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Improving typically developing children's acceptance toward children with autism via teaching with picture books

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A quasi-experimental group design with repeated measures at pretest and posttest was employed to examine the effect of teaching with picture books about autism on improving typically developing children's acceptance and attitude toward children with autism in this study. The participants were children with autism and their typically developing peers in two regular elementary schools, one from Hangzhou (as experimental group) and the other from Ningbo (as control group). A six-week long teaching with picture books about autism was carried out for the thirty-six typically developing children in the experimental group. The typically developing children's attitude toward their classmate with autism was assessed before and after the experiment for both experimental and control groups. The results indicated that teaching with picture books about autism improved the peer's acceptance of children with autism in three domains: basic understanding, emotional attitude, and behavioral tendency, with high social validity. However, the quality of peer relationship between children with autism and their typically developing peers was not increased significantly during the study.

Keywords: inclusive education, children with autism, teaching with picture books, acceptance, peer relationship, attitude

Including students with disabilities in the general education classroom is an increasing international trend of educational placement for children with autism (Camargo *et al.* 2014). Yet children with autism may as well face various specific challenges in the inclusive education settings due to their characteristics with difficulties in social communication and interaction, and with repetitive behavioral patterns and restricted interests (American Psychiatric Association 2013). One of the salient challenges is that children with autism have difficulties to be fully accepted by their typically developing peers (Rotheram-Fuller *et al.* 2010).

Peer acceptance of children with autism in inclusive classroom

It is found in a study exploring 233 typically developing children's attitude toward their autistic peers that the typically developing children held negative attitudes toward children with autism and denied their participation in daily social interactions (Swaim and Morgan 2001). Research has also found that even though children with high-functioning autism could be occasionally accepted by typically developing peers and had opportunity to participate in class activities, they still received more rejections and were more easily marginalized in classroom social networks than typically developing peers did (Locke *et al.* 2010). Findings of several studies even suggest that children with autism were more likely to receive rejection, derision, isolation and bullying from their peers (Ochs *et al.* 2001, Cappadocia *et al.* 2012). Chamberlain et al. (2007) discovered that peer acceptance of students with autism in general education classes was generally worse than that of typically developing students and that such situation may get improved somehow as the grade increased. However, children with autism appeared to have a significantly lower level of social status as compared with typically developing peers and children with other disabilities in the class-wide peer relationship network, and were seldom nominated as friends by their peers (Locke *et al.* 2013). In addition, children with autism were often

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found to be alone during recess and rarely take part in social interactions and activities with peers (Locke *et al.* 2016). Therefore, improving social acceptance of children with autism by typically developing peers as well as their overall peer relationships in general education settings has become the focus of numerous interventions.

Teaching with picture books (TPB)

Picture book is a unique genre of literacy books in which the story is told through a combination of words and picture illustration. Picture books were originally designed for infants and toddlers to nurture early learning and appeared, more recently, to be used to older readers with more sophisticated contents. Picture books function in multiple ways to meet children's basic learning needs and help children to deeply immerse into classic humanity atmospheres to experience emotions of characters in the stories. Most importantly, a picture book always embraces a specific theme around morality and philosophy explicitly or implicitly. While the theme is embedded in the story, it is often unfolded with the narration of a story to teach a lesson to children for helping shape their thoughts, personality, and behaviors (Prater *et al.* 2006, Wu 2013). Prior studies suggested that visual form of presentation via picture books about social behaviors could help children master social skills quickly and become more empathetic (Cartledge and Kiarie 2001), and that TPB about social interaction significantly promoted the cognitive and emotional development of preschool children's prosocial behaviors (Yang *et al.* 2014).

Improving peer acceptance for children with special needs via TPB

Research efforts have been made to improve typically developing children's acceptance toward children with special needs via TPB. In a study using picture books, learning sheets, and campus accessibility survey to teach typically developing students in the elementary schools, Ning (2006) found that varying degrees of attitude change occurred in three domains: cognition, emotion, and behavioral tendency. Not only had the typically developing students changed some stereotypical attitudes to their peers with special needs and become more respectful, but also the positive interaction between the typically developing students and students with special needs was increased significantly. Hu (2009) examined the effect of TPB on sixth-grade students and discovered that learning environment in the classroom became more positive and inclusive. Peer's acceptance of students with special needs was also increased, while the adaptability of students with special needs to class learning was improved. In a study conducted in the general education preschool settings, Fan (2012) noticed that TPB can improve typically

developing children's acceptance toward their classmates with physical disabilities in three areas: cognition, emotion, and behavior. Findings of all above mentioned studies seem to suggest that effective TPB can help typically developing children develop a positive image and understanding of children with special needs, and thus improve their acceptance and respectful attitude toward their peers with disabilities.

It is interesting to note that the underlying conceptual ideas shared by above studies seemed to focus on promoting all the three dimensions of peer acceptance. Song (2014) contended that the optimal model of TPB for promoting peer acceptance changes of typically developing children is "knowledge-emotion-behavior" model. The model emphasizes the sequential changes brought about by using picture books teaching: change cognitive understanding first, and then enhance positive emotional reactions, and lastly, increase behavioral tendency of acceptance, which is rooted in the Theory of Reasoned Action (Fishbein and Ajzen 1997) proclaiming that understanding of behavioral characteristics and change of attitude could eventually influence a person's behavior tendency. Therefore, such conceptual ideas became the basis of developing a logic model of the present study.

Purpose of current study

The intent of this study was reinforced by some prior research efforts already exploring the use of picture books about autism to promote understanding and acceptance of typically developing children toward their peers with autism. Studies have demonstrated that TPB including stories with interesting plots, vivid pictures, and positive-tone descriptions of the characteristics of children with autism can help typically developing children gain better understanding of children with autism and master some basic skills to interact with them socially (Maich and Belcher 2012, Brenna 2013). Yet still little is known about empirical evidence of TPB to promote typically developing peer's acceptance of children with autism and eventually improve peer relationship between the two parties. Using a repeated measure quasi-experimental design, this study focused on examining the effect of picture books teaching on improving peer's acceptance and peer relationship toward children with autism. We asked two broad research questions: a) Does TPB about autism affect typically developing children's acceptance toward children with autism? b) Can TPB about autism also affect positively peer relationships between children with autism and their peers?

Methods
Participants

A total of 70 s grade students participated in this study. Thirty-nine students from one regular elementary school in Hangzhou and 36 students from another regular elementary school in Ningbo were initially selected.

With a small dropout rate of the participants due to the students' personal reasons (e.g., leave of absence), 36 students from Hangzhou and 34 students from Ningbo fully completed this study. Students from Hangzhou were in the experimental group where they received TPB while students from Ningbo did not receive TPB, serving as the control group. Of 36 participants from Hangzhou, 22 (61.1%) were boys and 14 (38.9%) were girls. Of 34 participants from Ningbo, 18 (52.9%) were boys and 16 (47.1%) were girls.

For both groups, they had one classmate who is a child with autism. The two children with autism had the formal diagnosis of autism given by the qualified professionals in their local hospitals with which mild intellectual disability was also recorded. Teachers reported that they had basic academic skills (e.g., rote memory of most of the Chinese characters in textbook; writing simple sentences in $S + V + O$ and counting numbers). In terms of observations, the child with autism in experimental group could passively communicate and work with his peers, but had poor active and spontaneous social communication skills and sometimes exhibited inappropriate behavior to initiate social interaction (e.g., pull peers' hair to draw their attentions). He also had a great difficulty to maintain peer relationship. Moreover, he showed numerous challenge behaviors such as leaving seat without permission during the class, keeping asking the same question and sometimes throwing temper tantrum abruptly (e.g., crying and screaming). The child with autism in the control group similarly had insufficient social communication skills. He used to stay alone during recess time and rarely initiated social interaction toward peers. Although he could respond with simple words to others' request, in most of time he reacted inappropriately (e.g., avoiding eye contacts) which made it difficult to maintain peer relationship. In addition, he couldn't regulate and control his emotion very well. Sometimes he shouted and screamed suddenly during the class.

Hangzhou and Ningbo are adjacent from each other in Zhejiang province, China with similar economical and educational demographics. The teaching qualities of the teachers involved in this study from the two schools were comparable.

Measures

A modified questionnaire of "Questionnaire on the Acceptance of Typically Developing Children toward Children with Autism" was used in this study. Considering that the participants were only second grade students with limited literacy and language skills, we modified the survey based on "The Scale on Kindergarten Children's Acceptance to Their Peers with Disabilities" (Yang 2008) and "The Scale on the Acceptance of Typically Developing Children to Their Peers with Disabilities" (Fan 2012). The modified

questionnaire had 30 items in two sections: demographic information section (2 items) and peer acceptance section (28 items). The items on the peer acceptance section comprised of three domains/dimensions: basic understanding (9 items), emotional attitude (9 items), and behavioral tendency (10 items). The questionnaire adopted a 3-point Likert scale with the responses: No (0), Sometimes (1), and Yes (2). Participants were asked to fill out the questionnaire at pretest and post-test. The higher the scores are rated, the better acceptance they indicate. The overall internal reliability (Cronbach's α) of the questionnaire was 0.96. The reliabilities of three dimensions were respectively 0.78, 0.92 and 0.93, indicating good reliability of the survey. Confirmatory factor analysis conducted to this study sample via SPSS Amos22.0 yielded satisfactory results. The model evaluation index was good ($\chi^2/\mathrm{df} = 1.20$, $p = 0.30$), and the fit indices were acceptable: RMSEA (0.05), GFI (0.79), IFI (0.92), and CFI (0.92). The results suggested a good construct validity of the survey.

This study also adopted the peer nomination approach (Coie *et al.* 1982). Each participant nominated three students who they like most and three they dislike most and wrote their names in a piece of paper to measure the class-wide social network status of the children with autism before and after the experiment.

Materials

Picture books about autism were used as teaching materials. Gaffney and Wilkins (2016) noted that basic principles of selecting picture books about autism were as follows: (1) the language of picture books should be positive; (2) the author of picture books should have direct experience with children with autism or be experts in the field of autism; (3) the characteristics of children with autism depicted in picture books should meet diagnostic criteria; and (4) strengths of children with autism should also be incorporated in the picture books. We searched for Chinese picture books about autism published in the largest online bookseller of China, Dangdang. Only five picture books were identified. Two of them were then excluded since they didn't conform to the principle (2). The remaining three were "Unimaginable Friends" (Tajima 2017), "Russell's World: A Story for Kids about Autism" (Amenta III and Pollack 2014) and "My Friend with Autism" (Bishop and Bishop 2017). *Unimaginable Friends* tells a story about how a typically developing child and a child with autism grow up together and become friends gradually to show children with autism's simple and pure heart. *Russell's World: A Story for Kids about Autism* depicts the family experiences of a boy with autism through photos and stories to help readers gain a full understanding of characteristic of children with autism (e.g., lack of social communication skills, different

play styles, restricted and repetitive behaviors, sensory oversensitivity, etc.) and some challenges inflicted to their families. *My Friend with Autism* is a picture book of a story told by a peer about the difficulties his friend with autism encounters and the proper ways to g*et al*ong with his friends.

Process
Pretest and posttest
This study employed a pretest–posttest quasi-experimental design. Pretest was conducted in both experimental and control group by using the modified peer acceptance questionnaire and peer nomination approach one week before TPB. Participants took the pretest and posttest in their classrooms. Typically developing children first filled out the questionnaire, and then completed the peer nomination task. Instructions were given before the pretest. Participants were required to fill out the questionnaire independently. To control the effect of social expectations, teachers were not present in the classroom during pretest time. Researchers only explained the meaning of questions to the participants. The child with autism was absent from the classroom when other participants filled out the questionnaire. The child with autism also completed the peer nomination task with their parent's accompany. One week after the completion of TPB, the same questionnaire and peer nomination task were completed again by the same participants at posttest. The procedures were the same as pretest. Finally, 36 valid questionnaires were collected for the experimental group and 34 for the control group at both pretest and posttest.

TPB about autism
TPB about autism was only delivered to the participants in the experimental group. The teaching plan was discussed and written down by the researchers and the reading teacher of experimental group together. In order to avoid the forming social expectation during instruction, TPB about autism was carried out as a part of the class' existing picture books reading lessons and the purpose of the teaching wasn't informed to the students. Teaching was conducted strictly by the second researcher based on the teaching plan, including components of researcher's guidance, group reading, and role play. Three picture books were taught in the following order: *Unimaginable Friends* (overall understanding children with autism and the pure relationship between them and people), *Russell's World: A Story for Kids about Autism* (learning more about the characteristic of children with autism) and *My Friend with Autism* (learning how to g*et al*ong with children with autism). The lesson was given once a week and instructions lasted for 6 weeks. Each picture book was taught in a weekly lesson (45 min) for two weeks totally.

The first lesson included researcher's guidance and group reading to help students understand the story and improve their recognition of autism or how to g*et al*ong with them. The researcher used multimedia to present the content of the picture book and performed the story with vivid oral language, gestures, and facial expressions in order to help children better understand the details and characters of the story and sense the emotions expressed in the picture books. Children could ask questions during the teaching process. After that, the researcher asked questions to guide students understand the story and autism deeply. The questions were based on the content of each picture book and mainly referred to the characteristic of the characters with autism (strength and weakness), the way to g*et al*ong with children with autism, students' feeling of children with autism and their behavior tendency in future (see Table 1). If the students couldn't answer the question, the research would go back to the corresponding page and explained it orally. The second lesson contained mainly students' activities to induce students to experience the feeling of children with autism and practice how to g*et al*ong with them. Since the students already knew the story through the first lesson, the researcher asked the students to retell the story in their own words. In addition, role play was conducted under the guidance of researcher. Thirty-six students were divided into six group with 6 students in each group. Each group discussed the characteristic of characters and the story, assigned roles and acted out the story.

Social validity survey
A week after the completement of TPB, another survey was conducted to the typically developing children in the experimental group to probe the social validity of this study, and structured interviews were also conducted with the head teacher and the mother of child with autism in the experimental group. The survey for typically developing children included four yes-no questions, "Do you like the teaching?", "Does the teaching change your recognition of children with autism?", "Dose the teaching change your acceptance toward children with autism?" and "Would you like to participate similar activities in the future?". The structured interviews for teachers consisted of three open-ended questions: "What do you think of the TPB?", "What does the teaching bring to you?" and "What are the changes of students' attitude toward to the child with autism after teaching?". Three open-ended questions were also asked for the mother of child with autism: "What do you think of the TPB?", "What does the teaching bring to your child?" and "What are the changes of students' and teachers' attitude toward your child after teaching?".

Table 1. Questions for each picture books during teaching.

Picture books	Questions
Unimagining Friends	1. Who is my friend? What is wrong with him? 2. What is Xiao An different from his classmates? 3. What does Xiao An do very well? 4. What do you fell about Xiao An? 5. How do classmates and teachers get along with Xiao An? 6. How do I get along with Xiao An? 7. Why do I think Xiao An is an unimaginable friend? 8. What do you fell about the relationship between I and Xiao An? 9. If you have a friend like Xiao An, what will you do?
Russell's World: A Story for Kids about Autism	1. What is wrong with Russell? What does it mean to him? 2. Why is Russell with autism? 3. Do children like Russell like to make friends? Why? 4. How do children like Russell speak? 5. What kinds of strange behaviors may children like Russell show? 6. How do the children like Russell communicate with others? 7. Why brothers and parents reward Russell a cheerio if he responds to them? 8. What are difficult for children like Russell to learn? What can they do well? 9. How do children like Russell play games and toys? 10. Can all the children like Russell do action gracefully? 11. Are children like Russell sensitive to environmental changes? 12. Are they mean when children like Russell show disruptive behaviors? 13. What would happen to children like Russell to go to sleep? 14. Do Russell's brothers and parents love him? Why? 15. What do you fell about Russell's strange behaviors? 16. What will you do if you encounter a child with autism?
My friend with autism	1. What happens to my friend? 2. What is my friend good at? 3. What does my friend struggle with? 4. What do I do when my friend doesn't like to be touched or hugged? 5. What do I do when my friends can't communicate freely? 6. What do I do if my friend doesn't like to share with me? 7. What do I do if my friend refused to change? 8. What do I do if my friend couldn't calm down? 9. What is the effective way to help my friend? 10. How do you fell about my friend? 11. If you have a friend with autism, what will you do?

Table 2. Pretest comparisons of peer acceptance in the experimental and control groups.

	Experimental group ($n = 36$)		Control group ($n = 34$)			
	M	SD	M	SD	t	p
Basic understanding	10.78	3.55	11.97	3.60	−1.40	0.17
Emotional attitude	13.58	4.91	13.62	4.92	−0.03	0.98
Behavioral tendency	14.97	3.88	15.21	4.50	−0.23	0.82
Total	39.33	10.41	40.79	11.43	−0.56	0.58

Data analysis

The questionnaire data were analyzed by SPSS16.0 software. UCINET6.0 and NETDRAW2.0 were adopted to analyze the information of peer nominations.

Results

The focus of this study was to examine the effect of TPB about autism on typically developing children's acceptance toward children with autism and the relationship between them. The major findings of this study were reported in the following sequence: (1) comparisons between the experimental and control groups for peer acceptance of typically developing children toward children with autism, (2) changes of the class-wide social network status of the children with autism between pretest and post-test for both groups, (3) stability of peer relationships, and (4) social validity.

Group comparisons on peer acceptance

When comparisons were first made at pretest, there was no significant differences in the total scores of acceptance, basic understanding, emotional attitude, and behavioral tendency toward children with autism between the experimental and control groups (see Table 2). The results indicated no difference in peer acceptance of typically developing children toward children with autism between the two groups before the TPB took place.

Analysis was then done to look into group mean difference between the experimental and control groups based on the score changes of the peer acceptance questionnaire with respect to the total survey score and scores of three domains (i.e. basic understanding, emotional attitude, and behavioral tendency). Results showed that the score increase in the experimental group was significantly higher than that in the control

Table 3. Comparisons of change scores of peer acceptance between experimental and control groups.

	Experimental group (*n* = 36)		Control group (*n* = 34)			
	M	*SD*	*M*	*SD*	*t*	*p*
basic understanding	3.22	3.27	1.03	4.25	2.43	0.02
emotional attitude	2.86	4.21	0.73	4.53	2.03	0.04
behavioral tendency	2.08	3.60	0.21	3.95	2.53	0.01
Total score	8.16	8.25	1.56	10.23	2.98	0.00

group on all three domains of the peer acceptance questionnaire and its total score (see Table 3). The score changes ranging from high to low were associated with the domains of basic understanding, emotional attitude, and behavioral tendency respectively. The significantly different ratings of the peer acceptance questionnaire between the experimental and control groups suggest that TPB about autism effectively promoted the peer acceptance of typically developing children toward children with autism.

Changes of the class-wide social network status of children with autism

Results of peer nominations between the experimental and control groups at both pretest and post-test were plotted as social network figures (see Figure 1). Individual centrality refers to the position of individual in a social network, which can be measured by degree centrality (Coie *et al.* 1982). Degree centrality is a simple count of the total number of connections link to the particular vertex. For directed networks, there are two measured degree: in-degree and out-degree. In-degree is the number of connections that point inward at a vertex. Out-degree is opposite. In this study, the number of "like" or "dislike" the child received was in-degree and the number of "like" or "dislike" the child gave to peers was out-degree. In-degree and out-degree can be normalized in class-wide in order to conduct comparison among individuals, which is called relative in-degree and out-degree. Since all the children in this study were required to choose three "like or "dislike" classmates, the out-degree were the same among them. In this case, only relative in-degree was calculated as an indicator of individual centrality of children with autism. The results are presented in Table 4.

As shown in Figure 1a, there were five children in the experimental group chose the child with autism as the "like" one before the experiment took place. The relative in-degree centrality of the child with autism was 0.14, ranked No. 6 "like" in the whole class (of 36 participants).

In contrast, only one child in the experimental group chose the child with autism as the "dislike" one. The relative in-degree centrality of the child with autism was 0.03, ranked No. 21 "dislike" in the whole class (see Table 4). These results indicated that the child with autism was located in the central area of the class social network, and had a good social status. After the

experiment being conducted, Figure 1a showed that four children in the experimental group chose the child with autism as the "like" one in the class. The relative in-degree centrality of the child with autism was 0.11, ranked No. 9 "like" in the whole class. Interestingly no longer did anyone in the experimental group rated the child with autism as the "dislike" one (i.e., the inward centrality was 0, ranked the least "dislike" in the class as seen in Table 4. Despite minimal change of relative in-degree centrality of the child with autism, he remained a central position in the class-wide social network in the experimental group. Yet the change of "dislike" rating was noteworthy and will be discussed later.

In comparison, it is shown in Figure 1b that at the pretest, there were two peers in the control group choosing the child with autism as the "like" one. His relative in-degree centrality was 0.06, ranked No. 16 in the class. As for the "dislike" nomination, two peers in the control group chose the child with autism as the "dislike" one. The relative in-degree centrality of the child with autism was 0.06, ranked No. 14 in the class (see Table 4). At the post-test, Figure 1b showed that there were five children in the control group choosing the child with autism as the "like" one. He relative in-degree centrality was 0.15, ranked No.5 "like" in the class. As for the "dislike" nomination, one child in the control group remained choosing the child with autism as the "dislike" one. The relative in-degree centrality of the child with autism was 0.03, ranked No. 18 in the class (see Table 4). In summary, the central position of the child with autism in the class-wide social network in the control group seemed to have shown some positive improvement.

Stability of peer relationships

Stability of peer relationships can be measured by checking the percentage of overlapping about self-selection and other-selection (i.e., selected by peers) as the "like" or "dislike" one in a class-wide social network as well as the change of mutual selection at pretest and post-test (Coie *et al.* 1982). It was shown in Figure 1a that before the experiment, the mutual selection of being "like" between the child with autism and his typically developing peers in the experimental group was 1 pair (with classmate #4) and that the mutual selection of being "dislike" was none (i.e., 0 pair). After the experiment, the mutual selection of being "like" was 1
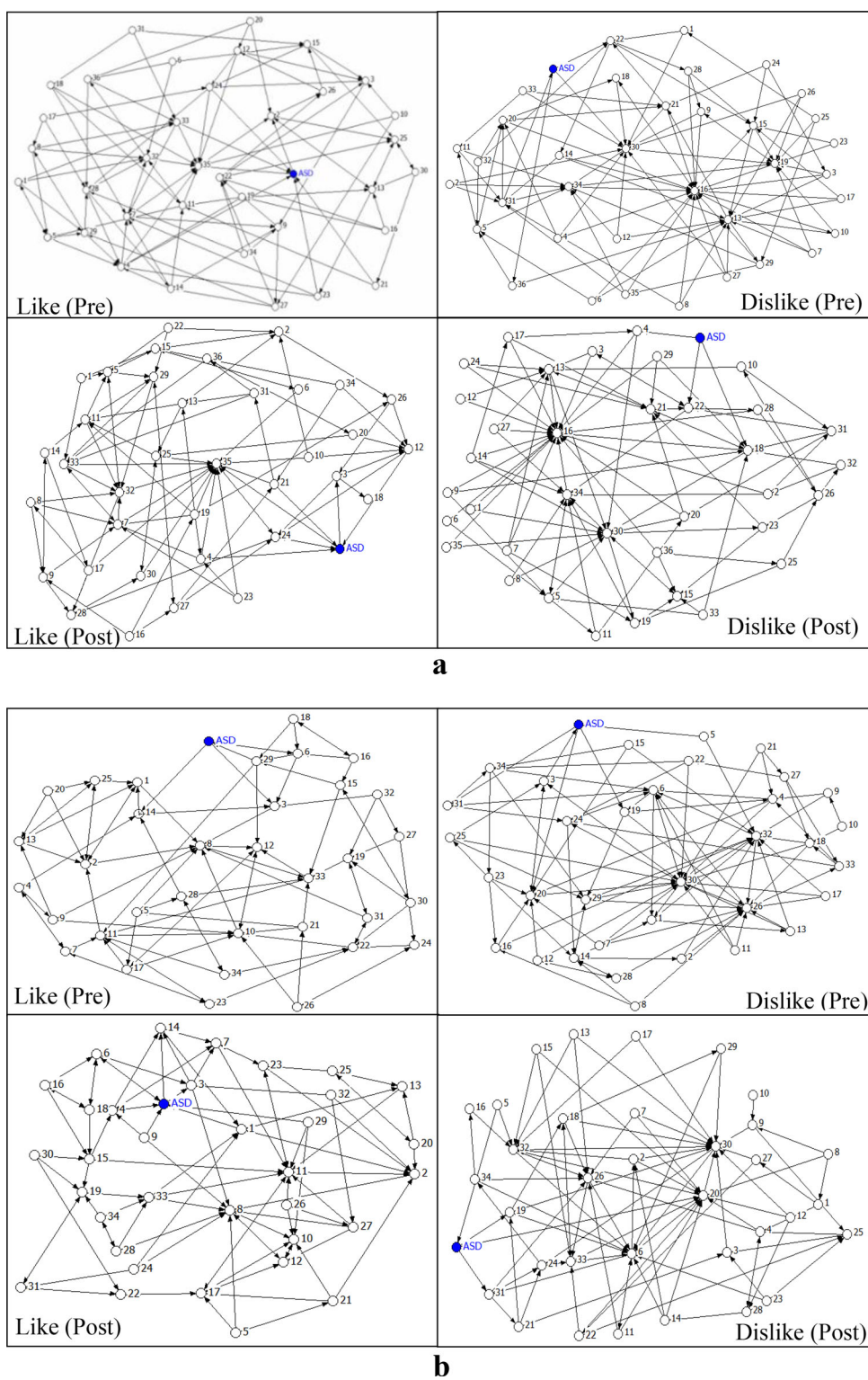
Figure 1. Class-wide social network status of children with autism in the experimental group (a) and control group (b). Circles and numbers represent typically developing children, blue dots represent children with autism, and arrows represent children who they like or dislike.

pair (between the child with autism and classmate # 24) and the mutual selection of being "dislike" was 0 pair. Table 5 showed the percentage of overlapping of the child with autism chosen by his peers before and after the experiment was 50% as the "like" one and 0% as the "dislike" one respectively. In the reverse order of other-selection, the percentage of overlapping of the peers chosen by the child with autism before and after

the experiment was 33.33% for both "like" and "dislike" nominations. Figure 1a also revealed some change of the peer relationship between the child with autism and his peers before and after the experiment given the shift of mutual "like" selection pairs (e.g., from classmate # 4 to classmate # 24).

In comparison, the peer relationship of the child with autism and his peers in the control group was relatively

Table 4. Individual centrality and class-wide social network ranking of children with autism.

			Experimental group		Control group	
			Pretest	Post-test	Pretest	Post-test
Like	Classmates	Range	0-0.28	0-0.36	0-0.27	0-0.29
		Average	0.08	0.08	0.08	0.08
	Child with Autism	Centrality	0.14	0.11	0.06	0.15
		Ranking	6	9	16	5
Dislike	Classmates	Range	0-0.33	0-0.56	0-0.47	0-0.38
		Average	0.08	0.07	0.08	0.08
	Child with Autism	Centrality	0.03	0	0.06	0.03
		Ranking	21	36	14	18

Table 5. Child with autism self-selection and being selected before and after experiment.

		Experimental Group			Control Group		
		Pretest	Post-test	Overlapping	Pretest	Post-test	Overlapping
Other-selection	Like	4, 21, 23, 24,33	4, 12,21, 24	50%	6, 29	1, 4, 6, 9, 29	40%
	Dislike	31	No	0%	3, 5	5	50%
Self-selection	Like	2, 4, 35	3, 24, 35	33.33%	3, 6, 14	3, 6, 14	100%
	Dislike	22, 30, 36	4, 18, 22	33.33%	19, 20, 31	19, 20, 31	100%

stable at the pretest and post-test. For example, it was shown in Figure 1b that the mutual "like" selection between the child with autism and his peers was consistently associated with classmate # 6 at both pretest and post-test. When it comes to the percentage of overlapping of the other-selection by peers for "like" or "dislike" between pretest and post-test, the child with autism in the control group had 40% for the "like" nomination and 50% for the "dislike" nomination. The percentage of overlapping of self-selection, the child with autism in the control group had the same 100% for both "like" and "dislike" nominations (see Table 5).

Social validity

Results showed that 91.67% of children believed that the TPB about autism indeed improved their understanding and acceptance of children with autism, indicating a good social validity of this study. In addition, this form of teaching was also widely accepted by many children. 83.33% of children in the experimental group expressed their like of the teaching, and 87.89% of children wanted to have more similar teaching activities in the future. Head teacher of the experimental group pointed out that this study helped her improve inclusive education practices, and provided her with new ideas for dealing with peer relationships in the class. The mother of child with autism believed that the teaching had effectively improved the understanding of typically developing children and teachers about her child so that her child could be better accepted by their peers. She also mentioned that the teaching helped her child reduce psychological pressure associated with not being understood by peers.

Discussion

Several limitations should be noted before we discuss about the major findings of this study and important implications. First, a relatively small sample size of the participants ($n = 70$) could impact the generalizability of results. Given the lack of a representative sample in this study, we caution against any overgeneralization of the findings about the effect of TPB on peer acceptance toward children with autism in China. Second, only three picture books met the selection criteria and were read to students. It is relative a small sample to provide a comprehensive view and knowledge of the characteristics of autism and the ways to g*et al*ong with them for students to fully understand and accept children with autism. Third, the selection of schools and students was also limited. Since it was hard to find schools in China where numerous children with autism could be included in the same regular class, we had to adjust our study plan to allow the participants only coming from two similar schools where only one child with autism was arranged in each inclusive class due to school policy. Forth, no observational data on the participants' interactive behaviors were collected to corroborate with the self-reported questionnaire data on children's behavioral tendency due to the difficulty of getting schools and parents' consent. Given these limitations, it is important that future research endeavors should replicate such study with large samples representing different schools from different parts of China.

Despite above mentioned limitations, this study has yielded some important findings that can contribute to the field for a better understanding of peer acceptance of children with autism. First, the fact that typically developing peers in the experimental group outperformed those in the control group on all three dimensions of peer acceptance (i.e. basic understanding, emotional attitude, and behavioral tendency) seems to suggest that TPB about autism through reading, discussion, and role-play can really promote peer acceptance of typically developing children toward children with

autism. The results of prior studies indicated that after TPB, typically developing children had positive change in understanding, emotion, and behavioral tendency, showing better peer acceptance toward children with special needs (Wu, 2005; Hu, 2009). The findings of this study are consistent with what have been discovered in those Taiwanese studies. In addition, some of the teaching procedures and learning strategies suggested for employing the TPB approach in the literature have been attested to be useful in this study. Cartledge and Kiarie (2001) proposed a set of teaching procedures (e.g., narrating the story, clarifying the key concepts, explaining the target learning skills, enacting the skills, and practicing and maintaining skills, etc.) for using TPB to promote children's social skills learning. Maich and Belcher (2012) suggested the use of strategies such as: story narration, theme related discussion, and purposefully designed play and activities (e.g., role play and comedy acting) to promote peer awareness of children with autism. It is evident in this study that the features of picture books such as vivid scripts and language use, imaginative plots, attractive pictures, and age appropriate expressions are useful to draw children's attention and better understand the contents and themes of picture books. The teaching strategies such as adult-led discussion and role play employed in this study are demonstrated to be effective to help typically developing peers understand real life challenges from the perspective of children with autism, and thus develop their positive and empathetic attitude to accept children with autism. Moreover, it is equally important to be found in the social validity check with the teachers and parents of children with autism participating in this study that they acknowledge the usefulness of TPB and its real-life impact on children with autism by having more sympathetic and/or empathetic peers.

Second, results of this study reveal that TPB about autism has had different effects on changing the three domains or dimensions of peer acceptance of typically developing children toward children with autism in basic understanding, emotional reaction, and behavioral tendency. The scope of the typically developing children's self-reported changes after receiving TPB varies from greater increase to smaller increase of peer acceptance corresponding with the respective dimensions of basic understanding, emotional attitude, and behavioral tendency. This result is consistent with a model of TPB suggested by Song (2014) which demonstrated that TPB activities could promote the acceptance of typically developing children to children with mental and physical disabilities. As mentioned earlier in the limitations of the study, no direct observational data were able to collect to corroborate with this finding of weaker impact of TPB on children's behavioral tendency. Future research should use observations to capture children's interactions regarding peer acceptance.

Third, despite a significant effect of TPB on promoting peer acceptance of children with autism in this study, we are puzzled by the fact that TPB about autism does not seem to have an effect on significantly improving the quality of peer relationships between children with autism and their typically developing peers. The information of peer nominations sheds light on some positive signs of social network status change between the children with autism and their typically developing peers associated with TPB. For example, there is no peers in the experimental group nominating the child with autism as "dislike" one in the class after the TPB which exhibits a strong contrast with the control group. However, the result that invariance of individual centrality of the child with autism in the class-wide social network before and after the experiment reveals insignificant change of his relationship with typically developing peers seems to suggest a weak or no impact of TPB on peer relationships. Such results are different from some previous research findings where after the TPB children with developmental disabilities have changed gradually their role from being passive as participant to being more active as facilitator and leader leading to the improvement of peer relationship (Zheng 2012), and typically developing peers seek to actively play and interact with children with special needs (Hu 2009, Fan 2012).

The differences between results of this study and previous study findings may as well be of two reasons. On the one hand, improving peer acceptance of typically developing children is necessary but maybe not sufficient to promote the quality of peer relationships. TPB can clearly help improve peers' understanding of children with autism and form a positive attitude toward them. However, it falls short in nurturing some important social and communication skills necessary for both children with autism and their peers to engage in daily social interactions and build a strong relationship (Ma and Zhu 2014). It is also recommended in previous studies that lack of long-term guidance and assistance in the inclusive environments can create difficulty for children with autism to establish reciprocal peer relationships with their typically developing peers (White *et al.* 2007). This study was limited in its timeline and scope of support to maintain a long-term guidance and assistance. On the other hand, different strategies have been incorporated into the TPB approach employed in this study versus those in other studies. Some strategies used in the previous studies (Hu 2009, Fan 2012) may include more extended activities for children with autism and their peers such as: playing games together, watching movies together, and acting in dramas plotted together, which were not adopted in this study. Future research should focus on reexamine the effect of TPB by empirically probing correlational relationship between the scope and level of strategies incorporated

in TPB and the level of improvement of peer relationships.

Implications for practice

Effect of TPB about autism has been demonstrated in many studies including this study in terms of improving understanding and acceptance of typically developing children toward children with autism and helping build up positive peer relationships. Therefore, how to incorporate TPB approach into the teachers' and parents' routine practices has important practical implications.

It is noted that many Chinese teachers face numerous challenges in their daily practices when they need to provide services and support to students with disabilities in inclusive education settings (Wang *et al.* 2018). In particular, when it comes to the situations where children with autism are not welcome and accepted by the peers and even some of their parents, Chinese teachers often feel unprepared or incapable to handle it. Given the effectiveness of TPB in promoting peer acceptance and peer relationship for children with autism and its feasibility to apply in regular schools, teachers in regular schools and/or district resource centers ought to consider adding some thematic picture books about children with special needs in the book corners of classrooms accessible to all students. Teachers should also attempt to incorporate TPB with class assembly meetings and instructional sessions (e.g., reading class) to promote disability awareness and peer acceptance for children with autism. As for how to choose proper picture books, teachers could consider to follow some of the principles identified in this study: a) use positive tone of language, b) book authors have direct experiences of working with children with autism or are experts in the field of autism, c) characteristics of children with autism are well reflected in picture books meeting the diagnostic criteria, and d) strengths of children with autism are highlighted in picture books.

In addition, there are some strategies of TPB deserving teachers' attention. Although it is evident in this study that using individual and group reading, adult led discussion, and role play can be effective to promote students' understanding and emotional reactions to their peers with autism, teachers should not limit their choice of only these strategies. Lessons also learned from this are the importance for teachers to creatively incorporate some extended activities such as: cooperative play, watching movie, and drama performing into the classroom routine. Furthermore, schools should involve parents in recognizing the importance of increasing peer acceptance of children with autism by the means of TPB. Teachers should collaborate with parents in promoting TPB in both school and home settings to enhance disability awareness and change attitude of typically developing students to better accept children with autism as well as facilitate social skills learning for establishing a positive peer relationship.

Disclosure statement

The authors reported no conflict of interest.

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