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Abstract

Preschools represent social structures in which preschoolers learn to maintain positive relationships and learn how to behave prosocially towards their peers. At the same time, social structures also form hierarchies, in which some members assert themselves better for resources and have a higher social status than others. This raises the question of how social behaviour is organised in our youngest social groups. In my thesis, I investigated dominant and prosocial behaviour as well as social status in four preschool groups with $n = 46$ preschoolers (female = 29, male = 17, $M = 59.54$ months, $SD = 10.76$). I assessed social status by asking preschoolers about their preferred play partners. In instructed games repeated three times, I observed preschoolers' dominant and prosocial behaviour in the peer group. Additionally, preschool teachers rated preschoolers' dominance, prosociality and social status. Results did not confirm a negative relation between dominant and prosocial behaviour. Post hoc calculations showed that the prior found positive relation between dominance and prosociality is partly explained by age. Social status was not found to be a predictor for either dominance or prosociality, however, I found a nonsignificant trend when interacting social status and gender to dominance. The positive link between social status and prosociality diminished with partial correlations post hoc including age. My findings emphasise the role of age when studying dominance, prosociality and social status among preschoolers and identify future directions for developmental research of dominant and prosocial behaviour in peer groups.

Keywords: dominance, prosociality, dominant behaviour, helping, social status, peer preferences, preschoolers, peer groups

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Theoretical background

Our living together is organised in social relations and hierarchies, which require cooperation and prosociality. However, it is also important to assert oneself in order to obtain resources. Dominance and prosociality have long been seen as being opposing behaviours: While dominant behaviour is about asserting oneself for a resource at the expense of others (Hawley, 1999), prosocial behaviour involves acts on behalf of others (Eisenberg et al., 2006). However, both behaviours are important to succeed in social groups: On the one hand, it is important to assert oneself in order to acquire resources. On the other hand, acts of prosociality, such as sharing resources and helping each other, are crucial aspects of living together (Eisenberg et al., 2006; Hawley, 1999). This ambiguity raises the question of how acts of helping and sharing are associated and compatible with acts of asserting oneself at the expense of others. The consideration of these behaviours in early childhood is particularly interesting to analyse, as this time is regarded to be an important developmental period for both behavioural constructs (Ostrov & Guzzo, 2015). Also, children are born into systems of social hierarchy (Charafeddine et al., 2015; Gülgöz & Gelman, 2017) and preschool classrooms are among the first group environments where children start to interact, cooperate, share resources and/or assert themselves over resources with peers (Dirks et al., 2018; Pellegrini et al., 2007). Yet, up until now, research has hardly investigated the link between dominant and prosocial behaviour in preschool age (e.g. Guinote et al., 2015), and to my knowledge, no study investigated this behaviour directed towards peers in “real world” interactions. Hence, this thesis aims to investigate the relationship between dominant and prosocial behaviour among preschoolers. Even though there is a research gap regarding the direction of the relation, studies among preschoolers indicate that more dominance is associated with less prosociality (e.g. Guinote et al., 2015; Terrizzi et al., 2020). Given the fact that natural peer groups are studied, it is also relevant to consider an individual’s social standing in the group. Therefore, I include preschoolers’ social status, which is the degree of being accepted or rejected by peers (Horn et al., 2018), in my investigation and assume that it influences both dominant and prosocial behaviour towards peers.

Dominant behaviour

This chapter gives an overview of *dominance*, its meaningful theories, developmental trajectories and its expression in preschool peer groups. In addition, I address prosocial and affiliative strategies as approaches to exert dominance.

Resource acquisition is central to development and growth (Ricklefs, 1979). Social dominance, in the following referred to simply as *dominance*, is defined as assertiveness in a competition for resources (Hawley, 1999; Pellegrini et al., 2007), which can be obtained with different strategies. Dominance evolves across all ages in dyads or dynamic group formations (Vaughn, 1999) and is – among other dimensions, like goal achievement, permission, giving orders or setting norms – a manifestation of *social power* (Gülgöz & Gelman, 2017). Traditional perspectives have often related dominance to aggression (Reijntjes et al., 2018), however, several scholars postulated that dominant individuals, irrespective of their aggressiveness, can also be considered socially competent (Hawley, 2002; Vaughn, 1999; Vaughn & Santos, 2007). This consideration questions the bipolar view of social competence, with prosociality and agreeableness on the one hand and aggression and hostility on the other hand (Bukowski et al., 2001).

Dominance from a developmental point of view

The prediction of cues linked to power, such as relative size, seems to be an early-developing cognition (Thomsen et al., 2011). Using the *violation-of-expectation* (VOE) paradigm, where “looking time is interpreted as an indicator of infants’ expectation” (Tafreshi et al., 2014, p.228), 10-13-month-old infants expect a smaller agent to make space for a bigger agent to reach its goal, indicating that they relate power with an agent’s size (Thomsen et al., 2011). In their preschool years, three-five-year-old children can presume dominance from certain characteristics: For example, preschoolers expect an older child with more resources to be more dominant (Charafeddine et al., 2015). Children of this age group also refer from dominance to a certain behavioural outcome: For example, they expect a dominant child to win a game against a less dominant (Charafeddine et al., 2015). Investigating children’s dominant behaviour, Hawley (2002) showed that preschoolers’ age predicts 29% of variance for the dominance status and correlates highly with dominance. Concerning age, it is indicated that not physical development (e.g. body size), but the cognitive development that goes hand in hand with age, is crucial for children’s dominance among peers (Hawley, 2002).

Infants are not only able to mentally represent power and dominance (e.g. Thomsen et al., 2011), but they also distinguish between different bases of power (Margoni et al., 2018): While *respect-based power* is characterised by legitimate and/or merited power, *fear-based power* is achieved by coercive, intimidating or aggressive acts towards others (e.g. Cheng et al., 2010, 2013; Margoni et al., 2018; Van Vugt, 2006). In a study by Margoni et al. (2018), 21-month-old infants watched an animated video with a leader and three subordinates, in

which a leader gave orders to the subordinates, by either exerting respect-based or fear-based power and afterwards left the scenery. Using the VOE paradigm, children looked longer, when the subordinates disobeyed than obeyed in the respect condition. Longer looking times are regarded as a violation of expectation, meaning that infants would expect the subordinates to obey when power is exerted respect-based. In the fear condition, children looked equally long at both obey and disobey events, suggesting that both events are plausible: Either the subordinates might obey the order to avoid further harm or the leader's absence might diminish their power and the subordinates decide to disobey. These findings suggest that infants already distinguish between different types of power (Margoni et al., 2018). This sensitivity to distinguish types of power is further established with age: Gülgöz and Gelman (2017) showed case vignettes of two characters with different social power dimensions to three-nine-year-old children and asked them which character is in charge. Three-year-old children deducted social power from case vignettes presenting resource control, goal achievement and permission. Five-year-old children were able to additionally detect setting norms as a dimension of social power. Only by the age of seven, children link all dimensions, including giving orders, to social power (Gülgöz & Gelman, 2017).

Another influential theory, the *resource control theory* (RCT), refers to fear- and respect-based power and includes different behavioural strategies to exert dominance among preschoolers (Hawley, 2002, 2003a). It explains two strategies to assert oneself over peers: Namely via (1) *coercive control*, e.g. direct, thwarting or aggressive behaviour and via (2) *prosocial control*, e.g. making suggestions, guiding a play partner or offering objects (Hawley, 2002). According to RCT, five subtypes of resource control are further distinguished: (1) *prosocial controllers*, who primarily use prosocial strategies, (2), *coercive controllers*, who mainly use coercive strategies, (3) *bistrategic controllers*, who score high on both, (4) *non-controllers*, who score low on both and (5) *typicals*, who score neither high nor low on either strategy simultaneously (Hawley, 2003a). According to Hawley (2002, 2003a, 2014), bistrategic control represents a form of social competence, because an individual asserts oneself ("getting ahead") while maintaining positive relationships ("getting along"). A short-term-longitudinal study by Reijntjes et al. (2018) pointed out that bistrategic elementary school students were the most successful in acquiring resources compared to other subtypes. At the same time, they also showed more bullying and were unpopular among their peers. With respect to preschool aged children, Hawley (1999) suggested that dominance appears to be mostly coercive because children still lack negotiating and verbal skills to use a prosocial strategy for resource control. However, Hawley (2002) also showed that three-six-year-old

preschoolers were able to show prosocial strategies when obtaining resources. This is an interesting outcome, since prosocial behaviour in general starts developing in the second year of life (Dirks et al., 2018).

Dominance among preschool peers

To find out more about dominance in peer groups, a study by Pellegrini and colleagues (2007) investigated preschoolers' dominance across one school year. Dominance was obtained via behavioural classroom observations, teacher ratings and the *ticket paradigm*, a competition game, in which preschoolers have to queue for resources (Pellegrini et al., 2007). The ticket paradigm is a case of *scramble competition*, in which all individuals eventually acquire a resource, but they have to scramble in order to obtain a more desirable part (Parker, 2000; Pellegrini, Roseth, et al., 2007). On the contrary, *contest competition* is characterised by a single item or a limited amount of a resource, which allows one individual to monopolise the resource and therefore results in clear winners and losers (Parker, 2000). Contest competition is more likely to elicit aggressive behaviour, whereas, in scramble competition, individuals are more likely to use affiliative behaviour (Pellegrini et al., 2007; Pellegrini, 2008). Moreover, the study by Pellegrini et al. (2007) showed that winning aggressive bouts predicts teacher rated dominance, but not ticket-paradigm related dominance. In line with *social dominance theory*, rates of aggression decreased with time (Pellegrini et al., 2007). The theory states that aggression stabilises in new emergent groups after some time because individuals find their status and realise that the costs of behaving aggressively towards others outweigh the benefits (Pellegrini & Long, 2003).

Peer investigations on dominance and gender show that preschoolers act more aggressively towards same than towards opposite gender peers (Ostrov & Keating, 2004; Pellegrini, Long, et al., 2007; Pellegrini et al., 2007). Moreover, Ostrov and Keating (2004) found different aggression modes related to gender: Preschool teachers rated girls as more relationally aggressive (e.g. excluding a peer from a play group) than boys (Hawley, 2003a). Observing preschoolers in competitive bead collection games, Weinberger and Stein (2008) found that boys did more competitive moves than girls, while there was no such outcome when the competition took place in mixed gender groups. These and further findings, which I will outline in more detail in the chapter on social status, emphasise the socialisation of gendered worlds in preschool classrooms and highlight gender as a relevant factor when dominance relationships are studied (Hawley, 2003a; Ostrov & Keating, 2004; Weinberger &

Stein, 2008). The next paragraph illustrates the second main interested behaviour of this thesis, prosocial behaviour.

Prosocial behaviour

In the following, I provide a definition of *prosociality* and illustrate prosocial development from infancy until preschool age. Moreover, I aim to shed light on research regarding prosociality among preschool peers.

Prosocial behaviour is defined as „voluntary behaviour, intended to benefit another“ (Eisenberg et al., 2006, p.646), and „refers to acts that increase the well-being of other individuals, often at a cost to oneself“ (Kafashan et al., 2014, p.140). With regard to this definition, prosocial behaviour is strongly linked to *altruism*, a moral norm “promoting the welfare of the collective” (Pfafftheicher et al., 2022, p.127). A distinction within prosocial behaviour is made between the subtypes *helping*, *sharing*, *comforting* and *cooperating* (Dunfield, 2014). Even though many definitions characterise prosocial behaviour as other-oriented concerns (Eisenberg et al., 2006; Kafashan et al., 2014), it has been contended that the subtypes of prosocial behaviour underlie heterogeneous motivations (Paulus, 2018; Paulus & Moore, 2012). Examples are the desire to affiliate (Carpendale et al., 2015; Eisenberg et al., 2006) or *goal slippage*, which means that the identification with a goal, such as picking up a pen for someone else, “has the effect that the goal slips from perception into action, and the child treats it as her or his own goal” (Michael & Székely, 2019, p.178). Hawley (1999, 2002) states that prosocial strategies of resource acquisition (e.g. offering another child a less valuable toy in order to obtain the more valuable toy) are not aligned with altruism, but with personal goal attainment. Therefore, it could be argued that prosocial strategies in the context of resource control only seem prosocial (Boxer et al., 2004; Dirks et al., 2018), since they are produced to achieve interests which predominantly serve the self (Hawley, 2002).

Prosociality from a developmental point of view

Research in developmental psychology suggests that infants represent prosociality and fairness from an early age: A much cited study by Hamlin et al. (2007) showed that six-month-old babies prefer a helping over a non-helping figure in a video clip. Schmidt and Sommerville (2011) hypothesise the expectation for equal resource distribution by the age of 15 months. Using the VOE paradigm, 15-month-old babies looked significantly longer at a clip if the distribution of resources was not fair. Further, there is consensus that prosocial behaviour emerges and develops in the second year of life: Helping behaviour develops first,

followed by sharing behaviour (Dirks et al., 2018). Warneken and Tomasello (2007) observed helping behaviour in toddlers by the age of 14 months. In a study by Dunfield et al. (2011), 18-month-old toddlers showed helping and sharing behaviour toward an adult whom they met during the experiment. Brownell and colleagues (2009) witnessed sharing behaviour in toddlers by the end of their second year if the recipient explicitly expressed their need. Regarding sharing behaviour in a fairness game with a stranger, three-year-old children's motivation to allocate more resources to themselves trumps a fair distribution, however, self-interest decreases by the age of five (Rochat et al., 2009). Comforting behaviour emerges in the third year of life (Dunfield et al., 2011; Hoffman, 2000). With the preschool years, children are able to respond to others' needs by showing concrete forms of prosocial action, such as handing someone a desired object (Dirks et al., 2018).

In summary, the developmental trajectory of prosociality starts with the mental representation of fairness and prosociality in preverbal infants (Hamlin et al., 2007; Schmidt & Sommerville, 2011) and progresses to more actual prosocial actions (helping and sharing) after the first year of life (Dirks et al., 2018; Dunfield et al., 2011; Warneken & Tomasello, 2007). By preschool age, latest, children get in touch with peer environments and thus prosocial actions unfold in interaction with peers.

Prosociality among (preschool) peers

Typically, children's prosocial behaviour is assessed in laboratory settings with most research focusing on how children behave prosocially towards either an adult stranger (e.g. Brownell et al., 2009; Dunfield et al., 2011; Rochat et al., 2009; Warneken & Tomasello, 2007), a hypothetical peer (Guinote et al., 2015) or a familiar peer in a hypothetical game setting (Paulus, 2016). Research using naturalistic conditions is scarce, even though such methods allow to investigate "real-world" prosocial peer interactions: Children's spontaneous responses to a distressed peer demonstrated that preschoolers paid attention to the distressed peer, but only a few times acted prosocially towards them (Caplan & Hay, 1989). To act prosocially, children must be able to "read" others' signal, be able to understand what it means and react accordingly. For young children, responding to peer's distress might be more challenging than responding to parents' or adults' distress conducted in laboratory settings, as peer's emotions are not easy to interpret and not scaffolded and young children cannot follow a script to react upon (Nichols et al., 2009). A study by Toppe et al. (2021) investigated preschoolers' sharing behaviour towards in- or outgroup members of familiar peers, after playing a competitive, cooperative or solitary game in same gender dyads. The prior gaming

context did not influence the later prosocial behaviour towards peers. Regardless of the gaming context, children shared equally with in-group and out-group members (Toppe et al., 2021). Tavassoli et al. (2023) investigated Tzotzil Maya and Canadian preschoolers' prosocial responsiveness by letting them play a brick building game in peer groups and assess how prosocially they respond to each other's needs. Preschoolers of both cultures most frequently failed to respond to others' expressed needs with only 9% of needs following a prosocial response (Tavassoli et al., 2023). This finding is in line with the aforementioned suggestions by Nichols et al. (2009) that especially for young children, responding to a peer's distress is challenging.

To sum up the studies that investigated children's prosocial behaviour regarding peers with different research questions, one can say: Either the game setting was investigated as a critical factor for prosocial behaviour (Toppe et al., 2021), or it was addressed whether there is a prosocial response to an expressed need (Caplan & Hay, 1989; Nichols et al., 2009; Tavassoli et al., 2023). Findings are in line with what is illustrated in the chapter on dominance and prosociality from a developmental point of view: Dominant as well as prosocial behaviour develop gradually with age and are refined in naturally formed and evolving peer groups, such as can be found in preschools. Nevertheless, the directional relationship between the two behaviours is still unclear, especially when they are expressed towards peers in a naturalistic context.

The relationship between dominant and prosocial behaviour

The following chapter aims to outline empirical findings, which provide directional guidance on the relationship between dominant and prosocial behaviour in preschoolers. When interacting with peers, preschoolers show cooperative and prosocial behaviour. However, the social world, including preschools, is also characterised by limited resources (e.g. desirable toys, the teacher's attention), which lead to the necessity to assert oneself against others. Therefore, the preschool context, as it incorporates a critical developmental period and the beginning of regular peer interactions, is an interesting field to study both dominant and prosocial behaviour. The peer context may also facilitate a more authentic view of children's dominant and prosocial behaviour, as the behaviour is not scaffolded and directed with an adult as a counterpart (Nichols et al., 2009).

To begin with, preschooler's prosocial behavioural strategies have been studied in the context of resource oriented behaviour (Eisenberg et al., 2006; Hawley, 2002; Reijntjes et al., 2018; Roberts et al., 2020; Roseth et al., 2011). Up until now, there are only a few

investigations regarding the link between dominant and prosocial behaviour (e.g. Terrizzi et al., 2020; Thomas et al., 2022). Theories and definitions of the past have defined dominance and prosociality as opposite behaviours, although both behaviours are important to succeed in social groups (Eisenberg et al., 2006; Hawley, 1999).

Some studies investigated the association between social power and prosociality: Terrizzi et al. (2020) investigated four-seven-year-old children's intuitions about the relationship between power and responsiveness to another person's needs: Children, watching a video with two female characters, associated the unhelpful character with a greater authority status. Furthermore, Terrizzi et al. (2020) found that negative links between power and prosociality decrease gradually: Six-seven-year-old children predicted that a subordinate would help significantly more than an authority in the future, whereas four-five-year-old children did not (Terrizzi et al., 2020). In a study conducted by Thomas and colleagues (2022), preschoolers were told a story about four different characters, one character with a crown identified as a leader and three subordinates. Preschoolers had to guess, who of the characters reacted to a behaviour, by answering questions such as "who helped someone who fell?". Among children aged three to eight years, leaders were less expected to show more helping and sharing behaviour than their subordinates (Thomas et al., 2022). It is crucial to point out that these studies did not investigate preschoolers' actual behaviour, but their intuition about the link between power and prosociality (Terrizzi et al., 2020; Thomas et al., 2022).

Further, Guinote et al. (2015) examined behavioural measures of dominance and prosociality among four-year-old preschoolers. Dominance was measured with ranks as a result of whether they won in a dyadic competition game. Two preschoolers competed for a valuable toy and two weeks later, paired winners and losers competed again. Prosociality represented the number of stickers donated to a hypothetical child in need. Results showed that low-rank preschoolers donated more stickers than high-rank preschoolers. Furthermore, losing a rank in the second assessment increased donating behaviour, whereas gaining a rank had the reverse effect (Guinote et al., 2015). A short-term longitudinal study by Ostrov and Guzzo (2015) observed prosocial behaviour among three-year-old peers in a preschool setting and measured teacher reported dominance. Contrary to the previous study, prosocial behaviour predicted an increase in dominance four months later. Additionally, age turned out to be a significant predictor of prosocial behaviour, whereas dominance was no predictor of prosocial behaviour four months later (Ostrov & Guzzo, 2015).

The studies attempt to provide directional guidance on the relationship between dominant and prosocial behaviour. Overall, the relationship between the two behaviours in preschool settings remains understudied. Even though a negative relationship is hypothesised, either regarding actual behaviour (Guinote et al., 2015) or intuitions (Terrizzi et al., 2020; Thomas et al., 2022), more research is necessary to better understand the directionality. When studying social behaviours in naturalistic peer groups, peer preferences should be taken into consideration, as they potentially contribute to the outcomes in dominant and prosocial behaviour (e.g. Newcomb et al., 1993; Sebanc et al., 2003; Thomas et al., 2022).

The links between dominance and prosociality to social status

This chapter sheds light on the importance of social status when studying dominance and prosociality in naturalistic peer contexts. First, I define social status and then link it to the behaviours of interest. The target age group to which I refer my considerations are preschool children.

Social status, which is sometimes also referred to as *popularity*, can be defined as “children’s standing, visibility, or social prominence in the peer group” (McDonald & Asher, 2018, p.430), or the “degree to which a group member is liked or disliked by peers” (Horn et al., 2018, p.2). Some researchers see social status as a more global construct and consider dominance and *prestige*, i.e. the status an individual reaches due to skills, knowledge or success, as fundamental pathways to acquire a certain human rank (e.g. Cheng et al., 2013; Kafashan et al., 2014). In this thesis, I aim to make a clear distinction between social status and dominance. I describe social status with the terms *peer acceptance* and *peer rejection*, by asking individuals in sociometric peer nominations how much they like or dislike each of their peers (Horn et al., 2018; McDonald & Asher, 2018). Dominance, yet a manifestation of power (Gülgöz & Gelman, 2017), is defined as assertiveness in a competition for resources (Hawley, 1999; Pellegrini et al., 2007).

Whether a child asserts him- or herself against others, potentially depends on whether (s)he* is liked or disliked by others. Children’s intuitions on social status, leadership and dominance evolve by an early age: Toddlers, watching a contest competition between two puppets, liked the winning puppet significantly more than the yielding puppet, but rejected the winning puppet when it used force (Thomas et al., 2018). When social status is translated into actual behaviour in peer groups, Sebanc et al. (2003) found an effect of gender between peer preferences and dominant behaviour in preschoolers: More dominant boys were preferred over less dominant boys, while less dominant girls were preferred over more dominant girls.

These findings suggest that gender constructs the social acceptance of dominant behaviour in preschool groups: While for boys, dominance and peer preferences seem to represent both constructs of social competence, for girls these constructs tend to be independent or even contradictory (Sebanc et al., 2003).

Social status seems to have a bidirectional positive relationship with prosocial behaviour, even though the issue of causality remains unresolved (Warden & MacKinnon, 2003). On the one hand, Caputi et al. (2012) showed that improvements in prosocial behaviour at preschool age favour later peer acceptance at elementary school age. On the other hand, a high degree of visual regard from peers (i.e. receiving a lot of attention from peers), which has been suggested as a proxy for high social status within the group, has been linked to more prosocial behaviour in preschoolers (Horn et al., in press) and elementary school children (Ginsburg & Miller, 1981). Moreover, a meta-analysis by Newcomb et al. (1993) showed that children with a high social status, compared to children with a lower social status, demonstrated significantly higher positive social actions, such as helpfulness, support, empathy, concern for others, cooperation, or leadership. Prosocial acts by the age of two and three predict being a target of prosocial behaviour one year later (Persson, 2005). Therefore, one can assume that children's interpersonal styles do not only predict their probability to experience similar behaviour but also determine their social status (Persson, 2005). Considering a positive relation between prosocial behaviour and peer acceptance (e.g. Newcomb et al., 1993), a logical inference would be that, as a recipient of prosocial behaviour, one would also receive more and faster help if one is more accepted than less accepted by peers. In concluding this chapter, one critical directive is to consider social status, when studying dominant and prosocial behaviour in naturalistic peer contexts.

Knowledge gaps in current research

In this chapter, I summarise the current gap in research regarding prosocial and dominant behaviour, which eventually leads me to my research questions and hypotheses. Only a few studies have investigated the relationship between dominance and prosociality among preschoolers so far. Prosocial behaviour has often been examined as part of strategies for resource control (Hawley, 2014; Reijntjes et al., 2018; Roberts et al., 2020; Roseth et al., 2011). Otherwise, studies have mainly focused on intuitions (Terrizzi et al., 2020; Thomas et al., 2022), or behaviours directed at a hypothetical person (Guinote et al., 2015). So far, no study has examined children's dominant and prosocial behaviours directed towards familiar peers in separate tasks, eliciting dominance and prosociality, respectively. Neither has this

connection been investigated in a naturalistic peer group that allows for dynamic interaction. Recently, however, Dirks et al. (2018) have emphasised the need to conduct research on the influence of social interactions on preschoolers' dominant and prosocial behaviour. As mentioned above, both behaviours are important to succeed in social groups: It is required to maintain positive relationships and help each other, while also asserting oneself to acquire a desired resource (Eisenberg et al., 2006; Hawley, 1999). Yet, it is unclear how these two behaviours are linked to each other, and it is particularly interesting to study them in peer interactions during a developmentally sensitive period, the preschool age (Ostrov & Guzzo, 2015).

This study

Investigations in naturalistic groups with peers, who are familiar with each other, can help to better understand preschoolers' social interactions and competencies in a dynamic setting: These groups enable researchers to find indicators of who prevails over others, of who is a helper and who is helped. A sequential behavioural setting allows the investigation of the connection between different behaviours. More specifically, whether preschoolers who assert themselves also help others, and whether social status is connected to both dominant and prosocial behaviour.

In the study conducted in this thesis, I first assessed preschoolers' social status by asking them about their peer play partner preferences, a procedure similar to (Horn et al., in press). With this sociometric assessment, I generated a peer acceptance score and peer rejection score per preschooler. Second, to analyse dominant and prosocial behaviour, I instructed peer groups into games and observed their behaviour. The games were repeated three times over the course of three weeks.

To observe dominant behaviour, two competition games, namely a modification of a contest competition and a scramble competition similar to Pellegrini and colleagues (2007) were conducted. These two types of competition are assumed to underlie two different dominance strategies, with contest competition being characterised by coercive strategies and scramble competition being characterised by affiliative strategies; (Parker, 2000; Pellegrini, 2008; Pellegrini, Roseth, et al., 2007). From both games, I specified dominance ranks when participants acquired the resource. Regarding the contest competition, I additionally measured the duration of resource possession. A more detailed description of the two dominance ranks resulting from the competition games follows in the method chapter.

To analyse prosocial behaviour, a helping game, which resembles common games played by preschoolers, was designed for this study. Regarding the prosocial game, I observed the ratio of helping as well as the ratio and the latency of receiving help. To test for construct validity, preschool teachers provided dominance, prosocial as well as peer preference ratings for each participating child.

Research questions and hypotheses

Based on the theoretical background discussed previously, I formulated the following research questions: First, is there a connection between preschoolers' dominant and prosocial behaviour? Second, does social status influence preschoolers' dominant and prosocial behaviour and does it influence being a recipient of prosocial behaviour?

I proposed a series of different hypotheses for my research questions: Results of several studies (Guinote et al., 2015; Terrizzi et al., 2020; Thomas et al., 2022) suggested a negative correlation between dominant and prosocial behaviour, indicating that more dominant children help less in preschool age. Taking into account that dominance ranks are coded inverted (i.e. a low rank represents higher dominance), I expected positive correlations between dominant and prosocial behaviour. Therefore, hypothesis 1.1 (H1.1) is: Among preschoolers, there is a positive relation between the ratio of helping behaviour and a) the scramble as well as b) the contest rank respectively. Hypothesis 1.2 (H1.2) is: The duration of resource possession and the ratio of helping behaviour are negatively correlated. Based on the study results from Sebanc et al. (2003), I expected the relationship between social status and dominance rank to be influenced by gender, resulting in the following hypotheses: Regarding the contest rank, I hypothesised that social status predicts the contest rank positively among boys (H2.1) and negatively among girls (H2.2). Regarding the scramble rank, I hypothesised the same: Social status predicts the scramble rank positively among boys (H2.3) and negatively among girls (H2.4). Further, I proposed the following hypotheses regarding social status and prosocial behaviour, based on corresponding literature (Ginsburg & Miller, 1981; Horn et al., in press): Hypothesis 3 (H3) is: More liked preschoolers help more often than less liked preschoolers. Finally, I assumed the following hypotheses regarding social status and being a target of prosocial behaviour: Hypothesis 4.1 (H4.1), based on logic inferences, is: More liked preschoolers receive more help than less liked preschoolers. Hypothesis 4.2 (H4.2) is: More liked preschoolers receive help faster than less liked preschoolers.

Method

Participants

Table 1 describes the sample, which was recruited in two different Viennese preschools. It had a size of $n = 46$ preschoolers (female = 29, male = 17) and consisted of four mixed gender groups of familiar peers. Age ranged from 38 to 79 months ($M = 59.54$ months, $SD = 10.76$). Three participants were excluded from hypotheses testing. Two of them were not present in any of the group game sessions. One participant had a suspected diagnosis of an autism spectrum disorder and, in consultation with the respective preschool teachers, the instructed group games could potentially cause too much stress for them. However, since data on social status as well as teacher ratings were available for these three participants, they were included in preliminary analyses and reliability testing. Given the necessity of recruiting whole groups and the scarcity of existing literature on naturalistic experiments with peers and therefore limited information about expected effect sizes, a priori sample size calculations are difficult. Prior estimates of a convenience sample size with a summed approximate sample size of $n = 60$ participants were not met due to a lack of parental consent and unforeseen schedule changes in data collection. Two preschool groups, which had very few participants, were combined in order to keep the number of participants balanced across all groups (group 3).

Table 1

Sample description regarding group size, gender and age

Group	Number of participants	Gender		Mean age (months)
		Female	Male	
1	11	6	5	59.64
2	12	7	5	59.67
3	11	8	3	63.09
4	12	8	4	56.08
Total	46	29	17	59.54

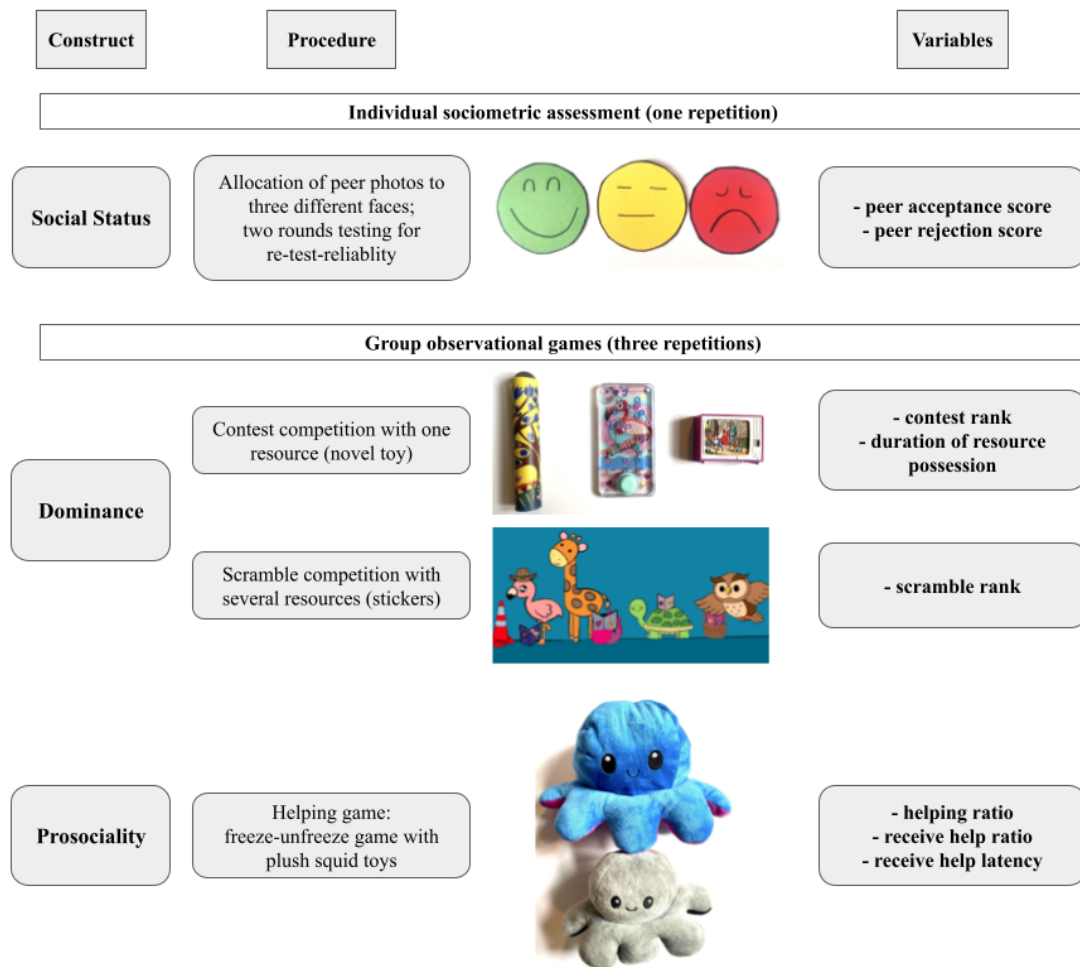
Parents and preschool teachers and provided written consent prior to the start of the study (parental information see in appendix B). Preschoolers' verbal consent for participating was obtained before each assessment session. As a reward for participating, preschoolers received a sticker pass with stickers collected during the games as well as some extra stickers they were allowed to choose in the debriefing session after the last session. All procedures

were carried out in accordance with the Declaration of Helsinki and have been approved by the ethics committee of the University of Vienna (Ref. No. 00796 & 00852) and the respective childcare institutions. Moreover, the study took place in consultation and under the supervision of the respective preschool teachers.

Study design and procedure

The data collection took place during the summer semester 2022 and the winter semester 2022/2023 and was conducted in collaboration with multiple undergraduate research assistants from the University of Vienna. Each preschool facility was visited on four to six days over the course of a month, depending on the number of preschool groups participating. In the first preschool facility were three participating groups and in the second preschool facility one participating group.

First, social status was assessed, by asking participants individually about their peer preferences, which lasted about five minutes and took place in a separate room within the preschool facilities. Second, both dominant and prosocial behaviour with the whole peer group were investigated in group games in the preschool's movement rooms. Peer group games were videotaped for later analysis. The games were repeated on three separate days over the course of three weeks, with each session lasting approximately 30 minutes. Prior to the start of data collection, the games were piloted with a comparable group of children. In addition to the behavioural observations of the group games, teachers provided ratings of preschoolers' peer preferences and dominant and prosocial behaviour. In the following paragraphs, I describe the procedures for each game and the resulting variables. The flow chart in figure 1 displays the measuring procedure of the preschooler's study design for each construct and the resulting variables.

Figure 1*Flowchart of the preschooler's study design*

Note. The upper picture displays the faces for the peer photo allocation. The second picture from above depicts the three novel toys used in the contest competition. The third picture from above illustrates the queuing for stickers in the scramble competition, read to the preschoolers from the storybook. The picture on the bottom shows two different sized plush squid toys used in the freeze-unfreeze game.

Social status

Among preschoolers, peer preferences are most evident through joint playing behaviour. Sociometric measures have been shown to be a reliable and valid instrument for assessing preschoolers' peer preferences (Ladd et al., 1999; Ladd & Coleman, 1997). In this study, I used an assessment procedure similar to Horn et al. (in press). I asked each participant individually, how much they like to play with each child in their preschool group, following a predefined script (see appendix C). I showed each participant a photo of each peer of their

group and asked to identify the peer on the photo. Then, I asked them to allocate it either to a green, smiling face “I really like playing with this child”, a red, frowning face “I do not like playing with this child at all“, or a yellow, intermediate face “I neither like nor dislike playing with this child”. Two slightly different rounds of this assessment were conducted to ensure re-test reliability. In the first round, the participant was given each peer photo sequentially and allocated it to one of the three smileys. Then, peer photos were shuffled. In the second round, the participant received the whole set of photos and allocated all photos to the three different faces simultaneously, creating three groups of photos at the same time. I standardised the number of being nominated as a liked and disliked play partner per group size and generated an index for peer acceptance and peer rejection for each participant.

Observational games – dominant and prosocial behaviours

Dominant and helping behaviour were assessed consecutively in semi-naturalistic observations within a game setting with the whole peer group. One experimenter instructed the games following a predefined script (see appendix C), while one or two more experimenters were keeping log and adjusting the video cameras. In the following, I present the procedure for each game.

Game 1 – contest competition. In the first game, I investigated assertiveness behaviour among preschoolers with one available resource. Participants sat in a circle, the experimenter placed a novel and attractive toy in the middle of the circle and the group had three minutes (group size < 10 participants) or five minutes (group size > 10 participants) time to play with it. An hourglass was visible so the preschoolers knew how much time they had left. Preschoolers agreed amongst themselves who gets to play with the toy. In each repeated session, the experimenter presented one of the three toys (a kaleidoscope, a ring game, or a device with moving fairy tale pictures), with randomising the order of toys across preschool groups. This form of competition is a “soft” contest: There is no clear winner (Pellegrini, 2008), but the resource can only be played by one preschooler at a time and can therefore be monopolised. The generated variables from the contest competition are the rank when the participants received the resource for the first time, called contest rank, and the average of the complete duration of possessing the toy over the three sessions, called the duration of resource possession (DRP).

Game 2 – scramble competition. In the second game, which is similar to the ticket paradigm conducted by Pellegrini and colleagues (2007), I investigated assertiveness behaviour with several resources. The experimenter read a story to the participants about a

flamingo, who takes part in a sticker hunt with other animals. After hearing the story, each participant answered two comprehension questions to warrant reliability of the dominance measure: “Please show me on the picture, which animal gets to choose a sticker first?” and “Please show me on the picture, which animal gets to choose a sticker last?”. The experimenter asked every second participant the questions in reverse order. The answer was rated correctly if participants pointed to the animal in the book or named the animal. Subsequently, the participants played the same sticker game themselves, meaning that they queued for stickers of different quality. The first participant in line got to choose the sticker first, the second participant in line got to choose their sticker second and so on, until each participant got one sticker. Stickers varied in their desirability (e.g. glittering and colourful versus neutral circles). The number of available stickers corresponded with the number of participants. The variable scramble rank, deducted from the scramble competition, refers to the final rank of the participant in the queue.

Game 3 – helping game. After the two dominance games, helping behaviour was investigated by playing the “freeze-unfreeze” game, which lasted five minutes and was accompanied by music. Each participant chose a plush squid toy and the group was instructed to walk around freely while balancing the squid on their head. If their squid fell, the participants had to freeze and were not permitted to touch the dropped squid. They could start moving again if a peer picked up the squid for them and put it back on their head. Two experimenters demonstrated the game by playing the procedure of a balanced, dropped, and picked up squid. The experimenter emphasised that it is not a big deal if the squid falls, since other peers can pick it up. However, the instruction did not use the term “helping” as such to prevent priming behaviour. The game started after a one-minute training. The setting evoked helping behaviour with a slight cost to oneself: By picking up a squid, a peer had to stop their walk and bend down to pick up the dropped squid. Even though the experimenter allowed the children to shortly hold their squid while picking up a peer’s squid, it induced the risk that the helper would lose their squid as well. The game was repeated the same in each session, however, the difficulty was increased when no squids dropped, by placing obstacles in the room, walking on tiptoes, or backwards. The measured variables were the helping ratio (HR), the receive help ratio (RHR) and the receive help latency (RHL). Latter is the time in seconds from when the squid landed on the floor until the participant received help.

Teacher ratings

To assess the validity of peer preferences and observational measures of dominance and prosociality, two teachers per preschool group filled out one questionnaire for each participant. For group 3, only one teacher each provided data. The questionnaire included the rating of a maximum of five best friends for each participant and eight items, which were answered on a continuous rating scale with the endpoints “does not apply” and “is very true”. More specifically, it included four dominant items (e.g. „tells others what to do“), which were obtained from Pellegrini et al. (2011) as well as four prosocial items (e.g. “helps other children”), which were obtained from Ladd and Profilet (1996). The number of items was selected in accordance with validity assurance, the time feasibility to answer, and the appropriateness for the age range and peer context.

Coding of variables and data treatment

Reliability and validity of social status

Data was coded with protocol lists (see in appendix D), while the participant rated peer preferences. To operationalise social status, I calculated a peer acceptance score and a peer rejection score for each participant: The acceptance score was derived by standardising the number of like nominations (allocations to the green face) by the group size. The rejection score was derived by standardising the number of dislike nominations (allocations to the red face) by the group size. Allocations to the yellow face were not further analysed. I assessed the test-retest-reliability by calculating the internal consistency of the two rounds of peer nominations, which yielded high Cronbach’s α reliability coefficients for the acceptance score ($\alpha = .93$) and rejection score ($\alpha = .88$), respectively (table 2). Due to the high reliability, I obtained a mean acceptance score and a mean rejection score across the two rounds. I used the mean scores for illustrating the distribution of social status across the four preschool groups (table 2) and any further analyses.

Table 2

Reliability coefficients and descriptive analysis of social status

	α	M (SD)			
		Group 1	Group 2	Group 3	Group 4
Acceptance score	.93	.59 (.22)	.34 (.13)	.52 (.22)	.44 (.18)
Rejection score	.88	.17 (.24)	.21 (.13)	.24 (.21)	.23 (.13)

After analysing the distribution of the social status variables (see table E1 in appendix E), I tested for discriminant validity and calculated a Spearman rank-order correlation between the acceptance and rejection score ($r_s = -.70, p < .001$). Because of this significant negative correlation and the fact that external validity with the teacher ratings was only possible for the acceptance score, I excluded the rejection score from further analyses. Pearson-product-moment correlation showed a positive significant association between teacher and participant rated peer acceptance ($r(32) = .37, p = .03$).

Coding of dominant behaviour

Data was coded live during the games by using protocol lists (see appendix D). I further double-checked the accuracy by analysing the video recordings. For coding the duration of resource possession, I used the behavioural coding software BORIS (Behavioral Observation Research Interactive Software) by Friard and Gamba (2016).

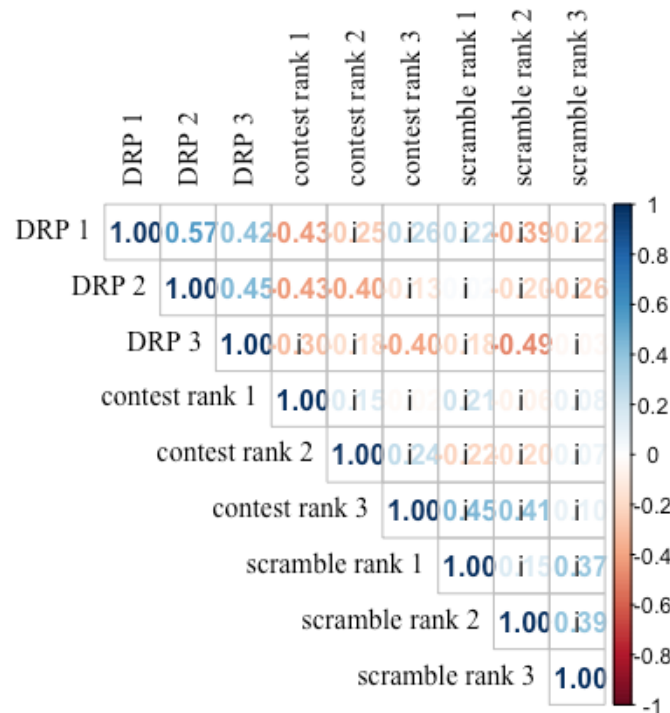
As a first dominance variable, I determined the contest rank by the sequence the participant received the desired resource. Participants were assigned the rank, which corresponded to the first time they received the toy. If a participant acquired the toy more than once, this specific rank was not assigned to any participant, while the individual receiving the toy afterwards was assigned the next higher rank. Participants, who never received the toy were excluded from further analysis because I could not determine their dominance rank. As a second dominance variable, I counted the DRP in seconds starting from the time the participant held the toy in their hands until they passed it on or got it taken away. If the resource was placed on the floor in between, the duration of possession stopped and started again as soon as another participant took it. I calculated the duration each time the participant possessed the resource, irrespective of whether they possessed it more than once. As a third and last dominance variable, I determined the scramble rank as the participant's final queue position in the scramble competition. The first participant in line equalled rank₁ and the last participant in line equalled rank_{number of participants per group}. Only participants, who correctly answered both comprehension questions, were assigned the scramble dominance rank.

The three variables of dominant behaviour (contest rank, scramble rank, DRP) were observed across three sessions. As shown in figure 2, except for the variable DRP, bivariate Spearman rank-order correlations (see tables E2, E3 and E4 in appendix E for data distribution) yield weak to moderate and mostly nonsignificant coefficients among the three sessions. Due to the absence of several participants during one or two of the three sessions, I still decided to calculate an average across all three sessions to avoid losses in my sample

size. These means were further used for intercorrelations and hypotheses tests. When discussing the results later, the low bivariate correlations across sessions must be interpreted with caution.

Figure 2

Bivariate correlations of behavioural dominance variables across the three sessions



Note. Boxes without an “i” represent significant correlations ($p < .05$). Numbers 1, 2 and 3 refer to the session.

Coding of prosocial behaviour

The behavioural coding of helping behaviour was obtained with the video recordings and the coding software BORIS (Friard & Gamba, 2016) and consisted of three variables. Prior to the generation of variables, I counted the number of dropped squids per session (the squid touches the ground $\geq$ three seconds) and the instances when participants picked up their squid themselves (self-pickup after $\geq$ three seconds), instead of waiting until another peer helped them. The first variable, the helping ratio, is the number of picked up squids per participant divided by the number of totally dropped squids among all participants. The second variable, the receive help ratio, represents the percentage of cases per session in which a participant was helped (i.e. squid is picked up by a peer) when they dropped the squid. For this, I divided the absolute receive help instances by the sum of absolute receive help instances and self-pickups. The third variable, receive help latency, represents the duration

until a participant received help. I coded the seconds from the time the squid fell on the floor until a helper touched the squid and calculated the mean duration for each session.

Like the behavioural dominance variables, the three variables of prosocial behaviour (HR, RHR, RHL) were also observed across three sessions. Table 3 shows that bivariate Spearman rank-order correlations (see tables E5, E6, and E7 in appendix E for data distribution) for the helping variables differ regarding their stability: While the variable helping ratio is significantly related across sessions, the variables receive help ratio and receive help latency are not consistent. No correlation could be calculated for the variable receive help ratio between the first two sessions. Yet, to avoid a decrease in my sample size, I calculated a mean for the three helping variables across sessions. When discussing the results later, the low bivariate correlations across sessions must be interpreted with caution.

Table 3

Bivariate correlations of the helping variables between the three sessions

	Session 1	Session 2	Session 3
Session1	1	HR $r_s = .54^{**}$ RHR $r_s = /$ RHL $r_s = .44$	HR $r_s = .42^*$ RHR $r_s = -.05$ RHL $r_s = .20$
Session 2		1	HR $r_s = .39^*$ RHR $r_s = .55^{**}$ RHL $r_s = .20$
Session 3			1

Note. * $p < .05$. ** $p < .01$. / no coefficient computation possible.

Coding and reliability of teacher ratings

To analyse teacher rated prosociality (TRP) and teacher rated dominance (TRD), the markings on the paper-pencil questionnaire were measured in millimetres along a continuous scale, using a ruler (0mm – lowest possible score; 113mm – highest possible score). All items were positively poled. Four items, pertaining to both dominance and prosociality, showed high internal consistency (cronbach's $\alpha = .92$ and $\alpha = .86$ for dominance and prosociality, respectively) and therefore I calculated a mean for each. I transformed the teacher rated friendship nominations per participant into a peer acceptance score by counting how often each participant was nominated among the five best friends and divided that score by the

participant's group size. The questionnaire did not allow the transformation of answers into a peer rejection score.

To evaluate the interrater reliability among teachers of the same group, I calculated two-way intra-class correlations (ICC) estimates with 95% intervals for the dominance, prosociality and peer acceptance ratings. No ICC was computed for group 3 because it was merged from two preschool groups and only one teacher each provided ratings. While agreements of TRD were high and significant for group 1 (ICC = .82, $F(10,5.99) = 14.12$, $p = .002$) and group 4 (ICC = .79, $F(11,11.2) = 7.83$, $p = .001$), agreement of TRD in group 2 yielded low and nonsignificant results (ICC = .29, $F(11,11.82) = 1.85$, $p = .16$). Conversely, TRP showed significant correlations in group 2 (ICC = .46, $F(11,10) = 3.22$, $p = .04$) and similar coefficients, but nonsignificant results for group 1 (ICC = .48, $F(10,10) = 2.68$, $p = .07$) and group 4 (ICC = .66, $F(11,1.29) = 37.21$, $p = .08$). Regarding the TR acceptance score, significant and moderate to high correlations were found for group 1 (ICC = .48, $F(10,10.01) = 3.23$, $p = .04$) and group 4 (ICC = .63, $F(11,11.97) = 4.60$, $p = .01$). The teachers of group 2 showed null results regarding their peer acceptance agreement (ICC = .07, $F(11,10.29) = 1.41$, $p = .30$). Due to the moderate and high ICC, means among the two teacher ratings were calculated and used for further validity analyses. Due to the non-existing agreement, the TR peer acceptance score of group 2 was excluded from further analyses.

Statistical analysis

Data from the social status assessment, dominant and prosocial observations as well as teacher ratings were first transcribed to Microsoft Excel and then further analysed using the statistical computing software R with RStudio (R Core Team, 2021; RStudio Team, 2022) and the packages psych, DHARMA, lme4, dplyr, MuMIn, sjplot, corrplot, ppcor, and extrafont (Bartón, 2022; Bates et al., 2015; Hartig, 2021; Lüdtke, n.d.; Revelle, 2022; Seongho, 2015; Wei & Simko, 2021; Wickham et al., 2023). I analysed my sample regarding age and gender, calculated descriptive statistics of dominance and prosociality and eventually performed my hypotheses tests. Last, I calculated post hoc tests including the variable age.

Results

Sample analysis

As a descriptive display of the sample regarding group distribution, age and gender serves table 1 in the method chapter. The four preschool groups did not differ regarding age (ANOVA: $F(3,42) = .79, p = .51$) and gender distribution (Pearson's chi-squared test $X^2(3,46) = 1.95, p = .58$). A t-test showed that girls did not differ from boys regarding age ($t(44) = .32, p = .37$).

Descriptive statistics of dominance and prosociality

In the method chapter, I described calculations of mean values for each behavioural dominance variable. Table 4 depicts the descriptive statistics of these mean dominance variables across the four preschool groups.

Table 4

Descriptive statistics of dominance variables across the four preschool groups

Group	M (SD)			
	Contest rank	Scramble rank	DRP	TRD
1	6.90 (4.40)	4.40 (1.80)	38.36 (19.97)	69.36 (30.44)
2	4.77 (1.95)	4.75 (2.30)	35.93 (11.98)	41.11 (25.14)
3	4.31 (1.73)	5.18 (2.84)	30.19 (25.57)	57.18 (21.44)
4	5.10 (2.94)	4.75 (1.69)	21.30 (15.39)	56.50 (23.80)

Note. Low rank values equal higher dominance. DRP in seconds.

Further, table 5 displays intercorrelations between the mean dominance variables. The contest and scramble rank are significantly related ($r_s = .41, p = .01$). Participants acquiring a high dominance rank in the contest competition, also acquired a high rank in the scramble competition. Also, the contest rank ($r_s = -.33, p = .04$), as well as the scramble rank ($r_s = -.38, p = .02$), are significantly related to the DRP: Acquiring a high dominance rank is associated with longer durations of possessing the toy. Regarding the negative coefficient, it must be considered that ranks are inverted and low values indicate a higher dominance rank. Further, the behavioural variables show weak positive correlations with teacher rated dominance. As mentioned in the method part, participants who did not correctly answer both comprehensive questions prior to the start of the scramble contest were excluded from further analysis and assigned a N/A value (eight out of 37 participants for the first, four out of 33 participants for

the second, three out of 33 participants for the last session). When calculating the session mean for the exclusively correct ($n = 39$) and the inclusion of wrong ($n = 42$) scramble contest answers, respectively, and grouping them by age, it showed that the participants who gave wrong answers ($n = 3$) were all aged between three and four years.

Table 5

Intercorrelations between the mean dominant variables

	Contest rank	Scramble rank	DRP	TRD
Contest rank	1	.41*	-.33*	-.18
Scramble rank		1	-.38*	-.18
DRP			1	.18 ^a
TRD				1

Note. * $p < .05$. All coefficients were calculated with Spearman rank-order correlation, except for ^a Pearson product-moment correlation (see table E8 in appendix E for data distribution).

Table 6 describes the means of prosocial variables, including teacher rated prosociality across the four preschool groups. The Spearman rank-order correlations of these means of prosocial variables are displayed in table 7 (see table E9 in appendix E for data distribution). HR is significantly correlated with TRP ($r_s = .36, p = .02$): Being helpful towards peers in the game is associated with higher teacher rated prosociality. RHR and RHL show weak and nonsignificant correlations ($r_s = -.08, p = .66$). Both RHR ($r_s = .18, p = .28$), and RHL ($r_s = .13, p = .43$) are weakly correlated with HR.

Table 6

Descriptive statistics of prosocial variables across the four preschool groups

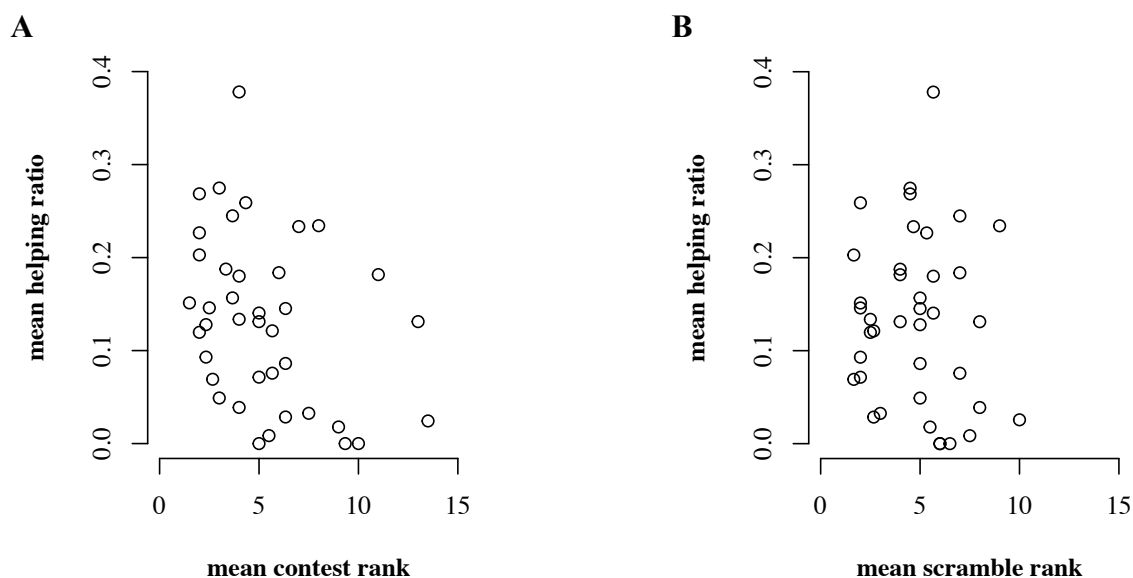
Group	M (SD)			
	HR	RHR in %	RHL in seconds	TRP
1	.13 (.08)	94 (9)	4.90 (1.36)	68.07 (19.91)
2	.16 (.12)	100 (1)	3.22 (2.21)	64.22 (23.70)
3	.11 (.09)	95 (12)	2.90 (2.42)	76.55 (34.35)
4	.10 (.09)	91 (12)	5.59 (4.95)	65.90 (18.44)

Table 7*Intercorrelations between the mean prosocial variables*

	HR	RHR	RHL	TRP
HR	1	.18	.13	.36*
RHR		1	-.08	.04
RHL			1	.21
TRP				1

Note. * $p < .05$.**Hypothesis testing**

Contrary to the predicted positive relationship between dominance rank and helping behaviour (H1.1), I found a significant negative Spearman rank-order correlation between the mean helping ratio and the mean contest rank ($r_s = -.38, p = .02$) and a nonsignificant negative Spearman rank-order correlation between the mean helping ratio and the mean scramble rank ($r_s = -.16, p = .32$). As shown in figure 3, a lower rank in the contest competition was associated with more helping in the helping game (part a). Further, the rank in the scramble competition did not relate to helping in the helping game (part b). Consequently, H1.1, assuming a positive correlation between dominance rank and helping behaviour, could not be confirmed for either dominance rank.

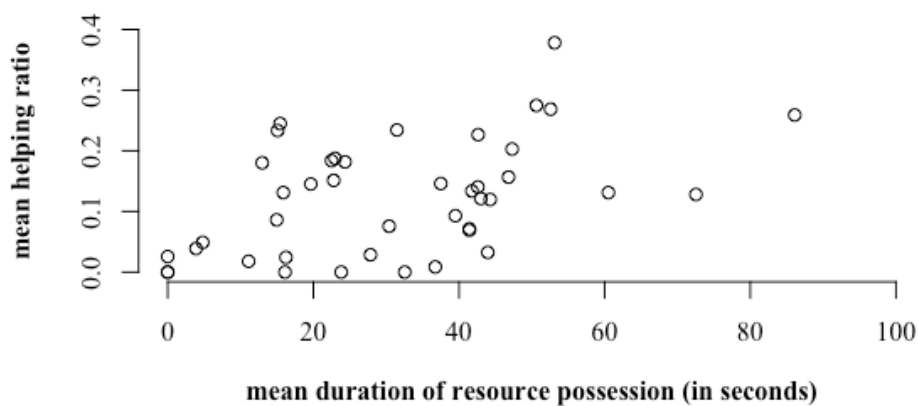
Figure 3*Association between helping ratio and (A) contest rank and (B) scramble rank*

Note. Each dot represents one participant. $N = 39$ for testing H1.1a and H1.1b.

H1.2 assumed a negative correlation between the mean DRP and the mean helping ratio. The two variables were not normally distributed (see tables E8 and E9 in appendix E for data distribution). The Spearman rank-order correlation applied for this reason showed a significant positive relation, $r_s = .44, p = .004$. Figure 4 illustrates the positive association between the DRP and helping ratio: A longer resource possession (i.e. duration of monopolising a toy in the contest competition) was associated with more instances of helping in the helping game. Consequently, H1.2 was rejected.

Figure 4

Association between helping ratio and the duration of resource possession



Note. Each dot represents one participant. $N = 42$ for testing H1.2.

To test the hypotheses of whether social status predicts the two dominance ranks positively among boys (H2.1, H2.3) and negatively among girls (H2.2, H2.4), I conducted two statistical models. I chose a generalised linear model (GLM) with contest and scramble rank as outcome variables, respectively (tables F1 and F2 in appendix F for model fit), because both the contest and the scramble rank followed a Poisson distribution (tables E2 and E4 in appendix E). In both models, the peer acceptance score and gender served as predictors and were individually and interactively added as fixed effects. To control for the three repeated sessions, the participant's ID nested in the preschool group was added as a random effect.

Hypotheses that social status predicts the contest rank positively among boys (H2.1) and negatively among girls (H2.2), were not confirmed. Table 8 shows that neither the peer acceptance score ($p = .22$) nor gender ($p = .09$) nor their interaction ($p = .08$) had a significant effect on the contest rank. The R^2 of the fixed effect model explains 6.01%, while the entire model (including both random and fixed effects) explains 43.55% of variance.

Table 8*Random and fixed effects for the contest rank model*

Random effects	Name	Variance	SD	
ID:group	Intercept	0.14	0.37	
Fixed effects	Estimate	SE	z	p-value
Intercept	1.89	0.33	5.75	< .001
Acceptance ^a	-0.72	0.58	-1.23	.22
Gender	-0.87	0.50	-1.71	.09
Acceptance ^a *gender	1.81	1.02	1.76	.08

Note. No. of observations = 73; no. of groups = 4; no. of ID's = 35. ^a peer acceptance score.

Regarding the hypotheses that social status predicts the scramble rank positively among boys (H2.3) and negatively among girls (H2.4), table 9 shows that neither the peer acceptance score ($p = .19$) nor gender ($p = .26$) and nor the interaction of the two ($p = .23$) significantly predicts the scramble rank. Here, the R^2 of the fixed effect model explains 3.27% while the entire model (including both random and fixed effects) explains 27.04% of variance. Consequently, H2.3 and H2.4 were rejected.

Table 9*Random and fixed effects for the scramble rank model*

Random effects	Name	Variance	SD	
ID:group	Intercept	0.007	0.26	
Fixed effects	Estimate	SE	z	p-value
Intercept	2.21	1.85	2.00	.23
Acceptance ^a	-0.64	0.49	-1.31	.19
Gender	-0.43	0.38	-1.12	.26
Acceptance ^a *gender	0.99	0.82	1.20	.23

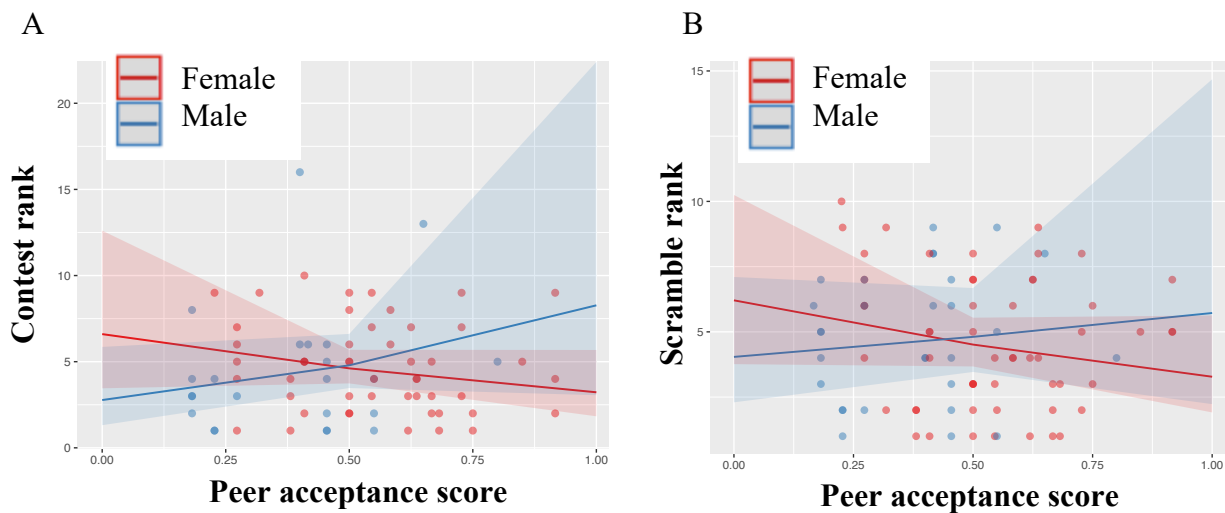
Note. No. of observations = 84; no. of groups = 4; no. of ID's = 39. ^a peer acceptance score.

Although the models did not show significant interactions, figure 5 illustrates the tendency between the interaction of gender and the acceptance score with respect to the

dominance ranks: Contrary to my expectations, more accepted girls show lower dominance ranks while more accepted boys show higher dominance ranks.

Figure 5

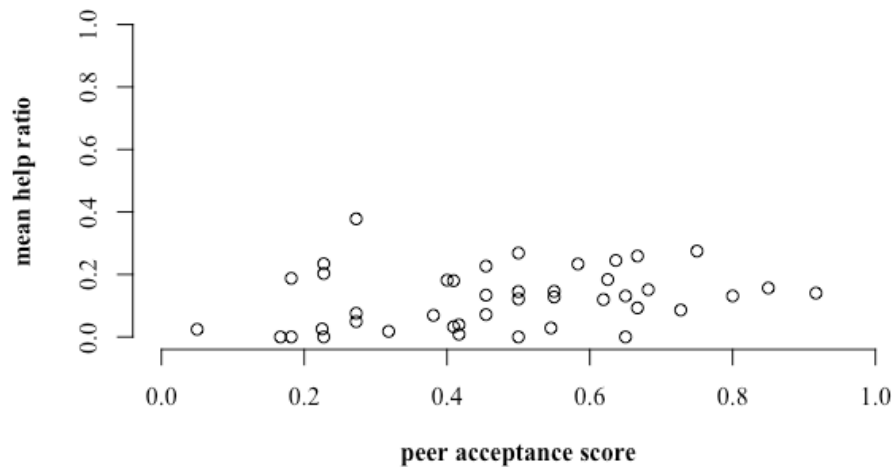
Interaction of peer acceptance score and gender with respect to (A) contest and (B) scramble rank



Note. Each dot represents an observation. No. of observations = 73 for contest rank and = 84 for the scramble rank.

To test H3, whether more liked preschoolers help more often than less liked preschoolers, I first examined the distribution of the outcome variable helping ratio, which followed a Poisson distribution (see table E5 in appendix E). Like in the models before, I chose to conduct a GLM with the peer acceptance score as a fixed effect and the participant's ID nested in the preschool group as a random effect. I transformed the outcome variable helping ratio, by multiplying the variable times 100 and rounding it to an integer value. After conducting the GLM, DHARMA residuals however formed a significant deviation between the observed and expected model (see table F3 in appendix F) and indicated a poor model fit for the respective GLM, meaning it was different than expected from the model assumptions.

Hence, to test H3, I calculated a Spearman rank-order correlation (for distribution see tables E1 and E9 in appendix E) between the peer acceptance score and the mean helping ratio, showing a significant correlation of $r_s = .31, p = .04$. Figure 6 illustrates the relationship between the mean helping ratio and the peer acceptance score. With this correlation, I did not confirm social status as a predictor of helping (H3), however, I confirmed a positive correlation.

Figure 6*Association between the peer acceptance score and the mean helping ratio*

Note. Each dot represents one participant. $N = 42$.

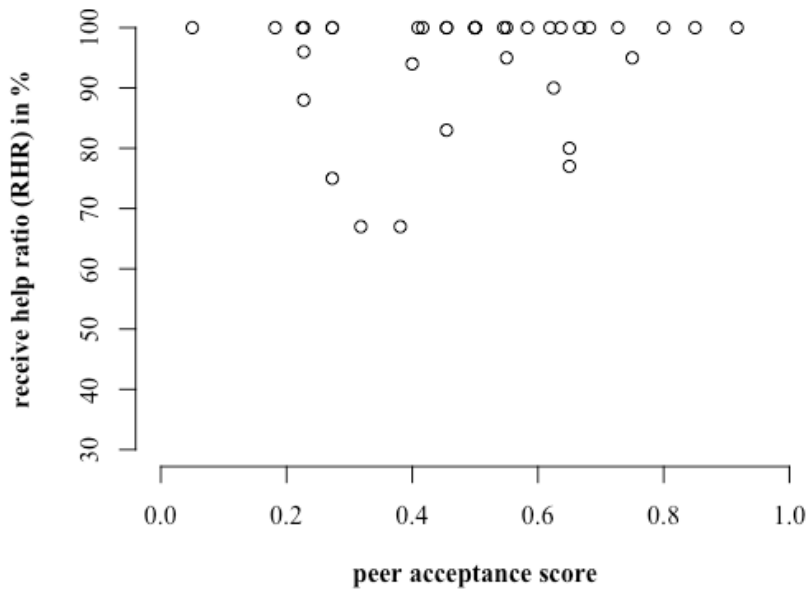
To test the last hypotheses, whether more liked preschoolers receive more (H4.1) and faster help (H4.2) than less liked preschoolers, I chose to conduct two GLMs, because both variables followed a Poisson distribution (see tables E6 and E7 in appendix E). To apply the model, I first transformed the variables RHR and RHL into integer values by multiplying them times 100 and rounding them to an integer number. Hence, RHR was transformed into a percentage variable and RHL into a count variable. The peer acceptance score was added as a fixed effect and the participant's ID nested in the group was stacked as a random effect. The variables RHR and RHL served as outcome variables in both models, respectively. When conducting the GLM models, DHARMA residuals formed a significant deviation between the observed and expected model (see tables F4 and F5 in appendix F) and indicated a poor model fit for the RHR and the RHL GLM, respectively.

Instead of calculating a GLM for testing H4.1 and H4.2, I conducted Spearman rank-order correlations (see tables E1 and E9 in appendix E for data distribution) between the peer acceptance score and the mean RHR and the mean RHL: Peer acceptance did neither significantly correlate with the receive help ratio, $r_s = .12$, $p = .51$ (H4.1) nor with the receive help latency, $r_s = .13$, $p = .46$ (H4.2). Figure 7 displays the association between the peer acceptance score and the receive help ratio across sessions, indicating a ceiling effect of RHR, with $n = 25$ out of 37 participants receiving help in 100% of cases. Figure 8 illustrates the association between the peer acceptance and the receive help latency across sessions, indicating a ground effect of RHL, with $n = 26$ out of 37 participants receiving help in less than five seconds. Since there is no relation between the peer acceptance score and the receive

help ratio and the receive help latency respectively, the hypotheses that more liked preschoolers receive more help (H4.1) and faster help (H4.2), were rejected.

Figure 7

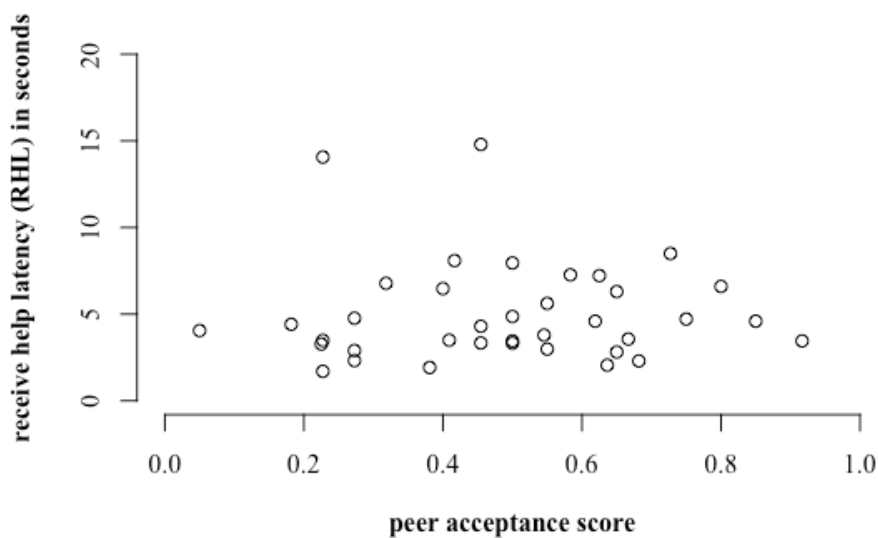
Association between the peer acceptance score and the mean receive help ratio



Note. Each dot represents one participant. N = 37.

Figure 8

Association between the peer acceptance score and the mean receive help latency



Note. Each dot represents one participant. N = 37.

Post hoc analysis with age

The variable age was not included in the hypotheses. However, correlations conducted post hoc showed significant relationships to both dominant and helping behaviour, indicating that the participant's age was associated with more dominant and more helping behaviour: Pearson product-moment correlations yielded significant associations between age and the DRP ($r(40) = .39, p = .01$) and peer acceptance ($r(44) = .35, p = .02$). Spearman rank-order correlations produced significant results between age and the contest rank ($r_s = -.53, p < .001$), the scramble rank ($r_s = -.42, p = .008$) and the helping ratio ($r_s = .56, p < .001$). No significant relations were found between age and the receive help ratio ($r_s = .22, p = .20$) and the receive help latency ($r_s = -.01, p = .94$).

To account for age as a potentially meaningful variable, I calculated a post hoc analysis. First, I was interested in whether the negative correlation between dominance rank and helping behaviour (H1.1) and the positive correlation between DRP and helping behaviour (H1.2) is affected by age. To test this, I conducted partial correlations: When I controlled age on the relationship between contest rank and helping ratio (H1.1a), I found a partial correlation of $r_s = -.15, p = .37$. As calculated in the paragraph above, the correlation without accounting for age was $r_s = -.38, p = .02$ (H1.1a). For the partial correlation between the scramble rank and helping ratio, controlling for age, I calculated $r_s = .04, p = .80$. In comparison, the correlation without accounting for age was $r_s = -.16, p = .32$ (H1.1b). Finally, when I controlled for age on the relationship between duration of resource possession and helping ratio (H1.2), I found a correlation of $r_s = .33, p = .04$. Without accounting for age, the correlation was $r_s = .44, p = .004$ (H1.2).

Second, I was interested in whether age influenced the two dominance ranks in the models of hypotheses 2. To test this, I included age as a fixed effect in the contest and scramble model respectively (for model fit see tables F6 and F7 in appendix F). As displayed in tables 10 and 11, age did not predict the contest rank model ($p = .13$) and scramble rank model ($p = .09$), respectively. In the contest rank model, acceptance became a significant predictor ($p = .04$). The fixed effects models with the inclusion of age explained 18.96% of variance for the contest model (95.83% for the entire model) and 9.39% for the scramble model (30.16% for the entire model).

Table 10*Post hoc contest rank model with age as an additional fixed effect*

Random effects	Name	Variance	SD	
ID:group	Intercept	1.10	1.05	
Fixed effects	Estimate	SE	<i>z</i>	p-value
Intercept	5.23	1.25	4.19	< .001
Acceptance ^a	-2.91	1.42	-2.04	.04
Gender	-1.01	1.16	-0.87	.38
Age	-0.37	.25	-1.53	.13
Acceptance ^a *gender	2.49	2.35	1.06	.29

Note. No. of observations = 68; no. of groups = 4; no. of ID's = 34. ^a peer acceptance score.

Table 11*Post hoc scramble rank model with age as an additional fixed effect*

Random effects	Name	Variance	SD	
ID:group	Intercept	.07	.26	
Fixed effects	Estimate	SE	<i>z</i>	p-value
Intercept	2.44	0.47	5.16	< .001
Acceptance ^a	-0.33	0.50	-0.65	.52
Gender	-0.65	0.45	-1.39	.17
Age	-0.16	0.09	-1.72	.09
Acceptance ^a *gender	1.48	0.94	1.58	.12

Note. No. of observations = 68; no. of groups = 4; no. of ID's = 39. ^a peer acceptance score.

Third and last, I was interested in the relationship between peer acceptance and helping behaviour (H3) after controlling for age. Therefore, I calculated a partial correlation: When I controlled for age regarding the relationship between the mean helping ratio and the acceptance score, I found a partial correlation of $r_s = .13$, $p = .40$ ($n = 42$). The correlation referring to H3 in the paragraph above, without accounting for age, was $r_s = .31$, $p = .04$.

Discussion

Summary and interpretation of results

In this thesis, I investigated the relationship between dominance, prosociality and social status among preschool peers. Although research has contributed to our knowledge on dominance (e.g. Hawley, 2002; Pellegrini et al., 2007) and prosociality in early childhood (e.g. Dirks et al., 2018), to date, little is known about their relationship. However, both behaviours are important to succeed in social groups (Eisenberg et al., 2006; Hawley, 1999) and preschools allow the study of dynamic social interactions in familiar peer contexts. To my knowledge, this was the first study relating preschoolers' dominant and prosocial behaviour directed towards familiar peers, induced in a semi-naturalistic study setting with the inclusion of social status as a potential predictor. Although I was not able to confirm a negative correlation between dominant and prosocial behaviour, nor that social status is a predictor of either dominance or prosociality, conclusions and implications for further research emerged. In the next paragraphs, I discuss the results of each hypothesis. Since my study holds several limitations, the following interpretations must be considered with caution.

Discussion of hypothesis 1

Based on the research question, whether preschoolers' dominant and prosocial behaviour are related to each other, I hypothesised a negative relation between dominant and helping behaviour (H1). I tested this hypothesis with three sub-hypotheses, each accounting for one different dominance variable. Considering the inverted coding of the two dominance ranks, I assumed a positive correlation between the helping ratio and the contest rank (H1.1a) and the scramble rank (H1.1b), respectively. Correlations showed that neither dominance rank was positively linked to helping behaviour. Contrary to my expectations, higher dominance in the contest competition was moderately related to more instances of helping (H1.1a). Dominance in the scramble competition did not significantly relate to helping, also showing a weak correlation contrary to my expectations (H1.1b), based on interpretations by Dancey and Reidy (2011). When I controlled for age post hoc regarding H1.1a, the correlation between the contest rank and helping ratio diminished and turned out to be nonsignificant, indicating that preschoolers' age explains the relationship between dominant and helping behaviour. When I controlled for age regarding H1.1b, I found no correlation, indicating that the above mentioned weak correlation is indeed explained by age. Contrary to my predicted hypothesis 1.2, which assumed a negative correlation between the duration of resource possession and the helping ratio, the correlational test yielded a moderate positive link. The result indicates

that preschoolers' duration of monopolising a desirable toy in the contest competition goes in hand with more helping instances in the helping game. When I accounted for age in the correlation, the coefficient diminished but was still significantly positive.

Taken together, age plays a crucial role when studying dominance and prosociality in preschoolers: With respect to dominance, older preschoolers are associated with acquiring better dominance ranks as well as longer durations of possessing a resource than younger preschoolers. With respect to prosociality, older preschoolers are associated with more helping behaviour than younger preschoolers. Instances and latencies of receiving help, however, are independent of preschoolers' age. My results are in line with Hawley (2002), who suggested that cognitive development, which goes hand in hand with age, is crucial for children's dominance and showed that preschoolers' age predicts 29% of variance for the dominance status. Also, the developmental trajectory of prosociality is closely tied to age (Dirks et al., 2018; Dunfield et al., 2011; Warneken & Tomasello, 2007). Therefore, age seems not only to be important for the development of both dominance and prosociality (e.g. Dirks et al., 2018; Hawley, 2002) but also for their interconnection and should be considered when studying further relationships of these social behaviours in preschool age.

Even though study results suggest a negative relationship between dominance and prosociality (Guinote et al., 2015; Terrizzi et al., 2020; Thomas et al., 2022), I could not confirm this in my investigation. On the contrary, H1.1a and H1.2 depict that more dominant preschoolers also help more. For H1.2, the effect can be seen regardless of age. Therefore, my unexpected results are more in line with theoretical considerations of bistrategic resource control, which refer to asserting oneself while maintaining positive relationships (Hawley, 2002, 2003b), namely by behaving prosocially towards peers.

The focus of this study was to measure dominance in two different competitive games. Results showed that the behaviour of both competitions was significantly linked to each other and weakly linked to teacher rated dominance. Interestingly, the correlation between dominance and helping is stronger in the contest than in the scramble competition. This is in contrast to findings that contest competition is more likely to elicit aggressive behaviour, whereas, in scramble competition, individuals are more likely to use affiliative behaviour (Pellegrini, 2008; Pellegrini et al., 2007). Nonetheless, it is important to mention that the contest in my study was not conducted in zero-sum conflicts or dyads as usual (Pellegrini, 2008). To allow the study of dominance in groups, the contest competition was adapted with multiple ranks and durations of resource monopolisation.

I did not additionally conduct strategies preschoolers used to exert dominance, as it would have exceeded time capacities within the scope of this master thesis. An interesting implication for further research would be, whether the connection between dominance and prosociality is still positively related and strongly dependent on age when dominance strategies are further investigated. Infants by the age of 21 months are already capable of distinguishing between fear-based power and respect-based power (Margoni et al., 2018) and according to Hawley (2002), preschoolers use coercive and prosocial strategies to exert dominance. Therefore, a comprehensive observation of dominance strategies, rather than solely observing ranks and durations of possessions, might shed more light on the relationship between dominance and prosociality.

Discussion of hypothesis 2

The hypotheses 2 complex was deducted from the research question, whether more liked preschoolers have a higher dominance rank than less liked preschoolers. Regarding social status, I expected peer acceptance to predict the two dominance ranks (scramble and contest) positively among boys and negatively among girls. Hypothesis 2 was split into four sub-hypotheses to test gender and ranks, respectively. I derived this hypothesis including the gender interaction from Sebanc et al. (2003), who demonstrated that peer preferences and dominant behaviour differ with preschoolers' gender. However, fitted GLM models did not support any of the hypotheses 2. Contrary to my expectations, I did not identify social status as a significant predictor for both dominance ranks. Sebanc et al. (2003) identified a gender-by-dominance interaction for peer preferences: While more dominant boys were preferred over less dominant boys, less dominant girls were preferred over more dominant girls. My study did not yield significant interactions, however, it showed a tendency contrary to Sebanc et al. (2003): More popular girls tended to be more dominant than less popular girls, whereas more popular boys tended to be less dominant than more dominant boys. Taking into consideration that 20 years have passed since Sebanc et al.'s (2003) findings, one could also argue that educators, caregivers as well as children are becoming more aware of adverse gender stereotypes, such as that dominance is more accepted among boys than girls. Thus, my study could give a prospective hint that the gendered worlds mentioned by Sebanc et al. (2003) are changing, as girls, who assert themselves are also accepted by peers. Still, it remains unclear why my study showed that more accepted boys tend to be less dominant. All in all, these results must be interpreted with caution, as in both models (contest and scramble

competition), neither peer acceptance nor gender and nor their interaction were identified as predictors.

Further, the unexpected tendency raises the question of the importance of group gender composition when studying preschool play groups. Fabes and colleagues (2003) observed more stereotypical gender differences when preschoolers played in same gender groups. Sebanc et al. (2003), studying same gender groups, hypothesised and found that “for boys, assertive skills, dominance, and peer preferences are overlapping components of social competence whereas, for girls, these components are fairly independent, or even conflicting” (p.100). One possible explanation for my contrary results may be that I studied mixed gender groups. Such groups were found to diminish gender differences of competitive moves in games (Weinberger & Stein, 2008), which adds to the importance of the group context and that “the emergence of competition in early childhood is unlikely to be uniform in nature” (p.499).

Discussion of hypothesis 3

For the third hypothesis, I assumed that more liked preschoolers help more than less liked preschoolers. Due to statistical problems in fitting the data to GLM models, I could not test and interpret social status as a predictor of being more helpful. Therefore, I solely investigated the relationship between social status and helping behaviour with a correlation analysis. I cannot confirm a causal relationship between social status and helping behaviour, but a higher social status is significantly associated with preschoolers’ helping. However, post-hoc calculations including age as a covariate resulted in nonsignificant correlations between helping behaviour and social status. Age was significantly positively associated with helping behaviour as well as social status and diminished their association. Taken together, I could not confirm that more liked preschoolers help more, the positive correlation analysis, diminished by age, at best is an indication that a causal relationship exists. However, validity measures between preschoolers’ helping behaviour and teacher rated prosociality showed a positive association: Preschoolers’ helpfulness in the game was significantly associated with teacher rated prosociality.

Discussion of hypothesis 4

The fourth hypotheses were based on the research question whether social status is a predictor for being a target of prosocial behaviour. I hypothesised that more liked preschoolers receive more (H4.1) and faster help (H4.2) than less liked preschoolers. Fitting

the data to GLM models failed due to the distribution of both the ratio and the latency of receiving help. Due to this prerequisite violation, I resorted to correlational analyses between social status and the RHR and the HLR, respectively. This analysis did not yield significant associations between social status and the extent to which help is received. On the contrary, the data is not interpretable because RHR and RHL are characterised by a ceiling and ground effect, respectively. In other words, preschoolers are helped quickly and in almost all cases, irrespective of their social status or age.

One explanation for the ceiling and ground effects of the ratio and latency of receiving help is that the goal (i.e. to pick up dropped squids of peers) was represented in an agent-neutral manner. This refers to the term goal slippage and serves as an alternative explanation of spontaneous helping behaviour among young children. Once a goal is identified, the preschooler treats it like their own goal and acts upon it, irrespective of who is the recipient (Michael et al., 2016; Michael & Székely, 2019). The instruction of the freeze-unfreeze-game did not explicitly mention that a participant should help their peers, but that picking up the squid toy results in the continuation of actively participating in the game. If participants identified picking up their peer's squid toy as their goal and not as an act of costly helping, goal slippage could serve as an explanation for the observation that participants received helped in almost all cases (Michael et al., 2016; Michael & Székely, 2019). This explanation also relates to the consideration that the participant's motivation was to keep the game going. The nature of the game conveys that participants should pursue the "unfreeze" state. If interruptions occurred (i.e. the squid dropped and participants had to "freeze"), intervention happened immediately. Therefore, it is important to reflect different underlying motivations of prosocial behaviour (Paulus, 2018) in "real world" peer interactions, and to what extent they potentially influence the observed behaviour. For future investigations, the helping game should also include measures, which try to disentangle underlying motivations, such as observing, whether preschoolers explicitly ask for help.

Even though preschoolers' helpfulness in the game was consistent across sessions and significantly associated with teacher rated prosociality, the variables instances and latency of receiving help induced strong ceiling and ground effects. Gaps in research studies on preschoolers' dominant and prosocial behaviour directed towards familiar peers also refer to study designs, which allow the observation of prosocial behaviour. The study design planned and conducted in this thesis, eliciting both dominance and prosociality, was a novel research setting. To my knowledge, there is no comparable helping game in the literature on prosociality among preschoolers, which allows the preschoolers to help their peers in a

dynamic game setting with a cost to themselves and provides observational data of being an agent as well as a recipient of helping behaviour. Prior research investigated preschoolers' prosociality toward a strange adult (e.g. Brownell et al., 2009; Dunfield et al., 2011; Rochat et al., 2009; Warneken & Tomasello, 2007), toward a hypothetical peer (Guinote et al., 2015), or toward a familiar peer in a hypothetical game setting (Paulus, 2016). In general, it is challenging to design a game, which elicits spontaneous helping genuinely "intended to benefit another" (Eisenberg et al., 2006, p.646), and to disentangle it from playful behaviour with the underlying motivation of keeping the game going. Therefore, I do not discard the study design in this thesis as such. Further research with a bigger sample is necessary to finally evaluate the study design's reliability and test respective hypotheses. Despite the inconsistency of variables across sessions and the ceiling and ground effects, several other reasons, including limitations regarding my sample size and dropouts, might have contributed to the inability of confirming my predictions.

Limitations

Sample

The conduction of the study holds several limitations regarding the sample. First, I was not able to recruit a sample size of $n = 60$ participants due to schedule changes in data collection and a lack of parental consents. Two preschool groups (group 3) were merged to keep group sizes similar. However, preschoolers of the two groups were not as familiar with each other as members of the same group. This limited their nomination of peer preferences. Second, the sample of $n = 46$ participants was further diminished by dropouts, either when preschoolers did not consent to participate or when they were absent on the scheduled game session. Finally, along with the dropout, I could not ensure to investigate a representative sample: I was not able to recruit whole naturalistic peer groups, because only preschoolers participated, whose caregivers provided consent. Moreover, both preschool facilities participating in the study are located in Viennese districts with higher income, education and less unemployment compared to the Viennese average (Landesstatistik Wien (MA23), n.d.). Therefore, I assume that the participant's socio-economic status (SES) in my sample is also higher compared to the Viennese preschooler population. In accordance with the time feasibility of this study, future studies should consider the assessment of parental SES, as it provides information about the actual SES of the sample and makes it possible to investigate links to preschoolers' dominance and prosociality. A study by Safra et al. (2016) for example

gives hint that low SES environments negatively impact children's prosocial behaviour towards strangers.

Methodological limitations

Except for the variables duration of resource possession and helping ratio, the participant's behavioural variables are not consistent across the sessions (see figure 2 and table 5). Hence, the formation of means across the sessions did not reliably represent the dominance ranks and the ratio and latency of receiving help. Nonetheless, it was the only possibility to deal with the extent of missing data due to the above mentioned dropouts, as well as the ceiling and ground effects in the helping game. Results of hypothesis 1, 3 and 4 based their analysis on these session means: Given the correlational disparity of dominance ranks across sessions, H1.1a and H1.1b, which refer to the association between helping ratio and dominance ranks, are vague to properly interpret.

One explanation for the inconsistency of dominance ranks across sessions is that the mode of conduction in both games increased missing values and consequently the lack of reliability: Regarding the contest competition, participants were assigned a N/A value, if they did not acquire the toy in the game. In the scramble competition, participants were assigned a N/A value if they did not correctly answer both comprehensive questions after hearing the story of animals playing the game. Eight out of 37 participants were excluded due to this lack of comprehension of the story in the first session. However, I could identify a learning effect across the sessions. In the second session, only four out of 33 participants and in the third session, only three out of 33 participants were excluded. Another explanation for the lack of reliability in the contest competition was the unpredictable event of participants simply passing the toy around in the circle rather than competing for it. This was the case in all three sessions of group 2 and group 3, respectively. Keeping this in mind, half of the contest ranks were assigned randomly instead of being the result of a competition. Except for the first participant acquiring the toy, the rank of acquisition depended on where the participant sat in the circle.

Calculations post hoc showed that age is linked to dominant and prosocial behaviour. Participants, who gave wrong answers regarding the comprehensive questions before the scramble competition, were aged between three and four years. I cannot be certain that the effect of age on dominance and prosociality calculated post hoc is therefore also explained by the fact that younger participants were not as active as older participants. For future investigations, it is therefore recommended to keep log on which participants do not actively

participate in the games (e.g. just run around instead of engaging in the freeze-unfreeze game) and analyse whether this dropout is explained by age.

Study design

Even though sociometric measures completed prior to the sequential games are a reliable and valid instrument for assessing preschooler's peer preferences (Ladd et al., 1999; Ladd & Coleman, 1997) and are used in similar assessment procedures (e.g. Horn et al., in press), sociometric answers conducted in this study might have been influenced by the presence of another peer. Sometimes, two children were assessed at the same time in the same room. Although the experimenters ensured that the tables for the sociometric assessments were located out of sight for the peers' answers, participants sometimes turned towards their peers during the testing procedure. This might be an indicator that they felt observed when giving their answers on peer preferences. Future sociometric assessments should guarantee an undisturbed and private setting, which does not evoke the feeling of being observed. The reason for the sociometric assessment of two preschoolers at the same time was because the experimenters were still quite unfamiliar with the preschool group. Therefore, the experimenters assumed that the preschoolers feel more comfortable participating in the individual sociometric assessment if another peer is present. Improvement suggests that preschoolers become more acquainted with the experimenters before the beginning of the study, for example by playing a game together.

The conduction of the "soft" contest competition was novel. Prior research (Pellegrini, 2008) investigated contest competition in dyads, which result in clear winners and losers. The contest competition in this study was argued to be a contest because the novel toy to compete for could only be possessed by one preschooler in a limited time and therefore be monopolised. In the paragraph above, I mentioned that two preschool groups passed the toy in the circle rather than competing for it across all three sessions. Even though the "passing-on in the circle" behaviour illustrates cooperation with a limited resource and ensures that every member gets the chance to play with it, it was likely no reliable measure for dominance ranks. Future investigations of this game should focus more on durations of resource possessions and dominance strategies used to acquire the resource. Further, participants, who did not acquire the resource at all, should not be assigned a N/A value, because it results in losses of valuable information on their dominance status.

Finally, the completion of teacher questionnaires was carried out at an inappropriate time, namely after the preschoolers' observational games. Since these games were conducted

under the supervision of the respective teachers, I cannot rule out that observing preschoolers' dominant and prosocial behaviour affected the teachers' ratings regarding dominance, prosociality and peer acceptance at a later time. Future designs should conduct teacher questionnaires prior to behavioural observations to prevent a potential *carry-over effect*, this is when the exposure to a variable influences the later response in another variable (Breakwell et al., 2020).

Implications

Even though this study holds several limitations, I can still contend with implications for theoretical considerations and future research directions. The study emphasises the sensitive developmental period in preschools, indicating that the age range between three and six years is crucial for the development of dominance and prosociality. For both behaviours, this study showed that older preschoolers assert themselves better and behave more prosocial than younger preschoolers. My study results, therefore, support scholarly work regarding the developmental trajectories of both behaviours (Dirks et al., 2018; Eisenberg et al., 2006; Hawley, 1999). One important implication for future investigations on dominance and prosociality is therefore to include age in all assumptions and additionally observe whether it plays a role in the degree of participation in the designed games.

Further, the results did not predict a negative relationship between dominance and prosociality in preschool age. Contrarily, all dominance variables were positively associated with helping behaviour. This is an interesting outcome because prior study results found a negative relationship between hypothetical dominance and prosociality assessed in zero-sum-conflicts (Guinote et al., 2015). Hence, this study adds to the still rare research scope of dominance and prosociality in the preschool setting and showed that the respective behaviours, studied in real-world peer interactions, are positively associated.

Since the investigation was conducted in peer groups, it was important to consider peer preferences, as they potentially contribute to the outcomes in dominant and prosocial behaviour (e.g. Newcomb et al., 1993; Sebanc et al., 2003; Thomas et al., 2022). My results did not identify social status as a predictor of dominance and prosociality. However, the tendency of a gender by social status interaction on dominance gives hint on changes in gender stereotypical behaviour and indicates the potential relevance of group gender compositions in peer groups. I cannot conclude pedagogical implications regarding group compositions, but mixed gender groups were found to diminish gender differences of competitive moves in games (Weinberger & Stein, 2008). Whether the mixed gender group

composition in my study had an effect on dominance and prosociality remains unclear and needs further investigation.

Conclusion

This study observed dominance and prosociality in natural preschool peer groups and additionally investigated social status as a potential predictor for both behaviours. It sheds light on an understudied research topic, especially since studies regarding the link between dominant and prosocial behaviour in preschool age are scarce. Dominance, as well as prosociality, are important to succeed in social groups and the preschool time is regarded as a sensitive developmental period for both behavioural constructs (Ostrov & Guzzo, 2015): Children in preschool age start to interact, cooperate, share resources and/or assert themselves over resources with peers (Dirks et al., 2018; Pellegrini et al., 2007).

My results, however, did not confirm my hypotheses. On the contrary, I found a positive association between dominance and prosociality. Post hoc calculations diminished the positive association and pointed out age as a meaningful variable for the interconnection between dominance and prosociality. Further, I was not able to identify social status as a significant predictor, neither for dominant nor for prosocial behaviour. Unexpected tendencies of a social status by gender interaction were discussed. Methodological shortcomings as well as the small sample size are likely for the inability to confirm my predictions. However, this was the first study designed to elicit both dominance and prosociality in a naturalistic and dynamic preschool setting. Therefore, its conduction highlighted implications and future directions for the developmental study of children's behaviour in their peer groups.

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List of abbreviations

M	mean
mm	millimetres
N/A	not applicable, not available
no	number
R ²	percent of variance explained by the model
SD	standard deviation
SE	standard error
<i>z</i>	<i>z</i> value (estimate/SE)

Appendices

Appendix A: German abstract

Kindergärten stellen soziale Strukturen dar, in denen Kinder lernen, positive Beziehungen zu pflegen und sich prosozial gegenüber Gleichaltrigen zu verhalten. Gleichzeitig finden sich in diesen sozialen Strukturen auch Hierarchien, in denen sich manche Kinder besser durchsetzen und einen höheren sozialen Status haben als andere. Dies wirft die Frage auf, wie das Sozialverhalten in unseren jüngsten sozialen Gruppen organisiert ist. In meiner Masterarbeit habe ich dominantes und prosoziales Verhalten sowie den sozialen Status in vier Vorschulgruppen mit $n = 46$ Vorschulkindern (weiblich = 29, männlich = 17, $M = 59.54$ Monate, $SD = 10.76$) untersucht. Ich ermittelte den sozialen Status, indem ich die Vorschulkinder nach ihren präferierten Spielpartner*innen befragte. In instruierten Spielen, die dreimal wiederholt wurden, beobachtete ich dominantes und prosoziales Verhalten in Peer-Gruppen. Zusätzlich bewerteten die Kindergartenpädagog*innen die Dominanz, Prosozialität und den sozialen Status der Vorschulkinder. Die Ergebnisse bestätigten den postulierten negativen Zusammenhang zwischen dominantem und prosozialem Verhalten nicht. Post-hoc-Berechnungen zeigten, dass der zuvor gefundene positive Zusammenhang zwischen Dominanz und Prosozialität teilweise durch das Alter der Kinder erklärt wird. Der soziale Status erwies sich weder für Dominanz noch für Prosozialität als Prädiktor, jedoch fand ich einen nicht-signifikanten Trend zwischen sozialem Status und Geschlecht in Bezug auf Dominanz. Der positive Zusammenhang zwischen sozialem Status und prosozialem Verhalten wurde durch post hoc durchgeführte partielle Korrelationen mit dem Alter abgeschwächt. Meine Ergebnisse unterstreichen die Rolle des Alters bei der Untersuchung von Dominanz, Prosozialität und sozialem Status bei Vorschulkindern und zeigen zukünftige Richtungen für die Entwicklungsforschung bei der Untersuchung von dominantem und prosozialem Verhalten in Peer-Gruppen auf.

Schlüsselwörter: Dominanz, Prosozialität, dominantes Verhalten, Helfen, sozialer Status, Peer Präferenzen, Vorschüler*innen, Peer-Gruppen

Appendix B: study information for the study



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Parent Information

Subject: Study "Helping and asserting oneself in kindergarten"

Dear families!

In this research project, we are investigating how often kindergarten children help each other and how well they assert themselves in the group. We would love for your child to participate in our study!

In this study, your child will get to play a simple game called "freeze" with the other participating children. In this game, children balance a beanbag on their head and have to "freeze" when it falls down. However, they can be freed by other children. In a second game, the children will first look at an interesting toy (e.g., a kaleidoscope). Then they will be read a story about a group of animals who have to wait in line to be allowed to pick stickers. After that, we will ask your child some comprehension questions. Then your child, along with the other children, will have the opportunity to line up for stickers. We will video record the children's interactions during these games so that we can accurately analyze their behavior at a later date. Both games will be played a total of 3 times (on three different days). In addition, we will interview your child about her/his friendships with the other children. We will also ask the educators to fill out a short questionnaire about the friendships between the participating children and about each child's assertiveness in the group. The study will be conducted on 4-5 days directly in the kindergarten, in agreement with and under supervision of the kindergarten staff.

All information that you and your child, as well as the educators provide in this study will be handled in strict confidence. The information will be stored under an anonymous ID number without name reference on a secure, university-internal drive, to which only researchers that are directly involved in this project have access.

During this study, your child will be video recorded, which allows us to later analyze the interactions in detail. These recordings will be stored by the principal investigator and used for scientific analyses. They will not be made public in any way.

This study will only be conducted with your child if you give your consent and if your child participates voluntarily. Additionally, you can withdraw your agreement to your child's participation in this study without justification, which will result in the immediate deletion of all data of your child.

The data collected as part of this study will be completely anonymized 3 months after data collection and archived in this anonymized form. This form of storage does not allow any conclusions to be drawn about the identity of the participants. Video and questionnaire data will be stored for 5 years and then deleted.

If you decide to support our research, please sign the enclosed participant information and consent form and return it to your contact person in the kindergarten.

Should you have any questions regarding our study, please do not hesitate to contact us via email or phone.

Thank you very much for your support! Kind regards,

Appendix C assessment scripts of social status and the observational games on dominance and prosociality

Social status

Die Bilder der Peers liegen auf einem Stapel (noch verdeckt) auf dem Tisch. Die drei Smileys liegen auf dem Tisch. Die Reihenfolge der Fotos ist bei jedem Kind zufällig, bevor das Kind zur ersten Runde kommt, die Fotos gut mischen. Um das Protokollieren zu erleichtern und zügig zu gestalten, ist die Reihenfolge der IDs gleich ins Protokollblatt zu übertragen, bevor das Kind zur ersten Runde kommt¹.

1.Runde

Hallo [*Name des Kindes*]. Wir möchten dir gerne ein paar Fragen dazu stellen, mit welchen Kindern aus deiner Kindergartengruppe du gerne spielst und mit welchen Kindern du nicht so gerne spielst. Dafür habe ich von allen Kindern ein Bild und drei verschiedene Smileys mitgebracht.

Das grüne, lachende Gesicht bedeutet, dass du sehr gerne mit diesem Kind spielst. [*dabei auf das grüne Gesicht zeigen*]. Das rote, traurige Gesicht bedeutet, dass du gar nicht gerne mit diesem Kind spielst. [*dabei auf das rote Gesicht zeigen*]. Das gelbe Gesicht bedeutet, dass es dir egal ist, ob du mit diesem Kind spielst oder nicht. Das heißt, du spielst weder sehr gerne mit dem Kind, noch gar nicht gerne mit dem Kind, oder du weißt es einfach nicht, wie gerne du mit diesem Kind spielst [*dabei auf das gelbe Gesicht zeigen*].

Ich zeige dir jetzt gleich die Fotos von den anderen Kindern. Du darfst jedes Foto zu einem dieser Gesichter legen, je nachdem, ob du mit diesem Kind sehr gerne spielst [*dabei auf das grüne Gesicht zeigen*], oder mit dem Kind gar nicht gerne spielst [*dabei auf das rote Gesicht zeigen*], oder ob es dir egal ist, ob du mit diesem Kind spielst [*dabei auf das gelbe Gesicht zeigen*].

Das erste Bild vom Stapel nehmen. Wer ist das [überprüfen, ob das Kind den richtigen Namen sagt; wenn nicht, richtigen Namen nennen]? Wie gerne spielst du mit Kind-XY? [bei den 2-3 ersten Fotos nochmal wiederholen]:

- Ich spiele sehr gerne mit Kind-XY – grünes, lachendes Gesicht [*dabei auf das grüne Gesicht zeigen*]

¹ The italicised text in appendix C refers to the preparations for and the way in which the study was carried out.

- Ich spiele gar nicht gerne mit Kind-XY – rotes, trauriges Gesicht [*dabei auf das rote Gesicht zeigen*]
- Es ist mir egal, ob ich mit Kind-XY spiele – gelbes Gesicht [*dabei auf das gelbe Gesicht zeigen*]

Das Kind soll das Bild zu dem jeweiligen Smiley legen. Wenn die Kinder die Frage nicht verstehen, nochmal wiederholen oder Frage umformulieren. Für jedes Kind aus der Gruppe durchführen.

2. Runde

So, jetzt mische ich kurz alle Bilder und zeige sie dir dann alle noch einmal. Jetzt kannst du noch einmal alle Kinder, mit denen du sehr gerne spielst zum grünen Gesicht legen [*dabei auf das grüne Gesicht zeigen*], alle Kinder mit denen du gar nicht gerne spielst zum roten Gesicht legen [*dabei auf das rote Gesicht zeigen*], und alle Kinder, bei denen es dir egal ist, ob du mit ihnen spielst zum gelben Gesicht legen [*dabei auf das gelbe Gesicht zeigen*].

Dem Kind den ganzen Stapel mit allen Fotos in die Hand geben. Das Kind soll jedes Bild unter den entsprechenden Smiley legen. Dadurch entsteht unter jedem Gesicht eine Gruppe an Fotos. Wenn das Kind mit dem Anordnen fertig ist, noch einmal fragen: Passt das jetzt so? Wenn das Kind „ja“ sagt, sich beim Kind bedanken, die Fotos umdrehen und die jeweiligen IDs protokollieren. Wenn die Kinder die Frage nicht verstehen, nochmal wiederholen oder Frage umformulieren. Für jedes Kind aus der Gruppe durchführen.

Contest Competition Game

[*Kinder und ein*e Versuchsleiter*in setzen sich in den Sitzkreis*]: Liebe Kinder, heute haben wir euch mehrere lustige Spiele mitgebracht. Wir werden jedes Spiel zuerst hier im Sitzkreis erklären und es dann spielen. Das heißt, es ist wichtig, dass ihr zuerst zuhört, wenn wir das Spiel erklären, damit jeder von euch versteht, wie das Spiel funktioniert. Wenn ihr Fragen habt, könnt ihr natürlich gerne fragen. Am besten, ihr hebt die Hand, falls ihr eine Frage habt:

1) Kaleidoskop

Schaut mal, als erstes Spiel habe ich euch ein neues Spielzeug mitgebracht [*Kaleidoskop zeigen*]. Das ist ein Kaleidoskop, wenn ihr dort durchschaut seht ihr tolle und lustige Muster. Ich werde es gleich hier in die Mitte des Kreises legen und ihr könnt es dann 5

Minuten anschauen und damit spielen. Damit ihr wisst, wie lange ihr Zeit habt, mit dem Spielzeug zu spielen, habe ich auch eine Sanduhr mitgebracht. Wenn es los geht, werde ich die Sanduhr umdrehen. Wenn die Hälfte des Sands durch die Uhr gefallen ist, werde ich euch sagen, dass schon die Hälfte der Zeit um ist. Wenn der letzte Sand durch die Sanduhr gefallen ist, ist das Spiel zu Ende und ich werde das Spielzeug wieder einsammeln. Ihr könnt euch selbst ausmachen, wer anfängt und wie lange jeder spielt.

Habt ihr noch Fragen zu dem Spiel? Seid ihr bereit? Los geht's! *[Das Spiel in die Mitte des Kreises legen; die Sanduhr umdrehen]*

[bei Hälfte der Zeit]: Die Hälfte der Zeit ist um!

[bei Ende der Zeit]: Die Zeit ist um! Könnt ihr mir das Spielzeug bitte zurückbringen? Danke! Wir werden jetzt das nächste Spiel spielen.

2) Ring-Spiel

Schaut mal, ich habe euch heute ein neues Spielzeug mitgebracht *[Ring-Spiel]*. Mit diesem Spielzeug drückt ihr die Knöpfe so, dass die Ringe auf den Stäben landen *[weiterer Text siehe oben]*.

3) Apparat mit Märchenbildern

Schaut mal, ich habe euch noch ein neues Spiel mitgebracht *[Apparat mit Märchenbildern]*. Wenn ihr da hineinschaut und auf den Knopf drückt, seht ihr viele schöne Märchenbilder *[weiterer Text siehe oben]*.

Scramble Competition

Die Kinder sitzen weiterhin im Sitzkreis mit Sitzkissen (nach dem Contest Competition Game). Orange Kegel sind schon in einer anderen Ecke des Raumes aufgestellt. Sticker-Pass mit Namen sind schon vorbereitet.

Schaut, was ich euch noch mitgebracht habe *[in den Beutel greifen und das Bilderbuch herausholen]* – ein Bilderbuch! In diesem Bilderbuch gibt es eine ganz tolle Geschichte – wollt ihr sie hören? *[wenn die Kinder zustimmen, etwas Bestärkendes antworten, wenn die Kinder zögerlich sind, etwas Aufmunterndes sagen z.B. „also ich habe schon in dieses Buch reingeschaut und es ist wirklich spannend“]* In dem Buch geht es um Flippy Flamingo und ganz viele andere Tiere, die alle bei einem tollen Sticker-Spiel mitmachen. Soll ich es euch vorlesen? Schaut, ob ihr euch die Geschichte gut merken könnt *[Das Buch vorlesen]*.

Wir werden euch jetzt einzeln im Kreis ein paar Fragen zu der Geschichte von Flippy Flamingo stellen. Bleibt auf euren Sitzkissen sitzen, wir kommen zu euch. *Der*die Versuchsleiter*in geht von Kind zu Kind und zeigt Fotos von den 4 Tieren und fragt jedes Kind einzeln diese zwei Fragen:*

1. Zeig mir doch bitte auf dem Bild, welches Tier darf sich als erstes einen Sticker aussuchen?
2. Zeig mir doch bitte auf dem Bild, welches Tier darf sich als letztes einen Sticker aussuchen?

*Wenn das Kind auf das richtige Tier zeigt, sagt der*die Versuchsleiter*in laut und deutlich „Ja, das stimmt“. Wenn das Kind auf das falsche Tier zeigt, sagt die Versuchsleiterin laut und deutlich „Hm, ich glaube, es ist dieses Tier“. So kann entweder ein*e zweite*r Versuchsleiter*in die Antworten der Kinder protokollieren oder es ist später auf den Videos hörbar.*

Am ersten Tag kommt jetzt das Austeilen der Stickerpässe.

Wisst ihr was, wir haben auch für jeden von euch einen Stickerpass mitgebracht. Das heißt wir können das gleiche lustige Stickerspiel spielen, wie Flippy Flamingo und seine Freunde. Jeder von euch darf sich jetzt einen Stickerpass nehmen. Wer schon selbst seinen Namen schreiben kann, darf ihn draufschreiben. Wer Hilfe mit dem Schreiben braucht, dem können wir den Namen draufschreiben

So, jetzt setzen wir uns alle wieder in den Sitzkreis und ich erkläre, wie das Spiel funktioniert. Dort drüben stehen orange Kegel, genau wie in der Geschichte von Flippy Flamingo und seinen Freunden *[zu den Kegeln zeigen]*. Dort gibt es dann auch eine Sticker-Box mit ganz vielen tollen Stickern, schaut mal her *[den Kindern die Sticker-Box zeigen]*. Schaut, da sind ganz viele verschiedene Sticker drin *[die Kinder gerne ein paar der Sticker benennen lassen]*.

Wenn ich später „los“ sage, stellt ihr euch wie Flippy Flamingo und seine Freunde hinter den orangenen Kegeln in einer Reihe an. Das Kind, das ganz vorne in der Reihe steht, darf sich dann als erstes einen Sticker aus der Sticker-Box aussuchen, das Kind, das als Zweites in der Reihe steht, darf sich als zweites einen Sticker aussuchen, usw. Und das Kind, das als letztes in der Reihe steht, muss den Sticker nehmen, der übrig geblieben ist. Wenn ich später „Los!“ sage, habt ihr 1 Minute Zeit, um euch in einer Reihe anzustellen, um eure Sticker auszusuchen. Die Reihe beginnt dort drüben bei den orangenen Kegeln *[zu den Kegeln zeigen]*, so wie in der Geschichte im Buch „Flippy Flamingo“ *[die Seite zeigen, auf der sich die Tiere um ein Sticker anstellen]* und endet an dieser Stelle *[die Stelle im Raum*

zeigen, wo die Reihe enden soll]. Ihr macht euch untereinander aus, wer in der Reihe ganz vorne steht, wer in der Mitte steht, und wer am Schluss steht. Wir werden euch nicht sagen, in welcher Reihenfolge ihr euch anstellen sollt.

Habt ihr noch Fragen zu dem Spiel? Seid ihr bereit? Los geht's! Ihr dürft euch anstellen *[Stoppuhr auf 1 Minute stellen]*.

Falls die Kinder um Hilfe bitten: Wir werden euch nicht sagen, in welcher Reihenfolge ihr euch anstellen sollt. Das müsst ihr euch selbst ausmachen. Okay, die Zeit ist um! Alle bleiben in ihrer Position stehen.

Jetzt darf das erste Kind zwischen den Kegeln durchgehen, um sich einen Sticker auszusuchen. Die Kinder laufen einzeln durch die zwei Kegel durch. Falls mehrere Kinder gleichzeitig durch die Kegel durchlaufen, aufhalten und sagen: Nur immer ein Kind auf einmal!

Helping Game

*Der*die Versuchsleiter*in und die Kinder setzen sich wieder in den Sitzkreis; der*die zweite Versuchsleiter*in steht außerhalb des Sitzkreises. Plüschtiere sind noch in den Beuteln.*

So, jetzt kommen wir alle zurück in den Sitzkreis und ich erkläre euch das dritte Spiel. Es ist ein Bewegungsspiel. Ihr bekommt gleich alle einen Oktopus aus Plüsch *[die sitzende Person zeigt einen Oktopus beispielhaft]* und der Oktopus möchte einen Ausflug machen. Und zwar nicht irgendwie, der Oktopus möchte sich bei diesem Ausflug auf euren Kopf rauf setzen. Mit dem Oktopus auf dem Kopf macht ihr euren kleinen Ausflug hier im Raum, ihr wandert durch den Raum, den Oktopus balanciert ihr auf eurem Kopf *[die stehende Person platziert den Oktopus auf dem eigenen Kopf und geht ein paar Schritte hin und her]*.

Und was passiert, wenn der Oktopus von eurem Kopf runterfällt *[die stehende Person lässt den Oktopus vom Kopf fallen und bleibt in einer auffallenden Position stehen]*?

Wenn der Oktopus runterfällt, dann müsst ihr stehen bleiben und seid eingefroren! Wisst ihr was das bedeutet *[Antwort der Kinder abwarten, in jedem Fall nochmal wiederholen]*?

Ihr dürft euch nicht mehr bewegen. Das heißt, sobald der Oktopus auf den Boden gefallen ist, dürft ihr euch nicht mehr bewegen und dürft auch den Oktopus selbst nicht aufheben. Aber das macht gar nichts. Ein anderes Kind kann euch euren Oktopus aufheben und zurück auf den Kopf setzen. Dann seid ihr nicht mehr eingefroren, sondern wieder aufgetaut *[die sitzende Person steht auf und geht zur eingefrorenen Person, setzt den Oktopus*

wieder auf den Kopf; die Person beginnt sich wieder zu bewegen. Ganz wichtig: NICHT „DANKE“ SAGEN und das Vorzeigen mit so neutralem Gesichtsausdruck wie möglich machen; danach wieder in den Sitzkreis zu den Kindern setzen].

Habt ihr noch Fragen zu diesem Spiel? Habt ihr Lust dieses Spiel zu spielen?
Die Plüschtiere werden an die Kinder verteilt, die Kinder dürfen sich ihren Oktopus aussuchen. Jetzt habt ihr alle euren Oktopus bekommen und wir probieren das mal aus. Setzt euch den Oktopus auf den Kopf und versucht mit ihm rumzulaufen. Wie klappt das [weniger als 1 min. üben lassen]?

Wir werden das Spiel jetzt starten. Ich werde Musik anschalten und sobald das Lied startet, geht das Spiel los. Wenn das Lied vorbei ist, endet das Spiel. Seid ihr bereit? Los geht's *[wenn Kinder bereit sind, die Musik starten und das Spiel beginnt]!*

Social Status

Runde 1		Runde 2					
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__
ID:			ID__	ID__	ID__	ID__	ID__

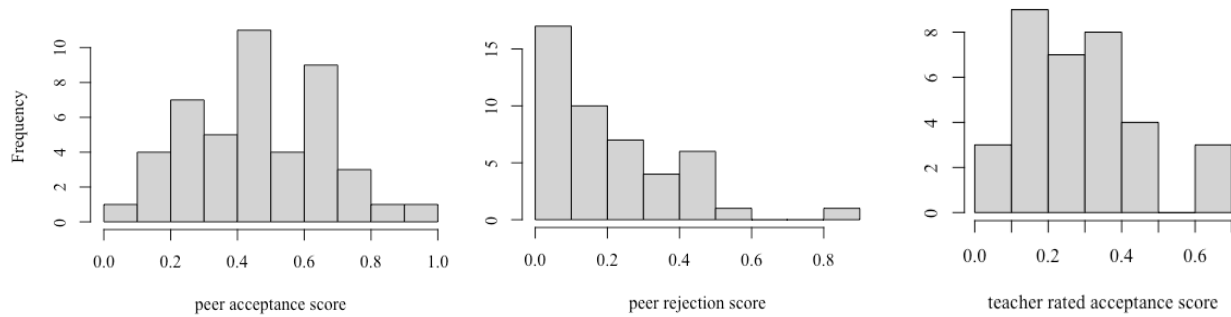
1. Tag – Datum: _____

[illegible]

[illegible][illegible]

Appendix E: data distribution of interested variables**Table E1**

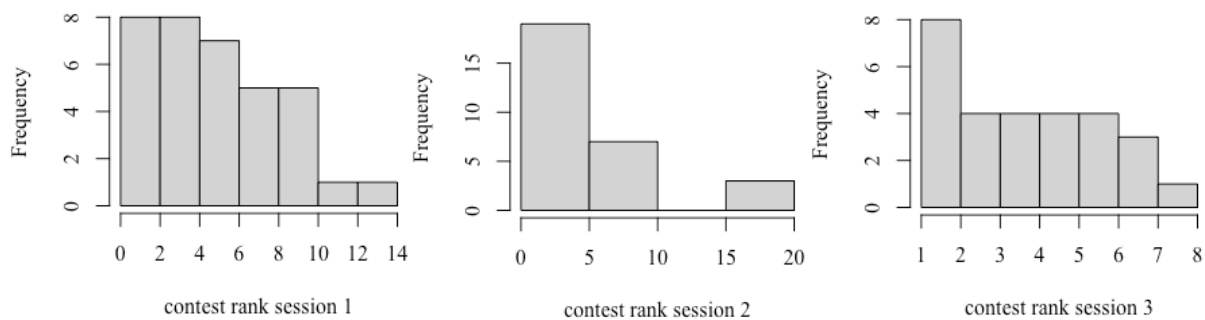
Histograms of the participant rated peer acceptance, peer rejection score and teacher rated peer acceptance score



Note. The frequency on the y-axis refers to all graphs.

Table E2

Histograms of the contest rank across the three sessions

**Table E3**

Histograms of the duration of resource possession across the three sessions

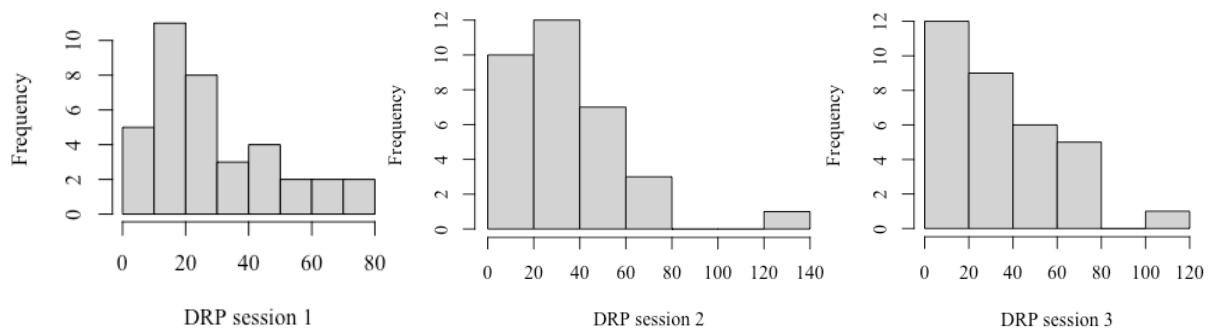


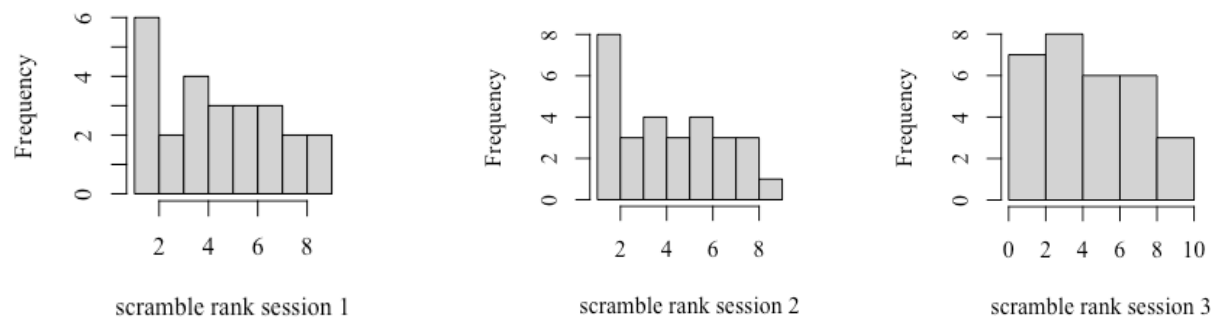
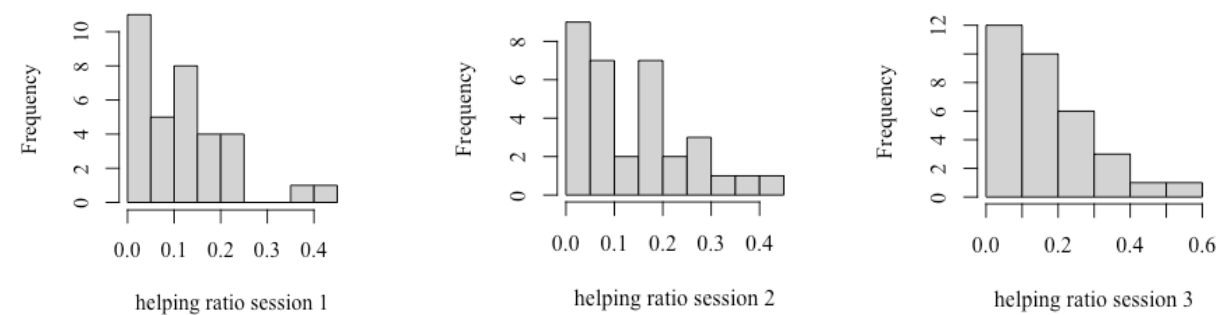
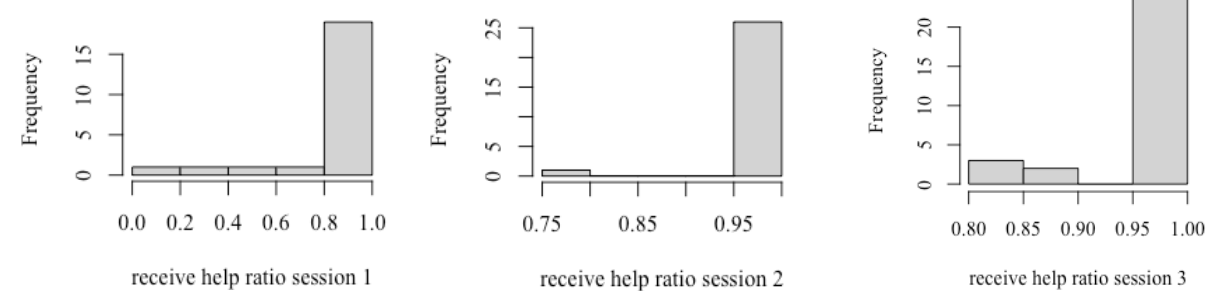
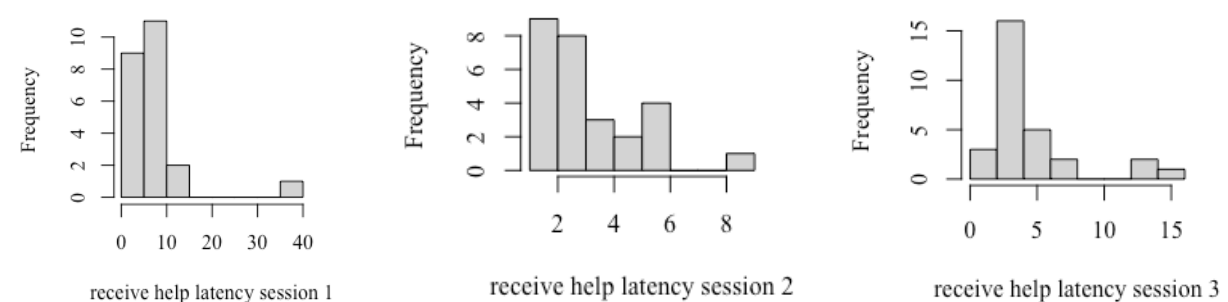
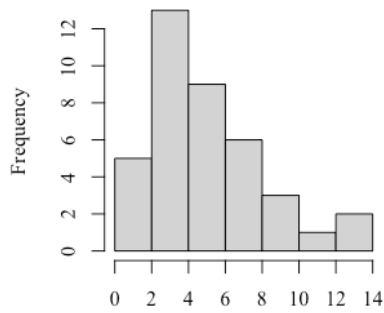
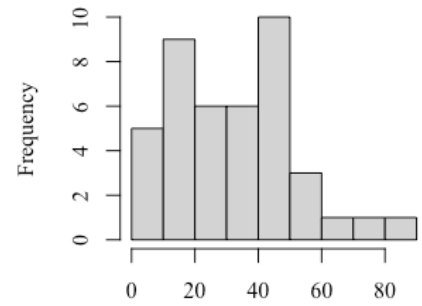
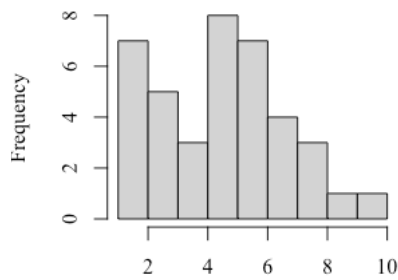
Table E4*Histograms of the scramble rank across the three sessions***Table E5***Histograms of the helping ratio across the three sessions***Table E6***Histograms of the receive help ratio across the three sessions***Table E7***Histograms of the receive help latency (in seconds) across the three sessions*

Table E8*Histograms of the mean dominance variables*

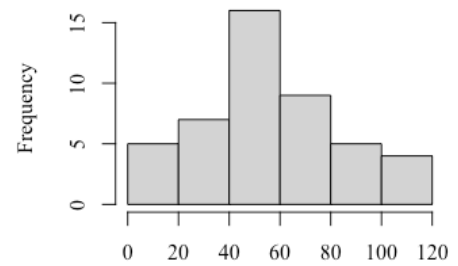
mean contest rank



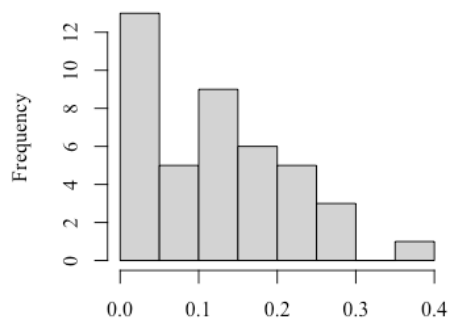
mean duration of resource possession



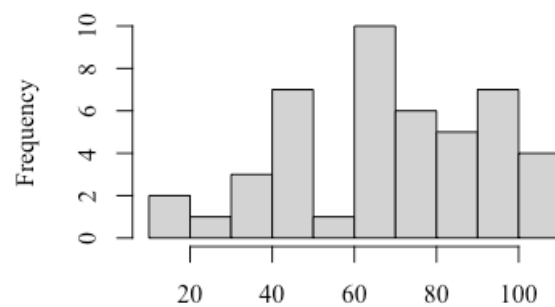
mean scramble rank



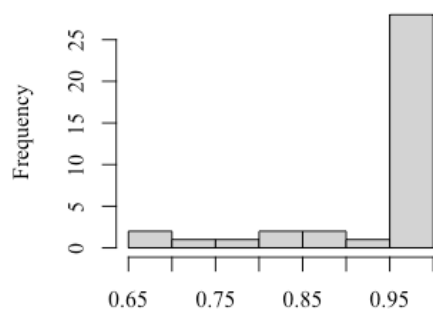
teacher rated dominance

Table E9*Histograms of the mean prosocial variables*

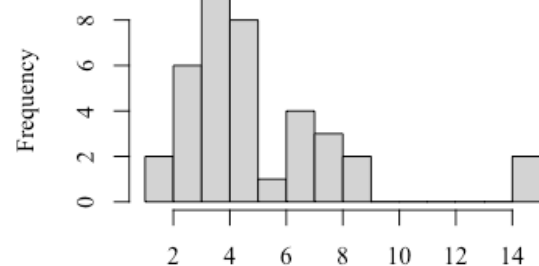
mean helping ratio



teacher rated prosociality



mean receive help ratio



mean receive help latency (in seconds)

Appendix F: DHARMA residuals for model fit

Table F1

DHARMA residuals for the contest rank model

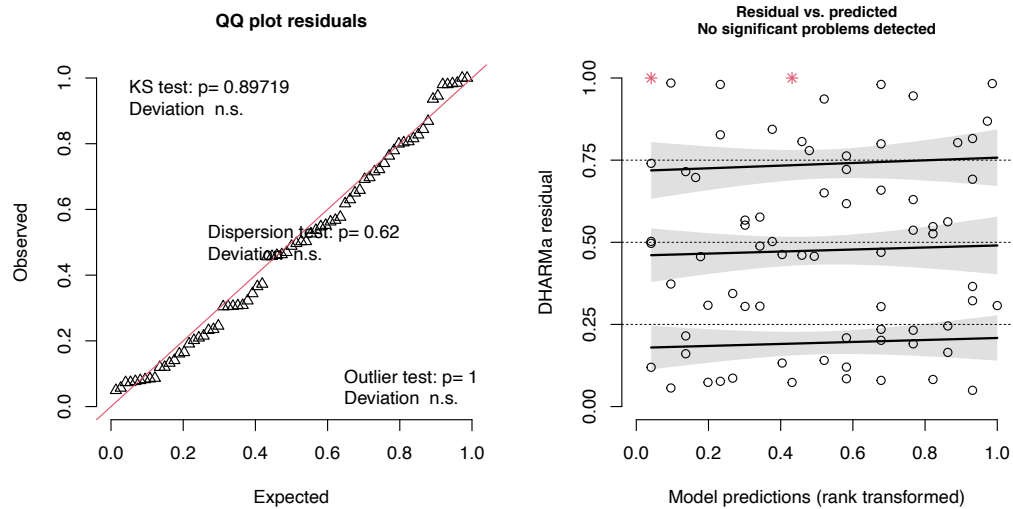


Table F2

DHARMA residuals for the scramble rank model

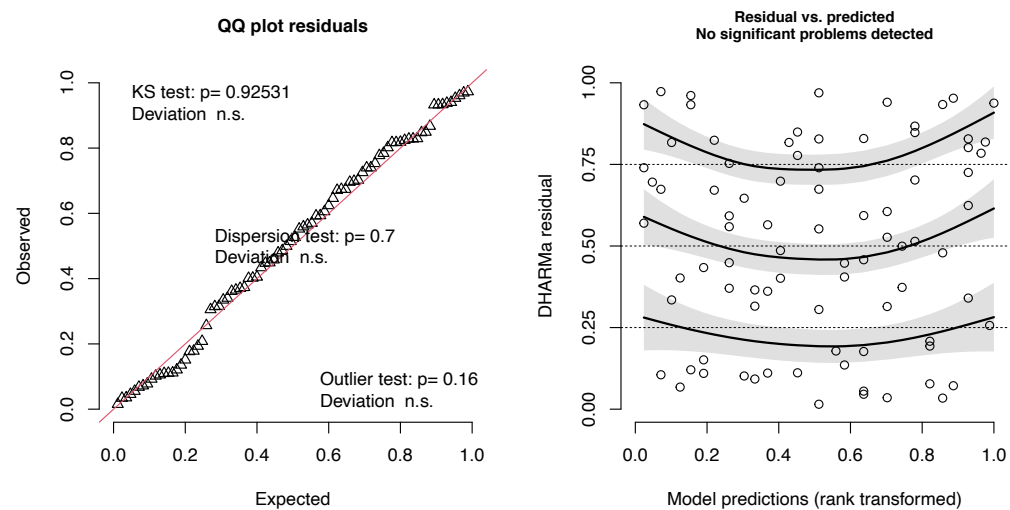


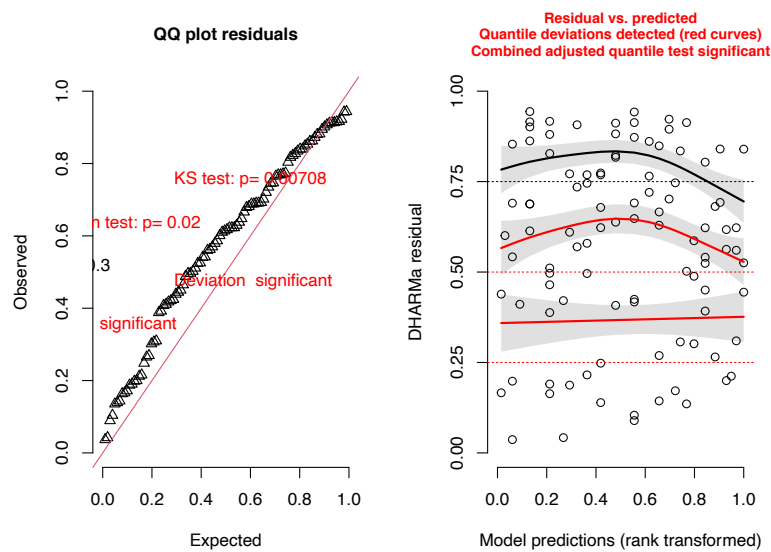
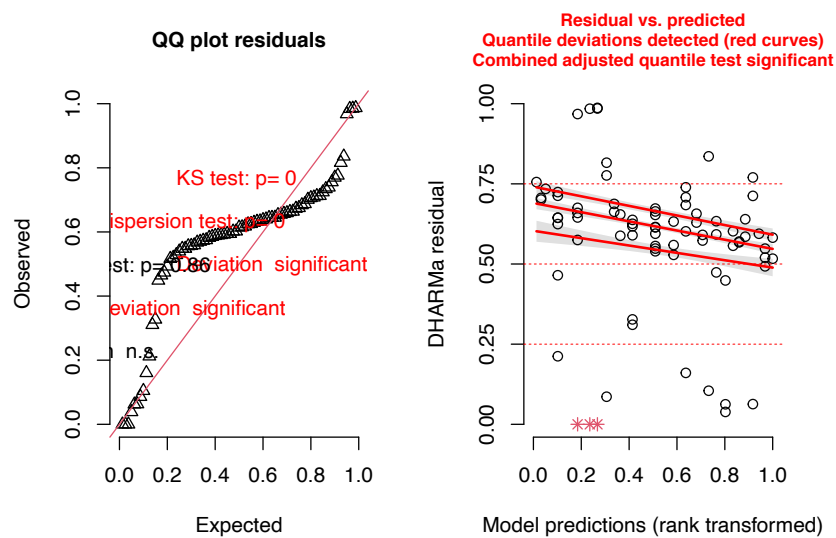
Table F3*DHARMA residuals for the helping model***Table F4***DHARMA residuals for the receive help model*

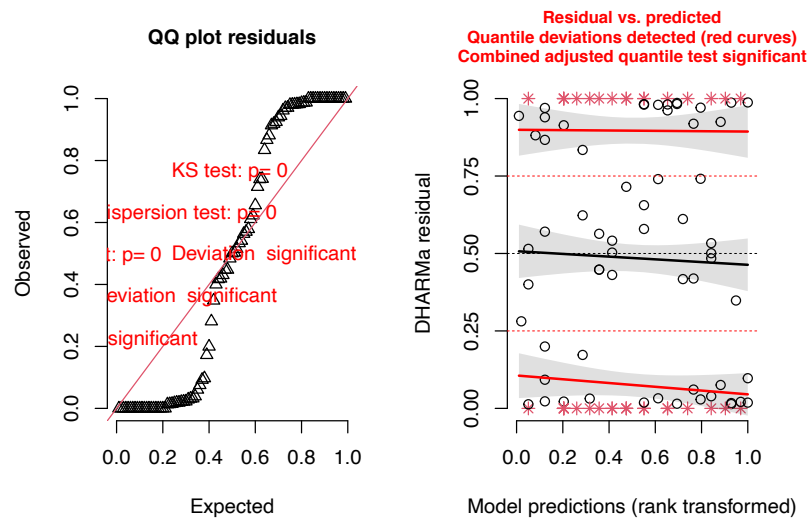
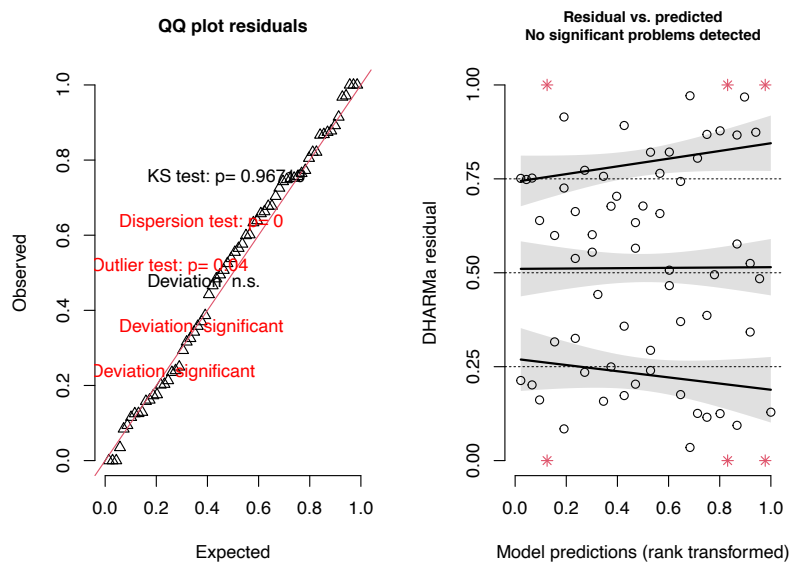
Table F5*DHARMa residuals for the latency model***Table F6***DHARMa residuals for the post hoc contest model*

Table F7*DHARMA residuals for post hoc scramble model*