gratification for the sake of a later, more valued, outcome is related to higher scholastic performance in adolescence (Mischel, Shoda, & Rodriguez, 1989).

Effortful control, "the ability to inhibit a dominant or prepotent response in favor of a subdominant or less salient response" (Blair & Razza, 2007, p. 647), is also positively related to socially appropriate behavior (Eisenberg et al., 2003). In line with this, longitudinal relations between early inhibitory control and later behavioral problems (Nigg, Quamma, Greenberg, & Kusche, 1999) as well as between early inhibitory control and later social competence (Ciairano, Visu-Petra, & Settanni, 2007) have been demonstrated. There is also evidence that earlier EF performance predicts later ToM understanding (Carlson, Mandell, & Williams, 2004; Flynn, O'Malley, & Wood, 2004; Hughes, 1998b). These relations often remained significant after controlling for IQ or verbal ability.

Despite the apparent importance of executive control, there are few training studies in the domain of EFs in children in a laboratory setting (but see Meltzer, 2007 and Diamond, Barnett, Thomas, & Munro, 2007, for classroom-based strategies for teaching EFs). Dowsett and Livesey (2000) assigned 49 3- to 5-year-old children, who were classified as "noninhibitors" on a go/no-go task, to one of three conditions: 17 children practiced the same go/no-go task without explicit feedback (practice condition), 16 children were trained on a modified version of the Wisconsin Card Sorting Test and on a simplification of the change paradigm (Logan & Burkell, 1986) with explicit feedback on performance (training condition), and 16 controls received neither practice nor training. Both exposure to the practice and training condition generated a significant improvement on the go/no-go task, with posttest performance in the training condition being significantly better than in the practice condition.

Children with attention-deficit/hyperactivity disorder (ADHD) experience deficits in EF, including working memory and response inhibition. Klingberg et al. (2005) demonstrated effects of a computer-based training on EFs in a sample of 44 children with ADHD, 7–12 years of age. All children used a computerized training of visuospatial and verbal working memory tasks on at least 20 days during a 5-week period. In the treatment condition, the difficulty level of the tasks was adjusted during the training, but in the comparison condition, a low difficulty level, that was expected to show only minor training effects, was used. Postintervention and at a 3-month follow-up, the treatment group showed a significantly greater improvement than the comparison group on a nontrained visuospatial working memory task. In addition, there were significant treatment effects for other executive tasks (measuring verbal working memory, response inhibition, and reasoning) and parent-rated symptoms of ADHD.

In sum, these two studies indicate that, as in the domain of ToM, explicit feedback is important and that the difficulty level of the training tasks should be age appropriate.

Interrelations Between ToM, EFs, and School Achievement

Also relations between ToM, EFs, and school achievement have been demonstrated. A number of studies have shown a link between developmental advances in ToM and EF, often remaining significant with age and/or verbal intelligence partialled out (e.g., Carlson, Moses, & Breton, 2002; Carlson, Moses, & Claxton, 2004; Frye, Zelazo, & Palfai, 1995; Hala, Hug, & Henderson, 2003; Hughes, 1998a, 1998b; Hughes & Ensor, 2005; Perner, Lang, & Kloo, 2002; for a review, see Perner & Lang, 1999). More specifically, ToM development seems to be specifically linked to one type of executive task, namely, inhibitory tasks involving some kind of conflict (Carlson & Moses, 2001). Importantly, Blair and Razza (2007) found that false-belief understanding, EFs (in particular, inhibitory control), and effortful control were related to kindergarten children's math and literacy ability.

In an attempt to clarify the relationship between ToM and EFs, Kloo and Perner (2003) trained preschool children in both domains. A ToM group was trained on stories about false statements and false beliefs. An EF group was given training on a set-shifting task (card sorting). A control group received one of two different control trainings (relative clause or number conservation training). Each child participated in two training sessions, each lasting about 15 min, within approximately 1 week of each other. Interestingly, generalization worked both ways: The false-belief training led to a significant rise in card-sorting performance, and the card-sorting training significantly increased children's performance on the false-belief task. Though the card-sorting training also significantly improved children's performance on the trained task, the false-belief training did not significantly enhance false-belief performance (possibly due to a ceiling effect).

A study by Fisher and Happé (2005) also suggests that set-shifting training is suitable for improving ToM skills. Fisher and Happé trained children with autism spectrum disorders, who are impaired in both theory of mind understanding (for a review, see, e.g., Frith, 2003) and executive control (for a review, see Hill, 2004), on ToM and EFs. Ten children were trained on ToM by instructing them to think about beliefs as "photos in the head." Ten children were trained on set-shifting using cards varying along different dimensions. Children were trained individually for 25 min per day for 5–10 days. A control group of seven children received no intervention. Both the ToM *and* the set-shifting training lead to an improvement on ToM measures. There was no conclusive evidence for an improvement on EF tasks in any of the training groups (possibly in part due to a ceiling effect). It should be noted that the far-transfer effect of the set-shifting training on ToM is a striking finding considering that most theory of mind training studies in individuals with autism showed only task-specific effects.

The Promoting Alternative Thinking Strategies (PATHS) Curriculum (Kusché & Greenberg, 1994) is an elementary school program designed to promote the development of social-emotional competence. It has two main aims. First, children are encouraged to use self-control strategies like verbal mediation. Second, children are taught to verbally identify feelings and emotions in order to handle them. In a study with 318 7- to 9-year-old children, Riggs, Greenberg, Kusché, and Pentz (2006) showed that the PATHS Curriculum reduces externalizing and internalizing behavior problems and does so, in part, via the mediating role of inhibitory control. Riggs et al. even conclude that "it appears that inhibitory control is the main generative mechanism in the relation between PATHS and behavioral outcomes" (p. 98).

FUTURE DIRECTIONS

To sum up, two important school-related competencies—executive control and social cognition—can be trained. Future research should further investigate the school and preschool application of ToM and EF trainings. Also, as Riggs et al.

(2006) suggest, future studies should combine training interventions and neural imaging techniques to be able to detect possible training effects on neural structures and to better understand the underlying developmental mechanisms. Indeed, some studies have demonstrated structural and functional changes in adults in relation to training (see Kelly & Garavan, 2005, for a review).

A breakthrough study with children using this promising approach comes from Rueda, Rothbart, McCandliss, Saccomanno, and Posner (2005). They investigated executive attention in 4- and 6-year-old children. Executive attention is thought to be necessary in situations when there is conflict between several responses. Half of the children received 5 days of attention training using computerized exercises like a number Stroop or stimulus discrimination tasks. Compared to a control group, the trained children showed some improvement on executive attention and intelligence measures. Perhaps more importantly, event-related potentials recorded from the scalp revealed changes in the pattern of brain activations. After training, the 4-year-olds showed a pattern similar to the untrained 6-year-olds, and the trained 6-year-olds showed a more adult-like neural response. Furthermore, by including genotyping and a temperament questionnaire, Rueda et al. were also able to explore the role of effortful control and genotype for interindividual variation in executive attention.

In sum, several studies indicate that social skills and EFs are amenable to training. Considering the fact that these fundamental cognitive abilities are critical for success in school, future studies should follow up this important area of research.

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NOTE

1 However, it should be noted that advanced ToM understanding may not only have positive but also negative social outcomes. For example, ringleader bullies have been shown to score higher on social cognition measures than follower bullies, victims, and defenders of victims (Sutton, Smith, & Swettenham, 1999).

REFERENCES

Amsterlaw, J., & Wellman, H. M. (2006). Theories of mind in transition: A microgenetic study of the development of false belief understanding. *Journal of Cognition and Development*, *7*, 139–172.

Appleton, M., & Reddy, V. (1996). Teaching three year-olds to pass false belief tests: A conversational approach. *Social Development*, *5*, 275–291.

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist*, *57*, 111–127.

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, *78*, 647–663.

Bull, R., & Scerif, G. (2001). Executive functioning as a predictor of children's mathematics ability: Inhibition, switching, and working memory. *Developmental Neuropsychology*, *19*, 273–293.

Carlson, S. M., Mandell, D. J., & Williams, L. (2004). Executive function and theory of mind: Stability and prediction from age 2 to 3. *Developmental Psychology*, *40*, 1105–1122.

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development*, *72*, 1032–1053.

Carlson, S. M., Moses, L. J., & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. *Infant and Child Development*, *11*, 73–92.

Carlson, S. M., Moses, L. J., & Claxton, L. J. (2004). Individual differences in executive functioning and theory of mind: An investigation of inhibitory control and planning ability. *Journal of Experimental Child Psychology*, *87*, 299–319.

Chen, X., Rubin, K. H., & Li, D. (1997). Relation between academic achievement and social adjustment: Evidence from Chinese children. *Developmental Psychology*, *33*, 518–525.

Ciairano, S., Visu-Petra, L., & Settanni, M. (2007). Executive inhibitory control and cooperative behavior during early school years: A follow-up study. *Journal of Abnormal Child Psychology*, *35*, 335–345.

Clements, W. A., Rustin, C. L., & McCallum, S. (2000). Promoting the transition from implicit to explicit understanding: A training study of false belief. *Developmental Science*, *3*, 81–92.

Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science*, *318*, 1387–1388.

Dowsett, S. M., & Livesey, D. J. (2000). The development of inhibitory control in preschool children: Effects of "executive skills" training. *Developmental Psychobiology*, *36*, 161–174.

Dunn, J., Brown, J., & Beardsall, L. (1991). Family talk about feeling states and children's later understanding of others' emotions. *Developmental Psychology*, *27*, 448–455.

Eisenberg, N., Valiente, C., Fabes, R. A., Smith, C. L., Reiser, M., Shepard, S. A., et al. (2003). The relations of effortful control and ego control to children's resiliency and social functioning. *Developmental Psychology*, *39*, 761–776.

Espy, K., McDiarmid, M., Cwik, M., Stalets, M., Hamby, A., & Senn, T. (2004). The contribution of executive functions to emergent mathematic skills in preschool children. *Developmental Neuropsychology*, *26*, 465–486.

Fisher, N., & Happé, F. (2005). A training study of theory of mind and executive function in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *35*, 757–771.

Flavell, J. H., Everett, B. A., Croft, K., & Flavell, E. (1981). Young children's knowledge about visual perception: Further evidence for the Level 1–Level 2 distinction. *Developmental Psychology*, *17*, 99–103.

Flavell, J. H., Flavell, E. R., & Green, F. L. (1983). Development of the appearance-reality distinction. *Cognitive Psychology*, *15*, 95–120.

Flavell, J. H., Green, F. L., & Flavell, E. R. (1986). Development of knowledge about the appearance-reality distinction. *Monographs of the Society for Research in Child Development*, *51*(1, Serial No. 212).

Flynn, E., O'Malley, C., & Wood, D. (2004). A longitudinal, microgenetic study of the emergence of false belief understanding and inhibition skills. *Developmental Science*, *7*, 103–115.

Frith, U. (2003). *Autism: Explaining the enigma* (2nd ed.). Oxford, UK: Blackwell.

Frye, D., Zelazo, P. D., & Palfai, T. (1995). Theory of mind and rule-based reasoning. *Cognitive Development*, *10*, 483–527.

Hala, S., Hug, S., & Henderson, A. (2003). Executive function and false-belief understanding in preschool children: Two tasks are harder than one. *Journal of Cognition and Development*, *4*, 275–298.

Hale, C. M., & Tager-Flusberg, H. (2003). The influence of language on theory of mind: A training study. *Developmental Science*, *6*, 346–359.

Hill, E. L. (2004). Executive dysfunction in autism. *Trends in Cognitive Sciences*, *8*, 26–32.

Howse, R. B., Calkins, S. D., Anastopoulos, A. D., Keane, S. P., & Shelton, T. L. (2003). Regulatory contributors to children's kindergarten achievement. *Early Education and Development*, *14*, 101–120.

Hughes, C. (1998a). Executive functions in preschoolers: Links with theory of mind and verbal ability. *British Journal of Developmental Psychology*, *16*, 233–253.

Hughes, C. (1998b). Finding your marbles: Does preschoolers' strategic behaviour predict later understanding of mind? *Developmental Psychology*, *34*, 1326–1339.

Hughes, C., & Ensor, R. (2005). Theory of mind and executive function in two-year-olds: A family affair? *Developmental Neuropsychology*, *28*, 645–668.

Hughes, C., & Leekam, S. (2004). What are the links between theory of mind and social relations? Review, reflections and new directions for studies of typical and atypical development. *Social Development*, *13*, 590–619.

Hülsken, C. (2001). *Training in der Theory of Mind-Forschung: Die Rolle von Kohärenz und Feedback in der Entwicklung einer naiven Alltagspsychologie*. Herzogenrath, Germany: Shaker-Verlag.

Jenkins, J. M., & Astington, J. W. (2000). Theory of mind and social behavior: Causal models tested in a longitudinal study. *Merrill-Palmer Quarterly*, *46*, 203–220.

Kelly, A. M. C., & Garavan, H. (2005). Human functional neuroimaging of brain changes associated with practice. *Cerebral Cortex*, *15*, 1089–1102.

Klingberg, T., Fernell, E., Olesen, P., Johnson, M., Gustafsson, P., Dahlstrom, K., et al. (2005). Computerized training of working memory in children with ADHD-a randomized, controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, *44*, 177–186.

Kloo, D., & Perner, J. (2003). Training transfer between card sorting and false belief understanding: Helping children apply conflicting descriptions. *Child Development*, *74*, 1823–1839.

Knoll, M., & Charman, T. (2000). Teaching false belief and visual perspective-taking skills in young children: Can a theory of mind be trained? *Child Study Journal*, *30*, 273–304.

Kusché, C. A., & Greenberg, M. T. (1994). *The PATHS (Promoting alternative thinking strategies) curriculum*. South Deerfield, MA: Channing-Bete.

Lohmann, H., & Tomasello, M. (2003). The role of language in the development of false belief understanding: A training study. *Child Development*, *74*, 1130–1144.

Logan, G. D., & Burkell, J. (1986). Dependence and independence in responding to double stimulation: A comparison of stop, change, and dual-task paradigms. *Journal of Experimental Psychology: Human Perception and Performance*, *12*, 549–563.

Malecki, C. K., & Elliot, S. N. (2002). Children's social behaviors as predictors of academic achievement: A longitudinal analysis. *School Psychology Quarterly*, *17*, 1–23.

Melot, A.-M., & Angeard, N. (2003). Theory of mind: Is training contagious? *Developmental Science*, *6*, 178–184.

Meltzer, L. (Ed.). (2007). *Executive function in education: From theory to practice*. New York: Guilford.

Mischel, W., Shoda, Y., & Rodriguez, M. (1989). Delay of gratification in children. *Science*, *244*, 933–938.

Nigg, J. T., Quamma, J. P., Greenberg, M. T., & Kusche, C. A. (1999). A two-year longitudinal study of neuropsychological and cognitive performance in relation to behavioral problems and competencies in elementary school children. *Journal of Abnormal Child Psychology*, *27*, 51–63.

O'Neill, D. K., & Gopnik, A. (1991). Young children's ability to identify the sources of their beliefs. *Developmental Psychology*, *27*, 390–397.

Perner, J., & Lang, B. (1999). Development of theory of mind and executive control. *Trends in Cognitive Sciences*, *3*, 337–344.

Perner, J., Lang, B., & Kloo, D. (2002). Theory of mind and self-control: More than a common problem of inhibition. *Child Development*, *73*, 752–767.

Perner, J., & Leekam, S. R. (2008). The curious incident of the photo that was accused of being false: Issues of domain specificity in development, autism, and brain imaging. *Quarterly Journal of Experimental Psychology*, *61*, 76–89.

Perner, J., Ruffman, T., & Leekam, S. R. (1994). Theory of mind is contagious; you catch it from your sibs. *Child Development*, *65*, 1224–1234.

Riggs, N. R., Greenberg, M. T., Kusché, C. A., & Pentz, M. A. (2006). The mediational role of neurocognition in the behavioural outcomes of a social-emotional prevention program in elementary school students: Effects of the PATHS Curriculum. *Prevention Science*, *7*, 91–102.

Rueda, M. R., Rothbart, M. K., McCandliss, B. D., Saccomanno, L., & Posner, M. I. (2005). Training, maturation, and genetic influences on the development of executive attention. *Proceedings of the National Academy of Sciences of the United States of America*, *102*, 14931–14936.

Ruffman, T., Perner, J., Naito, M., Parkin, L., & Clements, W. A. (1998). Older (but not younger) siblings facilitate false belief understanding. *Developmental Psychology*, *34*, 161–174.

Slaughter, V. (1998). Children's understanding of pictorial and mental representations. *Child Development*, *69*, 321–332.

Slaughter, V., & Gopnik, A. (1996). Conceptual coherence in the child's theory of mind: Training children to understand belief. *Child Development*, *67*, 2967–2988.

Sutton, J., Smith, P. K., & Swettenham, J. (1999). Social cognition and bullying: Social inadequacy or skilled manipulation? *British Journal of Developmental Psychology*, *17*, 435–450.

Taylor, M., & Hort, B. (1990). Can children be trained in making the distinction between appearance and reality? *Cognitive Development*, *5*, 89–99.