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PAPER

Chimpanzees help others with what they want; children help them with what they need

Robert Hepach[1] | Leïla Benziad[2] | Michael Tomasello[2,3]

[1]Research Methods in Early Child Development, Leipzig University, Leipzig, Sachsen, Germany

[2]Developmental and Comparative Psychology, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

[3]Duke University, Durham, NC, USA

Correspondence
Robert Hepach, Department of Research Methods in Early Child Development, University of Leipzig, Leipzig 04109, Germany.
Email: robert.hepach@uni-leipzig.de

Abstract

Humans, including young children, are strongly motivated to help others, even paying a cost to do so. Humans' nearest primate relatives, great apes, are likewise motivated to help others, raising the question of whether the motivations of humans and apes are the same. Here we compared the underlying motivation to help in human children and chimpanzees. Both species understood the situation and helped a conspecific in a straightforward situation. However, when helpers knew that what the other was requesting would not actually help her, only children gave her what she needed instead of giving her what she requested. These results suggest that both chimpanzees and human children help others but the underlying motivation for *why* they help differs. In comparison to chimpanzees, young children help in a paternalistic manner. The evolutionary hypothesis is that uniquely human socio-ecologies based on interdependent cooperation gave rise to uniquely human prosocial motivations to help others paternalistically.

KEYWORDS

children, chimpanzees, helping, paternalism, prosocial behaviour

1 | INTRODUCTION

Human cooperation is different from that of other primates in its frequency and the degree to which it is directed towards non-kin (Tomasello, 2009). One hypothesis is that humans' greater degree and breadth of cooperation may have emerged in the context of some species-unique forms of cooperative interaction (Fehr & Fischbacher, 2003; Nowak & Sigmund, 2005). In the context of, for example, collaborative foraging, there would have been a premium on choosing and maintaining good collaborative partners (Tomasello et al., 2012). Thus, in chimpanzee group hunting of monkeys, hunting parties seem to form spontaneously and hunt opportunistically with no process of partner choice (Boesch, 1994). But in early human collaborative foraging, there was very likely partner choice, and when a valued collaborative partner needed help, it would have been in the individual's interest to help that partner so that they could continue their mutually beneficial partnership. Individuals thus 'invested' in the partners on whom they depended (Roberts, 2005). This potential evolutionary scenario suggests the possibility that human helping is uniquely aimed at enhancing the recipient's well-being, regardless of whether this is what the recipient herself wants.

Humans, as young children, respond to others' immediate needs as well as show concern for others' long-term well-being. By toddler age, children help adults and peers to overcome physical obstacles and provide out of reach objects (Hepach, Kante, & Tomasello, 2017; Warneken & Tomasello, 2006). Children warn unaware others by means of pointing to potentially dangerous locations (Knudsen & Liszkowski, 2013) and comfort those who are hurt (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). In cases of instrumental helping, children before the age

of two respond proactively in the absence of a direct request for help (Warneken, 2013) and fulfil needs anonymously (Hepach, Haberl, Lambert, & Tomasello, 2017). These instances of instrumental helping behaviour are intrinsically motivated (Warneken & Tomasello, 2008) out of a concern for the well-being of others (Hepach, 2017; Hepach, Vaish, & Tomasello, 2012). This concern for others' long-term well-being is corroborated by findings that children by the age of three and five are paternalistic and concern themselves more with others' long-term well-being and correct dysfunctional requests for help (Hepach, Vaish, & Tomasello, 2013; Martin, Lin, & Olson, 2016; Martin & Olson, 2013). In one study, Martin and Olson (2013) presented 3-year-old children with a situation in which an adult experimenter requested one of two tools. The tools were positioned such that only the child could see that the requested object was in fact broken. The authors further manipulated whether providing the broken tool lead to a negative consequence (the adult was not able to finish a task) or not. Children complied with the adult's request less often when this resulted in a negative consequence and half the children corrected the adult by providing the intact tool instead. Note that the child and the adult did not share the same perspective, which may have put additional constraints on children's decision resulting in correction rates between 52% and 69% (see Martin & Olson, 2013, for details). In another study in which children's and the adult's perspective matched, children's complying behaviour and responses to unjustified requests for help were as low as 25% (Hepach et al., 2013). Thus, one open question from previous studies is whether children are less motivated to correct the adult when they do not have the same view of the situation as the adult (e.g., Martin & Olson, 2013) and more motivated to correct when the adult and child share the same perspective (e.g., Hepach et al., 2013).

Chimpanzees, on the other hand, are sensitive to others' immediate needs and requests for help (de Waal & Suchak, 2010). They inform conspecifics of potentially harmful situations (Crockford, Wittig, Mundry, & Zuberbühler, 2012), support their allies, and console others' emotional needs (Harcourt & de Waal, 1992; De Waal & van Roosmalen, 1979). In experimental studies chimpanzees remove physical barriers to provide conspecifics with access to food (Melis et al., 2011; Warneken, Hare, Melis, Hanus, & Tomasello, 2007) and exchange tools with those who need them most (Yamamoto, Humle, & Tanaka, 2009). In one study, chimpanzees flexibly responded to the need of a conspecific by providing the specific tool (among several tools) to appropriately fulfil the need (Yamamoto, Humle, & Tanaka, 2012). It is noteworthy that in these reported studies helpers are often confronted with a direct request by the recipient such as vocalizing and ostensibly clapping their hands (Yamamoto et al., 2009, 2012) or rattling a chain to be released to provide access to food (Melis et al., 2011). The fact that in many instances help is directly solicited by a conspecific has lead to suggestions that chimpanzee helping may be explained in part both by a sensitivity to others' needs as well as, or even entirely, by a motivation to avoid harassment (Schmelz & Call, 2016; Tennie, Jensen, & Call, 2016). Furthermore, in so-called prosocial choice tasks that confront helpers with a choice to deliver (or not) a reward to a conspecific (whilst conferring the identical reward to themselves in both cases), chimpanzees do not show a robust preference for choices that systematically improve the well-being of others (House, Silk, Lambeth, & Schapiro, 2014; Jensen, Hare, Call, & Tomasello, 2006; Silk et al., 2005; Vonk et al., 2008; though see Horner, Carter, Suchak, & de Waal, 2011, for different results). Thus, while chimpanzees may be sensitive to others' immediate needs especially in response to solicitation (Melis et al., 2011; Warneken et al., 2007; Yamamoto et al., 2012), they do not appear to primarily and spontaneously concern themselves with systematically benefitting others' long-term needs, especially if there is no personal gain to the helper (Silk et al., 2005; see Schmelz & Call, 2016, for a review).

Thus, while humans and non-human primates share a sensitivity to others' immediate requests for help, it is possible that humans more so than other primates additionally concern themselves with others' long-term well-being as is evident in young children's paternalism. However, while experimental studies investigated the rate of both chimpanzees' and young children's helping behaviour (Warneken et al., 2007; Warneken & Tomasello, 2006), no previous work has directly compared the underlying motivation of both species to help others. Here we suggest that a particularly relevant and applicable paradigm to compare prosocial motivations across species is that of paternalism. In a paternalism condition, the helper is confronted with a recipient who is making a request that will have negative consequences for his or her long-term well-being. The helper is then faced with the decision of *how* to help (rather than whether to help at all). If the helper's concern is the recipient's immediate request, she will comply with the request. On the other hand, if the helper is concerned about the long-term well-being of the requester, she will correct. Paternalism is then an 'interference for the good of the recipient' (Grill, 2007). Such an interference with another's goal-directed behaviour bears a cost given that it temporarily upsets and frustrates the recipient who did not get what he requested. In a highly interdependent species this cost is outweighed by the benefit of correcting others' ill-fated requests for help, given that there is a mutual understanding among collaborating partners to care about each other's needs above and beyond fulfilling each other's immediate requests for

Research Highlights

- We demonstrate that chimpanzees (*Pan troglodytes*) and human children differ not so much in *whether* they help conspecifics but rather *why* they help.
- Although chimpanzees helped others get what they want, human children were paternalistic and helped others get what they actually needed.
- This suggests that human-unique ecologies built on cooperation gave rise to human-unique motivations to help others paternalistically.

help. This particular dynamic of paternalism lends itself to a test of differences in the underlying motivation of humans and non-human primates to help others.

One hypothesis is that human helping, evolutionarily grounded in collaborative foraging with partner choice, is paternalistic in the sense that the helper is aiming not at what the recipient wants, but rather at her well-being (what she needs). To evaluate this hypothesis, we tested both chimpanzees and 3-year-old humanchildren in two paradigms: one in which the subject could help a conspecific retrieve the tool for which she was reaching (helping paradigm), and another in which the subject could potentially help a conspecific paternalistically by providing not the tool for which she was reaching, but rather the one that she actually needed (paternalism paradigm). In the paternalism paradigm, we systematically varied whether the subject's view was partially occluded or not (occluded vs. non-occluded contexts) and we manipulated whether the requesting recipient had an actual need (need vs. no-need control). We thus tested both chimpanzees and children in a 2 (paternalism vs. helping context) x 2 (need vs. no need condition) x (occluded vs. non-occluded context) experimental design.

The predictions were as follows: Based on previous work with children we hypothesized that 3-year-olds would help the requester and provide the functional tool if this was requested. We did not have predictions regarding a difference between the need and no-need conditions in the helping context. Including these two condition was relevant for the paternalism condition where we predicted that children would show paternalism and correct the recipient's request more in the need compared to the no-need condition (Hepach et al., 2013; Martin & Olson, 2013). Including the occluded and non-occluded contexts allowed us to disambiguate previous findings and to determine the conditions under which children's paternalism is strongest. One possibility is that introducing an occluder increases children's paternalism because children assume that the requester would agree with them if he/she had the same view of the situation. In contrast, it is possible that partially occluding the situation decreases paternalism because children doubt whether they are missing a crucial visual information and become reluctant to correct the adult.

Based on previous experimental work with chimpanzees we predicted that they would be sensitive to a conspecific's request for help and provide the functional tool more in the need compared to the no-need condition within the helping context (Yamamoto et al., 2012). Including the need and no-need conditions was particularly relevant for chimpanzee subjects to rule out that the extensive training they underwent resulted in a preference for the functional tool (regardless of whether the requester needed it or not). If chimpanzees developed a preference for one object then they should choose the functional object at similar rates across all conditions. The crucial question was whether chimpanzees would show evidence of paternalism. If the motivation to correct others is similar among humans and chimpanzees, chimpanzees should provide the functional tool in response to dysfunctional requests for help more often in the need condition compared to the no-need condition (similar to human children). However, if only children show paternalism then this overall pattern of results would point to a crucial difference in the nature of chimpanzees' and human children's manner of helping others.

2 | GENERAL METHOD

2.1 | Overview

To investigate the species-unique underlying motivation to help others we conducted two separate studies, one with chimpanzees and one with human children, using a paternalistic helping paradigm. The requester was a trained stooge (a conspecific for chimpanzees and an adult experimenter for human children) and we therefore experimentally controlled the recipient's reaching behaviour. Both children and chimpanzees were presented with the identical apparatus with minor differences to accommodate specific-unique procedural demands (see Figure 1). Each test session followed a blocked order commencing with the no-need condition, followed by the need condition, and ending with the no-need condition. This blocked design mirrored that of previous work on chimpanzee helping behaviour (Yamamoto et al., 2012; see also Engelmann, Herrmann, & Tomasello, 2015). We adapted the design for our child study to maintain the comparability between the two species. In the need condition the recipient had access to a reward box (juice for chimpanzees; sticker marbles for children) for which a specific out-of-reach tool was required. In the no-need condition the reward box was removed. Within each block helpers were presented with trials on which the requester reached for a functional tool (helping condition) or a dysfunctional tool (paternalism condition).

We further varied between sessions whether the helper's and requester's view was partially blocked (occluded condition) or not (non-occluded condition). This allowed us to address the question whether subjects' motivation to correct the adult or conspecific was influenced by whether both share the same view of the situation (Hepach et al., 2013; Martin et al., 2016; Martin & Olson, 2013). Chimpanzees were presented with more trials per condition given the small sample size and because we anticipated that we could not control the requesting chimpanzee's reaching behaviour on every trial in comparison to the child study where the requester was an adult experimenter (see the respective *Methods* section for details). For Study 1 the sample size and age were matched to a previous study on paternalistic helping in children (Martin & Olsen, 2013). For Study 2 we included all available subjects at the research facility in our sample. Given the small available sample of chimpanzees (eight helpers and three requesters) at the research facility, each of the eight chimpanzee helpers was tested in both the occluded and non-occluded contexts (within-subjects factor). At the same time and based on these constraints we decided to test all eight chimpanzee helpers with the occluded context first. The non-occluded context was subsequently run for a subset of five helpers as a second experimental block, whereas three helpers saw the non-occluded context as their second experimental block. The analyses involving the factor occluded versus non-occluded condition were thus exploratory for this species. Human children helpers were tested

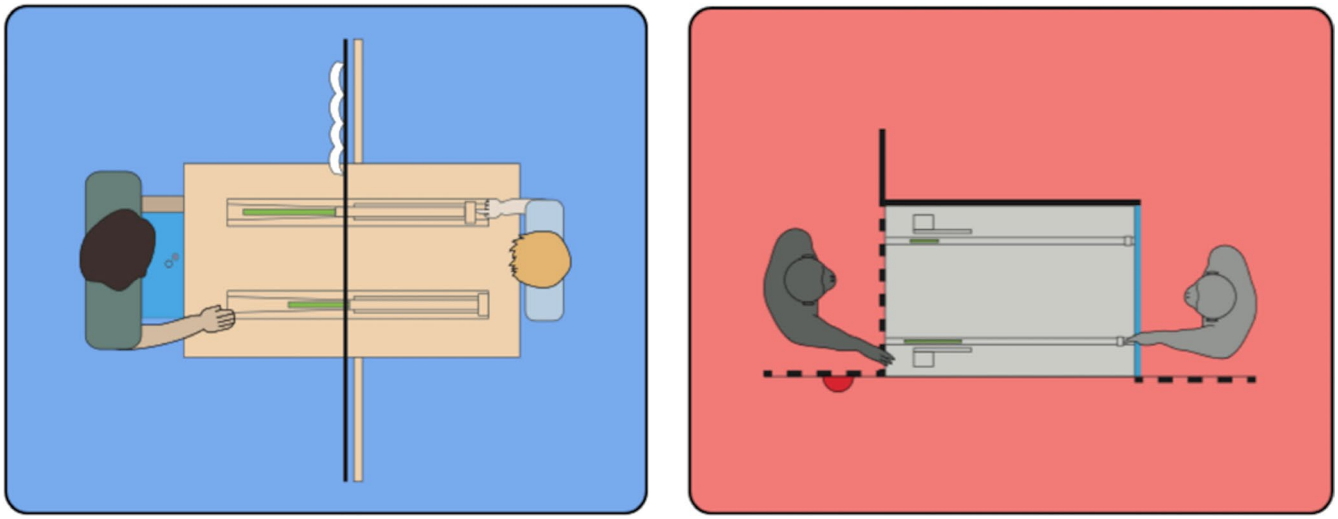

FIGURE 1 A bird's eye view of the experimental setup. The helper and recipient faced one another across a booth but did not come in direct contact. The apparatus was placed in the booth between the recipient and the helper. It sat on a metallic table and was fixed to the metal mesh (chimpanzee study) of both the helper's side ('pusher' side) and the recipient's side ('receiver' side). Both images depict the need condition (reward box on the adult's lap; reward box to the right of the requesting chimpanzee) in the non-occluded context. On the receiver side (left side), the requester could reach through the mesh (chimpanzee study) and indicate her side preference. On the pusher side the helper could choose which side (which tool) to push by operating a specially built 'decision panel' though which making a choice automatically blocked the non-chosen side. Therefore, only the helper had access to the tools. Left Panel. The child helper is presented with the paternalism context (the adult is reaching for the dysfunctional tool). Right Panel. The chimpanzee helper is presented with the helping context (the requesting conspecific is reaching for the functional tool)

either in the non-occluded or the occluded condition (between-helpers factor, fully counterbalanced).

The choice of experimental conditions was based on previous work with chimpanzees which included a helping context as well as need and no-need conditions (Yamamoto et al., 2012) and on previous work with young children which included a paternalism context as well as need and no-need conditions (Martin & Olson, 2013). We therefore arrived at an experimental design which extended previous work by including both helping and paternalism contexts as well as need and no-need conditions for both species. The factor of occluded versus non-occluded context was additionally included for both species but was particularly relevant for children to disambiguate previous findings (Martin & Olson, 2013).

Before the test phase of each study, all helpers (and chimpanzee requesters) underwent training phases to ensure that they understood the apparatus and the consequences of their actions. We first conducted the study with chimpanzees and then ran a pilot study with children in order to determine a procedure for children that was comparable both to a previous study with children (Martin & Olsen, 2013) and to the study with chimpanzees. The pilot study included 35 children (16 boys).

2.2 | Coding and data analysis

For every test trial, we noted down the type of tool the recipient reached for (functional or dysfunctional). This constituted the experimental factor helping versus paternalism context. We recorded whether the helper provided the recipient with the functional or the dysfunctional tool (1 if the functional and 0 if the dysfunctional tool was provided). For each helper and each test session and for each of four different types of test trials, we calculated the proportions of trials on which the helper provided the functional tool: need/helping, no-need/helping, need/paternalism, and no-need/paternalism. Thus, for each session the data for both blocks of the no-need conditions were averaged.

Videos to illustrate the procedure for children in the occluded and non-occluded context are provided in the supporting online materials.

3 | STUDY 1

3.1 | Participants

Children (n = 40, 20 girls) were between 3 years 6 months and 4 years (median age = 3 years 9 months 9 days; range: 3 years 6 months 24 days to 4 years 0 months 1 days). The study was carried out in a mid-sized German city (population approximately 500,000; median household monthly income approximately 1,400 €). Participants (predominately White Caucasian) were recruited and randomly selected from a local database. A research team visited children in their Kindergartens where the study was conducted. Informed consent was obtained from all parents before their child participated in the study.

3.2 | Materials and design

Children played with an apparatus that was operated by two people (see Figure 1, *Left Panel*) and the child, prior to participating

in the test phase, children received individual training on how to operate the apparatus. The first experimenter introduced the child to both a reward box, which contained a marble as well as to two wooden sticks. Only the long, functional wooden stick allowed children to retrieve the reward while the dysfunctional stick was too short (see Figure 1). During the training phase children operated the apparatus and could choose the functional tool to obtain rewards for themselves. In the test phase children could help an adult to obtain the functional tool and retrieve the marble from the reward box. The position of the tools was counterbalanced across trials. During the test phase, we manipulated whether the adult reached for the functional (helping condition) or dysfunctional tool (paternalism condition). The position of the tools was counterbalanced. In the no-need control condition of the test phase the adult held a bucket on his/her lap. In the need condition of the test phase he/she held the reward box on his/her lap. We further manipulated whether both the child and adult fully saw (non-occluded condition) the tools or whether their view of the tools was different (occluded condition). Children participated in a mixed experimental design. The between-helpers factor (20 helpers in each) was context (non-occluded vs. occluded) and the within-helpers factors were condition (no need vs. need) and type of the object that adult reached for (helping vs. paternalism context). Each child participated first in two no-need trials (one helping trial, one paternalism trial), then in four need trials (two helping trials, two paternalism trials) succeeded by another two no-need trials (one helping trial, one paternalism trial). The order of helping and paternalism trials within the need and no-need condition was counterbalanced.

3.3 | Procedure

All children underwent the same training phase to ensure that they understood the constraints of the apparatus (described in the online supporting information). The test phase consisted of two no-need control trials, followed by four need trails, followed by a second round of two no-need control trials. E2 entered the room and sat on the receiver side. The no-need control trial began (see Figure 2 top right panel). E1 first showed the reward box with the glass marble both to the child and E2 before he placed it outside the room. He said: 'OK, first we need to check whether these here work properly.' pointing to the sliding mechanism of the apparatus. He held a small bucket in one hand and the two tools in another hand. He then said looking at E2: 'Here you have a bucket into which you can place the sticks'. E1 closed a curtain between the child and E2 such that both could not see one another. In the occluded condition, E1 placed the tools on the apparatus and covered each tool with an occluder. From E2's perspective the tools stuck out from under the occluders such that they looked similar in length. From the child's perspective, on the other hand, the tools were fully visible (see Figure 2 and supporting informations for additional images). In this way, the identity of the tools was only visible to the child. In the non-occluded condition E2 did not place the occluders on the tools making the identity of the tools visible to both the child and E2. E1 opened the curtain: 'Now we can start'. E2 placed the bucket on her lap and turned her head to look at each tool for 1 s. She remained seated and leaned over to one side stretching out her arm (side counterbalanced). She increased the cues as follows: 'Let us see, whether this works' (5 s, looking at the child), 'Hmmm'. (2 s, looking at the bucket), 'Can you push over the stick?' (5 s, looking at the child), 'Hmmm' (2 s, looking at the bucket), 'Oh look, here. Can you give me the stick? Can you push it over?' (6 s, looking at the child). Children thus had 20 s to respond and were consequently in a position to decide whether to push over the tool the adult was requesting or to choose the other tool instead. Once children provided a tool, E2 picked up the tool and moved her hand over the bucket. Before she completed the action, E1 closed the curtain. In case the child did not provide a tool, E2 stopped reaching and moved back to her initial position. After closing the curtain, E1 took the bucket from E2 and placed both tools in it. In the occluded condition E1 removed the occluders and placed them on the side of the apparatus. Next, E1 opened the curtain and the trial is repeated.

At the beginning of the subsequent first need test trial E1 put away the bucket and retrieved the reward box from outside the room. E1 handed the reward box containing one glass marble to E2 who placed in on her lap (see Figure 2 top left panel). E1 reminded both the child and E2 of the game: 'You two remember how the game is played. Here is the glass marble' (pointing to it being inside the box). To ensure the child knew that E2 also wanted to retrieve the marble (similar to the child herself in the training phase) E1 addressed E2: 'Do you want to retrieve the marble?' E2 replied: 'Yes!' E1: 'But you know that you need the correct stick'. E1 held up both sticks in one hand. E2 pointed ambiguously to the two sticks saying: 'Yes, I need that one'. This interaction was important because we wanted children, at the beginning of every test trial, to be reminded (1) that E2 was playing the same game they played before, (2) that E2's goal was to get the marbles, and (3) that she knew there was one correct stick to use (see supporting information videos for details). E1 closed the curtain and placed the tools on the apparatus (position counterbalanced). In the occluded condition E1 placed the occluders on top of the tools (such the identity of the tools was only visible to the child). In the non-occluded condition, no occluders were placed on the tools. E1 then opened the curtain: 'OK, now you can play again. The following procedure was identical to that of the control condition with the crucial difference that now instead of the bucket, E2 held the reward box on her lap to remind children of her need to retrieve the glass marble with the functional tool. In total, we ran four need trials with the identical experimental protocol (only counterbalancing the position of the tools and the side of the adult's reach between the trials). After the four need trials the child participated in a second round of two no-need control trials which was identical to the first two no-need trials. At the beginning of these two trails, E1 said: 'We are done with the game now. I don't have any more marbles

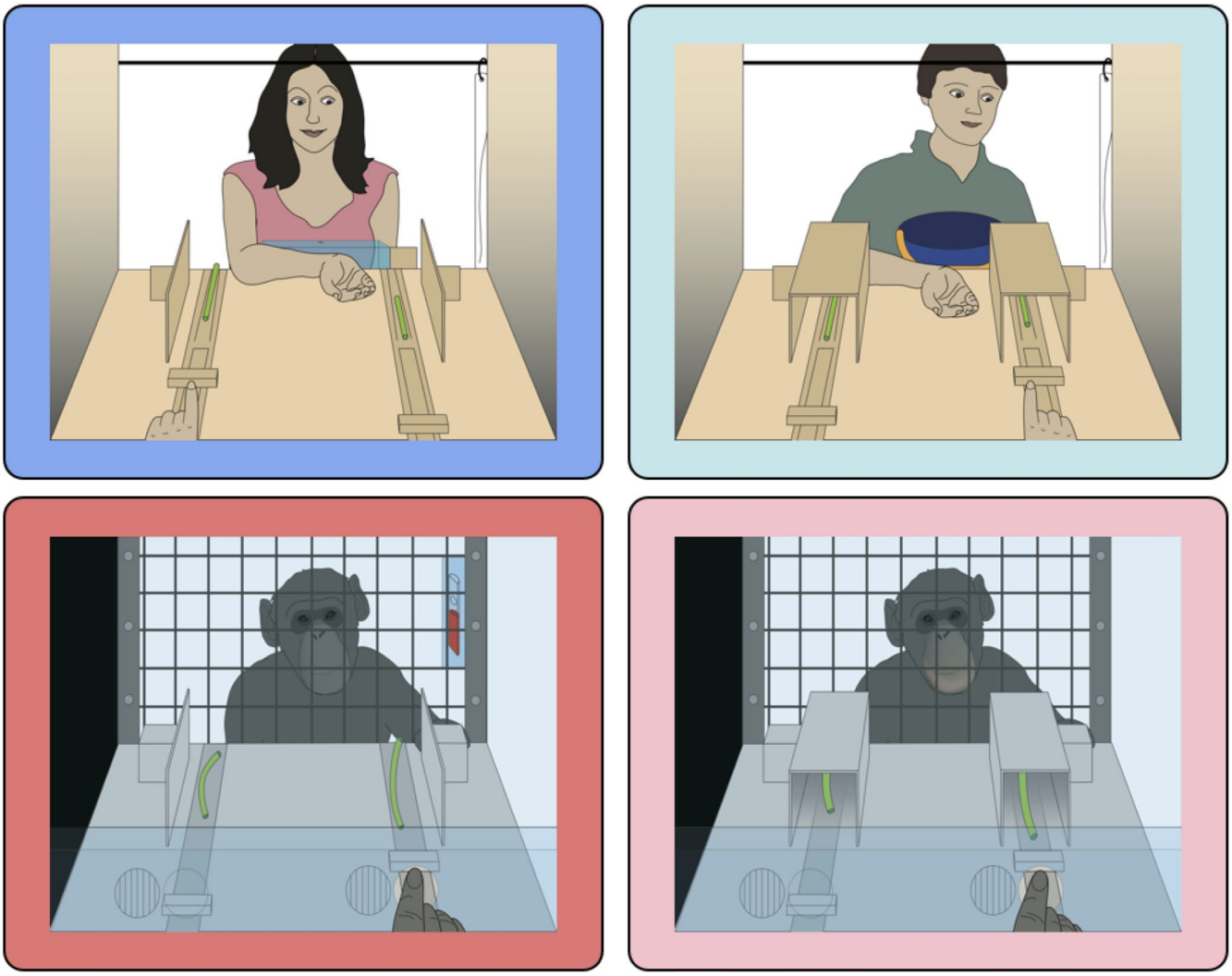

FIGURE 2 The experimental setup from the subject's perspective. Top left Panel. An example from the need condition in the children study. The experimenter is holding the reward box on her lap. She requests the dysfunctional tool (paternalism context). Both tools are fully visible to both the child and the adult (non-occluded condition). The child corrects the adult's request and provides the functional tool. Top right Panel. An example from the no-need condition in the children study. The experimenter is holding the bucket on his lap. He requests the dysfunctional tool (paternalism context). The view of the tools is partially blocked for the child and adult (occluded condition). The child complies with the adult's request and provides the dysfunctional tool. Bottom left Panel. An example from the need condition in the chimpanzee study. The chimpanzee requester sits next to the juice reward box. She requests the functional tool (helping context). Both tools are fully visible to both the child and the adult (non-occluded condition). The chimpanzee helper complies and provides the functional tool. Bottom right Panel. An example from the no-need condition in the chimpanzee study. There is no reward box next to the chimpanzee requester. She requests the functional tool (helping context). The view of the tools is partially blocked for the requester and the helper (occluded condition). The helper complies with the requester's reach and provides the functional tool

left. I am going to put the box outside. And then we will have to check, whether the apparatus is still working fine'.

3.4 | Coding & data analysis

Reliability was calculated on a random sample of 25% of participants (10 out of 40 children). Agreement between two adult coders (one also conducted the experiment, the other was blind to hypotheses and conditions) was high for the type of tool the requester reached for (*Cohen's Kappa* = 0.98), for helpers' choice (*Cohen's Kappa* = 0.97) and the latency to provide the requester with one of the two tools (*ICC* = 0.91). We calculated the proportions of trials on which the helper provided the functional tool in the need/ helping, no-need/helping, and need/paternalism, and no-need/paternalism condition. Twenty children provided data for the occluded condition and 20 children provided data for the non-occluded condition. Following the analyses by Martin and Olson (2013) we calculated Wilcoxon rank tests (with exact *p*-value calculation). To test our predictions, we carried out six focused pair-wise comparisons: First we combined data for the occluded and non-occluded conditions and compared children's responses

between the need and no-need condition within the helping context (analysis 1) and within the paternalism context (analysis 2). In addition, we carried out the same two analyses separately for the non-occluded (analyses 3 and 4) and the occluded condition (analyses 5 and 6). The adjusted α-level was 0.008. We report as effect size estimates the 95% confidence intervals.

4 | RESULTS

The rate with which children provided the functional tool varied as a function of context (helping vs. paternalism) and condition (need vs. no need), F (1, 39) = 7.43, p = .01. In the helping context, in which the tool the requester wanted and needed were the same, children complied and provided the functional tool at equally high rates in the need (M = 0.94, SD = 0.2) compared to the no-need condition (M = 0.95, SD = 0.15), T = 12, p = 1, 95% CI [-0.5 0.5], d = 0.07 (see Figure 3). In the paternalism paradigm, however, children corrected the requester and complied less with the dysfunctional request by providing the functional tool more often in the need condition (M = 0.55, SD = 0.46) compared to the no-need control condition (M = 0.36, SD = 0.41), T = 121, p = .003, [0 0.5], d = 0.43 (see Figure 3). In this context, children provided the requester with the tool that was actually needed to fulfill the need. Children's paternalism was more pronounced in the non-occluded context compared to the occluded context. In the non-occluded paternalism context, children provided the functional tool more often and complied less in the need condition (M = 0.78, SD = 0.38) compared to the no-need control condition (M = 0.38, SD = 0.36), T = 105, p = .0001, [.5 0.75], d = 1.08. On the other hand, in the occluded paternalism context, children provided the functional tool less often and complied at equally high rates in the need condition (M = 0.33, SD = 0.44) compared to the control condition (M = 0.35, SD = 0.46), T = 1, p = 1, [-1 0.5], d = 0.06 (see Figure 4).

5 | STUDY 2

5.1 | Participants

Participants were 25 socially housed chimpanzees (*Pan troglodytes* vs.; *schweinfurthii;* vs. *schweinfurthii hybrid*) living in a semi-natural habitat at the Wolfgang Köhler Primate Research Center in Leipzig, Germany. Chimpanzees live in zoo conditions with indoor and outdoor enclosures between 1,740 m^2 and 4,533 m^2. The study was conducted between February 2014 and March 2015. Three chimpanzees (one female) were assigned the role of the recipient and 22 individuals were initially assigned the role of the helper. Participation was strictly voluntary. Of the 22 helpers, eight individuals did not complete the training phase, because they could not be separated from their group (n = 2), did not show any interest in the tools (n = 4) and two elderly chimpanzee deceased. Of the remaining 14 helpers six did not provide data for the test phase because they did not operate the apparatus on at least one no-need trial and one test trial within two consecutive sessions (n = 4) or because they did not once operate the apparatus (n = 2). The final sample consisted of eight (five females; median age = 12.5 years; range: 9–40 years) helpers and the three recipients (median age = 21 years; range: 13–39 years).

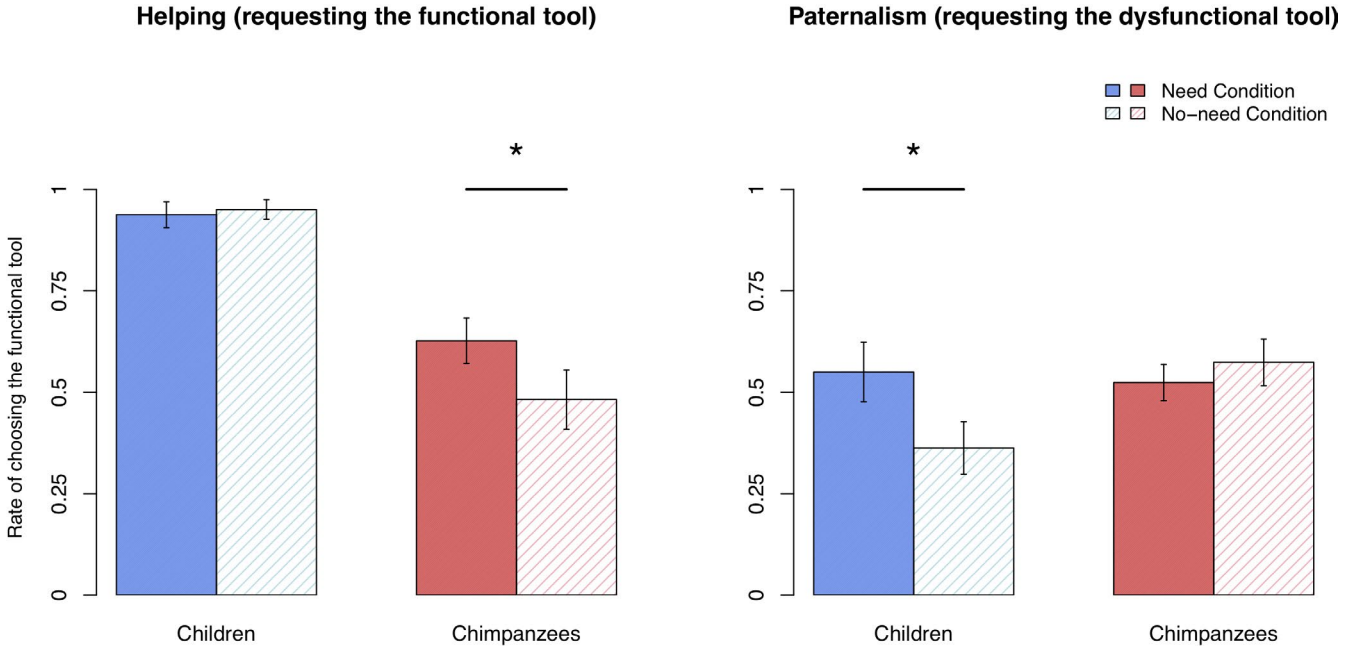

FIGURE 3 Results for both studies. The y-axis depicts the average number of trials, on which the helper provided the functional tool. In the helping context, the requester reached for the functional tool. In the paternalism context, the requester reached for the dysfunctional tool. Error bars represent the standard error of the mean within each group. * ~ p < .05

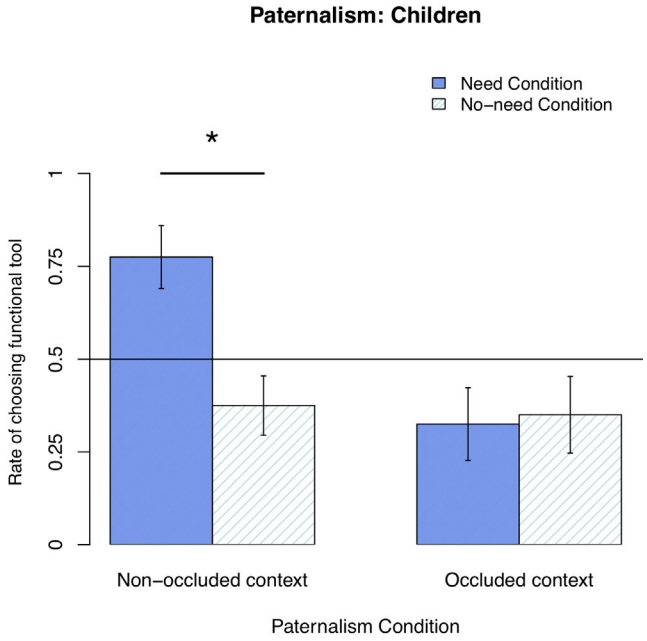

FIGURE 4 Results from the children study depicted separately for the non-occluded and occluded contexts. In the occluded context, the child's view of the situation was partly obstructed. In the non-occluded context, the child and adult shared the identical view of the situation. Error bars represent the standard error of the mean within each group. * ~ $p < .05$

5.2 | Ethical note

The study was ethically approved by an internal committee at the Max Planck Institute for Evolutionary Anthropology. Animal husbandry and research comply with the 'EAZA Minimum Standards for the Accommodation and Care of Animals in Zoos and Aquaria', the 'WAZA Ethical Guidelines for the Conduct of Research on Animals by Zoos and Aquariums' and the ASAB/ABS 'Guidelines for the Treatment of Animals in Behavioural Research and Teaching'. Research is always non-invasive and strictly adhered to the legal requirements of Germany. All individuals participated on a voluntarily basis. Chimpanzees were never food or water deprived and all rewards they received for participation were complimentary to their usual daily diet. All chimpanzees are treated in accordance with the global strategies of the European Endangered Species Program (EEP) and no medical, toxicological or neurobiological research of any kind is conducted at the Wolfgang Köhler Primate Research Center (in accordance with the recommendations of the Weatherall report 'The use of non-human primates in research').

5.3 | Materials and design

All chimpanzees were tested in their familiar indoor enclosure. The helpers and recipient faced one another across a booth but did not come in direct contact (see Figure 1). The apparatus was placed in the booth between the recipient and the helper. It sat on a metallic table and was fixed to the metal mesh of both the helper's side ('pusher' side) and the recipient's side ('receiver' side). The recipient and the helper were separated by a metal door, which could be opened as part of the individual training (see details below). On the receiver side, the recipient could reach through the mesh and indicate her side preference. On the pusher side the helper could choose which side (which tool) to push by operating a specially built 'decision panel' though which making a choice automatically blocked the non-chosen side. Therefore, only the helper had access to the tools. Each session was videotaped and the female experimenter remained in the testing room throughout the entire session. The reward box used in the need condition contained diluted grape juice, a highly desirable food resource for chimpanzees. During the training phase of the study chimpanzees were further introduced to two rubber straws, a long straw (functional tool) and a short straw (dysfunctional tool). The juice could only be obtained if chimpanzees used the functional long straw to drink from the reward box (see Figures 1 and 2).

Dyads were tested in sessions consisting of 16 trials that followed the following order: four no-need control trials, eight need trials and four no-need control trials. To manipulate the reaching gesture of the recipient, we placed, on every trial, small food pellets on the recipient's side of the apparatus. These pellets were placed in small compartments on either the left or right side and, crucially, were not visible to the helper. Chimpanzees recipients did not always reach for the food pellet item specifically but we were able to manipulate the reaching gesture enough to arrive at similar rates of reaching across the three recipients for the dysfunctional and functional tool (recipient 1:69% vs. 31%, recipient 2:67% vs. 33%, recipient 3:77% vs. 23%).

5.4 | Procedure

All helpers and requesters first participated in separate warm-up phases. We used different reward juice boxes for the helper and for the requester. The helpers could only drink juice with the functional tool while the requester could access her/his juice box with both the functional and dysfunctional tool. Therefore, only the helpers were aware of the different functionality of both tools. Details of the training procedure are described in the online supporting informations. The test phase consisted of four no-need control trials, followed by eight need trails, followed by a second round of four no-need control trials. In the occluded condition the experimenter placed the occluders on the tools, whereas in the non-occluded condition no occluders were used (see Figure 2). The experimenter waited until both the helper and the recipient were in their respective position facing each other across the booth. The no-need control trial began with the experimenter removing the juice box from the requester's side and placing it on the floor. She ensured that both the helper and the requester saw this. The experimenter placed an opaque occluder in front of the helper's panel such that his view was obstructed and then placed the food pellets in one of the two compartments (visible only to the requester). She then placed the same occluder in front of the requester's panel such that his view was obstructed and placed both tools on the apparatus (side counterbalanced). In the occluded

condition the human experimenter placed occluders above the tools (see Figure 3). Then the view occluder was lifted from the requester's and the first of four no-need trials started.

The requester could now reach and request one of the two tools. Once the requester began to reach for one tool the helper had the opportunity to respond (maximum time allowed was one minute). Immediately after the helper provided a tool, the experimenter placed the barrier in front of the helper's panel. We did not want the helper to see what the recipient did with either tool and therefore obstructed the helper's view. In addition, the initial training phase already ensured that the helpers understood the functionality of the long tool. To keep the helper motivated and engaged, each helper was a given a small food pellet reward of 1 min after the end of the trial (after the requester began reaching), regardless of what behaviour the helper showed. We thus reinforced the helper to participate but did not reinforce a particular type of behaviour. In case helpers did not provide a tool after 1 min the experimenter ended the trial and proceeded to the next trial. All four no-need trials followed the same structure.

At the beginning of the first need trial (the fifth trial in total) the experimenter fixed the juice box on the mesh on the requester's side next to the requester. She ensured that both the helper and the requester saw this. What the helper did not know is that the juice box on the recipient's side was different from the one the helpers were trained with and that the recipient's juice box was accessible with both tools. Therefore, the recipient could use both tools to drink juice. The rest of the need trials (eight trials in total) followed the same procedure as the no-need trials. After the eighth need trial (and the 12th trial in total) the experimenter again removed the juice box and again placed in on the floor to the side. Both the helper and the requester saw this. The following four no-need trials were identical to the first four no-need trials.

5.5 | Coding and data analysis

Reliability was calculated on a random sample of 22% of all sessions (29 out of 132). Agreement between two adult coders (one also conducted the experiment, the other was blind to hypotheses and conditions) was high for the type of tool the recipient reached for (*Cohen's Kappa* = 0.86), for helpers' choice (*Cohen's Kappa* = 0.92) and for the latency to provide the recipient with one of the two tools (*ICC* = 0.81). Following the analyses by Yamamoto et al. (2009) we calculated Wilcoxon Rank tests (with exact *p*-value calculation). To test our predictions and similar to the analyses of Study 1, we carried out six focused pair-wise comparisons (adjusted α = 0.008) and report as effect size estimates the 95% confidence intervals.

6 | RESULTS

The rate with which chimpanzees provided the functional tool varied as a function of context (helping vs. paternalism) and condition (need vs. no need), $F(1, 7) = 5.96$, $p = .045$. In the helping context, in which the tool the requester wanted and needed were the same, chimpanzees complied more often to provide the functional tool in the need ($M = 0.66$, $SD = 0.17$) compared to the no-need condition ($M = 0.47$, $SD = 0.24$), $T = 36$, $p = .008$, 95% CI [.03 0.52], $d = 0.93$. (see Figure 3). In the paternalism paradigm, however, chimpanzees did neither correct the requester nor comply with his/her request and provided the functional tool equally often in the need ($M = 0.49$, $SD = 0.13$) and no-need ($M = 0.53$, $SD = 0.15$) conditions, $T = 19$, $p = .47$, 95% CI [-0.03 0.13], $d = 0.28$. In the non-occluded paternalism context, chimpanzees provided the functional tool equally often in the need ($M = 0.63$ $SD = 0.18$) and no-need ($M = 0.76$ $SD = 0.16$) conditions, $T = 15$, $p = .063$, CI [.01 0.25], $d = 0.78$. Similarly, in the occluded paternalism context, chimpanzees provided the functional tool equally in the need ($M = 0.46$, $SD = 0.12$) and no-need ($M = 0.46$, $SD = 0.13$) conditions, $T = 14$, $p = .64$, 95% CI [0.06 0.04], $d = 0.02$. Note that the comparison between the occluded and non-occluded context are exploratory given that we did not fully counterbalance the factor across the small number of chimpanzee participants.

7 | GENERAL DISCUSSION

Previous experimental work had investigated the rate of helping in human and non-human primates but did not directly compared the manner of helping. In the current studies we used a novel paradigm giving both children and chimpanzees a choice not of *whether* to help but rather *how* to respond to others' needs. Our results replicate previous work in showing that both children and chimpanzees show concern for others and comply with others' request for help when these align with the requester's actual need (Warneken et al., 2007; Yamamoto et al., 2012). However, the crucial difference between the two groups was evident in the nature of their tendency to be paternalistic. Only human children showed paternalism and intervened for the benefit of the recipient and corrected her behaviour. Crucially, children did not automatically correct others' request for help but took into account how much better they could evaluate the situation. Children's paternalism was strongest when they shared the same view of the situation as the requesting adult. Overall, children complied with the adult's request in the majority of conditions unless the requested tool did not serve to fulfil the adult's actual need in which case children were more motivated to correct the request. Chimpanzees, on the other hand, did not show preference for either object and performed at chance across conditions unless the conspecific requested the functional tool when that tool was needed to retrieve a reward. Together these results suggest that while both children and chimpanzees show concern for others, the underlying manner in which each group provides this help is different.

The current results replicate previous work on chimpanzees' helping behaviour, both with regard to their response to others' requests for help as well as their lack in concern to systematically improve others' long-term well-being. Chimpanzees are sensitive to others' immediate needs and requests for help (Yamamoto et

al., 2009, 2012). These previous findings replicated in the current study where chimpanzees helped more in the need compared to the no-need control condition when the conspecific requested the functional tool. However, in the paternalism condition chimpanzees did not correct requests for help that were dysfunctional. In other words, chimpanzees were not paternalistic to interfere 'for the good of the recipient' (Grill, 2007). This lack in paternalism to improve the requester's well-being by means of correcting the request for help is comparable to previous findings that chimpanzees do not systematically improve a conspecific's well-being in the so-called prosocial choice task (House et al., 2014; Jensen et al., 2006). The results of the current study with human children also replicate and crucially extend previous work.

By age three children concern themselves with others' long-term well-being and correct dysfunctional requests for help (Hepach et al., 2013; Martin et al., 2016; Martin & Olson, 2013). In one study, the authors found that 3-year-old children complied with the adult's request less often when this resulted in a negative consequence and half the children corrected the adult by providing the intact tool instead (Martin & Olson, 2013). Note that the child and the adult did not share the same perspective which may have put additional constraints on children's decision resulting in correction rates between 52% and 69% (see Martin & Olson, 2013, for details). In the current study, we found different rates of correcting in children between the occluded and non-occluded contexts. This allows us to specify that the rate of correcting others is greatest if both parties share the same perspective, as is the case in the current study's non-occluded context. Children at the age of three may thus hesitate to override an adult's request for help if they cannot be certain that their view of the situations matches that of the adult. Therefore, in the current study's occluded context children may have complied with the adult's request because, from their perspective, the adult may have had a privileged view of the tools that children did not have. This context sensitivity resonates with previous findings from a study in which children's and the adult's perspective matched and children's complying behaviour and responses to unjustified requests for help were as low as 25% (Hepach et al., 2013). Thus, based on the current results we can conclude that children are less likely to correct the adult when they do not have the same view of the situation as the adult (e.g., Martin & Olson, 2013) but, in contrast, correct the adult more often when both the child and the adult share the same perspective (see also Hepach et al., 2013).

The current studies are the first to assess and directly compare the phenomenon of paternalism between young children and chimpanzees. At the same time, there are a number of methodological considerations of the current studies that warrant discussion. One crucial premise of a paternalism context is that the potential helper knows that only the functional tool can fulfill the requester's need even if the requester reaches for the dysfunctional tool. Given the species-unique testing constraints we chose different approaches for chimpanzees and children. Chimpanzees' underwent extensive training in which subjects were exposed to multiple days of using the functional tool to successfully obtain juice. Helpers only proceeded to the test phase if they correctly identified the functional tool on multiple successive sessions during the training phase. In this way, we sought to ensure that helpers had ample experience of using the functional tool and thus, in the helping and paternalism context of the test phase, knew that only the functional tool would fulfill the requester's need. In contrast, young children were only tested in a single session and thus the time we could allocate to training them on the apparatus and the tools were more limited in comparison to chimpanzees. Therefore, we included control questions during the training phase to ensure that all children knew that only the functional tool worked to retrieve the reward from the box. During the test phase, we reminded children of the adult's goal of wanting to retrieve the reward from the box and of the fact that one tool was needed to successfully to do so. To this end the adult experimenter pointed to both tools from a distance saying: 'Yes, I need that one'. Crucially, the adult pointed *ambiguously* and did not provide any clues as to *which* tool he required. Together, the extensive multi-session training and testing for chimpanzees could have made the functional tool more salient for chimpanzees than for children who received a total of four reminders during a single testing session that one tool (not which) was needed for the adult to successfully retrieve the reward. This would have resulted chimpanzees overall choosing the functional tool more often than children (which is not what we found).

Together, these methodological differences between children and chimpanzees prompt a more critical reflection on whether the differences in observed paternalism where a mere consequence of methodological differences between the paradigms in which each group was tested. It is important to point out that children – in the paternalism context when the adult reached for the dysfunctional tool but needed the functional tool – were not paternalistic per se but took into account what view of the situation they had in comparison to the adult. Children's paternalism was rather selective and occurred significantly more often in the non-occluded context, where both tools were fully visible, compared to the non-occluded context, where occluders changed the visual perspective of the child and adult on the two tools. If the study's procedure, including the training, prompted children to be paternalistic to correct the adult then one would have expected similar levels of paternalism between the occluded and non-occluded contexts. But this is not what we found. Children corrected the adult in the paternalism context significantly more often on the non-occluded compared to the occluded context. This suggests that asking children during the training phase to identify the correct tool did not automatically result in them providing this tool. One avenue for future research is to manipulate the conditions that result in paternalism in children. Children's paternalistic helping may depend on how certain they are that the adult's request will not sufficiently fulfill his/her need. In addition, it is important to investigate age effects whether older children are more motivated to be paternalistic, even in occluded context, than the 3-year-old children in our study (see also Martin et al., 2016). Similarly, additional research is needed to follow-up on the question of whether there are circumstances under which chimpanzees will show paternalism.

This could include varying the social relationship between the requester and the helper to include mother–child dyads or dyads of close allies and friends (see also Engelmann & Herrmann, 2016).

In addition to a difference in *how* chimpanzees and young children help others it is important to consider other factors that may explain the species difference observed in the current studies. It is possible that chimpanzees have greater difficulties taking the perspective of the requester than young children, which could explain their lack of paternalistic helping. On such an account both children and chimpanzees are motivated to help others and even help paternalistically but chimpanzees may not be able to think about the requester's goals and constrains in ways that are comparable to young children. While ultimately more research is needed to fully address this point, there are two reasons to think that a mere lack in a cognitive ability to take others' visual perspective is not the best explanation of the current pattern of results for chimpanzee subjects. First, the extensive training in the current study ensured that subjects proceeded to the test phase only if they had completed a training phase with the occluders during which they themselves had to walk to the non-occluded side to identify the functional tool (so they clearly knew the positions from which their own view was or was not occluded). Second, previous work with comparable experimental setups shows that chimpanzees are able, in addition, to discern the positions from which others can and cannot see things (Hare, Call, Agnetta, & Tomasello, 2000; Kaminski, Call, & Tomasello, 2008) and can represent others' false beliefs (Krupenye, Kano, Hirata, Call, & Tomasello, 2016), suggesting that subjects in the occluded context of the current study knew whether the requesting conspecific could or could not see the functional tool.

It is important to emphasize that the lack of paternalism in the current sample of chimpanzees does not indicate a lack of concern for others. On the contrary, the results from the helping condition in the current study replicate previous work with chimpanzees who help conspecifics to fulfill their instrumental goalsresponding to others' needs and helping more in need compared to no-need control scenarios (Melis et al., 2011; Warneken et al., 2007; Yamamoto et al., 2012). The results of the current study add to our understanding of the underlying motivation of chimpanzee helping behavior. Chimpanzees, as opposed to young children, help others by fulfilling the request for help. This suggests that for chimpanzees the cost of denying a conspecific the tool that he/she requested does not outweigh the benefits of having corrected the request to provide the tool that is functional to fulfilling the actual need. One interesting avenue for future research is to identify the conditions under which chimpanzees are paternalistic and do correct others. Previous work has shown that chimpanzee helping behavior does increase towards conspecifics who have benefitted the individual in the past (Schmelz, Grueneisen, Kabalak, Jost, & Tomasello, 2017). In such scenarios of dependence chimpanzees may correct others' dysfunctional requests for help because they themselves want to be helped by having their need rather than their request being fulfilled.

In summary, the current results suggest that while human children and chimpanzees share a sensitivity to others' immediate requests for help, humans additionally take into account others' long-term well-being. Only human children showed evidence for paternalism. Such paternalistic interference with another's goal-directed behavior bears a cost given that it temporarily upsets and frustrates the recipient who did not get what he requested. In a highly interdependent species this cost is outweighed by the benefit of correcting others' ill-fated requests for help, given that there is a mutual understanding among collaborating partners to care about each other's needs above and beyond fulfilling each other's immediate requests for help. Our hypothesis, therefore, is that the strongly interdependent nature of human social life has led, via natural selection, to helpful individuals who are not so much interested in fulfilling a conspecific's every wish and desire, but rather at keeping them in good shape as potential collaborative partners for the future.

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DATA AVAILABILITY STATEMENT

The data from both studies and the respective analyses scripts to reproduce the statistical analyses reported in the respective results sections are provide here: https://osf.io/wjdvf/.

ORCID

Robert Hepach https://orcid.org/0000-0001-6538-4891

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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