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Socio-cognitive influences on the domain-specificity of prosocial behavior in the second year

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ABSTRACT

The main aim of this study was to explain the domain-specificity of early prosocial behavior in different domains (i.e., helping, comforting, and cooperation) by simultaneously assessing specific socio-cognitive factors (i.e., self-other-differentiation and joint attentional skills) that were hypothesized to be differentially related to the three domains of prosocial behavior. Based on a longitudinal study design, observational and parental report data were collected when toddlers ($N = 42$) from German urban middle-class families were 15 and 18 months of age. At 15 months, regression analyses indicated differential relationships between socio-cognitive development and prosocial behavior (i.e., joint attentional skills were positively related with helping and, as hypothesized, both joint attentional skills and self-other differentiation were positively related with cooperation). Furthermore, self-other differentiation at 15 months predicted increases in coordination between 15 and 18 months. Finally, between 15 and 18 months, parental reports of socio-cognitive measures increased significantly while behavioral measures of both socio-cognitive concepts and prosocial behavior were stable across time. In sum, these results support the theoretical assumption of domain-specific socio-cognitive influences that constitute differential development of prosocial behavior. Implications of the results for theory and future studies are discussed from different perspectives with a focus on an interference interpretation calling for the integration of socialization approaches to the study of prosocial development.

1. Introduction

1.1. The emergence of prosocial behavior in the second year

Broadly, prosocial behavior can be defined as behavior that is responsive to others' needs and intended to benefit another (Eisenberg, Fabes, & Spinrad, 2006). As a rich body of empirical evidence demonstrates, prosocial behavior emerges around 12 months and increases in frequency and flexibility during the second year in different domains: toddlers start comforting others in distress (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992), they help others reach a goal, either instrumentally or cooperatively (Warneken, Chen, & Tomasello, 2006; Warneken & Tomasello, 2007) and they start sharing resources

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(Rheingold, Hay, & West, 1976). In the current study, we focus on three domains of prosocial behavior that require only little effort and do not involve direct material costs (cf. Warneken & Tomasello, 2009): helping another by handing over an object, comforting someone in distress, and coordination during cooperation, i.e., children's motivation and skill to coordinate their actions to reach a goal with the partner after seeing him fail individually.

1.2. Specific socio-cognitive influences on the different domains of prosocial behavior

More recently, researchers have acknowledged the domain-specific nature of prosocial behavior either by demonstrating that helping and sharing were uncorrelated at 18 and 24 months (Dunfield, Kuhlmeier, O'Connell, & Kelley, 2011) or by showing that helping, comforting, and costly comforting (i.e., giving away one's personal favorite toy), followed different developmental trajectories across the second year (Svetlova, Nichols, & Brownell, 2010). Consequently, the field has moved toward empirically differentiating between different domains of prosocial behavior (see also Paulus & Moore, 2012). The exact mechanism(s) underlying the domain-specific nature of prosocial development during toddlerhood is currently the subject of much debate (e.g., Hay & Cook, 2007). Some authors argue that different domains are based on and require different socio-cognitive capacities (Dunfield et al., 2011; Svetlova et al., 2010). According to these researchers, helping someone instrumentally is the least demanding domain of prosocial behavior because toddlers only have to infer the goal-directedness of the activity that they observe, which they normally begin to do around six to nine months (Woodward, 1998). This argument applies especially to out-of-reach tasks, in which the experimenter unsuccessfully grasps for an object. Comforting others who are in distress, i.e., emotion-related prosocial behavior, on the other hand, is more complex and relies on the presupposition that toddlers can infer and understand the other person's subjective mental state, i.e., their negative emotional state (Dunfield et al., 2011; Svetlova et al., 2010). Empirical support for this assumption comes from studies that have shown that comforting is related to self-other-differentiation as assessed by mirror self-recognition (Bischof-Köhler, 1991; Kärtner, Keller, & Chaudhary, 2010; Zahn-Waxler et al., 1992). Thus, self-other differentiation indexes toddlers' specific competence to differentiate between own and others' psychological states that depend on secondary representation as, e.g., emotions and desires (see Perner, 1991). Therefore, self-other-differentiation in the second year should be correlated with comforting, but not helping. In consequence, the development of self-other differentiation might be one of the factors that contribute to domain-specific development.

With regard to cooperative behavior there is wide consensus that toddlers not only have to differentiate between themselves and others but that they also need to coordinate their own intentions with those of others in order to cooperate successfully (Brownell, 1986; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Warneken et al., 2006). In support of this assumption, Brownell and colleagues could show that toddlers' degree of coordination during cooperation with a peer was positively correlated with self-other-differentiation as assessed by language about self and others (Brownell, Ramani, & Zerwas, 2006) and during an elicited pretense procedure (Brownell & Carriger, 1990).

Another specific aspect of socio-cognitive development that seems essential for successful cooperation is toddlers' social-communicative competence (Tomasello et al., 2005). Coordinating complementary roles and timing activity to coincide with that of the partner presupposes advanced joint attentional skills and, more specifically, toddlers' capacity to respond to and to direct others' attention by gestural communication. In support of this assumption, Brownell et al. (2006) demonstrated that toddlers that were more advanced in sharing an adult's attentional focus (e.g., following and sharing adults' referential points and gazes) were better at coordinating their behavior with a peer during a cooperation-task.

Based on these findings, we hypothesize that the distinctness of different types of prosocial behavior is constituted by domain-specific socio-cognitive influences. More specifically, we hypothesize that both advanced joint attentional skills and self-other differentiation are specific abilities that contribute to the domain-specificity of prosocial behavior in that these concepts are differentially related to helping, comforting, and cooperation. Both self-other differentiation and joint attentional skills are required for toddlers' capacity to cooperate, i.e., to coordinate their behavior with an adult in reaching a goal. As Fig. 1 illustrates, this double requirement sets cooperation apart from both comforting (which only requires self-other differentiation) and helping (which neither requires advanced joint attentional skills nor self-other differentiation).

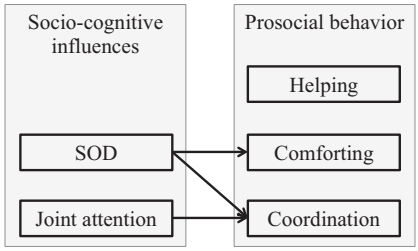

Fig. 1. Hypothesized socio-cognitive influences on the different domains of prosocial behavior.

1.3. The present study

As the review of the literature suggests, studies either focus on demonstrating the domain-specificity of prosocial behavior or on identifying specific socio-cognitive influences on only one domain of prosocial behavior, namely comforting or cooperation. To date, there is no empirical evidence supporting the idea that the domain-specificity of prosocial behavior is constituted by specific aspects of socio-cognitive development, namely advanced joint attentional skills and self-other differentiation. Building on these studies and theoretical considerations, the present study examines exactly this relation between socio-cognitive competencies and their influence on different domains of prosocial behavior in the second year.

Furthermore, taking a longitudinal approach by assessing toddlers at 15 and 18 months of age, we can address the question of development and stability of both prosocial behavior and socio-cognitive competencies across this age span. Previous research has shown that 15 to 18 months of age is a critical period for socio-cognitive development, especially for self-other-differentiation. For instance, research on mirror self-recognition has shown that recognition rates are below 35% for toddlers younger than 18 months of age but recognition rates increase to 40% to 65% between the ages of 18 and 20 months (for a review, see Kärtner, Keller, Chaudhary & Yovsi, 2012). However, mirror self-recognition has been interpreted in a variety of ways and it has been criticized as a rather indirect measure, if at all, of toddlers' capacity to differentiate between own and others' psychological states since it critically assesses the secondary representation of the toddlers' outer appearance (e.g., Nielsen, Suddendorf, & Slaughter, 2006). A more direct way of assessing self-other differentiation was suggested by Repacholi and Gopnik (1997) who found that the majority of 18- but not 14-month-olds gave the researcher the one out of two objects that the experimenter preferred, even if it conflicted with the toddlers' own preference. In this task, the critical response is directly based on the anticipation of the subjective mental state of the social partner. This finding indicates that, by 18 months, toddlers are able to differentiate between own and others' preferences and to act accordingly.

Joint visual attention emerges during the first year of life (i.e., early non-referential forms of gaze following, e.g., D'Entremont et al., 1997) and further develops during the second year of life. The first half of the second year also seems to be critical for the development of more advanced joint attentional skills (Tomasello et al., 2005) that can be interpreted in terms of comprehension of the referential intent of looking and pointing (Caron et al., 2002). For instance, Corkum and Moore (1995) have shown that reliable gaze following to distant objects emerges early in the second year and further increases during the following months. In addition, toddlers not only become better in responding to others' attempts to create joint attention (Mundy and Gomes, 1998), but they also improve their skills in addressing and guiding others' attention to specific locations or objects by pointing (Camaioni et al., 2004). Based on these findings, we hypothesized that there should be significant increases in both self-other-differentiation and joint attentional skills between 15 and 18 months.

Overall, the present study represents the first empirical attempt to trace the development of prosocial behavior in different domains (i.e., helping, comforting, and cooperation) while simultaneously assessing important socio-cognitive concepts (i.e., self-other-differentiation and joint attentional skills) that are hypothesized to contribute to the domain-specificity of early prosocial behavior. There were three main hypotheses: first, we hypothesized relative stability and increases for both socio-cognitive and prosocial measures between 15 and 18 months. Second, there should be differential relationships between the three domains of prosocial behavior and the two socio-cognitive achievements. More specifically, while helping is least demanding (i.e., no relation with either joint attentional skills or self-other-differentiation), comforting requires self-other differentiation, and coordination of cooperation requires both self-other differentiation and advanced joint attentional skills, i.e., the capacity to respond to and to direct others' attention. Advanced development of this capacity should specifically contribute to toddlers' coordination in the cooperation tasks, since it is only here that different roles have to be coordinated communicatively. These patterns should be found concurrently, i.e., at 15 and 18 months, as well as longitudinally. Concerning the longitudinal relationship, we finally hypothesized that socio-cognitive development with 15 months should differentially predict increases in prosocial behavior, i.e., increases in comforting should be predicted by self-other differentiation and increases in coordination should be predicted by self-other differentiation and advanced joint attentional skills with 15 months.

2. Method

2.1. Participants

Participating families were recruited in a mid-sized German city. Based on the data of the local registry office, families with children of eligible age received a letter containing information about the project, the possibility of voluntary participation, and financial reimbursement of 100€. There were behavioral data for all three domains of prosocial behavior at both ages for 39 (20 females, 19 males) out of a total of 42 toddlers. Concerning data on socio-cognitive development, there were random missing data for maternal reports (N_{Max} = 8 per scale and age) and observational data (N_{Max} = 5 per task and age that were due to toddlers' fuzziness, unwillingness or technical errors).

On average, toddlers were 15 months and 5 days (*SD* = 10.41 days) at the first and 18 months and 6 days (*SD* = 16.64 days) at the second assessment. Toddlers were either the only child (56.4%) or they had one (28.2%) or two siblings (15.4%) that, in most cases, were older siblings (94,1%). Most of the children lived in nuclear families with their parents and siblings (94.9%). On average, there were 3.62 (*SD* = .91) persons per household. The majority of parents were married (76.1%). On average, mothers were 33.64 years old (*SD* = 5.17) and most of them held a high school degree or above (82.1%).

2.2. General procedure

Families were invited to come to the department's laboratory four times, twice when their children were 15 and 18 months old, respectively. On average, the two sessions at 15 months as well as the two sessions at 18 months were 10 days apart. All sessions were videotaped. After one of the experimenters (E1) had given an overview of the visit and the assessments, mothers filled in questionnaires regarding sociodemographic information and the child's socio-cognitive development. Meanwhile, E1 established rapport with the toddler during a warm up task (e.g., playing with building bricks). Parents remained with their children at all times and were instructed to complete questionnaires and remain passive during the quasi-experimental observations of toddlers' prosocial behavior, self-other-differentiation and joint-attentional skills.

2.3. Prosocial behavior

During the two sessions at each age, toddlers participated in three tasks for helping and two tasks for each comforting and cooperation. At each session, there was at least one task for each of the domains of prosocial behavior. Tasks were interspersed with socio-cognitive tasks and the order was fixed for each session.

2.3.1. Helping

Toddlers' instrumental prosocial behavior was assessed with three tasks, in which E1 grasped for objects that were out of reach (cf. Warneken & Tomasello, 2007). In the Ruler Task (session 1), E1 and the toddler (sitting on the caretaker's lap) faced one another across a table. Each had three rulers in front of them, positioned so that neither could reach the other's rulers. E1 put the rulers on her side of the table into a container and then reached for those on the child's side of the table and, when given, put it in the container one by one. The Eraser Task (session 2) had an identical setup to the first but there were erasers instead of rulers. In the Clothespin Task (session 1), the toddler sat next to his or her caretaker while E1 began to hang up washing and a clothespin fell down, which E1 then reached for. After the toddler handed the clothespin over, E1 dropped a second clothespin. In all three tasks, while reaching, E1's ostensive cues became increasingly more explicit (15 s no gaze; 15 s alternating gaze; 15 s gaze plus direct address, i.e., calling toddler's name). For each task, we coded how many objects the child gave to E1. To compute interrater reliabilities, 35% of the helping tasks were coded by one of the authors and a research assistant and Kendall's τ indicated high reliability, $\tau = .98$. For the final analyses, we used a relative frequency score that ranges between 0 and 1 and that indicates the proportion of objects (x out of 8) that the toddler gave to E1.

2.3.2. Comforting

As in earlier studies we used distress simulations by an experimenter to assess toddlers' emotion-related prosocial behavior (e.g., Bischof-Köhler, 1991; Kärtner et al., 2010; Zahn-Waxler et al., 1992). In both simulation episodes, E1 first played with the toddler using a standardized set of toys (e.g., building bricks, doll, car). Among these toys were two teddy bears (Teddy Task, session 2), one of which had a hook-and-loop fastener attached to its arm (Bischof-Köhler, 1991). After 10 min of free play, the fastened arm fell off while E1 was playing with the teddy bear, in response to which E1 simulated sadness (i.e., sad face and mild sobbing). As in the helping tasks, the distress simulation consisted of three phases in which ostensive cues became increasingly more explicit. In the first 30 s, E1 kept her gaze on the teddy saying, "Oh, my teddy! I can't play with it anymore! The arm fell off!" For the next 60 s, she additionally alternated her gaze between the child and the teddy. During the last 60 s, E1 looked at the child every 15 s, and addressed the child directly saying ("Look, [name of the child] my car is broken. I can't play with it anymore!"). If the child showed clear prosocial behavior, either by providing physical comfort (e.g., hugging, kissing) or by offering an alternative toy, E1 stopped sobbing, thanked the child, and continued playing with the child. Otherwise, the simulation ended after 2.5 min. In addition, we used an analogous task (Car Task: toy car with a broken axle) during the first session.

Performance on the distress-simulation tasks was coded from videotape by the authors and four research assistants. The principal focus of the analysis of the distress simulation was the toddlers' prosocial behavior (cf. Kärtner et al., 2010; Zahn-Waxler et al., 1992). Coders evaluated the toddlers' prosociality on a 3-point scale ranging from 0 to 2. Toddlers were awarded a score of 2 (prosocial behavior) if they showed concern for the distressed experimenter (i.e., furrowing or raising of the eyebrows together with a concerned facial expression) and helped her either by (a) object-directed (e.g., trying to repair the teddy, taking the teddy and/or the teddy's arm to the mother) or person-directed prosocial behavior (e.g., offering an alternative toy, physical comfort) or by (b) perseveringly alarming their mother (i.e., pointing repeatedly at E1 while vocalizing and looking back and forth between E1 and the mother). Toddlers were awarded a score of 1 (tentative prosocial behavior) if they showed concern and rudimentary, ineffective, or tentative behavior (e.g., alarming their mother hesitantly or saying words like "ouch," "teddy," or "broken"). Toddlers were awarded a score of 0 (no prosocial behavior) if they did show neither prosocial nor tentatively prosocial behavior.

Four toddlers showed strong emotional reactions to E1's distress simulation in one of the two tasks. In these cases, E1 stopped the distress simulation immediately and reassured the child that everything was fine. Because these toddlers did not have the opportunity to show helping behavior, their performance on these tasks were excluded from further analyses.

Fig. 2. Cooperation tasks with complementary (left) and parallel (right) roles.

In order to compute interrater reliabilities, 24 simulations (15%) were coded by all coders and Kendall's τs indicated medium to high reliabilities, Kendall's $\tau s > .70$. For the final analyses, we used the mean score of the two distress simulations that could range between 0 and 2 in increments of .5.

2.3.3. Coordination

To measure to what extent toddlers were able to coordinate their actions with a partner to reach a goal cooperatively, we developed two mechanical devices, one with complementary roles (Elephant Task) and one with parallel roles (Bell Task) (cf. Warneken et al., 2006; Brownell et al., 2006).

The goal of the Elephant Task (complementary roles, session 1) was to squeak a toy elephant that was fixed on a movable platform inside a box (see Fig. 2). To be able to reach the platform, one person had to pull a string that moves the platform (role A) toward a door, which another person had to open (role B). A single person could not perform both tasks and reach for the object at the same time, since both the door and the platform moved back into their starting positions when not held. After the child became familiar with the apparatus (children were encouraged by E1 to have a look at the apparatus and/or touch it), E1 and a second experimenter (E2) showed a successful demonstration three times. Then, E2 left the room. While performing role A, E1 showed an unsuccessful attempt to open the door and became increasingly more explicit, if the child was not responsive (step 1: E1 performed role A for 30 s followed by a further successful demonstration with E2; step 2: E1 performed role A for 30 s while alternating gaze between the object and the toddler; step 3: E1 performed role A for 30 s while alternating gaze plus direct address, i.e., calling the toddler by his or her name, followed by a successful demonstration with E2; step 4: E1 repeated step 3). The goal of the Bell Task (parallel roles, session 2) was to ring a bell inside a wooden box by simultaneously pressing two identical buttons that were installed on top of the box spaced too far apart for the child to reach them both (see Fig. 2). The general procedure of the bell task (parallel roles) was identical to that of the Elephant Task.

In both tasks, the degree of coordination during cooperation was coded based on Warneken et al.' (2006) 4-point scale for toddlers' efficiency during the phase, in which successful cooperation occurred, i.e., no gaze, alternating gaze, or alternating gaze plus direct address. Toddlers' were awarded a score of 0 (no success) if they failed to coordinate their behavior successfully with E1 (i.e., did not ring the bell or open the door). They were awarded a score of 1 (uncoordinated) if they performed their role successfully, but additionally showed a high degree of uncoordinated behavior (i.e., individual attempts to solve the task, exploring the apparatus, or leaving the task). Toddlers were awarded a score of 2 (coordinated) if they performed their role successfully and showed only moderate degrees of uncoordinated behavior. Finally, toddlers were awarded a score of 3 (very coordinated) if they performed their role almost immediately with no further accounts of uncoordinated behavior. To compute interrater-reliabilities, one of the authors and a research assistant both coded 25% of the cooperation tasks. Kendall's τ indicated high reliability, $\tau = .90$. For the final analyses, we used the mean score of the two cooperation tasks that could range between 0 and 3 in increments of .5.

2.4. Socio-cognitive development

Four measures of two aspects of toddlers' socio-cognitive development were obtained, namely joint attentional skills and self-other-differentiation. Joint attention indexes children's ability to follow and initiate joint attention with an adult, while self-other-differentiation refers to toddlers' increasing awareness of themselves and others as autonomous agents with subjective mental states. For each concept, we used parental reports and behavioral measures to assess both a more general evaluation and one specific example behaviorally.

2.4.1. Joint attention

Parents completed the gestures sub-scale of the ELFRA-2 (Grimm & Doil, 2006)—the German adaptation of the MacArthur communicative development inventory (CDI: Fenson et al., 1994). The scale consists of 30 dichotomous items (yes = 1, no = 0)

and assesses toddlers' comprehension and usage of different communicative and symbolic gestures that are related to nonverbal communication of desires (e.g., "My child points to an object, that he/she wants to have") and initiation of joint attention (e.g., "My child stretches out his/her arm, to show what he/she is holding in the hand"). Internal consistencies were medium to high for this scale, Cronbach's $\alpha = .60$ with 15 months and $\alpha = .70$ with 18 months. The scales' mean score was the final score for parental report of toddlers' joint attentional skills and could range between 0 (i.e., none of the gestures reported) and 1 (i.e., all gestures reported).

For the behavioral assessment of toddlers' joint-attentional skills we used the object spectacle tasks of the early social communication scale (ESCS: Mundy et al., 2003). The ESCS is a standardized, structured procedure to index social understanding in children between 8 and 30 months of age using nonverbal communication tasks. The focal category was *initiating joint attention* (IJA) during the object spectacle task using two different objects that were each presented three times. Behavior was coded using the criteria established by Mundy et al. (2003), who differentiate between high-level joint attention (i.e., pointing to an active toy or showing an object to E1) and low-level joint attention (e.g., mere eye contact with E1 or alternating gaze between an active toy and E1). Because children typically have to communicate actively with and manipulate the attention of the interaction partner during cooperative situations, the analysis focused on high-level behaviors (i.e., pointing and showing), which were coded from video recordings. To determine interrater reliabilities, 26% of the sample were coded by one of the authors and a research assistant and reliability was medium to high, Kendall's $\tau = .68$. For the final analyses, we used the absolute frequency of high-level IJA behavior, i.e., pointing and showing.

2.4.2. Self-other differentiation

Parents indicated whether their child understands and uses (score of 2), understands (score of 1), or neither understands nor uses (score of 0) each of a list of eight personal pronouns (e.g., you, me, mine) taken from the Pronoun subscale of the ELFRA-2 (Grimm & Doil, 2006). The internal consistency was high, Cronbach's $\alpha = .90$ with 15 months and $\alpha = .87$ with 18 months. For the final analyses, we used the scale's mean score that could range between 0 and 2.

For the behavioral assessment of toddlers' awareness of subjective mental states, we assessed toddlers' awareness of the subjectivity of preferences by two tasks. Similar as in Repacholi and Gopnik's (1997) study, we tested whether or not toddlers responded to an ambivalent request by handing over the object preferred by the experimenter—a preference inconsistent with the toddlers' own preference. As Repacholi and Gopnik (1997), we used food items (Food Task, session 1) but also toys (Toy Task, session 2) that differed regarding their attractiveness (animal-shaped cookies vs. raw kohlrabi in the Food Task and a small, multicolored soft toy vs. a wooden brick in the Toy Task). The procedure was structurally equivalent in both tasks. E1 and the child (sitting on the parent's lap) sat across a table facing each other. During a warm-up period E1 played a "give and take" game with the child to ensure toddlers' understanding of the request to hand over an object to the experimenter. Two bowls with food (respectively two toys) were subsequently presented on a tray, and toddlers were given the opportunity to show a preference for one of the two options by either tasting (Food Task: 91% preferred cookies) or playing (Toy Task: 71% preferred the soft toy). Then, the tray was moved out of the child's reach toward E1 and E1 tasted (took) the food item (toy) that was preferred by the child and showed disgust (dislike) for approximately 10 s, then tasted (took) the other object and showed pleasure for approximately 10 s. Thus, E1 showed a clear preference that was inconsistent with the toddlers' preference. While moving the tray back to the toddler, E1 looked at the toddler, placed her hand, palm facing up, in the middle of the two bowls and asked the child: "Can you give me some more?" (Food Task) and "Can you give it to me?" (Toy Task), respectively.

Toddlers' behavior was coded from video. Toddlers were given a score of 1 if they handed over the food (toy) that E1 preferred and a score of 0 in all other cases. To compute interrater reliabilities, 26% of the total videos were coded by one of the authors and a research assistant and Cohen's κ indicated high reliability, $\kappa = .94$. The final score for toddlers' self-other-differentiation was the mean score of the Food and the Toy Task that could range between 0 and 1 in increments of .5.

3. Results

In the first part of this section we tested the developmental hypotheses, i.e., increases and stabilities between 15 and 18 months, concerning the three domains of prosocial behavior and the two specific aspects of socio-cognitive development. In the second part of this section, we present analyses on the concurrent and longitudinal relationships between socio-cognitive development and prosocial behavior and test the hypotheses concerning domain-specific socio-cognitive influences on toddlers' prosocial behavior.

3.1. Preliminary analysis

In order to determine whether there were gender or sibling effects on toddlers' prosociality, we conducted a multivariate analysis of variance (MANOVA) with the three domains of prosocial behavior as dependent variables (i.e., helping, comforting, coordination) and gender (male or female) and siblings (siblings or no siblings) as between-subjects factors at both ages. At 15 months, the analyses yielded no main or interaction effects, $F(3, 33) < 1$, $p > .40$. At 18 months, there was a significant main effect for siblings, $\Lambda = .72$, $F(3, 33) = 4.35$, $p < .05$. As subsequent 2-factorial (i.e., gender, siblings) univariate analyses of variance (ANOVAs) indicated, this main effect was due to a main effect of siblings on comforting, $F(1, 35) = 6.61$, $p < .05$. More

Table 1
Development and stabilities of prosocial behavior (helping, comforting and coordination).

	15 Months	18 Months	Statistics	r
	M (*SD*)	*M* (*SD*)		
Helping [0–1]	.68 (.30)	.71 (.28)	$t(38) = -.66$	.28†
Comforting [0–2]	1.27 (.70)	1.17 (.60)	$t((38) = .85$	.33*
Coordination [0–3]	2.03 (.74)	2.27 (.80)	$t(38) = -1.56$	.21

Note. Ranges for the different domains of prosocial behavior are indicated in square brackets.
† $p < .10$.
* $p < .05$, two-tailed.

Table 2
Development and stabilities of joint attention and self-other differentiation (parent's report and observation task).

	15 months	18 months	Statistics	r
	M (*SD*)	*M* (*SD*)		
Joint attention				
Parent report [0–1]	.75 (.30)	.85 (.28)	$t(33) = -6.73$***	.56**
Observed [abs. #]	1.0 (1.90)	1.09 (1.67)	$t(31) = -.25$	.33†
Self-other differentiation				
Parent report [0–2]	.56 (.40)	.88 (.45)	$t(29) = -4.98$***	.65***
Observed [0–1]	.29 (.32)	.28 (.34)	$t((36) = .16$	−.16

Note. abs. # = absolute frequency. For reported joint attention: $N = 34$. For observed joint attention: $N = 32$. For reported self-other differentiation pronouns: $N = 30$. For observed self-other differentiation: $N = 37$.
† $p < .10$.
** $p < .01$.
*** $p < .001$, two-tailed.

specifically, 18-month-old toddlers with siblings ($M = 94$, $SD = .61$) showed less comforting than toddlers without siblings ($M = 1.34$, $SD = .54$).

3.2. Development of prosocial behavior, joint attention and self-other differentiation

As the results in Table 1 indicate, there were no significant increases for the three domains of prosocial behavior between 15 and 18 months. Stabilities across time were medium and significant for helping and comforting (in the case of helping marginally). This means that children who helped or comforted with 15 months also tended to do so with 18 months.

There were no significant correlations between the three different domains of prosocial behavior at either 15 or 18 months, which is indicative of the domain-specificity of prosocial behavior (see Table 3).

There were significant increases for maternal reports, but not observational measures, of toddlers' joint attentional skills and self-other-differentiation. Similarly, stabilities were high for parental reports, $rs > .56$, $ps < .01$, but low to moderate for observational measures (see Table 2). Concerning intercorrelations between socio-cognitive variables, there was a significant correlation between parental report and observational measures of joint attentional skills with 15 months (see Table 3).

3.3. Socio-cognitive influences on prosocial behavior

At 15 months there were several significant correlations between socio-cognitive skills and at least one of the domains of prosocial behavior (see Table 3). More specifically, helping was significantly related to joint attentional skills and coordination was significantly related to both measures of self-other differentiation, *rs* between .33 and .36, $ps < .05$. Furthermore,

Table 3
Correlations (and *Ns*) between prosociality and socio-cognitive measures with 15 (above) and 18 (below diagonal) months.

		1	2	3	4	5	6	7
1	Helping		.21 (39)	.17 (39)	.36* (39)	.20 (36)	.08 (37)	.29† (38)
2	Comforting	.03 (39)		.04 (39)	.29† (39)	.30† (36)	−.17 (37)	.03 (38)
3	Coordination	−.12 (39)	.07 (39)		.00 (39)	.31† (36)	.34* (37)	.33* (38)
4	$JA_{reported}$	−.02 (34)	.30† (34)	−.02 (34)		.35* (36)	.20 (37)	.02 (38)
5	$JA_{observed}$	.19 (34)	−.09 (34)	−.14 (34)	−.14 (29)		.14 (34)	.26 (35)
6	$SOD_{reported}$	−.14 (31)	.04 (31)	.01 (31)	.30† (31)	.03 (26)		−.19 (36)
7	$SOD_{observed}$	.00 (38)	.18 (38)	−.01 (38)	.22 (33)	.07 (33)	.07 (30)	

Note. JA = joint attention; SOD = self-other-differentiation; observed = behavioral assessment; reported = maternal report data. *Ns* ranged between 26 and 39, in most cases (83%) *Ns* ranged between 34 and 39. Pattern of significant results are identical for listwise deletion of missing data.
† $p < .10$.
* $p < .05$, two-tailed.

Table 4
Regression analyses (βs) for the different domains of prosocial behavior.

	Helping	Comforting	Coordination
Joint attention			
Parent Report	.38*	.22	−.19
Observed	.13	.22	.35*
Self-other differentiation			
Parent report	.04	−.27	.40**
Observed	.32†	−.19	.41**
Adj. R^2	.18*	.07	.29**

Note. $N = 33$. Calculating ordinal regression models for comforting and coordination, the pattern of significant results is identical.
† $p < .10$.
* $p < .05$.
** $p < .01$.

there were marginally significant correlations between helping and observed self-other-differentiation, comforting and both measures of joint attentional skills and between coordination and observed joint attentional skills. At 18 months, there was a marginally significant correlation between reported joint attention and comforting.

Since both joint attentional skills and self-other differentiation were significantly related to at least one domain of prosocial behavior at 15 months, we computed three regression analyses with helping, comforting, and coordination as the dependent variables and joint attentional skills and self-other differentiation, both observed and reported, as a fixed set of predictors to test our central hypothesis that there are specific influences of the different socio-cognitive measures on each domain of the prosocial behavior when toddlers were 15 months old (see also Table 4).

Concerning helping at 15 months, the regression model explained about 18% of the total variance. As the regression analysis indicates, reported joint attention became a significant predictor: children who were, according to parental report, better at communicating own desires and initiating joint attention also tended to help more. Concerning comforting at 15 months, the regression model did not become significant. With regard to coordination at 15 months, both joint-attention and self-other differentiation became significant predictors and explained about 29% of the total variance. These results indicate the important and distinct role that joint attentional skills and self-other differentiation play for toddlers' coordination during cooperative activities. Children who were better at initiating joint attention (observational measure) and were better at differentiating self from other (both reported and observed) also coordinated their behavior with that of the experimenter more efficiently during cooperative activities.

Longitudinally, we tested whether self-other differentiation and joint attentional skills at 15 months where differentially related to increases in the different domains of prosocial behavior. To do so, we computed partial correlations between socio-cognitive measures at 15 months and the different domains of prosocial behavior at 18 months, controlling for prosocial behavior at 15 months. In line with our hypotheses, we focused on the influence of self-other differentiation (parent report and observational data) on both comforting and coordination and the influence of joint attention (parent report and observational data) on coordination. Of the six relevant partial correlations, only the observational data for self-other differentiation at 15 months correlated significantly with coordination ($r_p = .36$, $p < .05$) at 18 months while all others scores ranged between $r_p = -.12$ and .04, $ps > .50$.

4. Discussion

The main aim of this study was to analyze the development and stability of prosocial behavior in different domains, namely helping, comforting, and cooperation, and to examine the role of advanced joint-attentional skills and self-other differentiation as central socio-cognitive factors that contribute to the domain-specificity of prosocial behavior. The results of the present study extend earlier findings on the distinctness of early prosocial behavior (Dunfield et al., 2011; Svetlova et al., 2010) in that they included another domain of prosocial behavior, i.e., toddlers' readiness to engage in cooperative behavior with a needy adult. In line with recent studies, we found support for the idea of domain-specificity of early prosocial behavior in the sense that the three domains, i.e., helping, comforting, and cooperation, were uncorrelated at both ages.

Starting with the assumption that the middle of the second year is a critical phase for the development of prosocial behavior, we – unexpectedly – did not find significant increases between 15 and 18 months in any of the three domains. At first sight, this seems to contrast with earlier findings on cooperation (Warneken & Tomasello, 2007) and comforting (Zahn-Waxler et al., 1992). However, one has to keep in mind that these two studies compared either samples of children who were four (14 vs. 18 months; Warneken & Tomasello, 2007) or five (13–15- vs. 18–20-month-olds; Zahn-Waxler et al., 1992) months apart. Thus, it might be that the selection of age groups that was inspired by studies on socio-cognitive development, especially self-other-differentiation, was too narrow to detect increases in prosocial behavior.

The key argument of the present study was that socio-cognitive factors are differentially related to the three types of prosocial behavior, thus constituting the domain-specificity of prosocial behavior in the second year. We approached this issue from two different angles, first, by examining potentially domain-specific correlational patterns and, second, by

looking at the degree to which socio-cognitive performance at 15 months is longitudinally related to increases in prosocial behavior between 15 and 18 months. Concerning the concurrent analyses, we found that, at 15 months of age, both self-other-differentiation and joint attentional skills predicted toddlers' coordination during cooperation and explained about 30 percent of the variance. Furthermore, comforting was related to neither of the socio-cognitive measures while helping was significantly related to joint attentional skills, which explained about 20 percent of the variance. These findings suggest that socio-cognitive factors do differentially influence the three domains of prosocial behavior: while joint attentional skills seem critical for both helping and cooperative behavior (see also Brownell, 1986), self-other-differentiation plays an important role only for cooperative behavior. Thus, there is evidence for the domain-specificity of socio-cognitive influences that supports some of the theoretical arguments that have been suggested in the literature (Dunfield et al., 2011; Svetlova et al., 2010). However, while the results were as hypothesized for cooperation, the domain-specific patterns were different from what we expected for helping and comforting.

Usually, helping – especially during the out-of-reach tasks that we used in this study – is discussed as the domain of prosocial behavior that – in terms of socio-cognitive requirements – is least demanding in that it only requires an understanding of goal-directed behavior that emerges relatively early in ontogeny. Nevertheless, the data of the present study suggest that the better toddlers are at initiating joint attentional states, the more likely they are to help a needy adult. This finding suggests that there might be something more to helping than understanding the goal-directedness of human behavior: toddlers' ability and motivation to share interest or, more generally, psychological states (see Tomasello et al.'s (2005) motivation to share psychological states or Hay and Cook's (2007) social engagement). As a consequence, interindividual differences in toddlers' social orientation led to differences in both toddlers' ability and motivation to direct others' attention as well as toddlers' responsiveness to others' needs by helping them. In summary, the correlation between joint attentional skills and helping might be best explained by toddlers' social engagement, i.e., their ability and motivation to share own and respond to other's attentional states. This is also what might underlie the marginally significant correlation between joint attentional skills and comforting.

Concerning comforting behavior, we could not replicate earlier findings showing that prosocial behavior vis-à-vis someone in distress presupposes self-other-differentiation (Bischof-Köhler, 1991; Zahn-Waxler et al., 1992). While the theoretical argument for such a correlation seems plausible and is widely shared in the current discourse, one could argue that it requires qualification, however. Recently, Kärtner et al. (2010) argued that it is unlikely that comforting behavior necessarily depends on self-other differentiation. They proposed shared intentional relations (Barresi & Moore, 1996), i.e., toddlers' understanding of intentional states by joining in an activity and experiencing and sharing the same psychological or mental state as the other person without attributing subjective mental states to either self or to another, as an alternative mechanism that may underlie comforting behavior (Kärtner & Keller, 2012). Applied to comforting behavior, the basic idea is that when toddlers observe the emotional expression of another person, this induces – via emotional contagion – a similar emotion in themselves. As a result, toddlers experience the situation as sad or painful while the other person's object-directed behavior indicates a possible reason for the distress, which allows toddlers to help the distressed other. As a consequence, emotional contagion and concern for the other might be enough to initiate comforting behavior.

For cooperative behavior the data support the common theoretical assumption that effective coordination requires both advanced joint attentional skills and self-other-differentiation since different roles have to be communicatively coordinated in time. To our knowledge, this is the first study that has demonstrated empirically that these relations do not only hold in peer cooperation during the late second and third year of life (Brownell & Carriger, 1990; Brownell et al., 2006) but also vis-à-vis an adult partner earlier in ontogeny (i.e., first half of the second year). This shows that although successful coordination with peers emerges ontogenetically later than with an adult, the same socio-cognitive factors seem to be important for the general development of cooperative skills. Critically for the main aim of this study, these results further support the basic assumption that these relationships are specific to coordination and do not hold for other domains of prosocial behavior.

The important role that self-other differentiation plays for successful coordination was further supported by the fact that socio-cognitive development at 15 months was important for toddlers' further prosocial development: increases in coordination between 15 and 18 months were the higher the better the toddlers were at self-other differentiation with 15 months. This results show that development of self-other differentiation is a critical prerequisite for further development in toddlers' coordination.

In conclusion, these differential patterns of concurrent and longitudinal relationships between socio-cognitive measures at 15 months of age and the three domains of prosocial behavior provide first empirical evidence for the widespread theoretical assumption that the domain-specificity of early prosocial behavior may, at least in part, be caused by domain-specific socio-cognitive influences.

However, the picture looks different at 18 months of age: only three months later, the socio-cognitive influences are less obvious, i.e., there were no significant correlations between any of the socio-cognitive and prosocial measures. In our opinion, these findings allow for at least three interpretations. First, the present results could indicate that there is a *critical period* in which socio-cognitive influences manifest. This would mean that while there are socio-cognitive influences on prosocial behavior with 15 months, socio-cognitive development is independent of prosocial behavior with 18 months. Based on the finding that both prosocial behavior and socio-cognitive development were moderately stable from 15 to 18 months, one could speculate that socio-cognitive factors might still be effective at 18 months in that the domain-specificity is constituted at 15 months and then sustained through later development only indirectly. However, this interpretation is hard to reconcile with other findings. For instance, based on this argument it is difficult to explain findings on socio-cognitive influences on

peer cooperation during the late second and third year (Brownell & Carriger, 1990; Brownell et al., 2006; Hunnius, Bekkering, & Cillessen, 2009).

Second, one could argue that the present findings indicate *developmental décalage* in a dynamic system. While the system was stable at 15 months, which manifested in systematic relationships between socio-cognitive functioning and prosocial behavior, the onset of socio-cognitive development destabilized the dynamic system, which manifested in unsystematic relationships between socio-cognitive status and prosocial behavior, i.e., socio-cognitive measures and prosocial behavior were uncorrelated. Following the *developmental décalage* argument, the fact that prosocial behavior did not increase between 15 and 18 months might indicate that this development is lagged. Once prosocial development is completed and the system has stabilized at a more advanced level, the equilibrium and the functional relationships between socio-cognitive and prosocial functioning might be regained (van Geert, 1994; van Geert & van Dijk, 2002).

Finally, it might be that at 18 months of age, other influences that interfere with the processes we focused upon in the present study become more important (*interference interpretation*). For example, from a socialization perspective, some researchers argue that domain-specific socialization practices lead to diverging developmental trajectories of prosocial behavior (Grusec, 2006; Hay & Cook, 2007). For instance, Hoffman (2000) suggested induction as a socialization strategy that is tailored toward socializing empathic concern and comforting in children and that starts to effect development already during the second half of the second year (see also Zahn-Waxler, Radke-Yarrow, & King, 1979). Furthermore, there might be processes that are uniquely associated with one of the domains of prosocial behavior and that critically develop around 18 months. For instance, some work has focused on the specific role that emotion-regulatory competencies play in comforting, which makes this domain of prosocial behavior distinct from others (cf. Eisenberg et al., 2006; Nichols, Svetlova, & Brownell, 2009; Trommsdorff, Friedlmeier, & Mayer, 2007).

In order to differentiate between these alternative interpretations, future studies should aim at assessing other important influences on early prosocial behavior that might interfere with socio-cognitive development concurrently so that their specific influences on prosocial behavior could be identified, especially emotion-regulatory skills and potentially domain-specific socialization goals and practices (*interference interpretation*). To further discriminate between the *critical period* and *décalage* interpretations, it would be interesting to follow children over longer periods of time to see whether the system stabilizes so that relationships between socio-cognitive and prosocial behavior at least temporarily resume.

In the following, we would like to address some of the limitations of the current study. At first sight, one may wonder why the maternal report and the observational data on self-other-differentiation and joint attentional skills were, with one exception, uncorrelated in the present study. We see mainly two reasons for this finding. First, there is a basic difference in the way in which the data were assessed, namely maternal report and a standardized behavioral observation, which typically leads to lower correlations than when using the same methodological approach. Second, and more important, there is some but not a perfect conceptual overlap between the two corresponding measures. Concerning self-other-differentiation, maternal report is on toddlers' language use that is indicative of a differentiation between self and others, namely pronoun use. The behavioral task focuses on one specific competence, i.e., understanding the subjectivity of desires by being sensitive to the experimenter's incompatible desire. Thus, the same concept – self-other differentiation – was assessed using different methods and focusing on different manifestations of the emerging competence, which might have lead to the nonsignificant associations. Concerning advanced joint attentional skills, we see something very similar: while the questionnaire is based on a rather broad conceptualization, the coding of the ESCS is restrained on higher-order joint attentional skills, i.e., showing and pointing.

Furthermore, we think that it is critical that future studies refine the behavioral measures for toddlers' socio-cognitive development: one could critically mention that, in contrast to the assessment of prosocial behavior, we used only one behavioral measure for toddlers' joint-attentional skills, which makes this indicator more prone to measurement error. Moreover, the performance level was rather low for self-other differentiation at both ages. More generally, it seems promising to further develop indicators of self-other-differentiation and, generally, to use multiple indicators for socio-cognitive achievements in future research.

The main finding of the present study is that it provides first empirical evidence for the assumption that socio-cognitive factors play an important role for the domain-specificity of prosocial behavior of 15 month-olds. In an attempt to explain the minimal relationships only three months later, we offered a critical period, a developmental décalage and an interference interpretation, with the latter being the most plausible given the literature on social influences on the development of prosocial behavior. In our opinion, the pattern of findings presented here has major implications for future research that aims at describing and explaining the domain-specificity of prosocial development. Most importantly, theoretical and empirical approaches should aim at synthesizing socio-cognitive and socialization approaches in the literature on prosocial behavior by taking into account different factors (e.g., socio-cognitive influences, socialization strategies and parenting practices, emotion-regulatory competencies) in order to identify their distinct contribution to the domain-specificity of the early development of prosocial behavior.

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