



MASTERARBEIT | MASTER'S THESIS

Titel | Title

Investigating the effects of age and social dominance on prosocial choices
among 3-6- year-old preschoolers

verfasst von | submitted by

Mona Magloth BSc

angestrebter akademischer Grad | in partial fulfilment of the requirements for the degree of

Master of Science (MSc)

Wien | Vienna, 2025

Studienkennzahl lt. Studienblatt |
Degree programme code as it appears on the
student record sheet:

UA 066 878

Studienrichtung lt. Studienblatt | Degree
programme as it appears on the student
record sheet:

Masterstudium Verhaltens-, Neuro- und
Kognitionsbiologie

Betreut von | Supervisor:

Univ.-Prof. Mag. Dr. Thomas Bugnyar

Acknowledgements

Reaching the end of this master's thesis has only been possible with the help and encouragement of many people, to whom I owe my sincere gratitude.

First, I would like to thank Dr. Lisa Horn-Péter, for her continuous guidance, thoughtful feedback and patience during the entire course of this project. Your clear and constructive advice helped me to stay focused, while your openness to my own ideas allowed me to develop an independent perspective. I greatly appreciate the time and commitment you invested in supporting both my research and my academic growth. I am equally grateful to my colleagues Alissa Schwarz and Luisa Böttner. Working side by side with you, exchanging ideas and navigating challenges together has been a source of both motivation and joy. The teamwork and mutual support greatly enhanced my experience with this thesis. This work would not have been possible without the children, teachers and parents who kindly participated, as their openness and willingness to contribute their time made the study a reality, for which I am deeply thankful.

Finally, I owe special thanks to my family and friends, who have supported me throughout my studies with understanding, patience and confidence in my abilities. Your encouragement gave me the strength to persevere in demanding moments and reminded me of the value of persistence and resilience. To all of you, I am profoundly grateful. people, to whom I owe my sincere gratitude.

Abstract

This thesis investigates how age and social dominance influence prosocial behavior among preschoolers aged 3–6 years. Theoretical frameworks suggest that prosociality and dominance, while seemingly opposing strategies, can coexist as adaptive mechanisms for navigating peer relationships in early childhood. Previous research has highlighted age-related increases in fairness and sharing, but gaps remain in understanding how dominance and prosociality interact in familiar preschool settings. The study included 100 preschoolers from four Viennese kindergartens; 81 of them formed 44 dyads that participated in experimental sessions. After a warm-up to ensure task comprehension, each dyad completed three tasks: Resource Monopolization Task 1, the Resource Allocation Task and Resource Monopolization Task 2. Additionally, teacher ratings were collected to assess dominance traits and dyadic dominance relations from an external perspective. The results showed that older children were more likely to gain first access to resources and to monopolize them for longer durations than younger children, supporting the idea that age plays a role in dominance behaviors. However, the extent of the age difference within dyads did not significantly influence these patterns. Mixed-age dyads showed some evidence of stronger dominance behaviors by older children, but this effect was not consistent across all measures. Regarding prosocial behavior, no significant relationships were found between dominance and selfishness or prosociality, nor did the age composition of the dyad influence this relationship. Overall, the findings highlight the complexity of social dynamics in early childhood. While age and dominance play a role in resource control, their influence is shaped by task-specific and contextual factors. The study underscores the importance of examining natural peer interactions and encourages further research on how preschoolers link dominance and prosociality in their social environments.

Keywords: social dominance, prosociality, age difference, preschoolers, peer groups

Table of Contents

1. Theoretical Background	1
1.1. Humans as inherently social beings	1
1.2. Social behavior in children	1
1.3. Social dominance in preschoolers.....	2
1.4. Prosociality in early development.....	2
1.5. Linking dominance and prosociality.....	3
1.6. Measuring prosociality in children.....	3
1.7. The Effect of Age and Body-Size on Dominance and Prosociality	4
1.8. The gap in current research.....	5
1.9. Study Rational	6
1.10. Research questions and Hypotheses	6
1.10.1. Research question 1: How does age affect dominance in resource monopolization tasks?.....	6
1.10.2. Research question 2: How does social dominance affect prosocial choices in the resource allocation task?.....	7
2. Material and Methods	7
2.1. Study design.....	7
2.2. Participants.....	8
2.3 Warm-Up and Resource Allocation Task.....	12
2.3.1. Apparatus and Materials.....	12
2.3.2. . Warm-Up Procedure	13
2.3.3. Resource Allocation Procedure.....	16
2.4. Resource Monopolization Task	17
2.4.1. Materials	18
2.4.2. Resource Monopolization Procedure	18
2.5. Teacher Ratings.....	18
2.5.1. Dyadic Dominance Rating	19
2.5.2. Dominance Trait Rating	19

2.5.3. Intra- and Inter-Rater Reliability Analyses.....	20
2.6 Statistical analysis	20
2.6.1. Operational Definition and Measurement of Dominance.....	20
2.6.2. Operational Definition and Measurement of Prosociality.....	20
2.6.3. Hypothesis 1a: Older Children will monopolize resources more often and for longer periods than younger children	21
2.6.4. Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads	21
2.6.5. Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores.....	21
2.6.6. Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads	21
2.6.7. Teacher Rating.....	22
2.7. Operational Definition and Measurement of Dominance.....	22
2.8. Operational Definition and Measurement of Prosociality	23
2.9. Influence of size on dominance behavior	24
3. Results	24
3.1. Hypothesis 1a: Older children will monopolize resources more often and for longer periods than younger children	24
3.2. Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads	26
3.3. Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores.....	28
3.4. Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads	29
3.5. Teacher Ratings.....	31
4. Discussion	34
4.1. Discussion of Hypothesis 1a: Older children will monopolize resources more often and for longer periods than younger children.....	34
4.2. Discussion of Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads	35
4.3. Discussion of Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores	35

4.4. Discussion of Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads	36
4.5 Teacher ratings.....	36
4.6. Limitations	37
4.7. Implications	38
4.8. Future Directions	38
4.9. Conclusion.....	39
5. References.....	40
6. Table of Contents	44
7. Table of Figures.....	44
8. Appendices	44
8.1. German Abstract	47
8.2 Parental information.....	48
8.3. Parental consent form.....	49
8.4. Teacher Questionnaire.....	53
8.5. Room planning sketch	55
8.6. Protocol.....	56
8.6.1. Protocol list warm-up.....	56
8.6.2 Protocol list experiment (example prosocial - costly - envy)	57
8.7. Resource Monopolization Task 1	57
8.7.1. Resource Monopolization Task 1 – Toys.....	57
8.7.2. Resource Monopolization Task 2 – Pictures	58
8.8. Colorful Sticker.....	58
8.8.1. Sticker booklets Warm-up	59
8.8.2. Sticker booklet Resource Allocation Task	60
8.9 Script Experimenter 1 – German	61
8.10 Script Experimenter 1 – English.....	63
8.11. Duration of possession of Monopolization 1 and respective Δ -values	67
8.12. Dyadic Data on Age Differences and Duration Differences in Resource	

Monopolization by Session	69
--	-----------

1. Theoretical Background

Understanding how children develop strategies for cooperation, competition and fairness raises fundamental questions about the origins of morality, social cohesion and group functioning. From an early age, children exhibit emerging social competencies that shape their later interactions within larger social structures. Research suggests that while young children develop a sense of fairness early on, fair decision-making often requires deliberation. Li et al. (2022) demonstrated that fairness in children is not always spontaneous, but involves conscious reasoning, suggesting that fairness is not solely instinctive but develops as a socially guided cognitive skill. Early forms of prosociality are also evident in toddlers. Brownell et al. (2009) showed that by around 18 months, children begin to share resources when another's need is apparent, indicating the emergence of need-based prosocial behavior. Moreover, children begin to engage in reciprocal social strategies from a young age. Warneken and Tomasello (2013) found that preschoolers exhibit contingent reciprocity, helping others more readily when they themselves have been helped, highlighting the early development of strategic prosocial behavior shaped by social dynamics. Building on these findings, the study by Katerkamp and Horn (2025) investigates how dominance, friendship and popularity influence prosocial behavior among preschoolers in group settings. Observing children in naturalistic preschool environments, the authors found that children with higher social dominance did not necessarily behave less prosocially, but rather displayed more selective prosocial behavior depending on peer relationships and social standing. This suggests that already at a preschool age, children strategically navigate social hierarchies, balancing cooperation and competition.

1.1. Humans as inherently social beings

Humans depend fundamentally on social relationships: from early infancy onward, individuals are embedded in networks of interaction such as family, peers and community that shape both emotional and cognitive development (Baumeister & Leary, 1995). Cooperation, reciprocity and affiliative bonds (for instance through helping, sharing, or mutual support) coexist with competition and influence over resources, both are vital for navigating social groups. Preschool classrooms, in particular, provide an environment where children must both assert themselves (to gain scarce resources) and cooperate or share (to maintain acceptance). These dual demands appear early: children show preferences for cooperative partners and simultaneously attentiveness to who holds influence or power (Hawley, 1999).

1.2. Social behavior in children

During the preschool years, peer interactions become more frequent and complex, providing

a context where children develop social strategies. They begin to not only seek friends but also learn and apply social norms such as sharing, turn taking, fairness and influence. Prosocial responding develop significantly in this period, enabling children to understand others' feelings and intentions, which in turn affects their social behavior (Eisenberg et al., 2007). According to Thomas et al. (2022), children associate leadership with protective actions, like removing intruders, but they do not generally consider leaders to be more prosocial than others. This suggests that even from a young age, children distinguish between different functions of social power, associating leadership with authority and protection rather than kindness or generosity.

1.3. Social dominance in preschoolers

In preschool classrooms, social dominance can be expressed not only through aggressive or controlling behaviors but also through successful outcomes in competitive situations and participation in cooperative or interactive contexts. Pellegrini et al. (2007) demonstrated that children who frequently "win" confrontations, such as competition over resources and simultaneously display cooperative behavior and social self-presentation are later rated as more dominant by teachers, even after controlling for age. Additionally, Roseth et al. (2007) found that dominance in young children is closely linked to social visibility: more dominant children receive more attention from peers, are more embedded in social relationships and show relatively stable dominance hierarchies over time.

1.4. Prosociality in early development

Prosocial behaviors are self-initiated actions aimed at supporting or benefiting others, including sharing, helping and comforting. (Dunfield, 2014). They are crucial for group cohesion and cooperation. Prosocial behavior develops early in human development; by their second year, children begin to assist adults with basic tasks (Warneken & Tomasello, 2013). Different forms of prosociality follow distinct developmental patterns (Martin & Olson, 2015). Helping emerges first, often without cost to the helper, while sharing becomes more frequent in the preschool years, especially when peers are involved. Fairness and egalitarian concerns, such as preferring equal distributions, typically arise later, usually after the age of four.

During the early years, children's decisions in allocation tasks are largely self-serving (Fehr et al., 2008). By preschool, they increasingly integrate fairness principles, rejecting offers that disadvantage them and occasionally sacrificing to equalize outcomes (House et al., 2013). This developmental progression suggests that prosociality is shaped by both maturation (e.g., theory of mind, executive functions) and social experience (e.g., exposure to norms in peer groups).

1.5. Linking dominance and prosociality

The relationship between dominance and prosociality in humans has been a topic of significant interest, as these two behaviors appear to reflect opposing motivations. While dominance is often associated with self-interest, control and influence, prosociality emphasizes cooperation and concern for the welfare of others. However, Hawley (1999) argued that dominance and prosociality are not necessarily opposites but rather adaptive strategies that individuals employ depending on the social context and their specific goals. Dominant individuals may use prosocial behaviors, such as sharing and helping, to stabilize their position and maintain group cohesion, while subdominant individuals often rely on prosociality to build alliances and gain social support. This perspective provides a theoretical foundation for understanding how dominance and prosociality can function as complementary strategies in navigating social hierarchies. Research has further demonstrated how these strategies manifest in different contexts. For example, Hawley (2002) found that dominant children frequently employ prosocial behaviors to maintain group support and secure access to resources. These behaviors are particularly effective in fostering cooperation and ensuring the continued support of peers. Similarly, Eisenberg et al. (2007) highlighted that prosocial behavior in early childhood, such as sharing and helping, is strongly associated with higher peer acceptance and social standing, suggesting that acts of kindness and cooperation can enhance influence within peer groups. In contrast, subdominant children often use prosociality as a means to improve their social position. Hawley (2003) demonstrated that prosocial behavior, when combined with effective resource control strategies, is positively linked to higher peer status. These findings highlight that cooperation and generosity can be instrumental in achieving social influence, as they help children build alliances and gain support within their peer group. Together, these studies suggest that prosociality is essential for understanding the dynamics of social dominance, benefiting both dominant and subdominant individuals in different ways.

1.6. Measuring prosociality in children

Prosociality in children is often measured using experimental paradigms such as resource allocation tasks or dictator games, which allow researchers to manipulate the cost-benefit structure of decisions. These paradigms provide insights into whether children act generously, under what conditions they are willing to incur costs and how their behavior changes with age or social context.

Fehr et al. (2008) investigated egalitarian behavior in children aged 3 to 8 years using mini-dictator games. In these games, children were asked to choose between fixed distributions of resources for themselves and another child. The study found that egalitarian behavior, choosing equal distributions, became more frequent with age, suggesting that fairness

preferences develop as children grow older. This highlights the importance of age in shaping prosocial decision-making. Benenson et al. (2007) examined altruistic behavior in children aged 4, 6 and 9 years using a dictator game. In this paradigm, children decided how much of their own resources to share with another individual. The results showed that older children were more likely to act altruistically, donating more resources compared to younger children. This suggests that the willingness to incur personal costs for the benefit of others increases with age. Blake et al. (2015) explored the development of fairness preferences across seven different societies. This study used resource allocation tasks to show that children's sense of fairness and their willingness to behave fairly change depending on the cultural and social environment they are in. The findings emphasize that prosocial behavior is not only influenced by individual development but also shaped by the broader social environment in which children grow up. Warneken and Tomasello (2006) focused on early prosocial behavior, particularly helping. Their study showed that even infants as young as 14 months are capable of helping others without expecting a reward. This finding provides evidence that prosociality is not limited to resource sharing but also includes other forms of cooperative behavior, such as helping, which emerge very early in development. House et al. (2013) investigated how social context influences prosocial behavior in children. Their study revealed that children are more likely to act prosocially when interacting with familiar peers compared to anonymous partners. This suggests that the salience of social relationships plays a critical role in shaping prosocial decisions, highlighting the importance of social proximity in fostering generosity and cooperation.

Together, these studies demonstrate that prosociality in children is a multifaceted construct influenced by age, cultural context and social relationships. Experimental paradigms such as dictator games and resource allocation tasks provide valuable tools for understanding the conditions under which children act generously and how their prosocial behavior develops over time.

1.7. The Effect of Age and Body-Size on Dominance and Prosociality

Meta-analytic evidence suggests that prosocial behaviors consistently increase with age from early childhood through adolescence. Eisenberg et al. (2007) found that older children generally engage more in helping, sharing and comforting behaviors than younger ones, although the magnitude of age effects varies by the type of prosocial act and its context. In line with this, Höflinger (2023) observed that in kindergarten-aged children, older individuals more frequently deploy prosocial dominance strategies, particularly in sibling or familiar peer settings. Together, these studies point to a developmental trajectory in which both, age and physical attributes shape how dominance and prosociality are expressed in dyadic social interactions.

A further dimension is physical dominance. Pollet et al. (2015) reported that body height predicts dominant behavior in everyday dyadic encounters, for example, who yields space to whom or who asserts priority in narrow pathways. This finding highlights that dominance can be influenced not only by social strategies but also by physical characteristics.

1.8. The gap in current research

Despite increasing interest in preschoolers' social behaviors, only a limited number of studies have investigated the relationship between dominance and prosociality in this age group. Much of the research has focused on prosocial behavior as part of resource control strategies, highlighting how children combine cooperation and assertiveness to gain access to resources (Hawley, 2014; Reijntjes et al., 2018; Roseth et al., 2011). There is still a clear gap in research: no studies have looked at how children show dominance and prosocial behavior towards familiar peers in everyday, dynamic situations using tasks that focus specifically on one of these behaviors. Dirks et al. (2018) recently emphasized the importance of studying the influence of ongoing social interactions on preschoolers' dominant and prosocial behaviors, as these are both critical for success in social groups. Spinrad & Eisenberg (2023) similarly stress that maintaining positive relationships through prosociality and asserting oneself to obtain desired resources through dominance are both vital components of early social competence. However, it remains unclear how these two behaviors interrelate within peer groups, particularly during the preschool years, a developmentally sensitive period marked by rapid social-cognitive growth (Ostrov & Guzzo, 2015). Furthermore, while Hawley (2014) has contributed extensive work demonstrating that children's social dominance involves a dual strategy of prosocial and coercive behaviors, the developmental trajectory and interaction of these strategies in familiar peer contexts require further investigation. Longitudinal work by Reijntjes et al. (2018) has refined resource control typologies but leaves open questions about the role of prosociality in dominance among young children. Roseth et al. (2011) showed that preschoolers engage in "bistrategic" control combining reconciliation with dominance, but the mechanisms linking these behaviors to peer status are not fully understood. In addition, recent research by Terrizzi et al. (2020) and Thomas et al. (2022) points to complex social perceptions around power and prosociality, suggesting that children's expectations of leaders include nuanced views on aggression and kindness, which merits more naturalistic exploration. Overall, these gaps highlight the necessity to study dominance and prosociality simultaneously within dynamic peer groups to better understand their interplay and developmental significance in early childhood.

1.9. Study Rational

Building on the identified research gaps, this study specifically investigates how age and social dominance shape prosocial choices among preschoolers aged 3 to 6 during dyadic interactions. While prior research has acknowledged the importance of both dominance and prosociality in early social development, few studies have empirically examined how these factors interact within familiar peer contexts, especially in mixed-age settings. This study aims to clarify whether older children are more effective at monopolizing resources and if children with higher social dominance exhibit lower prosocial behavior. By focusing on mixed-age dyads, the aim is to illuminate the dynamics of resource control and prosociality that remain underexplored in naturalistic preschool interactions.

1.10. Research questions and Hypotheses

In the present study, prosociality was assessed using a Resource Allocation Task (Horn et al., 2018). Children made allocation decisions across different distributions, where they could choose either a prosocial or a selfish option. The frequency of prosocial choices served as an indicator of prosociality, with higher proportions of selfish choices reflecting lower levels of prosocial behavior. A detailed description of the procedure is provided in section 2.4.3.

To investigate the connection between age, social dominance and prosocial choices, 3- to 6-year-old familiar preschoolers were divided into same-aged and different-aged dyads. The first Resource Monopolization Task was conducted immediately before the Resource Allocation Task and the second one took place directly after the Resource Allocation Task. The procedure was then repeated, with the roles in the Resource Allocation Task reversed, whoever had initially served as the donor became the recipient in the second round and vice versa.

1.10.1. Research question 1: How does age affect dominance in resource monopolization tasks?

My hypothesis (H1) is that older preschoolers are better at monopolizing resources than younger preschoolers. More precisely, I predict (H1a) that older preschoolers will gain first access in the resource monopolization tasks more often and also have a longer duration of access to the resource compared to younger preschoolers. Furthermore, I predict (H1b) that this age-related difference in resource monopolization will be more pronounced in different-age dyads than in same-age dyads.

1.10.1. Research question 1: How does social dominance affect prosocial choices in the resource allocation task

My hypothesis (H2) is that more dominant preschoolers are more likely to act selfishly when making allocation decisions. Specifically, I predict (H2a) that dominant preschoolers will be more inclined to make selfish choices in the allocation task. In addition, I predict (H2b) that this tendency will be even stronger in different-age dyads than in same-age dyads, as dominance is expected to be more pronounced in interactions between differently aged children.

2. Material and Methods

The study consisted of several components: a warm-up task followed by the experimental sessions (each including three consecutive tasks: Resource Monopolization Task 1, the Resource Allocation Task and Resource Monopolization Task 2) as well as a questionnaire completed by the teachers. In order to participate in the study, parental consent was required.

2.1. Study design

Before a child could participate in the experimental session, they completed an individual warm-up session. The purpose of this session was to ensure that the child understood the experimental setup and the decision-making structure of the resource allocation task (Horn et al., 2018). Each child was individually introduced to the apparatus by Experimenter 1. In this phase, the child always took on the role of the donor, with the goal of collecting as many colorful stickers as possible. The warm-up included three different practice trials: explanation, knowledge probe and familiarization. Children could earn stickers as rewards during these trials. If the child successfully passed the knowledge probe by making no more than four errors across ten trials, they were allowed to proceed to the experimental session. Experimenter 2 recorded the child's decisions during the warm-up. The time span between the warm-up and the first experimental session ranged from 0 (meaning that the experimental session took part at the same as the warm-up) to 57 days. Longer delays were mainly due to illness, holiday absences or unexpected non-attendance at kindergarten.

The experimental sessions were conducted with dyads consisting of two children from the same kindergarten group. Dyads were either same-aged (both children aged 3 to 4 or 5 to 6 years) or different-aged (one child aged 3 to 4 and the other 5 to 6). Most dyads participated in two sessions, with roles reversed in the second session. The child who acted as the donor in the first session took the role of the recipient in the second and vice versa. If only one child in a dyad successfully completed the warm-up phase, only one session was conducted with that child as the donor. Each experimental session consisted of three tasks presented in a fixed order:

1. *Resource Monopolization Task 1*: Based on Grueneisen and Tomasello (2022), the children were presented with an attractive and novel toy. They were given three minutes to negotiate who could play with the toy and when. Experimenter 2 recorded which child accessed the toy first and the duration of use was recorded on video for later analysis.
2. *Resource Allocation Task*: In this task (cf. Horn et al., 2018), the designated donor child made 18 allocation decisions involving stickers. Three types of distribution scenarios were used: prosocial, costly sharing and envy. The second child (recipient) played a passive role during this task. The donor's decisions were documented.
3. *Resource Monopolization Task 2*: After the allocation game, both children received two crayons, one functional (colored) and one non-functional (white) and were asked to color a picture independently (cf. Staub and Sherk, 1970). As in the first monopolization task, the children were free to negotiate who used which crayon and when. The three-minute interaction was also video recorded.

During the experimental session, Experimenter 1 guided the dyads through the procedure, while Experimenter 2 stood behind the donor and recorded the donors decisions on the designated dyad sheet and the first access of the resource in monopolization 1 and monopolization 2.

The time between the two experimental sessions ranged from 6 to 42 days ($M = 14.67$ days, $SD = 9.17$). Longer intervals were primarily due to absences caused by illness, vacation or organizational challenges within the kindergarten. Each session took place in a quiet room at the kindergarten and was recorded by using two cameras. The total duration of a session was approximately 20 to 30 minutes including instructions and short breaks.

In parallel with the warm-up and experimental sessions, a teacher questionnaire was completed by two teachers from each kindergarten group. The questionnaire consisted of two sections:

- *Dyadic Dominance Rating*: Teachers rated each child in comparison to all other participating children in the group. For each dyad, they indicated whether the child was more dominant, more submissive or if the dominance relationship was unknown.
- *Dominance Trait Rating*: In this section, teachers assessed each child's dominance characteristics using four items: assertiveness, dominance, ability to assert oneself and tendency to give instructions to others.

2.2. Participants

Preschoolers aged 3 to 6 were recruited from four different childcare facilities of the

organization "Kinderfreunde Wien." A total of four preschools (labeled A–D) participated in the study, each consisting of one to six groups.

Participation in the study was entirely voluntary and took place only after written consent had been obtained from the children's parents or legal representatives. All procedures followed the ethical guidelines of the Declaration of Helsinki. Prior ethical approval was granted by the institutional ethics committee (Ref. No. 00992) as well as by the respective childcare facilities involved in the study. Data collection was carried out between September 12, 2023 and September 19, 2024.

In total, 100 preschoolers (55 girls and 45 boys; age: $M = 59.28$ months, $SD = \pm 11.70$) participated in the warm-up task. Each child took part in the warm-up individually, completing the task alone. Of these 100 children, 78 successfully passed the warm-up procedure and were therefore eligible to continue to the following experimental session.

Two preschoolers formed one dyad for the experimental session. Ideally, both children came from the same kindergarten group. These dyads could either consist of two children of the same age group (i.e., both 3–4 years or both 5–6 years) or of two children from different age groups (i.e., one 3/4-year-old and one 5/6-year-old child). Whenever possible, children of the same gender were matched within a dyad; however, this was not always feasible due to the gender distribution within some groups. For example, in one kindergarten group, four children participated in the warm-up, of whom only one was a girl and three were boys.

A total of 81 children (44 females, 37 males), forming 44 dyads, participated in the experimental session (see Table 1). Of the 44 dyads, several specific constellations occurred: In cases where only one of the two children in a dyad had successfully passed the warm-up procedure, only one experimental session was conducted. A total of seven children participated in two different dyads. Six of them had passed the warm-up procedure, while one child had not. In five dyads, one of the two children had not passed the warm-up procedure but still took part in the dyad; in all such cases, the child who had failed served as the recipient and again, only one session was conducted. Two dyads consisted of children from different subgroups within the same kindergarten: one dyad included a child from group D.4 and one from D.5 and another dyad included a child from D.4 and one from D.6. In these two cases, both children had passed the warm-up procedure, but only one session was conducted, as data collection had concluded at that point. Of the 44 dyads, 26 were same-sex dyads (either two girls or two boys) and 18 were mixed-sex dyads (one girl and one boy) (see Table 2).

Table 1. Group size, gender distribution and mean age per kindergarten group used for dyad formation

KG	Size	Gender		Age (Months)
		Female	Male	
A	16	10	6	57.06 ($\pm$ 8.87; 43, 69)
B.1	10	8	2	62.20 ($\pm$ 11.02; 37, 73)
B.2	6	4	2	60.83 ($\pm$ 10.8; 41, 74)
C.1	10	1	9	64.40 ($\pm$ 11.92; 44, 79)
C.2	9	8	1	64.11 ($\pm$ 7.62; 53, 75)
C.3	12	5	7	64.83 ($\pm$ 12.39; 44, 77)
C.4	4	1	3	56.00 ($\pm$ 9.42; 46, 65)
D.2	4	1	3	68.75 ($\pm$ 7.46; 60, 78)
D.3	4	2	2	62.25 ($\pm$ 15.62; 42, 75)
D.4	1	1	0	41.00 ($\pm$ NA; 41, 41)
D.5	1	0	1	78.00 ($\pm$ NA; 76, 78)
D.6	2	1	1	46.50 ($\pm$ 0.71; 46, 47)
D.7	2	2	0	46.00 ($\pm$ 7.07; 41, 51)
Total	81	44	37	62.00 ($\pm$ 11.17; 39, 79)

Table 2. Distribution of dyads by age and sex group

Age_Group	Sex_Group	Dyad_Count
young		9
	Female	4
	Male	3
	Mixed	2
old		17
	Female	4
	Male	6
	Mixed	7

Mixed	18
Female	8
Male	4
Mixed	6
Total	44

For 33 of the dyads, a second session was conducted, while 11 dyads participated in only a single session. The reasons for the missing second session varied: in one case, a child had changed kindergartens, making further participation impossible; in six cases, only one of the two children in the respective dyad was present during the second session; and for the remaining four dyads, no suitable partners, who had also passed the warm-up task, could be found. Consequently, the children who had passed the warm-up task were only tested as donors and were paired with recipients who had not passed the warm-up task.

In the experimental session, group sizes across the 13 kindergarten subgroups ranged from 1 to 16 children, with an average of 6.23 children per group. Children's ages ranged from 37 to 79 months, with subgroup means varying between 41.00 and 78.00 months. Overall, the mean age across all participating children was 62.00 months ($SD = \pm 11.17$).

In summary, 100 children participated in the warm-up. Of these, 81 children formed 44 dyads (7 children participated in 2 dyads), which constituted experimental session 1. Out of these, 66 children (corresponding to 33 dyads) also participated in experimental session 2 (see Figure 1).

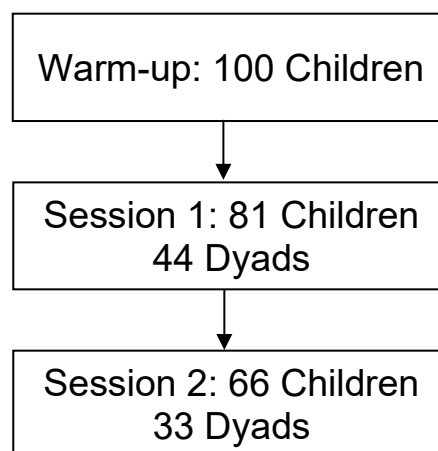


Figure 1. Flowchart of the Number of Children participating in the warm-up, experimental session 1 and experimental session 2

2.3 Warm-Up and Resource Allocation Task

As the Resource Allocation Task builds on the preceding warm-up, the materials are described first to provide a clearer understanding of the procedure. Following the description of the materials, the procedures for both the warm-up and the Resource Allocation Task are explained in detail.

2.3.1. Apparatus and Materials

The apparatus used in the study (dimensions of the apparatus are approximately 120 cm × 79 cm; see Figure 2) consists of two elongated wooden constructions mounted parallel to each other on a wooden base. These are referred to as the left and right boxes. Each box is divided into two transparent compartments, with one compartment assigned to the donor side and the other to the Recipient side. This results in a total of four transparent sections (two per side). The clear front panels of the boxes allow children to view the stickers placed inside.

The donor side is characterized by two coin slot boxes mounted at the front of the apparatus (see Figure 3). The donor is given a coin and can freely decide whether to insert it into the left or right coin slot box.

Between the two compartments of each box, there is a non-transparent, closed-off section. Inside this hidden section, a battery and an electrically operated lifting mechanism are installed, enabling the automatic opening of the boxes. These lifting mechanisms can be triggered in two ways: either via a hidden sensor (e.g., concealed in Experimenter 2's jacket pocket) or manually using a rod, hereafter referred to as the "magic wand", made of two thin, folded cables. This allows the experimenter to open either the left or the right box, depending on the donor's coin placement.

After the donor inserts the coin, Experimenter 2 used the hidden sensor to first open the corresponding box on the donor side and then the corresponding box on the recipient side, in order to remove or place stickers depending on the experimental condition. The colorful stickers are placed into the boxes by Experimenter 1 for each trial. The number and distribution of stickers vary according to the specific experimental condition.

For the study, two cameras with tripods were generally required: one positioned behind the donor side and one behind the recipient side. Both cameras recorded the apparatus to capture the children's decisions. Additional materials include sticker booklets in which the children can paste their colorful stickers.



Figure 2: Apparatus



Figure 3. Coin slot box

2.3.2. Warm-Up Procedure

The warm-up procedure consisted of three parts: two demonstration trials, ten knowledge probe trials and six familiarization trials. The child's goal was to collect as many stickers as possible, always taking on the role of the donor.

During the demonstration trials, the child received a coin while the experimenter instructed them where to drop it to maximize sticker collection (three stickers in one box and one in the other). For example, in the first trial, three stickers were placed in the right box and one in the

left box. The experimenter handed the child a coin and instructed them to drop it into the right coin slot box. The child then took the three stickers and placed them in the first sticker booklet. In the second trial, the distribution was reversed, with one sticker in the right box and three in the left. The experimenter again instructed the child to drop the coin into the right coin slot box and the child collected the single sticker.

Next, during the knowledge probe trials, the reasons for the varying resource distributions became clear: in some trials, stickers were only in the donor boxes, in others only in the recipient boxes and in some on both sides. This setup required children to carefully observe both sides to succeed. The children were asked to choose the box (left or right) containing the most stickers, receiving stickers from both donor and recipient sides. Importantly, during the knowledge probe, children did not distinguish between donor and recipient sides but only between the left and right boxes. The experimenter no longer instructed where to drop the coin; the child had to decide independently. Selecting the box with fewer stickers counted as a “fail,” and fewer fails indicated better performance. Children with zero or one error received a “full pass,” those with two to four errors a “qualified pass,” and more than four errors a “fail.” Children who achieved a full or qualified pass demonstrated sufficient knowledge to proceed to the resource allocation task and thus qualified for the experimental session.

Overall, 100 children participated in the warm-up. Thus, 78 children qualified for the experimental session.

An ANOVA was conducted to examine differences in age between these groups, revealing a significant effect of Pass/Fail status on age ($F(2, 97) = 15.93, p < 0.001$). Post-hoc analyses showed that children who received a full pass were significantly older than those who failed (mean difference ≈ 14.88 months, $p < 0.001$) and those with a qualified pass were also significantly older than the fail group (mean difference ≈ 10.60 months, $p = 0.0014$). The difference in age between the full pass and qualified pass groups was not statistically significant (mean difference ≈ 4.28 months, $p = 0.189$). This pattern indicates that, on average, older children were more likely to pass fully, while younger children tended to fail.

Finally, in the familiarization trials, children were introduced to a test structure similar to the actual experimental task to prepare them for the resource allocation task. The child stood on the donor side while the experimenter stood on the recipient side. The child received a coin and decided into which coin slot box to place it. In this phase, the child received only the stickers from the donor side of the chosen box, while the experimenter received the stickers from the recipient side.

Table 3. Group size, gender distribution and mean age per kindergarten group used for dyad formation

Kindergarten	Pass/Fail	Total	Young	Old	Age (Months)
A	Full pass	10	6	4	57.10 [$\pm$ 8.13; 45, 68]
	Qualified pass	5	3	2	56.40 [$\pm$ 10.16; 43, 68]
	Fail	2	2	0	44.00 [$\pm$ 9.90; 37, 51]
B.1	Full pass	8	3	5	64.50 [$\pm$ 7.27; 56, 73]
	Qualified pass	2	1	1	53.00 [$\pm$ 22.63; 37, 69]
	Fail	3	3	0	44.67 [$\pm$ 11.55; 38, 58]
B.2	Full pass	4	0	4	62.50 [$\pm$ 1.29; 61, 64]
	Qualified pass	2	1	1	57.50 [$\pm$ 23.33; 41, 74]
	Fail	6	4	2	49.00 [$\pm$ 8.12; 39, 61]
C.1	Full pass	5	3	2	60.40 [$\pm$ 11.98; 44, 77]
	Qualified pass	5	1	4	68.40 [$\pm$ 11.76; 52, 79]
	Fail	1	0	1	67
C.2	Full pass	7	3	4	62.00 [$\pm$ 7.07; 53, 72]
	Qualified pass	2	0	2	71.50 [$\pm$ 4.95; 68, 75]
C.3	Full pass	7	0	7	72.00 [$\pm$ 4.32; 64, 76]
	Qualified pass	4	2	2	62.25 [$\pm$ 16.15; 45, 77]
	Fail	3	3	0	49.67 [$\pm$ 5.51; 46, 56]
C.4	Full pass	3	1	2	57.67 [$\pm$ 10.21; 46, 65]
	Qualified pass	2	1	1	56.50 [$\pm$ 9.19; 50, 63]
	Fail	4	4	0	49.75 [$\pm$ 8.06; 41, 58]
D.2	Full pass	3	0	3	71.67 [$\pm$ 5.69; 67, 78]
	Qualified pass	1	0	1	60.00
D.3	Full pass	2	0	2	72.00 [$\pm$ 0]
	Qualified pass	1	0	1	75.00
	Fail	1	1	0	42.00
D.4	Qualified pass	1	1	0	41.00
D.5	Full pass	1	0	1	78.00
	Fail	1	1	0	56.00

Kindergarten	Pass/Fail	Total	Young	Old	Age (Months)
D.6	Qualified pass	1	1	0	47.00
	Fail	1	1	0	46.00
D.7	Qualified pass	2	2	0	46.00 [$\pm$ 7.07; 41, 51]
Total	Full pass	50	16	34	63.74 [$\pm$ 8.88; 44, 78]
	Qualified pass	28	13	15	59.46 [$\pm$ 13.53; 37, 79]
	Fail	22	19	3	48.86 [$\pm$ 8.42; 37, 67]

2.3.3. Resource Allocation Procedure

In this study, a Resource Allocation Task was used to assess children's prosocial decision-making (Horn et al., 2018). The apparatus required for this task is shown in Figure 2.

Before the session began, two additional chairs were placed, one to the right and one to the left of the apparatus, to prevent children from taking stickers they did not earn. A dice roll determined which distribution was presented first.

Each donor completed 18 consecutive trials, with six trials per distribution type. In total, there were 3 different distributions. The distributions were structured as follows (see Figure 4):

- *Prosocial distribution*: The donor could choose between one sticker for themselves and one for the recipient (prosocial 1/1 option) or one sticker for themselves and none for the recipient (selfish 1/0 option).
- *Costly sharing distribution*: The donor could choose between one sticker for themselves and one for the recipient (prosocial 1/1 option) or two stickers for themselves and none for the recipient (selfish 2/0 option).
- *Envy distribution*: The donor could choose between one sticker for themselves and two for the recipient (prosocial 1/2 option) or one sticker for themselves and one for the recipient (selfish 1/1 option).

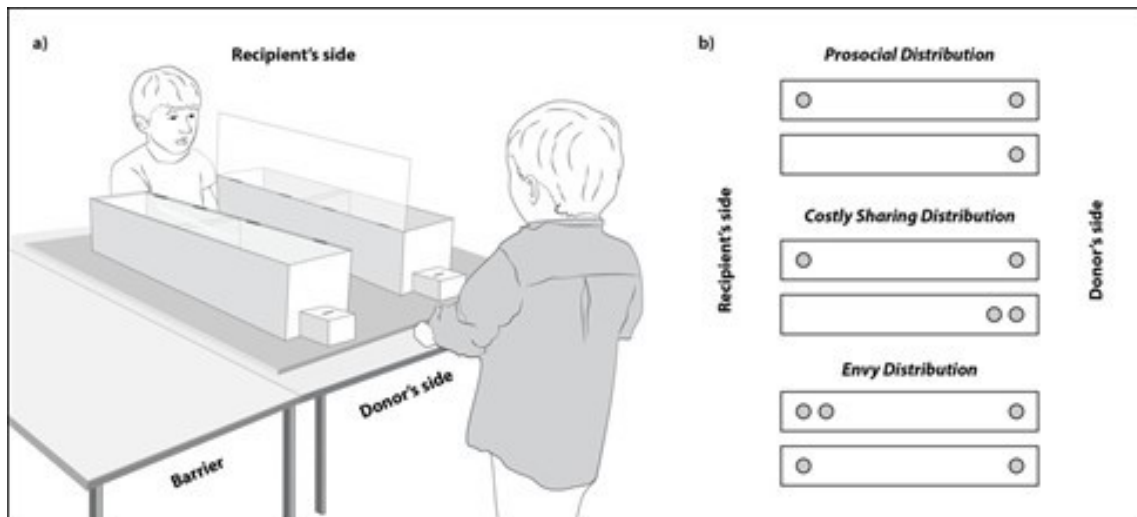


Figure 4. Design of the Experimental Resource Allocation Task setting

The sequences of the distributions were designed to ensure that an equal number of dyads were tested for each distribution. However, in the end, the distributions were unfortunately not properly balanced.

In Session 1, 12 dyads were assigned to the prosocial distribution condition, 17 dyads to the envy distribution condition and 15 dyads to the costly sharing distribution condition.

In Session 2, 11 dyads were assigned to the prosocial distribution condition, 10 dyads to the envy distribution condition and 12 dyads to the costly sharing distribution condition.

At the start of each trial, once both the donor and the recipient had taken their assigned positions, Experimenter 1 handed a coin to the donor. The donor then decided which of the two coin slot boxes to place the coin in. As soon as the donor inserted the coin, Experimenter 2 discreetly pressed the corresponding button on the sensor to open the selected box. The donor and recipient could then collect the stickers from their respective sides. Experimenter 1 removed any remaining stickers from the other side and returned them to the supply. Afterward, Experimenter 1 placed the next set of stickers into the right and left boxes, depending on which trial and distribution were being conducted. This process continued until all 18 trials were completed.

Using the resource allocation task, the variable "prosociality" was calculated.

2.4. Resource Monopolization Task

The Resource Monopolization Task was used to measure the variables "first access to the resource" (Who had the resource in their hands first?) and "duration of access to the resource" (How long did each child have the resource in their hands?). These variables were subsequently used to determine dominance. Since the Resource Monopolization Tasks were very similar, they were described together in a single section.

2.4.1. Materials

To conduct the Resource Monopolization Tasks, two pillows were provided for the children to sit on during the tasks. An hourglass was used to measure the duration of each task. For Resource Monopolization Task 1, an additional toy (either a kaleidoscope or a water game) was placed between the children. For Resource Monopolization Task 2, the setup included two coloring pictures, two crayons and a sharpener. For both tasks, the same two cameras, which had already been used in the Resource Allocation Task, were used. Their positions were the same as in the Resource Allocation Task, except that the camera on the donor side was rotated 90 degrees to better capture the area around the pillows. These recordings were used to determine the first access and duration of possession.

2.4.2. Procedure

The Resource Monopolization Task consisted of two rounds, each lasting three minutes and timed with an hourglass.

In both tasks, two pillows were placed on the floor at a distance of 0.5 meters apart, where two children from the same class were seated. In the first task, the children were presented with a novel toy, either a kaleidoscope or a water game, placed between them and initially covered. When the timer started, the toy was uncovered and the children were free to negotiate the sequence and duration of play. After three minutes, the toy was taken away. To ensure novelty, the toy was switched in the second round; children who played with the kaleidoscope in the first round played with the water game in the second and vice versa. The order of first access was recorded live by the experimenters during the session. The duration of access was later coded from video recordings using the software BORIS. The videos were recorded with two cameras positioned near the children.

The second task followed a similar procedure but involved two coloring pictures (either a sun or an apple) and two crayons, a functional colored crayon (yellow or red) and a non-functional white crayon, placed between the children. The crayons were covered initially and uncovered at the start of the timed session. Children again negotiated freely over the use of the crayons and pictures. After three minutes, materials were collected, marking the end of the experimental session. As with Task 1, first access was recorded live and duration of access for the functional crayon was coded from video using BORIS. The first task was based on Grueneisen and Tomasello's (2022) dominance test, while the second task was inspired by Staub and Sherk's (1970) crayon task.

2.5. Teacher Ratings

Each kindergarten group's questionnaire was typically completed by two teachers who were

familiar with the children. An exception to this occurred in Kindergarten D, where only one teacher per group completed the questionnaire. The assessment of children's dominance was conducted by the teachers using two different evaluation approaches: the dyadic dominance rating and the dominance trait rating.

2.5.1. Dyadic Dominance Rating

Each participating child was evaluated in a pairwise comparison with every other participant from their kindergarten group regarding their assertiveness in resource conflicts. Specifically, teachers were asked to assess which child (Child A or Child B) would prevail in a hypothetical conflict over resources, such as toys or other desirable items. The teachers could indicate whether one child was more assertive (i.e., more likely to secure the resource) or whether no clear assessment was possible ("unknown"). This approach focused on the children's ability to assert themselves in competitive situations rather than on a general evaluation of dominance. Each participating child was evaluated individually in relation to every other child in their kindergarten group. For each pairwise comparison, teachers were asked to assess whether the child being evaluated (e.g., Child A) was dominant, subdominant, or whether no clear assessment was possible ("unknown") in relation to another child (e.g., Child B). This process was repeated for all other children in the group. For example, in Kindergarten Group A, which consisted of 17 children, Child A was evaluated as dominant, subdominant, or unknown in relation to each of the other 16 children (Child B, Child C and so on).

2.5.2. Dominance Trait Rating

The teachers rated each participating child on four items related to assertiveness and dominance in relation to other children:

- Assertiveness ("Durchsetzungsvermögen"),
- Dominant ("Dominant"),
- Ability to stand up for oneself ("Behauptet sich selbst"),
- Tendency to give instructions to others ("Sagt anderen, was zu tun ist").

The evaluation was carried out using a continuous scale that was 10.7 cm long. For each item, the teachers placed a mark on the scale to indicate their level of agreement with the statement for the respective child. A mark closer to 0 indicated low agreement with the item (i.e., the characteristic was not strongly expressed in the child), while a mark closer to 10.7 indicated high agreement (i.e., the characteristic was strongly expressed). For example, if the mark for the item "Behauptet sich selbst" (ability to stand up for oneself) was placed at 10.7, this meant that the child was perceived as consistently standing up for themselves in interactions with

other children.

2.5.3 Intra- and Inter-Rater Reliability Analyses

For the following analyses, it was first necessary to examine whether the teachers were consistent with themselves (Intra-Rater Reliability) in order to then calculate whether the teachers were consistent with each other (Inter-Rater Reliability).

2.6 Statistical analysis

All analyses were conducted using R (version 4.3.2; R Core Team, 2023) within RStudio (Posit Team, 2023). Excel files were imported with readxl (Wickham & Bryan, 2023) and data preprocessing was performed with dplyr (Wickham et al., 2023). Statistical tests and linear models were conducted using functions from the base stats package (R Core Team, 2023).

2.6.1. Dominance

Effect sizes (e.g., Cohen's h) were computed using effsize (Torchiano, 2020) and model outputs were summarized with broom (Robinson et al., 2023). Visualizations such as scatterplots and regression lines stratified by sex were created with ggplot2 (Wickham, 2016). Statistical tests included binomial tests, linear models and analyses of variance with Tukey post-hoc comparisons conducted using functions from the base stats package (R Core Team, 2023). For hypothesis H2a, which required session-level analyses, generalized linear mixed-effects models were fitted with lme4 (Bates et al., 2015) and post-hoc comparisons were conducted with emmeans (Lenth, 2023). Additional data cleaning and descriptive summaries were supported by the janitor package (Firke, 2023).

2.6.2. Prosociality

Descriptive statistics and group means were computed with the aid of janitor (Firke, 2023). Visualizations of group differences and model effects were generated with ggplot2 (Wickham, 2016). Group comparisons were tested using t-tests and analyses of variance from the base stats package (R Core Team, 2023). To model prosocial versus other choices at the trial level, generalized linear mixed-effects models were fitted with lme4 (Bates et al., 2015) and significance testing for fixed effects was carried out using lmerTest (Kuznetsova et al., 2017). Post-hoc comparisons of estimated marginal means were conducted with emmeans (Lenth, 2023).

2.6.3. Hypothesis 1a: Older Children will monopolize resources more often and for longer periods than younger children

Binomial tests for proportions were calculated using functions from the base stats package. Correlation analyses examining the relationship between age differences and differences in monopolization duration were conducted using Pearson's r . All data cleaning and transformation steps were supported by janitor (Firke, 2023) and descriptive tables were created using flextable (Gohel, 2023). The final tables and summaries were exported to Word documents using the officer package (Gohel, 2023).

Only dyads in which one child was older than the other were included in the analyses; dyads with two children of the exact same age were excluded. Additionally, cases where neither child accessed the toy (i.e., no first access occurred) were omitted from the calculations.

2.6.4. Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads

To test Hypothesis 1b, the package tidyr (Wickham, 2023) was used. Data cleaning and validation steps were performed with janitor (Firke, 2023). Binomial tests for proportions and Welch Two Sample t-tests were conducted using functions from the base stats package. Pearson correlation analyses were performed to examine relationships between age differences and possession duration. Descriptive tables were created and formatted with flextable (Gohel, 2023) and final results were exported to Word documents using the officer package (Gohel, 2023).

2.6.5. Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores

Linear regression analyses were conducted using functions from the base stats package. Visualizations (scatterplots with regression lines and 95% confidence intervals) were generated using ggplot2 (Wickham, 2016).

2.6.6. Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads

Linear regression analyses were conducted using functions from the base stats package (R Core Team, 2023). Visualizations (scatterplots with regression lines and 95% confidence intervals) were generated using ggplot2 (Wickham, 2016).

2.6.7. Teacher Rating

Analyses for the Dyadic Dominance Rating were conducted in R (Version 4.3.2; R Core Team, 2023) using RStudio (Posit Team, 2023). Excel data were imported using the readxl package (Wickham & Bryan, 2023) and data processing was carried out with dplyr (Wickham et al., 2023). Intra-rater and inter-rater reliability (Cohen's Kappa, weighted) were assessed using the irr package (Gamer et al., 2019). Tables were formatted and exported to Word documents using flextable and officer (Gohel, 2023).

Analyses for the Dominance Trait Rating were conducted in R (Version 4.3.2; R Core Team, 2023) using RStudio (Posit Team, 2023). Data were imported from Excel files using the readxl package (Wickham & Bryan, 2023) and data wrangling and summarisation were performed using dplyr (Wickham et al., 2023). Internal consistency was assessed using Cronbach's Alpha, calculated with the psych package (Revelle, 2023). Inter-rater reliability between teachers (ICC) was computed using both psych and irr (Gamer et al., 2019). The tables were created and exported to Word documents using the R packages *flextable* and *officer* (Gohel, 2023).

2.7. Operational Definition and Measurement of Dominance

In the present study, dominance was primarily operationalized based on the duration of resource monopolization in the two resource competition tasks. For each dyad and each session, a relative duration of access (Δ -value) was calculated based on the first monopolization of that session. Only the first monopolization was used for this calculation, as behavior in the second monopolization could have been influenced by the recipient's "payback" for the donor's prior decisions, either positively or negatively.

$$\Delta = \text{Duration Child 1} - \text{Duration Child 2}$$

The stability of dominance was assessed by calculating the correlation between the possession duration differences (Δ) in Session 1 and Session 2 using Pearson's correlation coefficient (cor.test). The analysis showed a moderate positive correlation ($r = 0.43$, $p = 0.025$), indicating that children who monopolized the resource longer relative to their partner in Session 1 tended to show similar dominance patterns in Session 2. This moderate stability suggested that the possession duration difference was a reliable measure of dominance across sessions. Establishing stability was important as it supported the use of this measure in further analyses, such as examining age-related differences in dominance within dyads.

The results of the Welch Two Sample t-tests showed that there was a significant difference in the duration of possession (Δ) between children who had first access to the resource and those

who did not, in both Session 1 ($t(29.5) = -2.40, p = 0.023$) and Session 2 ($t(23.9) = -2.49, p = 0.020$). Specifically, children who had first access tended to have longer possession durations (mean Δ positive) compared to those who did not. The Pearson correlations between first access (coded as 1 for child 1, 0 for child 2) and Δ values further supported this finding, revealing moderate positive correlations in Session 1 ($r = 0.37, p = 0.020$) and Session 2 ($r = 0.43, p = 0.017$). This indicated that first access was positively associated with longer monopolization durations within each session. This indicated that first access was positively associated with longer monopolization durations within each session. This finding was important because it validated “first access” as a reliable behavioral indicator of dominance in resource competition, demonstrating that early control over a resource often led to longer possession. Therefore, first access could be considered a useful predictor of dominance dynamics in dyadic interactions.

Additionally, the association between first access and longer duration of access within the same session was examined to assess whether the child who accessed the object first also tended to have a longer duration of access. For Monopolization 1, binomial tests conducted separately for each session revealed significant concordance: in Session 1, 31 out of 44 dyads (70.5%) showed agreement between first access (Monopolization 1) and longer duration of access ($p = .0096$) and in Session 2, 23 out of 33 dyads (69.7%) demonstrated this association ($p = .035$). These findings suggest that within a given session, the child who accessed the resource in monopolization 1 first usually also had the longer access duration.

2.8. Operational Definition and Measurement of Prosociality

Prosociality in this study was operationalized through children’s decisions in the Resource Allocation Task.

In every distribution, one option favored the donor at the expense of the recipient (selfish choice), while the other provided a more equitable or generous outcome (prosocial choice). For example, in the prosocial distribution the donor could choose between both children receiving one sticker (prosocial) or only the donor receiving one sticker (selfish). Similarly, in the costly sharing distribution, choosing the prosocial option meant that both children received one sticker, whereas the selfish option gave two stickers exclusively to the donor. In the envy distribution, prosociality was reflected in the donor allowing the recipient to receive more stickers (1 for donor, 2 for recipient), while the selfish option guaranteed equality but limited the recipient’s benefit (1/1).

Across the 18 trials, each donor’s prosocial score was computed. Higher proportions of prosocial choices indicated greater prosociality, whereas a higher frequency of selfish decisions reflected lower levels of prosocial behavior. For dyads where both children completed the task in alternating roles (donor and recipient), prosocial scores were calculated

for each child individually. The donor's prosocial score ranged between 0 and 16.

2.9. Influence of size on dominance behavior

This study examined whether taller children were more dominant in dyadic interactions. Each dyad consisted of two children and dominance was quantified using a dominance index calculated as the mean delta value from two sessions, representing the relative duration of resource monopolization. The child with the higher average delta value was classified as the dominant partner.

To assess the relationship between dominance and physical size, dyads where height data was missing or the children were of similar height were excluded from the analysis, resulting in a sample of 44 dyads with a clear size difference.

In 56.8% of these cases (25 out of 44), the dominant child was also the taller one, while in 43.2% (19 out of 44), the dominant child was shorter. A chi-squared test showed no statistically significant association between height and dominance, $\chi^2(1) = 1.6$, $p = .206$, indicating that taller children were not significantly more likely to be dominant in this sample.

Dominance analyses were conducted in R (Version 4.4.3; R Core Team, 2023) using RStudio (Posit Team, 2023). Excel files were imported using the readxl package (Wickham & Bryan, 2023) and data wrangling was performed with base R functions. The dominance index was calculated as the mean delta value across two sessions. Chi-squared tests for associations between dominance and height were conducted using functions from the base stats package. Visualizations were created with the ggplot2 package (Wickham, 2016).

3. Results

In the following, the results of the statistical analyses are presented according to the predefined hypotheses. First, findings related to age differences in resource monopolization and dominance (Hypotheses 1a and 1b) are reported. Next, we examine the associations between dominance and prosocial behavior (Hypotheses 2a and 2b). Finally, the reliability and consistency of teacher ratings of dominance traits are summarized.

3.1. Hypothesis 1a: Older children will monopolize resources more often and for longer periods than younger children

Hypothesis 1a predicted that older children would monopolize resources more often than younger children. In 82 out of 137 valid monopolizations (59.9%), older children had first access. A binomial test showed that this proportion was statistically significant ($p = .013$), indicating that older children were significantly more likely to gain first access to resources than

younger children.

Regarding the duration of access, older children monopolized resources for a longer period in 85 out of 147 valid monopolizations (57.8%). A binomial test again revealed a statistically significant result ($p = .035$), suggesting that older children were also significantly more likely to monopolize resources for a longer duration than younger children.

Table 4. First Access by Older Children per Session and Monopolization

Session	Monopol	First Access Older (n)	Valid Cases (n)	Percent (%)
Session 1	Monopol 1	20	41	48.8
Session 1	Monopol 2	24	42	57.1
Session 2	Monopol 1	19	31	61.3
Session 2	Monopol 2	19	32	59.4
Total	-	82	137	59.9

Table 5. Table: Longer Duration of Resource Access by Older Children

Session	Monopol	Longer.Duration.Older (n)	Valid.Cases (n)	Percent (%)
Session 1	Monopol 1	20	41	48.8
Session 1	Monopol 2	22	42	52.3
Session 2	Monopol 1	21	32	65.6
Session 2	Monopol 2	22	32	68.8
Total	-	85	147	57.8

To complement the analysis, the continuous relationship between age differences within dyads and differences in the monopolization longer duration of access was examined. Pearson correlation analyses showed no significant correlation for Monopolization 1 ($r = 0.22$, $p = 0.056$), indicating a weak, non-significant trend between age difference and duration difference. For Monopolization 2, the correlation was close to zero and not significant ($r = -0.02$, $p = 0.86$). These findings suggest that the difference in age between children within a dyad is not related to differences in how long each child monopolizes the resource. Thus, older children do not appear to monopolize resources for longer durations of access depending on how much older they are compared to their dyadic partner. To complement the analysis of Hypothesis 1a, we examined whether the relative age difference within dyads was related to dominance..

In Session 1, a Pearson's product-moment correlation test revealed a weak positive correlation between age difference and Δ , $r(37) = 0.22$, $p = 0.183$, 95% CI $[-0.10, 0.50]$. In Session 2, a similar pattern was observed, with a weak positive but non-significant correlation, $r(28) = 0.23$, $p = 0.213$, 95% CI $[-0.14, 0.55]$. These results suggest a slight tendency for older children within dyads to monopolize resources for longer durations. However, the associations were not statistically significant in either session. Thus, the data do not provide evidence that age differences systematically explain monopolization duration.

3.2. Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads

Hypothesis 1b predicted that age-related differences in dominance would be stronger in different-age dyads compared to same-age dyads. In different-age dyads, older children gained first access in 34 out of 59 valid monopolizations (57.6%). In same-age dyads, older children had first access in 48 out of 87 valid monopolizations (55.2%). Binomial tests revealed that these proportions were not statistically significant for either group (different-age dyads: $p = 0.149$; same-age dyads: $p = 0.196$). These results indicate that the age-related dominance advantage in first access to the resource is not significantly stronger in different-age dyads than in same-age dyads.

Regarding the duration of access, older children monopolized resources for a longer duration in 39 out of 59 valid monopolizations (66.1%) in different-age dyads and in 46 out of 87 valid monopolizations (52.9%) in same-age dyads. A binomial test revealed that the proportion for different-age dyads was statistically significant ($p = 0.009$), indicating that older children in these dyads were significantly more likely to monopolize resources for a longer duration than expected by chance. In contrast, the proportion for same-age dyads was not statistically significant ($p = 0.334$), suggesting no dominance advantage for older children in these dyads.

Table 6: First Access by Older Children per Session and Monopolization, Divided into Same-Aged vs. Different-Aged Dyads

Age_Group_ same_different	Session	Monopol	First Access Older (n)	Valid. Cases (n)	Percent (%)
Different					
	Session1	Monopol 1	9	17	53.0
	Session1	Monopol 2	10	18	55.6
	Session2	Monopol 1	8	12	66.7
	Session2	Monopol 2	7	12	58.3

Age_Group_ same_different	Session	Monopol	First Access Older (n)	Valid. Cases (n)	Percent (%)
Same					
	Session1	Monopol 1	11	24	45.8
	Session1	Monopol 2	14	24	58.3
	Session2	Monopol 1	11	19	57.9
	Session2	Monopol 2	12	20	60.0
Different	Total	-	34	59	57.6
Same	Total	-	48	87	55.2

Table 7. Table: Longer Duration of Resource Access by Older Children, Divided into Same-Aged vs. Different-Aged Dyads

Age_Group_ same_different	Session	Monopol	Longer.Dura- tion.Older (n)	Valid. Cases (n)	Percent (%)
Different					
	Session1	Monopol 1	11	17	64.7
	Session1	Monopol 2	11	18	61.1
	Session2	Monopol 1	10	12	83.3
	Session2	Monopol 2	7	12	58.3
Same					
	Session1	Monopol 1	9	24	37.5
	Session1	Monopol 2	11	24	45.8
	Session2	Monopol 1	11	19	57.9
	Session2	Monopol 2	15	20	75.0
Different	Total	-	39	59	66.1
Same	Total	-	46	87	52.9

To complement the analysis, the continuous relationship between age differences within dyads and differences in the monopolization of longer durations of access was examined separately for same-aged and different-aged dyads. For each monopolization, the age difference (Child 1 age minus Child 2 age) and the difference in possession duration (Child 1 duration minus Child 2 duration) were calculated. For same-aged dyads, Pearson correlation analyses showed no significant correlation for Monopolization 1 ($r = -0.09$, $p=0.73$) or Monopolization 2

($r = 0.27$, $p = 0.29$). These results indicate that within same-aged dyads, age differences were not related to differences in the possession duration. For different-aged dyads, Pearson correlation analyses revealed a significant positive correlation for Monopolization 1 ($r = 0.29$, $p = 0.025$), suggesting that larger age differences within the dyad were associated with greater differences in possession duration. However, for Monopolization 2, the correlation was close to zero and not significant ($r = -0.04$, $p = 0.78$).

These findings suggest that the relationship between age differences and differences in possession duration varies depending on the type of dyad. In different-aged dyads, larger age differences were associated with longer possession duration for the older child, but this effect was only observed for Monopolization 1. In same-aged dyads, no such relationship was found, indicating that age differences within these dyads do not influence the duration of possession. The results of the Welch Two Sample t-tests revealed no significant differences in dominance (as measured by Δ -values) between dyad types (same-age vs. different-age) in either session 1 ($t(37) = 0.24$, $p = 0.81$) or session 2 ($t(26.18) = 1.16$, $p = 0.25$). Similarly, when analyzing the Δ -values between “old” and “young” children in same-aged dyads, no significant differences were found in session 1 ($t(19.79) = -0.31$, $p = 0.76$) or session 2 ($t(10.80) = 0.38$, $p = 0.71$). These results suggest that age-related differences in dominance were not statistically stronger in different-age dyads compared to same-age dyads and older children did not consistently exhibit more dominant behavior (i.e., longer possession durations) than younger children. Therefore, Hypothesis 1b was not supported by the data.

3.3. Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores

The linear regression analyses were conducted to examine the relationship between dominance (measured as Δ) and prosocial behavior across two sessions (see Figure 5 and Figure 6). In session 1, dominance did not significantly predict prosocial scores ($\beta = -0.018$, $p = 0.415$). Similarly, in session 2, dominance was not identified as a significant predictor of prosocial behavior ($\beta = 0.002$, $p = 0.932$). Overall, these findings indicate that differences in dominance between children (Δ) do not exert a clear impact on prosocial decision-making in the resource allocation task. Consequently, the hypothesis that more dominant children make more selfish choices, resulting in lower prosocial scores, was not supported by the current data.

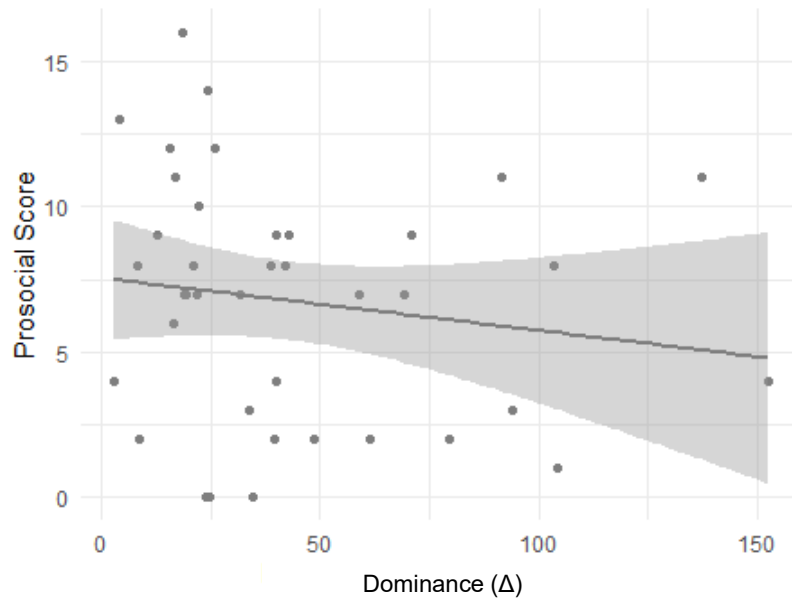


Figure 5. Scatterplot Session1: Correlation between Dominance and Prosocial Score

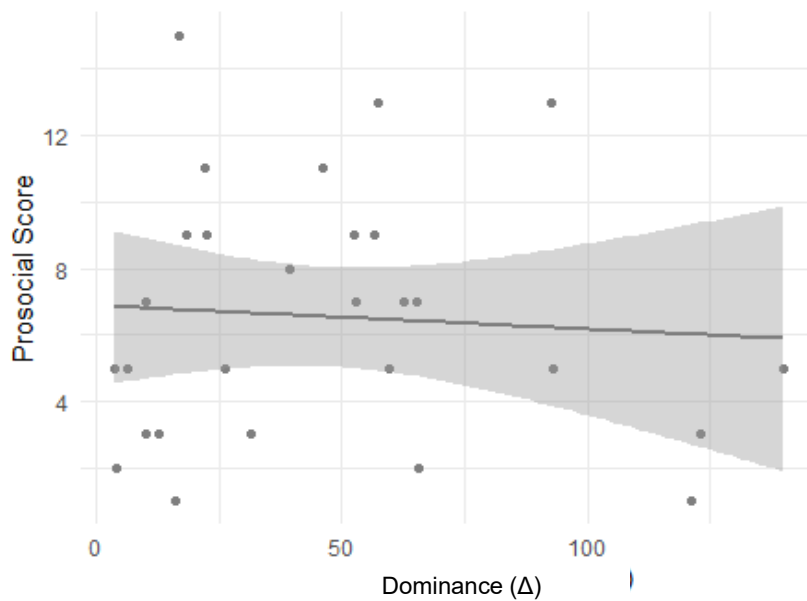


Figure 6. Scatterplot Session2: Correlation between Dominance and Prosocial Score

3.4. Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads

The linear regression analyses were conducted to examine whether the relationship between dominance (measured as Δ) and prosocial behavior was moderated by age similarity within dyads (same vs. different age) (see Figure 7 and Figure 8). In session 1, the interaction between dominance and age similarity was not significant ($\beta = 0.030$, $p = 0.514$) and dominance itself also did not significantly predict prosocial behavior in different-aged dyads (β

= -0.050, $p = 0.217$). Similarly, in session 2, the interaction term was not significant ($\beta = -0.057$, $p = 0.173$), nor was the main effect of dominance in different-aged dyads ($\beta = 0.030$, $p = 0.351$). These findings indicate that the association between dominance and prosocial behavior does not meaningfully differ between same-aged and different-aged dyads. Consequently, the hypothesis that the relationship between dominance and prosocial behavior is stronger in different-aged dyads was not supported by the current data.

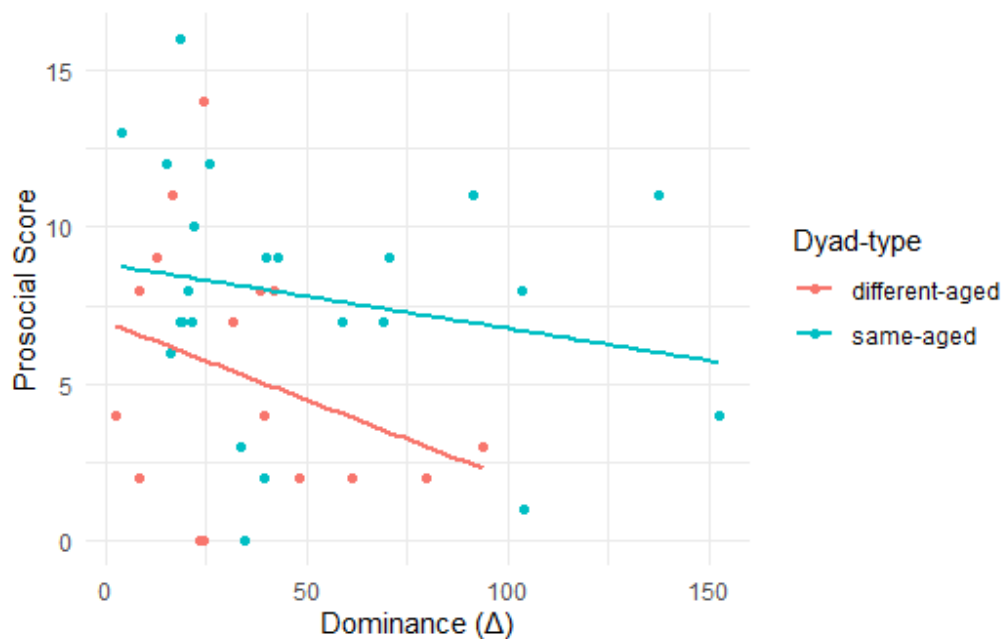


Figure 7. Scatterplot Session1: Correlation between Dominance and Prosocial Score based on dyad-type

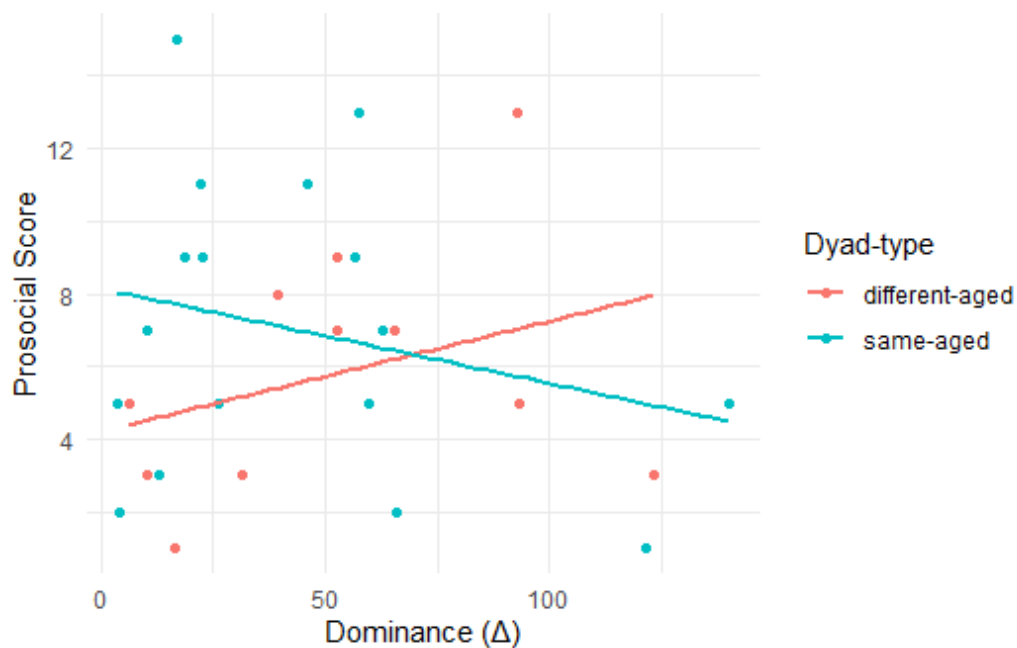


Figure 8. Scatterplot Session2: Correlation between Dominance and Prosocial Score based on dyad-type

3.5. Teacher Ratings

Dominance Trait Rating showed strong internal consistency, as analyses indicated that these items reliably measured the same construct. Cronbach's alpha values were very high for all teachers across kindergartens, ranging between $\alpha = .83$ and $\alpha = .97$, with most values falling in the "good" to "excellent" range (see Table 8). This suggested that the items were largely consistent in capturing children's dominance.

Table 8. Internal Consistency (Cronbach's Alpha, Questionnaire Ratings)

Group	Teacher1	Teacher2	Interpretation ¹
A	0.93	0.94	excellent
B.1	0.83	0.88	good
B.2	0.90	0.95	excellent
C.1	0.92	0.99	excellent
C.2	0.97	0.97	excellent
C.3	0.93	0.98	excellent
C.4	0.94	0.95	excellent

Across the kindergarten groups, the inter-rater reliability between the two teachers varied considerably. ICC values ranged from weak and sometimes even negative agreement up to excellent reliability (ICC range: -0.48 to 0.99). This meant that while some groups showed very strong consistency in how teachers judged children's dominance, in other groups the ratings diverged substantially. For example, in some cases ICCs reached values above 0.90 , indicating excellent agreement, whereas in other groups negative ICCs suggested that the teachers systematically disagreed in their evaluations. This broad spread highlighted the heterogeneity of teacher perspectives across different kindergartens and underscored the importance of considering group-specific differences when interpreting the reliability of teacher ratings (see Table 9).

¹ The interpretation of the Cronbach's alpha values is based on George & Mallery (2019)

Table 9. Inter-Rater Reliability (ICC, Teacher Rating)

Group	n_Children	ICC_Range	Interpretation ²
A	17	0.39 – 0.89	weak → good
B.2	13	0.78 – 0.98	good → excellent
B.3	12	0.82 – 0.99	good → excellent
C.1	11	–0.03 – 0.84	weak → excellent
C.2	9	–0.48 – 0.75	weak → excellent
C.3	14	–0.04 – 0.84	weak → excellent
C.4	9	0.27 – 0.94	weak → excellent

Teacher ratings were examined in the context of dyadic dominance relationships. Each child was evaluated in relation to all other children in the same kindergarten group (e.g., whether Child 1 was dominant, subdominant, or no clear dominance relation was observed with respect to Child 2). For every dyad, both teachers provided ratings in both directions (Child 1 vs. Child 2 and Child 2 vs. Child 1). Specifically, the following ratings were considered:

- *Teacher 1, Direction 1 (Child 1 dominant/subdominant vs. Child 2)*
- *Teacher 2, Direction 1 (Child 1 dominant/subdominant vs. Child 2)*
- *Teacher 1, Direction 2 (Child 2 dominant/subdominant vs. Child 1)*
- *Teacher 2, Direction 2 (Child 2 dominant/subdominant vs. Child 1)*

From these four judgments, three possible outcomes were defined: (1) Child 1 was clearly dominant (if consistently rated as dominant in both directions by both teachers), (2) Child 2 was clearly dominant, or (3) the relation was unclear (if ratings did not consistently identify the same child as dominant). The corresponding questionnaire is reproduced in the Appendices. When examining the intra-rater reliability, the results revealed a wide range of agreement levels. Cohen's Kappa values for self-consistency varied from negative agreement, suggesting systematic contradictions, up to perfect reliability (Kappa range: –0.29 to 1.00). Overall, the average level of self-agreement was moderate, with $\kappa = 0.60$ for Teacher 1 and $\kappa = 0.58$ for Teacher 2, indicating that while both teachers were generally consistent in their judgments, the strength of agreement varied considerably across groups (see Table 10).

² The interpretation of the ICC values is based on Koo & Li (2016)

Table 10. Cohen's Kappa Teacher Results by Group

Group	Kappa_Teacher1	Interpretation ³	Kappa_Teacher2	Interpretation ³
A	0.1666667	poor	0.2413793	poor
B.1	1.0000000	excellent	1.0000000	excellent
B.2	1.0000000	excellent	1.0000000	excellent
C.1	-0.1538462	poor	1.0000000	excellent
C.2	0.8387097	excellent	-0.2857143	poor
C.3	0.7500000	Good	0.6666667	good
C.4	1.0000000	Excellent	0.6666667	good
Total	0.6037736	Moderate	0.5763814	moderate

The weighted Cohen's Kappa values for inter-rater reliability ranged from negative agreement, indicating systematic disagreement in some groups, up to perfect agreement (Kappa range: – 0.43 to 1.00). According to Sim and Wright (2005), agreement was classified as poor in several cases, particularly in groups with negative Kappa values, while other groups showed excellent consistency between raters. The overall inter-rater reliability was moderate, with a global Kappa of $\kappa = 0.60$, suggesting that while the teachers were generally aligned in their assessments of dominance relationships, the strength of agreement differed notably across groups (see Table 11).

Table 11. Cohen's Kappa: Agreement Teacher1 and Teacher

Group	Kappa_Teacher1_vs_Teacher2	Interpretation ⁴
A	0.4000000	poor
B.1	1.0000000	excellent
B.2	1.0000000	excellent
C.1	-0.4285714	poor
C.2	0.5454545	moderate
C.3	0.8000000	good
C.4	-0.3333333	poor
Total	0.6034215	moderate

³ The interpretation of the weighted Cohen's Kappa values is based on McHugh (2012)

⁴ The interpretation of the weighted Cohen's Kappa values is based on McHugh (2012)

4. Discussion

In this thesis, I explored the relationship between dominance and prosociality among 3-6 year old preschoolers, focusing on how these behaviors manifest in dyadic interactions. While previous research has significantly advanced our understanding of dominance (e.g., Hawley, 2002; Pellegrini et al., 2007) and prosociality (e.g., Eisenberg et al., 2007; Dirks et al., 2018), the interplay between these two constructs, particularly in familiar peer contexts, remains underexplored. Both dominance and prosociality are critical for navigating social hierarchies and maintaining group cohesion, making their study in preschool settings particularly relevant (Hawley, 1999; Spinrad & Eisenberg, 2023).

To my knowledge, this study is among the first to examine dominance and prosociality in mixed- and same-age dyads using the resource allocation task. By employing tasks that elicited both dominance and prosocial behaviors, as well as teacher ratings, this research aimed to provide a comprehensive view of how these behaviors interact in early childhood. Although the results did not fully align with the initial hypotheses, they offer valuable insights into the complexity of social dynamics among preschoolers and raise important questions for future research.

In the following sections, I discuss the findings for each hypothesis in detail. Given the methodological and sample-related limitations of this study, the interpretations presented here should be approached with caution. The results add to the existing literature and underscore the importance of further research on the developmental and contextual factors influencing dominance and prosocial behavior in early childhood.

4.1. Discussion of Hypothesis 1a: Older children will monopolize resources more often and for longer periods than younger children

Hypothesis 1a assumed that older preschoolers would monopolize resources more often and for longer durations than younger children. This assumption was based on previous studies suggesting that age correlates with dominance behavior (Pollet et al., 2015; Höflinger, 2023). The results of the present study partially support this hypothesis: Older children gained first access to resources in 59.9% of valid cases and this proportion was statistically significant ($p = .013$). Similarly, they monopolized the resource for a longer duration in 57.8% of cases, also reaching significance ($p = .035$).

However, further correlation analyses showed that the degree of age difference within dyads was not significantly associated with the extent of monopolization. These findings do not fully support earlier research that suggested a clear dominance of older children in resource conflicts (Hawley, 2002; Pellegrini et al., 2007). Social dynamics, such as fairness norms in preschool groups, may play a role in shaping how age-related dominance is expressed (Fehr

et al., 2008; Blake et al., 2015). Future research should continue to explore how age interacts with social context in early peer interactions.

4.2. Discussion of Hypothesis 1b: Age-related differences in dominance will be stronger in different-age dyads than in same-age dyads

Hypothesis H1b proposed that age-related differences in dominance would be more pronounced in mixed-age dyads than in same-age dyads. The results showed that older children in mixed-age dyads monopolized resources for longer durations in 66.1% of cases, which was statistically significant ($p = 0.009$). However, in same-age dyads, this effect was not significant (52.9%, $p = 0.334$). Correlation analyses further revealed that the relationship between age differences and monopolization duration was only significant in the first monopolization task ($r = 0.29$, $p = 0.025$). These findings partially support the hypothesis, as older children in mixed-age dyads did indeed exhibit stronger dominance. This is consistent with previous studies suggesting that larger age differences can lead to more asymmetrical power dynamics (Hawley, 1999; Höflinger, 2023). However, the effect was not consistent across all tasks, indicating that other factors, such as the social dynamics within the dyads or the specific nature of the task, may play a role. These results highlight the complexity of dominance and the need for further investigation in future studies.

4.3. Discussion of Hypothesis 2a: More dominant children will make more selfish choices in the resource allocation task, leading to lower prosocial scores

Hypothesis H2a postulated that more dominant children would make more selfish decisions in the resource allocation task, resulting in lower prosocial scores. However, the results showed that dominance (measured as Δ -value) had no significant effect on prosocial decisions, neither in Session 1 ($\beta = -0.018$, $p = 0.415$) nor in Session 2 ($\beta = 0.002$, $p = 0.932$).

These findings contradict the hypothesis and previous studies that suggested a close link between dominance and selfishness (Hawley, 2002; Eisenberg et al., 2007). One possible explanation could be that dominant children in this study used prosocial strategies as a means to stabilize their social position, as proposed by Hawley (2003). This might also be related to the increasing emphasis on fairness and cooperation in preschool groups (Fehr et al., 2008; House et al., 2013). The results suggest that dominance and prosociality are not necessarily opposing strategies but can coexist depending on the context.

4.4. Discussion of Hypothesis 2b: The negative association between dominance and prosociality will be stronger in different-age dyads than in same-age dyads

Hypothesis H2b assumed that the negative relationship between dominance and prosociality would be more pronounced in mixed-age dyads than in same-age dyads. However, the results showed that neither the interaction between dominance and age similarity ($\beta = -0.057$, $p = 0.173$) nor the main effect of dominance in mixed-age dyads was significant ($\beta = 0.030$, $p = 0.351$).

These findings contradict the hypothesis and suggest that the relationship between dominance and prosociality is not significantly influenced by the age composition of the dyads. This may indicate that other factors, such as the quality of the relationship between the children or the specific social norms within the group, play a more substantial role (Baumeister & Leary, 1995; Dirks et al., 2018). The results highlight the need to examine the interaction between dominance and prosociality in future studies among preschoolers.

4.5 Teacher ratings

Teacher ratings were used to assess children's dominance through both Dyadic Dominance Ratings and Dominance Trait Ratings. The results showed moderate to high internal consistency for the Dominance Trait Ratings, with Cronbach's alpha values ranging from 0.83 to 0.97, indicating a reliable measurement of the construct. Intra-rater reliability was also moderate, with average Cohen's kappa values of $\kappa = 0.60$ for Teacher 1 and $\kappa = 0.58$ for Teacher 2. However, inter-rater reliability varied significantly across groups, with ICC values ranging from -0.48 to 0.99 , highlighting substantial differences in agreement between teachers.

These findings partially align with expectations, as the high internal consistency of the Dominance Trait Ratings suggests a reliable capture of dominance. However, the strong variability in inter-rater reliability may reflect differing interpretations of the concept of dominance by teachers or group-specific differences in social dynamics. Previous studies have shown that teacher ratings of social traits like dominance can be influenced by subjective perceptions and group contexts (Hawley, 2002; Pellegrini et al., 2007).

Another notable finding was the occurrence of negative ICC values in some groups, indicating systematic disagreements between teachers. This could be due to teachers placing different weights on behaviors such as assertiveness or cooperation when evaluating dominance. Alternatively, differences in the teachers' relationships with the children may also play a role (Baumeister & Leary, 1995; Dirks et al., 2018).

In summary, the results suggest that teacher ratings can be a useful tool for assessing dominance characteristics but are influenced by subjective and contextual factors.

4.6. Limitations

Despite the valuable insights provided, several limitations must be acknowledged. One challenge we faced was the absence of children in some dyads, which sometimes led to considerable delays between the warm-up and Experimental Session 1, as well as between Experimental Session 1 and Experimental Session 2. Additionally, a notable number of younger children struggled to complete the warm-up successfully and were therefore excluded from the main tasks. In some dyads, only one child completed the warm-up, which meant that only a single session could be conducted. This raises the question of whether the warm-up script and instructions were fully appropriate for younger preschoolers. While the procedure was based on established paradigms, it is possible that the cognitive demands exceeded the capacities of some 3-year-olds. This may have unintentionally biased the sample toward older children, limiting the generalizability of the findings across the full age range.

Although the study included 88 children who passed the warm-up, the number of dyads that completed both experimental sessions was smaller. This was often due to the absence of children during scheduled sessions, as some were sick, on vacation, or absent for unknown reasons. As a result, it was sometimes impossible to form the intended dyads, which not only reduced statistical power but also made it difficult to maintain a balance between same-age and mixed-age dyads. Since the study design required dyads from the same kindergarten group, the formation of pairs depended heavily on which children were present on a given day. Ensuring equal distribution across age and gender groups was therefore challenging. In some cases, dyads could not be matched as intended, leading to uneven representation. While such constraints are common in field research with preschoolers, they limit the comparability of conditions and reduce the robustness of between-group contrasts.

Dominance was calculated as the relative duration of access (Δ -value) in Monopolization 1. Since monopolizations did not consistently align, they were not combined, indicating that children did not exhibit a clear or stable “dominance” in these tests. Additional measures included first access per monopolization per session and duration of access per monopolization per session. While this multimethod approach enhances validity, it also complicates direct comparisons, as the different measures may reflect distinct facets of dominance. Similarly, although the Resource Allocation Task is controlled and replicable, it may not fully capture the complexity of children’s prosocial behavior in naturalistic settings.

Another limitation is the focus on dyadic interactions. While this design provides experimental control, it does not reflect the dynamics of larger peer groups. In real preschool environments, resource competition often involves multiple children and shifting alliances. These dynamics may amplify or moderate the link between dominance and prosociality in ways that cannot be captured in dyads alone. Future studies should consider incorporating group-level interactions to better understand these complexities.

4.7. Implications

The findings of this study have several important implications for understanding the interplay between dominance and prosociality in early childhood. First, the lack of a consistent relationship between age and dominance challenges assumptions that older children naturally assert dominance in resource conflicts. This suggests that social norms emphasizing fairness and cooperation may play a stronger role in shaping behavior than previously thought. Second, the partial support for Hypothesis H1b highlights the importance of age differences in shaping dominance dynamics, particularly in mixed-age dyads. This finding underscores the need for teachers to be mindful of age-related power imbalances in group settings, as these may influence how children interact and resolve conflicts. Structured activities that promote collaboration across age groups could help balance these dynamics. Finally, the results regarding teacher ratings emphasize the subjective nature of dominance assessments. While teacher evaluations can provide valuable insights, the variability in inter-rater reliability suggests that additional training or standardized guidelines may be necessary to ensure consistency. This has practical implications for how dominance and social behaviors are assessed in educational and research contexts.

4.8. Future Directions

Building on the limitations and implications of this study, several opportunities for future research are recommended. Future studies should aim to include larger and more diverse samples to improve statistical power and generalizability. Additionally, while this study focused on dyadic interactions, future research should explore dominance and prosociality in larger peer groups. Observing children in naturalistic group settings could reveal how coalitions, alliances and group norms influence these behaviors. To address the variability in teacher ratings, future studies could develop standardized training programs or use objective observational methods to complement subjective assessments. Incorporating real-time measures of prosociality and dominance in naturalistic settings could provide a more comprehensive understanding of these constructs. Examining the development of dominance and prosociality over time would also provide valuable insights into how these behaviors evolve and interact during critical periods of social development. Longitudinal designs could help identify factors that predict long-term social competence and peer relationships. Finally, future research could test interventions aimed at promoting prosocial behavior and reducing dominance-related conflicts in preschool settings. For example, cooperative learning activities or role-playing exercises could be evaluated for their effectiveness in fostering equitable interactions.

4.9. Conclusion

This study contributes to the understanding of dominance and prosocial behavior in early childhood by exploring how age influences resource control and prosocial decisions within dyads.

The findings provide strong support for Hypothesis 1a: older children were significantly more likely than younger children to gain first access to resources and to monopolize them for longer periods. However, the extent of the age difference within dyads did not significantly predict the degree of monopolization. This suggests that simply being older, rather than the size of the age gap, plays a key role in shaping dominance behaviors.

Hypothesis 1b, which predicted stronger age-related dominance differences in mixed-age dyads, was only partially supported. Older children in mixed-age dyads were significantly more likely to monopolize resources for longer durations than expected by chance, but this effect was not consistent across all measures. Additionally, no significant differences in dominance scores were found between dyad types. These results suggest that while age differences can influence resource control under certain conditions, the pattern is not uniform across tasks or contexts.

Regarding prosocial behavior, the analyses for Hypotheses 2a and 2b found no significant relationships between dominance and selfishness or prosociality, nor did the age composition of the dyad influence this relationship. These findings indicate that dominance and prosociality are not necessarily opposites in preschoolers and may coexist depending on the social and contextual factors at play.

Overall, the mixed results highlight the complexity of social dynamics in early childhood and emphasize the importance of considering both individual traits and dyadic contexts. Future research should further investigate how age interacts with social norms, task demands and relationship quality to shape dominance and prosocial behavior in young children.

5. References

- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior*, 28(3), 168–175. <https://doi.org/10.1016/j.evolhumbehav.2006.10.003>
- Blake, P. R., McAuliffe, K., Corbit, J., Callaghan, T. C., Barry, O., Bowie, A., Kleutsch, L., Kramer, K. L., Ross, E., Vongsachang, H., Wrangham, R., & Warneken, F. (2015). The ontogeny of fairness in seven societies. *Nature*, 528(7581), 258–261. <https://doi.org/10.1038/nature15703>
- Brownell, C. A., Svetlova, M., & Nichols, S. (2009). To Share or Not to Share: When Do Toddlers Respond to Another's Needs? *Infancy*, 14(1), 117–130. <https://doi.org/10.1080/15250000802569868>
- Dirks, M. A., Dunfield, K. A., & Recchia, H. E. (2018). Prosocial behavior with peers: Intentions, outcomes, and interpersonal adjustment. In *Handbook of peer interactions, relationships, and groups*, 2nd ed (pp. 243–264). The Guilford Press.
- Dunfield, K. A. (2014). A construct divided: prosocial behavior as helping, sharing, and comforting subtypes. *Frontiers in Psychology*, 5. <https://doi.org/10.3389/fpsyg.2014.00958>
- Fabes, R., Eisenberg, N. (1998). Meta-Analyses of Age and Sex Differences in Children's and Adolescents' Prosocial Behavior. In *Prosocial development*.
- Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2007). Prosocial Development. In W. Damon & R. M. Lerner (Eds.), *Handbook of Child Psychology* (1st ed.). Wiley. <https://doi.org/10.1002/9780470147658.chpsy0311>
- Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature*, 454(7208), 1079–1083. <https://doi.org/10.1038/nature07155>
- George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference* (6th ed.). Routledge. <https://doi.org/10.4324/9780429056765>

- Hawley, P. H. (1999). The Ontogenesis of Social Dominance: A Strategy-Based Evolutionary Perspective. *Developmental Review*, 19(1), 97–132. <https://doi.org/10.1006/drev.1998.0470>
- Hawley, P. H. (2002). Social dominance and prosocial and coercive strategies of resource control in preschoolers. *International Journal of Behavioral Development*, 26(2), 167–176. <https://doi.org/10.1080/01650250042000726>
- Hawley, P. H. (2003). Strategies of control, aggression, and morality in preschoolers: An evolutionary perspective. *Journal of Experimental Child Psychology*, 85(3), 213–235. [https://doi.org/10.1016/S0022-0965\(03\)00073-0](https://doi.org/10.1016/S0022-0965(03)00073-0)
- Hawley, P. H. (2014). The Duality of Human Nature: Coercion and Prosociality in Youths' Hierarchy Ascension and Social Success. *Current Directions in Psychological Science*, 23(6), 433–438. <https://doi.org/10.1177/0963721414548417>
- Hoeflinger, A. (2023). *Social dominance in kindergarten children - the effect of age and sibling status*. <https://doi.org/10.25365/THESIS.74311>
- Horn, L., Hungerländer, N. A., Windhager, S., Bugnyar, T., & Massen, J. J. M. (2018). Social status and prenatal testosterone exposure assessed via second-to-fourth digit ratio affect 6–9-year-old children's prosocial choices. *Scientific Reports*, 8(1), 9198. <https://doi.org/10.1038/s41598-018-27468-0>
- House, B. R., Silk, J. B., Henrich, J., Barrett, H. C., Scelza, B. A., Boyette, A. H., Hewlett, B. S., McElreath, R., & Laurence, S. (2013). Ontogeny of prosocial behavior across diverse societies. *Proceedings of the National Academy of Sciences*, 110(36), 14586–14591. <https://doi.org/10.1073/pnas.1221217110>
- Katerkamp, A., & Horn, L. (2025). Preschoolers' prosocial behavior in groups—Testing effects of dominance, popularity, and friendship. *Frontiers in Psychology*, 16, 1478493. <https://doi.org/10.3389/fpsyg.2025.1478493>
- Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine*, 15(2), 155–163. <https://doi.org/10.1016/j.jcm.2016.02.012>
- Li, L., & Tomasello, M. (2022). Disagreement, justification, and equitable moral judgments: A

- brief training study. *Journal of Experimental Child Psychology*, 223, 105494.
<https://doi.org/10.1016/j.jecp.2022.105494>
- Martin, A., & Olson, K. R. (2015). Beyond Good and Evil: What Motivations Underlie Children's Prosocial Behavior? *Perspectives on Psychological Science*, 10(2), 159–175.
<https://doi.org/10.1177/1745691615568998>
- McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica*, 276–282.
<https://doi.org/10.11613/BM.2012.031>
- Ostrov, J. M., & Guzzo, J. L. (2015). Prospective Associations Between Prosocial Behavior and Social Dominance in Early Childhood: Are Sharers the Best Leaders? *The Journal of Genetic Psychology*, 176(2), 130–138. <https://doi.org/10.1080/00221325.2015.1018860>
- Pellegrini, A. D., Roseth, C. J., Mliner, S., Bohn, C. M., Van Ryzin, M., Vance, N., Cheatham, C. L., & Tarullo, A. (2007). Social dominance in preschool classrooms. *Journal of Comparative Psychology*, 121(1), 54–64. <https://doi.org/10.1037/0735-7036.121.1.54>
- Pollet, G. S., Abraham P. Buunk, Simon Verhulst, Thomas V. (2015, February 26). *Gert Stulp - Human Height Is Positively Related to Interpersonal Dominance in Dyadic Interactions*.
https://www.gertstulp.com/research/publications/2015_stulp%20et%20al_plos_height_dominance?utm_source=chatgpt.com
- Reijntjes, A., Vermande, M., Olthof, T., Goossens, F. A., Vink, G., Aleva, L., & Van Der Meulen, M. (2018). Differences between resource control types revisited: A short term longitudinal study. *Social Development*, 27(1), 187–200. <https://doi.org/10.1111/sode.12257>
- Roseth, C. J., Pellegrini, A. D., Bohn, C. M., Van Ryzin, M., & Vance, N. (2007). Preschoolers' aggression, affiliation, and social dominance relationships: An observational, longitudinal study. *Journal of School Psychology*, 45(5), 479–497.
<https://doi.org/10.1016/j.jsp.2007.02.008>
- Roseth, C. J., Pellegrini, A. D., Dupuis, D. N., Bohn, C. M., Hickey, M. C., Hilk, C. L., & Peshkam, A. (2011). Preschoolers' Bistrategic Resource Control, Reconciliation, and Peer Regard. *Social Development*, 20(1), 185–211. <https://doi.org/10.1111/j.1467-9507.2010.00579.x>

- Spinrad, T. L., & Eisenberg, N. (2023). Developmental Theories of Prosociality. In T. Malti & M. Davidov (Eds.), *The Cambridge Handbook of Prosociality* (1st ed., pp. 17–36). Cambridge University Press. <https://doi.org/10.1017/9781108876681.003>
- Terrizzi, B. F., Woodward, A. M., & Beier, J. S. (2020). Young children and adults associate social power with indifference to others' needs. *Journal of Experimental Child Psychology*, 198, 104867. <https://doi.org/10.1016/j.jecp.2020.104867>
- Thomas, A. J., Navarro Hernandez, S., Sumner, E., & Sarnecka, B. (2022). Children Expect Leaders to Oust Intruders, Refrain From Unprovoked Aggression, but Not to Be Generally Prosocial. *Collabra: Psychology*, 8(1), 33956. <https://doi.org/10.1525/collabra.33956>
- Warneken, F., & Tomasello, M. (2006). Altruistic Helping in Human Infants and Young Chimpanzees. *Science*, 311(5765), 1301–1303. <https://doi.org/10.1126/science.1121448>
- Warneken, F., & Tomasello, M. (2013). The emergence of contingent reciprocity in young children. *Journal of Experimental Child Psychology*, 116(2), 338–350. <https://doi.org/10.1016/j.jecp.2013.06.002>

6. Table of Contents

Table 1. Group size, gender distribution and mean age per kindergarten group used for dyad formation	10
Table 2. Distribution of dyads by age and sex group	10
Table 3. Group size, gender distribution and mean age per kindergarten group used for dyad formation	15
Table 4. First Access by Older Children per Session and Monopolization	25
Table 5. Table: Longer Duration of Resource Access by Older Children	25
Table 6: First Access by Older Children per Session and Monopolization, Divided into Same-Aged vs. Different-Aged Dyads	26
Table 7. Table: Longer Duration of Resource Access by Older Children, Divided into Same-Aged vs. Different-Aged Dyads	27
Table 8. Internal Consistency (Cronbach's Alpha, Questionnaire Ratings)	31
Table 9. Inter-Rater Reliability (ICC, Teacher Rating)	32
Table 10. Cohen's Kappa Teacher Results by Group	33
Table 11. Cohen's Kappa: Agreement Teacher1 and Teacher2	33

7. Table of Figures

Figure 1. Flowchart of the Number of Children participating in the warm-up, experimental session 1 and experimental session 2	11
Figure 2: Apparatus	13
Figure 3. Coin slot box	13
Figure 4. Design of the Experimental Resource Allocation Task setting	17
Figure 5. Scatterplot Session1: Correlation between Dominance and Prosocial Score	29
Figure 6. Scatterplot Session2: Correlation between Dominance and Prosocial Score	29
Figure 7. Scatterplot Session1: Correlation between Dominance and Prosocial Score based on dyad-type	30
Figure 8. Scatterplot Session2: Correlation between Dominance and Prosocial Score based on dyad-type	30

Use of AI Tools

For this thesis, I used the generative AI tool "Academic AI" for specific tasks. These were limited to language editing to improve the clarity of the text. All content development, analysis, interpretation of results and conclusions were carried out by me. The use of AI was limited only to the tasks mentioned above and followed basic principles of academic integrity.

8. Appendices

8.1. German Abstract

Diese Arbeit untersucht, wie Alter und soziale Dominanz das prosoziale Verhalten von Kindergartenkinder im Alter von 3 bis 6 Jahren beeinflussen. Theoretische Ansätze legen nahe, dass Prosozialität und Dominanz, obwohl sie scheinbar gegensätzliche Strategien darstellen, als adaptive Mechanismen zur Navigation von Peer-Beziehungen im frühen Kindesalter koexistieren können. Frühere Studien haben altersbedingte Zunahmen von Fairness und Teilen hervorgehoben, doch es gibt noch Wissenslücken darüber, wie Dominanz und Prosozialität in vertrauten Kindergartenumgebungen interagieren. Die Studie umfasste 100 Kindergartenkinder aus vier Wiener Kindergärten; 81 von ihnen bildeten 44 Dyaden, die an experimentellen Sitzungen teilnahmen. Nach einer Aufwärmphase zur Sicherstellung des Aufgabenverständnisses absolvierte jede Dyade drei Aufgaben: die erste Ressourcenkontrollaufgabe, die Ressourcenzuteilungsaufgabe und die zweite Ressourcenkontrollaufgabe. Zusätzlich wurden Lehrerbewertungen erhoben, um Dominanzmerkmale und dyadische Dominanzbeziehungen aus einer externen Perspektive zu beurteilen. Die Ergebnisse zeigten, dass ältere Kinder häufiger zuerst Zugang zu Ressourcen erhielten und diese länger monopolisierten als jüngere Kinder, was die Annahme stützt, dass das Alter eine Rolle bei Dominanzverhalten spielt. Allerdings hatte der Altersunterschied innerhalb der Dyaden keinen signifikanten Einfluss auf diese Muster. In gemischtaltrigen Dyaden zeigten ältere Kinder teilweise stärkere Dominanzverhalten, jedoch war dieser Effekt nicht über alle Maße hinweg konsistent. Bezüglich des prosozialen Verhaltens wurden keine signifikanten Zusammenhänge zwischen Dominanz und Selbstbezogenheit oder Prosozialität gefunden, und die Alterszusammensetzung der Dyade hatte keinen Einfluss auf diese Beziehung. Insgesamt verdeutlichen die Ergebnisse die Komplexität sozialer Dynamiken im frühen Kindesalter. Während Alter und Dominanz eine Rolle bei der Ressourcenkontrolle spielen, wird ihr Einfluss durch aufgabenspezifische und kontextuelle Faktoren geprägt. Die Studie unterstreicht die Bedeutung der Untersuchung natürlicher Peer-Interaktionen und regt zu weiterer Forschung an, wie Kindergartenkinder Dominanz und Prosozialität miteinander verknüpfen.

Keywords: soziale Dominanz, Prosozialität, Altersunterschied, Kindergartenkinder, Peer-Gruppen

8.2 Parental information



universität
wien



Elternbrief

Betreff: Studie „Durchsetzungsvermögen und Großzügigkeit im Kindergartenalter“

Liebe Familien!

In diesem Forschungsprojekt untersuchen wir, ob es bei Kindergartenkindern einen Zusammenhang zwischen Durchsetzungsvermögen und Großzügigkeit gibt. Wir würden uns sehr freuen, wenn Ihr Kind an unserer Studie teilnehmen würde!

In dieser Studie darf Ihr Kind mit einem anderen teilnehmenden Kind aus der Gruppe drei Spiele spielen. Im ersten Spiel dürfen sich die Kinder für fünf Minuten ein interessantes Spielzeug ansehen (z.B. ein Kaleidoskop). Im zweiten Spiel darf sich eines der beiden Kinder mehrmals hintereinander entscheiden, wie es Sticker zwischen sich und dem anderen Kind aufteilt. Im dritten Spiel dürfen die Kinder fünf Minuten gemeinsam Ausmalbilder malen und müssen sich dafür die Buntstifte teilen. Die Interaktionen der Kinder bei diesen Spielen werden wir auf Video aufzeichnen, um das Verhalten der Kinder zu einem späteren Zeitpunkt genau analysieren zu können. Außerdem werden wir die Pädagog*innen bitten, einen kurzen Fragebogen über das Durchsetzungsvermögen der teilnehmenden Kinder auszufüllen.

Diese drei Spiele werden insgesamt 2x (an verschiedenen Tagen) mit dem gleichen anderen Kind gespielt. Pro Tag dauern diese Spiele (inklusive Erklärungen und kurzen Pausen) ungefähr 20-30 Minuten. Die Studie wird direkt im Kindergarten, in Absprache mit und unter Aufsicht von den Pädagog*innen durchgeführt.

Alle Informationen, die Sie und Ihr Kind, sowie die Pädagog*innen uns in dieser Studie geben, werden streng vertraulich behandelt. Die Informationen werden ohne Nennung von Namen unter einer Teilnehmer*innen-Nummer auf einem sicheren, universitätsinternen Laufwerk gespeichert, zu welchem nur die Mitarbeiter*innen, die an diesem Projekt beteiligt sind, Zugang haben.

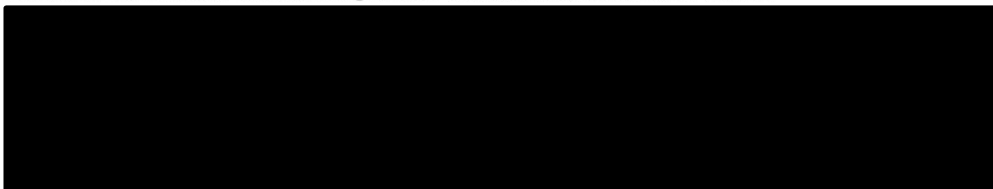
Während der Studie werden zur ungestörten Beobachtung Videoaufzeichnungen von Ihrem Kind gemacht, die von den Versuchsleiter*innen sicher aufbewahrt und für wissenschaftliche Analysen verwendet werden. Diese Videoaufzeichnungen werden nicht veröffentlicht.

Die Studie wird mit Ihrem Kind nur dann durchgeführt, wenn Sie zustimmen und Ihr Kind vollkommen freiwillig daran teilnimmt. Zusätzlich können Sie die Teilnahme Ihres Kindes an der Studie ohne Begründung zurückziehen, und somit eine sofortige Löschung aller von Ihrem Kind gesammelten Daten erwirken.

Die im Rahmen dieser Studie gesammelten Daten werden 3 Monate nach der Datenerhebung vollkommen anonymisiert und in dieser anonymisierter Form archiviert. Durch diese Form der Speicherung ist kein Rückschluss auf die Identität der Teilnehmer*innen möglich. Video- und Fragebogen-Daten werden für 5 Jahre gespeichert und danach gelöscht.

Wenn Sie sich dazu entscheiden, unsere Forschung zu unterstützen, unterschreiben Sie bitte die beiliegende Einverständniserklärung und geben Sie diese Ihrem Kind wieder in den Kindergarten mit. Bei Fragen zu unserer Studie können Sie uns gerne per Email oder Telefon kontaktieren.

Herzlichen Dank für Ihre Unterstützung und wir verbleiben mit freundlichen Grüßen,



Wien, März 2024

8.3. Parental consent form

Teilnehmer*innen-Information und Einwilligungserklärung zur Teilnahme an der Studie:

„Durchsetzungsvermögen und Großzügigkeit im Kindergartenalter“

Sehr geehrte*r Erziehungsberechtigte*r,

wir laden Sie ein, an der oben genannten Studie teilzunehmen.

Ihre Teilnahme und die Teilnahme Ihres Kindes an dieser Studie erfolgen freiwillig. Sie können jederzeit, ohne Angabe von Gründen, Ihre Bereitschaft zur Teilnahme ablehnen oder auch im Verlauf der Studie zurückziehen. Die Ablehnung der Teilnahme oder ein vorzeitiges Ausscheiden aus dieser Studie hat keine nachteiligen Folgen für Sie.

Diese Art von Studien ist notwendig, um verlässliche neue wissenschaftliche Forschungsergebnisse zu gewinnen. Unverzichtbare Voraussetzung für die Durchführung von Studien ist jedoch, dass Sie Ihr Einverständnis zur Teilnahme Ihres Kindes an dieser Studie schriftlich erklären. Bitte lesen Sie den folgenden Text sorgfältig durch und zögern Sie nicht, Fragen zu stellen.

Bitte unterschreiben Sie die Einwilligungserklärung nur

- wenn Sie Art und Ablauf der Studie vollständig verstanden haben,
- wenn Sie bereit sind, der Teilnahme Ihres Kindes zuzustimmen und
- wenn Sie sich über Ihre Rechte und die Rechte Ihres Kindes als Teilnehmer*innen im Klaren sind.

1. Was ist der Zweck der Studie?

In dieser Studie untersuchen wir, ob es bei Kindergartenkindern einen Zusammenhang zwischen Durchsetzungsvermögen und Großzügigkeit gibt.

2. Wie läuft die Studie ab?

In dieser Studie darf Ihr Kind mit einem anderen teilnehmenden Kind aus der Gruppe drei Spiele spielen. Im ersten Spiel dürfen sich die Kinder für fünf Minuten ein interessantes Spielzeug ansehen (z.B. ein Kaleidoskop). Im zweiten Spiel darf sich eines der beiden Kinder mehrmals hintereinander entscheiden, wie es Sticker zwischen sich und dem anderen Kind aufteilt. Im dritten Spiel dürfen die Kinder fünf Minuten gemeinsam Ausmalbilder malen und müssen sich dafür die Buntstifte teilen. Die Interaktionen der Kinder bei diesen Spielen werden wir auf Video aufzeichnen, um das Verhalten der Kinder zu einem späteren Zeitpunkt genau analysieren zu können. Außerdem werden wir die Pädagog*innen bitten, einen kurzen Fragebogen über das Durchsetzungsvermögen der teilnehmenden Kinder auszufüllen.

Diese drei Spiele werden insgesamt 2x (an verschiedenen Tagen) mit dem gleichen anderen Kind gespielt. Pro Tag dauern diese Spiele (inklusive Erklärungen und kurzen Pausen) ungefähr 20-30 Minuten. Die Studie wird direkt im Kindergarten, in Absprache mit und unter Aufsicht von den Pädagog*innen durchgeführt.

3. Worin liegt der Nutzen einer Teilnahme an der Studie?

Eine Teilnahme an dieser Studie gewährt Ihnen direkte Einblicke in die wissenschaftliche Arbeit im Bereich Verhaltensforschung und Entwicklungspsychologie. Die Ergebnisse dieser Studie sollen wichtige Daten darüber liefern, wie sich Großzügigkeit und Durchsetzungsvermögen unter Gleichaltrigen entwickeln, und welche Faktoren diese Entwicklung beeinflussen. Eine Zusammenfassung der Ergebnisse wird Ihnen am Ende der Studie zur Verfügung gestellt.

4. Gibt es Risiken bei der Durchführung der Studie und ist mit Beschwerden oder anderen Begleiterscheinungen zu rechnen?

Die Teilnahme an dieser Studie birgt für Sie und Ihr Kind keinerlei Risiken.

5. Hat die Teilnahme an der Studie sonstige Auswirkungen auf die Lebensführung und welche Verpflichtungen ergeben sich daraus?

Diese Studie wird direkt im Kindergarten zu den regulären Aufsichtszeiten durchgeführt. Daher hat die Studie keine Auswirkungen auf Ihre Lebensführung und es ergeben sich keine sonstigen Verpflichtungen daraus.

6. Was ist zu tun beim Auftreten von Beschwerdesymptomen, unerwünschten Begleiterscheinungen und/oder Verletzungen?

Wir erwarten im Rahmen dieser Studie keine Risiken für die teilnehmenden Kinder. Für weitere Fragen können Sie sich jederzeit an eine der Kontaktpersonen wenden (siehe Punkt 10).

7. Wann wird die Studie vorzeitig beendet?

Sie und/oder Ihr Kind können jederzeit, auch ohne Angabe von Gründen, die Teilnahme an der Studie widerrufen und die Studie aus persönlichen Gründen abbrechen, ohne, dass daraus Nachteile entstehen. Sollte die Versuchsleitung den Eindruck haben, dass eine weitere Teilnahme an der Studie nicht im Interesse Ihres Kindes ist, kann sie des Weiteren entscheiden, die Teilnahme Ihres Kindes an dieser Studie zu beenden.

8. In welcher Weise werden die im Rahmen dieser Studie gesammelten Daten verwendet?

Persönliche Daten (Geburtsdatum, Name etc.) werden streng vertraulich behandelt. Auch in etwaigen Veröffentlichungen der Daten dieser Studie werden die Namen der Teilnehmer*innen nicht genannt und es können keine Rückschlüsse auf die Teilnehmer*innen gezogen werden.

Alle Daten werden pseudonymisiert (d.h. unter Zuweisung einer anonymen, alphanumerischen ID-Nummer) erhoben und statistisch ausgewertet, sodass kein Rückschluss auf die Identität Ihres Kindes möglich ist. Für die Auswertung werden die Daten aller Kinder herangezogen, die an dieser Studie teilgenommen haben. Da es uns um die allgemeine Entwicklung von Kindern und nicht um die spezielle Entwicklung einzelner Kinder geht, werden keine Einzelauswertungen vorgenommen. Drei Monate nach der Datenerhebung werden die Daten vollkommen anonymisiert: d.h. ab diesem Zeitpunkt besteht auch für die Versuchsleitung keine Möglichkeit mehr, Ihren Namen und den Namen Ihres Kindes mit den erhobenen Daten in Verbindung zu bringen.

Aufzeichnungen von Ihrem Kind (Videos, Erhebungsbögen) werden ohne Namenskennung auf einem sicheren, universitätsinternen Laufwerk gespeichert, zu welchem nur die Mitarbeiter*innen, die an

diesem Projekt beteiligt sind, Zugang haben. Die Videoaufzeichnungen werden allein zur Datenanalyse verwendet und nicht veröffentlicht. Ausschließlich das an der Studie mitwirkende Personal hat Zugang zu den Daten und ist zur Verschwiegenheit verpflichtet.

Anonymisierte Daten, die keinerlei Rückschluss auf die Identität der Teilnehmer*innen erlauben, werden permanent auf einem sicheren, universitätsinternen Laufwerk archiviert. Videos und Erhebungsbögen werden ohne Namenserkennung für 5 Jahre sicher gespeichert und danach gelöscht.

Sie können bis zu 3 Monate nach der Datenerhebung und ohne Angabe von Gründen die Löschung Ihrer Daten (inkl. Videos) bei der Projektleiterin Lisa Horn-Péter beantragen (siehe Kontaktdaten in Punkt 10).

9. Entstehen für die Teilnehmer*innen Kosten? Gibt es einen Kostenersatz oder eine Vergütung?

Durch Ihre Teilnahme an dieser Studie entstehen für Sie keinerlei Kosten. Ihr Kind erhält für die Teilnahme Sticker.

10. Möglichkeit zur Diskussion weiterer Fragen

Für weitere Fragen im Zusammenhang mit der Studie steht die Projektleitung gerne zur Verfügung. Fragen, die Ihre Rechte als Teilnehmer*in an der Studie betreffen, werden selbstverständlich beantwortet.

Namen der Projektleitung bzw. der Kontaktpersonen:

Projektleiterin		
Studentin		

11. Einwilligungserklärung

Name der teilnehmenden Person in Druckbuchstaben:
(Erziehungsberechtigte*r)

Name der teilnehmenden Person in Druckbuchstaben:
(Kind)

Geb. Datum: Geschlecht: ☐ männlich ☐ weiblich ☐ divers
(Kind) (Kind)

Ich bin einverstanden, dass mein Kind an der Studie „Durchsetzungsvermögen und Großzügigkeit im Kindergartenalter“ teilnehmen darf.

Ich bin ausführlich und verständlich über Zielsetzung, Bedeutung und Tragweite der Studie und die sich für mich daraus ergebenden Anforderungen aufgeklärt worden. Ich habe darüber hinaus den Text dieser Teilnehmer*inneninformation und Einwilligungserklärung gelesen, insbesondere den 4. Abschnitt (Gibt es Risiken, Beschwerden und Begleiterscheinungen?). Aufgetretene Fragen wurden mir von der Studienleitung verständlich und ausreichend beantwortet. Ich hatte genügend Zeit, mich zu entscheiden, ob ich an der Studie teilnehmen möchte. Ich habe zurzeit keine weiteren Fragen mehr.

Ich werde die Hinweise, die für die Durchführung der Studie erforderlich sind, befolgen, behalte mir jedoch das Recht vor, meine freiwillige Mitwirkung und die Mitwirkung meines Kindes jederzeit zu beenden, ohne dass mir daraus Nachteile entstehen. Sollte ich aus der Studie ausscheiden wollen, so kann ich dies jederzeit schriftlich oder mündlich bei [REDACTED] veranlassen.

Ich bin zugleich damit einverstanden, dass die im Rahmen dieser Studie erhobenen Daten meines Kindes aufgezeichnet und ausgewertet werden.

Ich stimme zu, dass die Daten meines Kindes (Videos, Erhebungsbögen) für 5 Jahre ohne Nennung von Namen unter einer anonymen alphanumerischen ID-Nummer elektronisch gespeichert und dann gelöscht werden. Die Daten werden in einer nur der Projektleitung zugänglichen Form gespeichert, die gemäß aktueller Standards gesichert ist.

Sollte ich zu einem späteren Zeitpunkt, die Löschung der Daten (inkl. Videos) wünschen, so kann ich dies bis zu 3 Monate nach der Datenerhebung schriftlich oder telefonisch und ohne Angabe von Gründen bei Lisa Horn-Péter veranlassen.

Den Aufklärungsteil habe ich gelesen und verstanden. Ich konnte alle mich interessierenden Fragen stellen und sie wurden vollständig und verständlich beantwortet.

Eine Kopie dieser Teilnehmer*inneninformation und Einwilligungserklärung habe ich erhalten. Das Original verbleibt bei der Studienleitung.

.....
(Datum und Unterschrift des*der Erziehungsberechtigten)

.....
(Datum, Name und Unterschrift der Studienleitung)

8.4. teacher Questionnaire

Name der Pädagogin: _____

Dieser Teil wird zur Anonymisierung von der Versuchsleiterin abgetrennt.

Pädagoginnen-Fragebogen

Kind 1

Durchsetzungsvermögen

Bitte geben Sie an, ob sich **Kind 1** in einer Auseinandersetzung um ein beliebtes Spielzeug durchsetzen würde (d.h. **Kind 1** könnte am Ende mit dem Spielzeug spielen).

	Ja	Nein	Kann ich nicht sagen
gegen Kind 2...			
gegen Kind 3...			
gegen Kind 4...			
gegen Kind 5...			
Etc...			

Eigenschaften

Zeichnen Sie bitte mit einem senkrechten Strich auf den unteren Skalen ein, wie sehr jede einzelne Aussage auf das Kind zutrifft.

Trifft nicht zu

Trifft sehr zu



„Durchsetzungsfähig“ |-----|

„Dominant“ |-----|

„Behauptet sich selbst“ |-----|

„Sagt anderen, was zu tun ist“ |-----|

Hinweis: hierbei handelt es sich um eine Vorlage für den Pädagog*innen-Fragebogen. Die tatsächlichen Fragebögen werden jeweils alle teilnehmenden Kinder aus einer Gruppe enthalten

Name der Pädagogin: _____

Dieser Teil wird zur Anonymisierung von der Versuchsleiterin abgetrennt.

Kind 2

Durchsetzungsvermögen

Bitte geben Sie an, ob sich **Kind 2** in einer Auseinandersetzung um ein beliebtes Spielzeug durchsetzen würde (d.h. **Kind 2** könnte am Ende mit dem Spielzeug spielen).

	Ja	Nein	Kann ich nicht sagen
gegen Kind 1...			
gegen Kind 3...			
gegen Kind 4...			
gegen Kind 5...			
Etc...			

Eigenschaften

Zeichnen Sie bitte mit einem senkrechten Strich auf den unteren Skalen ein, wie sehr jede einzelne Aussage auf das Kind zutrifft.

Trifft nicht zu

Trifft sehr zu



„Durchsetzungsfähig“

|-----|

„Dominant“

|-----|

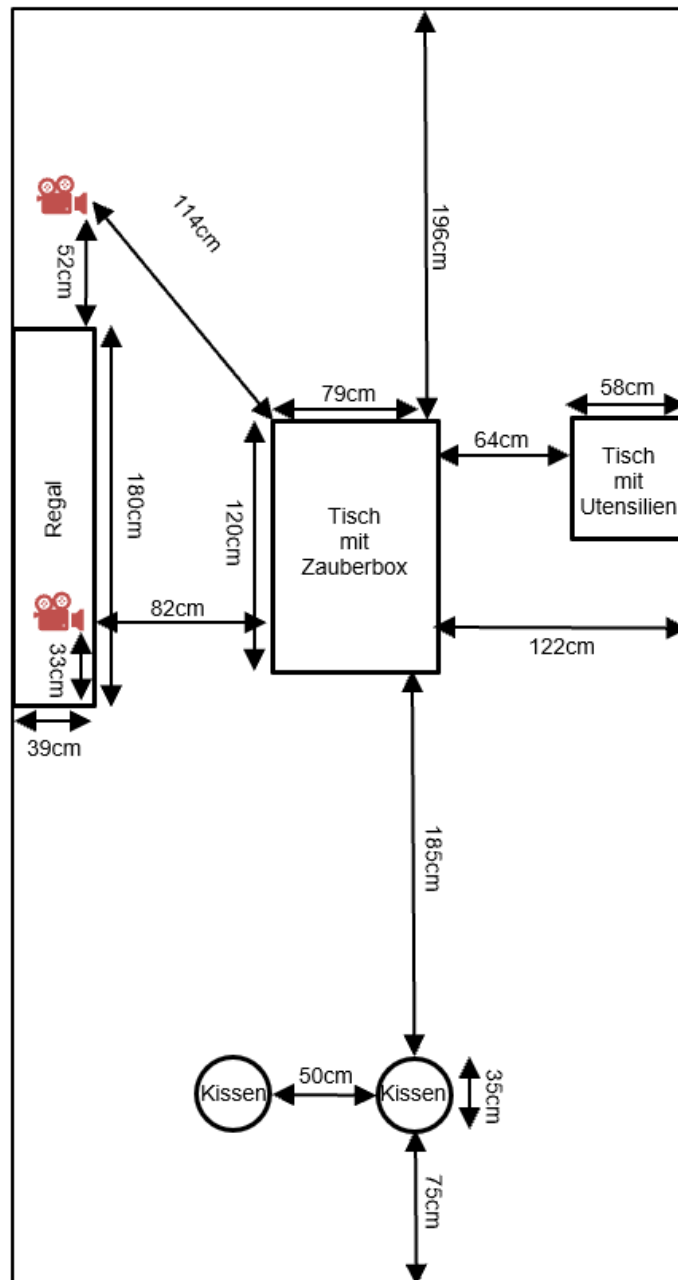
„Behauptet sich selbst“

|-----|

„Sagt anderen, was zu tun ist“

|-----|

8.5. Room planning sketch



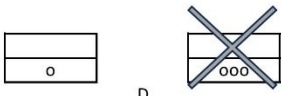
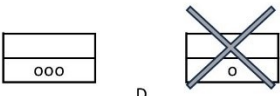
8.6. Protocol

8.6.1. Protocol list warm-up

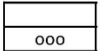
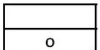
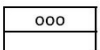
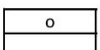
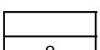
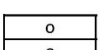
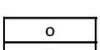
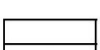
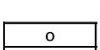
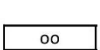
Child ID: _____ Date / Time: _____

Exp 1: _____ (Initials)
Exp 2: _____ (Initials)

Warm-up - EXPLANATION

Trial 1  Trial 2 

Warm-up - KNOWLEDGE PROBE
Please tick/circle which side was chosen and if there was an error

Trial	Recipient Side	Donor Side	Error
Trial 1			☐
Trial 2			☐
Trial 3			☐
Trial 4			☐
Trial 5			☐
Trial 6			☐
Trial 7			☐
Trial 8			☐
Trial 9			☐
Trial 10			☐

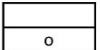
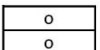
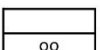
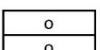
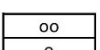
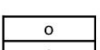
Explanation:

Recipient Side

Donor Side

o = Sticker

Warm-up - FAMILIARIZATION
Please tick/circle which side was chosen

Trial 1		
Trial 2		
Trial 3		
Trial 4		
Trial 5		
Trial 6		

Total number of errors / 10

☐ 0-1 error = FULL PASS
☐ 2-4 errors = QUALIFIED PASS
☐ ≥ 5 errors = FAILED (will not be tested further)

8.6.2 Protocol list experiment (example prosocial - costly - envy)

SESSION 1

Exp 1:
Exp 2:

Child 1 ID: Donor / Recipient
Child 2 ID: Donor / Recipient

Monopolization 1 => First access: Child 1 / Child 2
(please tick/circle child who used the toy first)

Please tick which side was chosen				Comments:
Pro R	☐	☐	☐	
Pro L	☐	☐	☐	
Pro L	☐	☐	☐	
Pro R	☐	☐	☐	
Pro R	☐	☐	☐	
Pro L	☐	☐	☐	
Cos L	☐	☐	☐	
Cos R	☐	☐	☐	
Cos R	☐	☐	☐	
Cos L	☐	☐	☐	
Cos R	☐	☐	☐	
Cos L	☐	☐	☐	
Env R	☐	☐	☐	
Env L	☐	☐	☐	
Env R	☐	☐	☐	
Env L	☐	☐	☐	
Env L	☐	☐	☐	
Env R	☐	☐	☐	

D

Monopolization 2 => First access: Child 1 / Child 2
(please tick/circle child who used the toy first)

Date / Time:
Comments:

SESSION 2

Exp 1:
Exp 2:

Child 1 ID: Donor / Recipient
Child 2 ID: Donor / Recipient

Monopolization 1 => First access: Child 1 / Child 2
(please tick/circle child who used the toy first)

Please tick which side was chosen				Comments:
Pro R	☐	☐	☐	
Pro L	☐	☐	☐	
Pro L	☐	☐	☐	
Pro R	☐	☐	☐	
Pro R	☐	☐	☐	
Pro L	☐	☐	☐	
Cos L	☐	☐	☐	
Cos R	☐	☐	☐	
Cos R	☐	☐	☐	
Cos L	☐	☐	☐	
Cos R	☐	☐	☐	
Cos L	☐	☐	☐	
Env R	☐	☐	☐	
Env L	☐	☐	☐	
Env R	☐	☐	☐	
Env L	☐	☐	☐	
Env L	☐	☐	☐	
Env R	☐	☐	☐	

D

Monopolization 2 => First access: Child 1 / Child 2
(please tick/circle child who used the toy first)

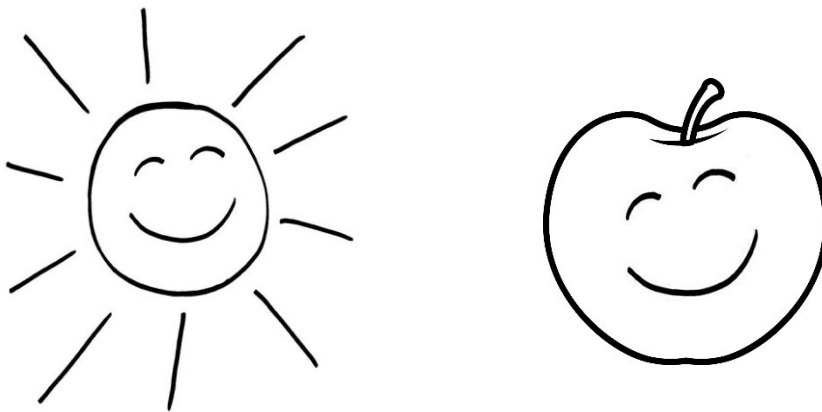
Date / Time:
Comments:

8.7. Resource Monopolization Task 1

8.7.1. Resource Monopolization Task 1 – Toys



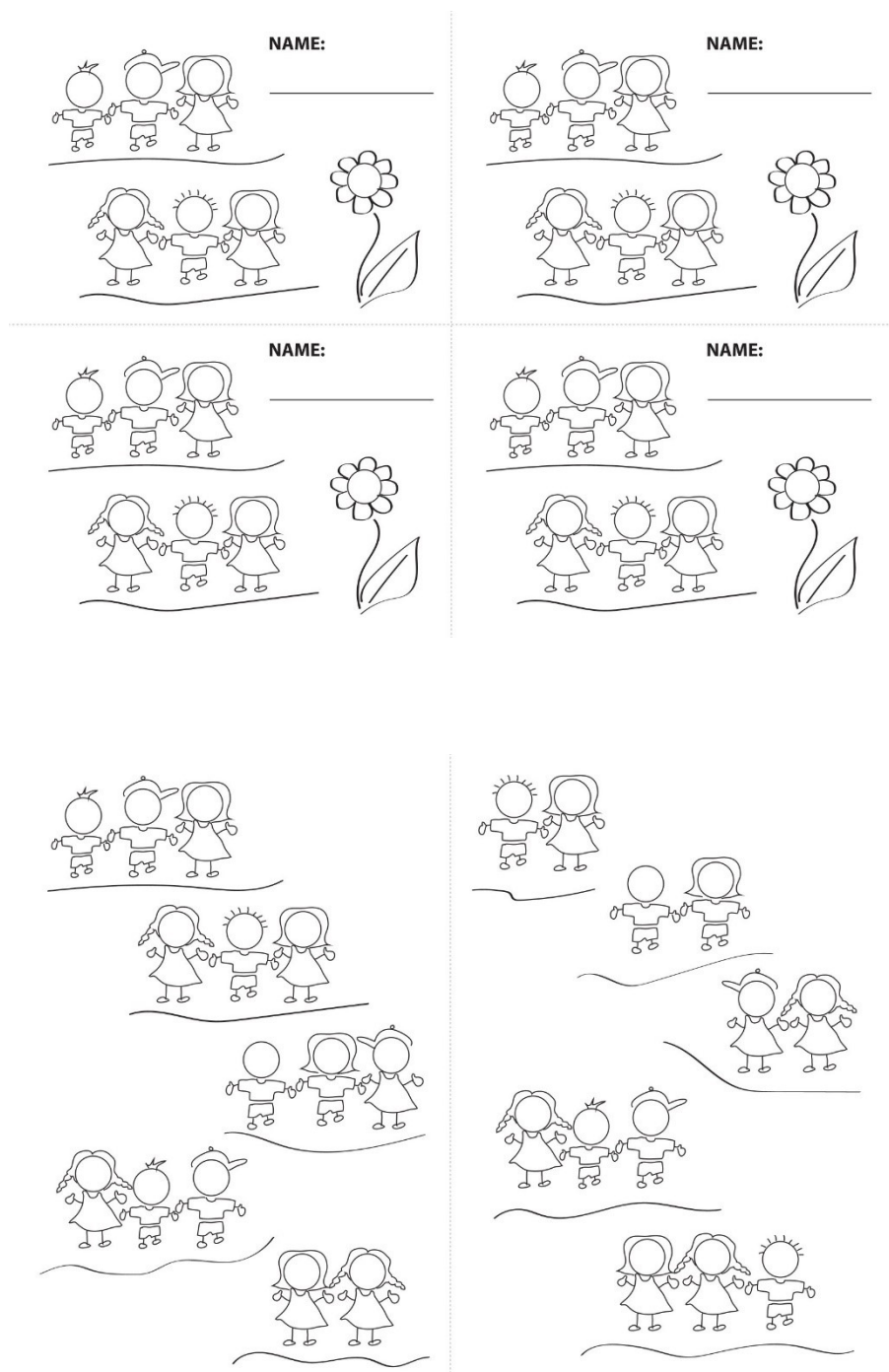
8.7.2. Resource Monopolization Task 2 – pictures

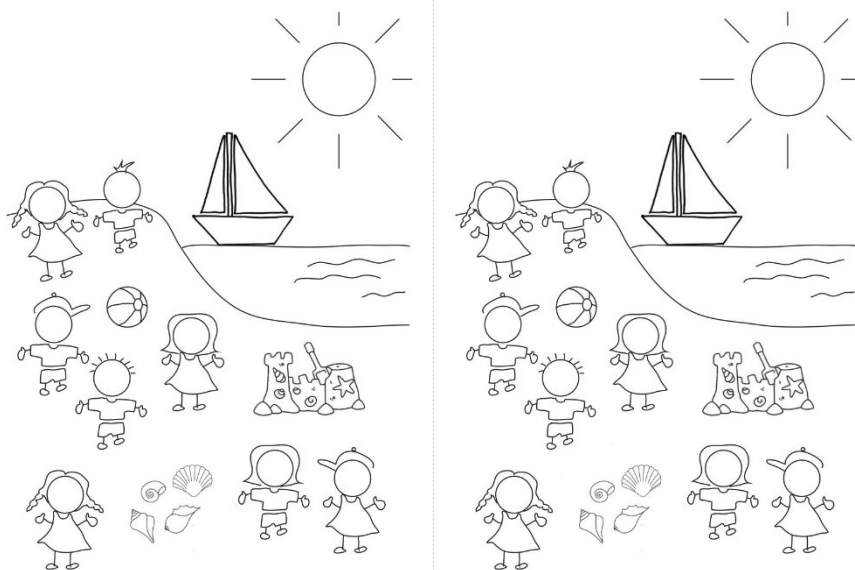


8.8. Colorful Sticker

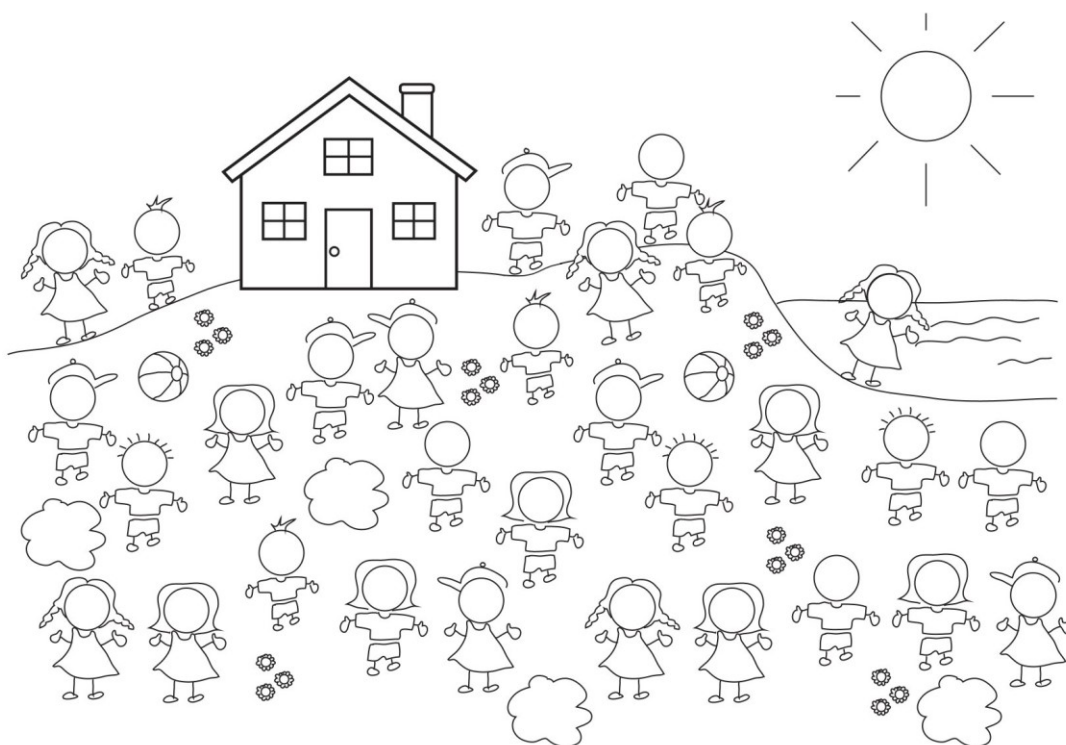


8.8.1. sticker Booklets Warm-up





8.8.2. Sticker booklet Resource Allocation Task



8.9 Script Experimentier 1 – German

Warm-up – Explanation & Knowledge Probe

Hallo ich heiße Mona und wie heißt du? Bevor wir starten, erzähle ich dir noch was wir heute machen werden.

Heute spielen wir mit dieser Zauberbox. Ich kann die Box mit meinem Zauberstab öffnen, um Sticker hineinzulegen. Und du kannst die Box mit einer Münze öffnen, um dir die Sticker herauszuholen.

Schau das ist mein Vorrat und hier sind die bunten Sticker drinnen (Sticker zeigen).

Ziel ist es heute so viele bunte Sticker wie möglich zu sammeln. Die Sticker sammelst du in diesem Briefumschlag. Zunächst beschriften wir noch dein Briefumschlag. Kannst du deinen Namen schon alleine schreiben oder soll ich dir helfen? (Name schreiben). Schau dann ist dein Briefumschlag auch schon fertig. Den Briefumschlag legen wir jetzt hier in die Mitte und dann können wir auch schon anfangen.

Ich zeige dir einmal, wie die Zauberbox funktioniert. Ich öffne jetzt die Zauberbox mit meinen Zauberstab öffnen umso die Sticker hineinzulegen (beide Seiten öffnen).

Schau, ich lege drei Sticker in diese Box, 1,2,3 (reinlegen & rechte Box schließen) und ich lege einen Sticker in die andere Box (reinlegen & linke Box schließen). Du kannst die Zauberbox jetzt öffnen, indem du eine Münze hier vorne hineinwirfst. Wirf sie doch mal hier hinein und schau was passiert. (rechte Öffnung zeigen → Kind wirft Münze rein → rechte Seite öffnet sich; Münze muss in diesem Fall nicht in der Mitte angeboten werden!). Schau, jetzt ist die Box aufgegangen und du kannst dir die Sticker nehmen und wenn du willst, gleich hier vorne auf deinen Briefumschlag kleben (Kind klebt Sticker ein). Die anderen Sticker kommen zurück in den Vorrat.

Schau, jetzt lege ich einen Sticker in diese Box und drei Sticker in die andere Box, 1,2,3. Schau mal was passiert, wenn du die Münze hier hineinwirfst (rechte Öffnung zeigen → Kind wirft Münze rein → rechte Seite öffnet sich; Münze muss in diesem Fall nicht in der Mitte angeboten werden!). Schau, wie viele Sticker hast du bekommen? (Antwort Kind). Und wie viele wären in der anderen Box gewesen? (Antwort Kind). Genau und deswegen ist es immer wichtig, genau zu schauen, wie viele Sticker in der Box sind. Denn das Ziel heute ist es, so viele Sticker wie möglich zu sammeln. Jetzt kannst du dir den Sticker herausnehmen und wieder einkleben. Die anderen Sticker kommen zurück in den Vorrat.

(Eventuell: Hier hast du drei Sticker einkleben können und hier nur einen.)

Den Rest der Sticker kannst du jetzt in deinen Briefumschlag hineingeben und für zu Hause sammeln. Am Ende gebe ich dir noch ein Stickerheft, dass du zu Hause mitnehmen kannst.

Wichtig ist, dass du so viele Sticker wie möglich sammelst. Das heißt, du musst bei der Zauberbox immer genau schauen, wo wie viele Sticker drinnen sind. Willst du das ganze jetzt ein paar Mal alleine probieren, ohne dass ich dir sage, wo du die Münze hineinwerfen sollst?

Ab jetzt immer der gleiche Ablauf:

„Ok, nächste Runde“. „Schau, ich lege ... Sticker in diese Box und ... Sticker in die andere Box.“

Falls Donor- und Recipient-Seite belegt werden:

„Schau, ich lege ... Sticker in diese Box, ... auf diese Seite und ... auf die andere Seite. Und ich lege ... Sticker in die andere Box, ... auf diese Seite und ... auf die andere Seite.“

Entscheidung:

„Hier ist die Münze und du darfst entscheiden.“

„Schau, jetzt hast du ... Sticker. Die anderen Sticker kommen zurück in meinen Vorrat.“

Warm-up – Familiarization

Dieses Spiel kann man auch zu zweit spielen. Wollen wir beide das mal zusammen probieren? Dieses Mal stehst du auf dieser Seite und kannst wieder die Entscheidung treffen und ich stehe auf dieser Seite. Du darfst die Sticker auf deiner Seite nehmen und ich darf die Sticker auf der anderen Seite hinausnehmen. Sollen wir das beide mal ausprobieren?

Ablauf wie oben

Sobald eine andere Person auf der Recipient-Seite steht:

„Schau, ich lege ... Sticker in diese Box, ... auf DEINE Seite und ... auf die andere Seite. Und ich lege ... Sticker in die andere Box, ... auf DEINE Seite und ... auf die andere Seite.“

„Ah schau, jetzt habe ich ... Sticker“

Wow, *Name Kind*, so viele Sticker hast du gesammelt. Das ist echt super. Dann ist die erste Runde auch schon wieder vorbei. Ich begleite dich jetzt zurück in deine Gruppe und wir holen noch ein Kind, mit dem wir die erste Runde machen, so wie gerade mit dir und danach könnt ihr dann zusammenspielen.

Resource Monopolization Task 1 (Kaleidoskop oder Wasserspiel)

(Kaleidoskop & Sanduhr befindet sich in Westentasche)

Hallo *Name Kind 1* und *Name Kind 2*. Wir haben für euch schon mal Pölster vorbereitet, auf die ihr euch setzen könnt. Am besten setzt sich *Name Kind 1* auf diesen Polster (links) und *Name Kind 2* auf diesen Polster (rechts). Ihr bekommt jetzt von mir ein super cooles neues Spielzeug, mit dem ihr in den nächsten Minuten spielen dürft. *(Kaleidoskop mit Hand verdeckt hinlegen)*. Und dann geht's auch schon los *(Hand wegnehmen & Sanduhr umdrehen & wegdrehen/abgelenkt sein)*.

Nach der abgelaufenen Zeit: Dann ist die Zeit auch schon wieder rum *(Utensilien einsammeln)* und wir können zusammen zur Zauberbox gehen aber dieses Mal spielt ihr zusammen, so wie wir es vorhin schon gemacht haben.

Resource Allocation Task

Jetzt ist es so, dass einer auf dieser Seite beginnt und der andere auf der anderen Seite beginnt. Damit wir entscheiden können, wer zuerst auf dieser Seite beginnt und wer zuerst auf der anderen Seite beginnt werfen wir einfach eine Münze. So, dann beginnt *Name Kind 1* auf dieser Seite und *Name Kind 2* auf der anderen Seite. Eure Stickerhefte legen wir hier zwischen die zwei Boxen.

Ablauf wie im Warm-up!

Und jetzt sind wir mit diesem Spiel auch schon wieder fertig. Bevor ihr wieder zurück zu eurer Gruppe könnt, haben wir noch ein letztes Spiel. Hierfür gehen wir wieder zu den Pölstern. (*Utensilien holen: Blätter befinden sich in Hand; Stifte und Sanduhr befindet sich in Westentaschen*)

Resource Monopolization Task 2 (Apfel oder Sonne zeichnen)

Am besten setzt sich *Name Kind 2* jetzt auf diesen Polster (links) und *Name Kind 1* auf diesen Polster (rechts). Ihr bekommt beide ein Blatt, das ihr ausmalen könnt. (*Blätter hinlegen*). Hier sind die Stifte zum Ausmalen und dann geht's auch schon los (*Stifte hinlegen, Sanduhr umdrehen und wegdrehen/abgelenkt sein*).

Nach der abgelaufenen Zeit: Dann ist die Zeit auch schon wieder rum (*Utensilien einsammeln*). Am Schluss stellt euch bitte noch nebeneinander hin und winkt in die Kamera dort drüben (*aufpassen, dass die Kinder ziemlich genau nebeneinanderstehen und man erkennen kann, wer von beiden größer ist!!*).

Vielen Dank, dass ihr heute dabei wart. Ich hoffe es hat euch auch Spaß gemacht und vergesst eure Stickerhefte nicht (*Stickerhefte den Kindern geben*).

Und dann begleite ich euch auch schon wieder zurück zu eurer Gruppe.

8.10 Script Experimentier 1 - English

Warm-up – Explanation & Knowledge Probe

Hi, my name is Mona. What's your name?

Before we start, I'll tell you what we're going to do today.

Today we're going to play with this magic box. I can open the box using my magic rod to put stickers inside and you can open the box with a coin to take the stickers out.

Look, this is my supply and here are the colorful stickers (*show stickers*).

Your goal today is to collect as many colorful stickers as possible. You'll collect the stickers in this envelope. First, we'll write your name on your envelope. Can you write your name by

yourself, or should I help you? (*Write name together*)

Look, now your envelope is ready. We'll put it here in the middle and then we can start.

Let me show you how the magic box works. I'll now open the box with my magic wand to put some stickers inside (*open both sides*).

Look, I'm putting three stickers into this box — one, two, three (*place and close right side*) and one sticker into the other box (*place and close left side*).

You can open the magic box by dropping a coin into this slot. Try putting the coin in here and see what happens (point to the right opening → child puts in coin ..> right side opens).

Look, now the box opened and you can take the stickers out. If you like, you can stick them right here on your envelope (child sticks them on). The remaining stickers go back into my supply.

Now look, I'll put one sticker into this box and three stickers into the other one — one, two, three.

Let's see what happens when you put the coin in here (*point to right opening → child puts in coin → right side opens*).

How many stickers did you get? (*Child answers.*)

And how many would have been in the other box? (*Child answers.*)

That's right. That's why it's really important to look carefully at how many stickers are in each box.

Because remember — the goal is to collect as many stickers as possible.

You can now take the sticker and stick it on your envelope again. The rest go back into my supply.

(*Optional: You got three stickers here and only one earlier!*)

You can now keep the rest of your stickers in your envelope and take them home later. At the end, I'll give you a sticker booklet to take with you.

So remember — you want to collect as many stickers as you can. That means you always have to look closely at how many stickers are in each box.

Would you like to try it a few times on your own now, without me telling you which side to choose?

From now on, always the same routine:

"OK, next round."

"Look, I'm putting ... stickers into this box and ... stickers into the other box."

If donor and recipient sides are used:

"Look, I'm putting ... stickers into this box ... on THIS side and ... on the other side. And I'm putting ... stickers into the other box ... on THIS side and ... on the other side."

Decision phase:

"Here is the coin and now you get to decide."

"Look, now you got ... stickers. The others go back into my supply."

Warm-up – Familiarization

You can also play this game with a partner. Do you want to try it together with me?

This time, you stand on this side and get to make the choice again and I'll stand on the other side.

You'll be allowed to take the stickers on your side and I'll take the stickers on the other side.

Shall we try that?

(Same procedure as above.)

As soon as another person is standing on the recipient side:

"Look, I'm putting ... stickers into this box — ... on YOUR side and ... on the other side. And I'm putting ... stickers into the other box — ... on YOUR side and ... on the other side."

"Oh look, I got ... stickers."

Wow, *Name Child*, you collected so many stickers. That's really great.

So the first round is already finished.

I'll walk you back to your group now and we'll bring another child who will do the first round just like you did. After that, the two of you can play together.

Resource Monopolization Task 1 (Kaleidoscope or Water Game)

(The kaleidoscope and hourglass are in your pocket.)

Hello [Child 1] and [Child 2]. We've already set out pillows for you to sit on. [Child 1], you can sit on this pillow (left) and [Child 2], you can sit on this one (right).

Now I'll give you a really cool new toy that you can play with for the next few minutes (place toy down with hand covering it).

And now we begin (remove hand, flip hourglass and turn away/look distracted).

After time is up:

Time's up! *(Collect materials.)*

Now we'll go together to the magic box, but this time you'll play together, just like we practiced earlier.

Resource Allocation Task

Now one of you will start on this side and the other will start on the other side.

To decide who starts where, we'll flip a coin.

Alright, *Name Child1* starts on this side and *Name Child2* on the other side.

Let's place your sticker envelopes right here between the two boxes.

(Proceed just like in the warm-up.)

And now we're finished with this game as well.

Before you go back to your group, we have one last game to play.

Let's go back to the pillows.

(Collect materials: papers in hand, crayons and hourglass in pockets.)

Resource Monopolization Task 2 (Drawing apple or sun)

Name Chil2, you can sit on this pillow *(left)* and *Name Chil1* on this one *(right)*.

You'll both get a picture to color in *(place papers)*.

Here are the crayons for coloring — and off we go *(place crayons, flip hourglass, turn away/look distracted)*.

After time is up:

And now the time is up again. *(Collect materials.)*

At the end, please stand next to each other and wave into the camera over there.

(Make sure the children stand close enough that it's easy to see which one is taller.)

Thank you so much for joining today. I hope you had fun!

And don't forget your sticker booklets *(hand out sticker books)*.

Now I'll take you both back to your group.

8.11. Duration of possession of Monopolization 1 and respective Δ -values

Dyad	Session 1			Session 2		
	child1 duration	child2 duration	Δ 1	child1 duration	child2 duration	Δ 2
dyad01	63.307	122.379	-59.072	23.756	163.779	- 140.023
dyad02	57.595	78.368	-20.773	79.932	102.352	-22.420
dyad03	44.418	124.012	-79.594	75.061	106.479	-31.418
dyad04	122.379	53.286	69.093	96.689	78.157	18.532
dyad05	NA	NA	NA	113.411	60.998	52.413
dyad06	3.466	156.110	- 152.644	16.672	137.892	- 121.220
dyad07	NA	42.311	NA	NA	15.610	NA
dyad08	70.060	85.470	-15.410	86.134	90.003	-3.869
dyad09	93.658	85.274	8.384	NA	NA	NA
dyad10	94.044	69.771	24.273	92.964	70.875	22.089
dyad11	30.158	133.659	- 103.501	39.132	131.719	-92.587
dyad12	73.809	97.520	-23.711	111.777	72.372	39.405
dyad13	92.775	79.999	12.776	41.337	134.425	-93.088
dyad14	102.815	71.211	31.604	86.974	93.232	-6.258
dyad15	113.897	NA	NA	94.275	84.179	10.096
dyad16	70.152	108.888	-38.736	61.859	118.337	-56.478
dyad17	50.680	46.760	3.920	48.363	111.088	-62.725
dyad18	NA	185.160	NA	167.757	NA	NA
dyad19	99.160	59.080	40.080	60.474	113.291	-52.817
dyad20	92.280	89.400	2.880	84.000	100.318	-16.318
dyad21	40.760	32.480	8.280	25.101	82.434	-57.333
dyad22	92.840	67.080	25.760	104.408	44.757	59.651
dyad23	115.080	72.400	42.680	85.917	96.242	-10.325
dyad24	NA	169.280	NA	96.002	78.962	17.040
dyad25	102.960	69.320	33.640	82.204	95.157	-12.953

dyad26	69.113	87.602	-18.489	NA	NA	NA
dyad27	81.560	100.320	-18.760	73.928	100.189	-26.261
dyad28	33.920	125.320	-91.400	83.153	78.968	4.185
dyad29	112.440	41.680	70.760	28.204	151.320	- 123.116
dyad30	60.680	122.200	-61.520	50.883	97.068	-46.185
dyad31	18.243	155.516	- 137.273	55.678	121.080	-65.402
dyad32	113.041	64.679	48.362	121.327	55.559	65.768
dyad33	61.679	101.401	-39.722	NA	NA	NA
dyad34	71.166	113.056	-41.890	NA	NA	NA
dyad35	104.496	70.004	34.492	NA	NA	NA
dyad36	143.490	39.288	104.202	NA	NA	NA
dyad37	56.906	17.401	39.505	100.913	78.565	22.348
dyad38	98.157	81.241	16.916	NA	NA	NA
dyad39	102.839	78.357	24.482	NA	NA	NA
dyad40	97.490	75.228	22.262	NA	NA	NA
dyad41	132.357	38.520	93.837	NA	NA	NA
dyad42	102.837	83.634	19.203	99.590	75.605	23.985
dyad43	72.960	94.762	-21.802	NA	NA	NA
dyad44	95.158	78.843	16.315	NA	NA	NA

8.12. Dyadic Data on Age Differences and Duration Differences in Resource Monopolization by Session

Dyad	Session	Child1_ age	Child2_ age	Duration _Diff_M 1	Duration _Diff_M 2	Age_Diff
dyad01	session1	56	48	-59.072	-52.614	8
dyad02	session1	58	58	-20.773	35.165	0
dyad03	session1	45	62	-79.594	-66.545	-17
dyad04	session1	68	65	69.093	-51.947	3
dyad05	session1	68	48	0.000	36.134	20
dyad06	session1	69	67	-152.644	157.163	2
dyad07	session1	49	43	-42.311	-178.546	6
dyad08	session1	63	64	-15.410	-19.275	-1
dyad09	session1	58	51	8.384	3.849	7
dyad10	session1	61	41	24.273	-81.905	20
dyad11	session1	62	74	-103.501	78.534	-12
dyad12	session1	71	56	-23.711	180.781	15
dyad13	session1	69	56	12.776	-15.237	13
dyad14	session1	73	69	31.604	121.414	4
dyad15	session1	68	56	113.897	62.568	12
dyad16	session1	37	67	-38.736	26.806	-30
dyad17	session1	44	52	3.920	14.920	-8
dyad18	session1	77	74	-185.160	17.282	3
dyad19	session1	64	74	40.080	38.120	-10
dyad20	session1	52	76	2.880	75.800	-24
dyad21	session1	44	60	8.280	195.160	-16
dyad22	session1	75	64	25.760	-51.760	11
dyad23	session1	70	76	42.680	-26.720	-6
dyad24	session1	79	77	-169.280	-111.640	2
dyad25	session1	59	58	33.640	170.880	1
dyad26	session1	65	63	23.080	-18.520	2

Dyad	Session	Child1_ age	Child2_ age	Duration _Diff_M 1	Duration _Diff_M 2	Age_Diff
dyad27	session1	50	46	-18.760	-75.400	4
dyad28	session1	53	63	-91.400	-10.880	-10
dyad29	session1	68	59	70.760	54.360	9
dyad30	session1	45	70	-61.520	-56.080	-25
dyad31	session1	75	68	-137.273	69.004	7
dyad32	session1	65	54	48.362	66.362	11
dyad33	session1	76	56	-39.722	30.118	20
dyad34	session1	72	59	-41.890	-178.916	13
dyad35	session1	78	67	34.492	-176.396	11
dyad36	session1	72	72	104.202	40.090	0
dyad37	session1	60	70	39.505	-31.342	-10
dyad38	session1	75	42	16.916	-22.681	33
dyad39	session1	42	72	24.482	-65.518	-30
dyad40	session1	46	47	22.262	-118.195	-1
dyad41	session1	78	41	93.837	43.639	37
dyad42	session1	41	51	19.203	4.429	-10
dyad43	session1	67	60	-21.802	44.992	7
dyad44	session1	41	47	16.315	87.893	-6
dyad01	session2	56	48	-140.023	12.844	8
dyad02	session2	58	58	-22.420	48.851	0
dyad03	session2	45	62	-31.418	-24.026	-17
dyad04	session2	68	65	18.532	58.300	3
dyad05	session2	68	48	52.413	-87.002	20
dyad06	session2	60	67	-121.220	-34.648	-7
dyad07	session2	49	43	-15.610	177.977	6
dyad08	session2	63	64	-3.869	-59.744	-1
dyad10	session2	61	41	22.089	-186.835	20
dyad11	session2	62	74	-92.587	-31.617	-12
dyad12	session2	71	56	39.405	-57.229	15

Dyad	Session	Child1_ age	Child2_ age	Duration _Diff_M 1	Duration _Diff_M 2	Age_Diff
dyad13	session2	69	56	-93.088	-70.060	13
dyad14	session2	73	69	-6.258	7.445	4
dyad15	session2	68	56	10.096	66.782	12
dyad16	session2	37	67	-56.478	-5.492	-30
dyad17	session2	44	52	-62.725	10.007	-8
dyad18	session2	77	74	167.757	83.641	3
dyad19	session2	64	74	-52.817	64.313	-10
dyad20	session2	52	76	-16.318	-109.320	-24
dyad21	session2	44	60	-57.333	-62.284	-16
dyad22	session2	75	64	59.651	-12.112	11
dyad23	session2	70	76	-10.325	76.080	-6
dyad24	session2	79	77	17.040	195.388	2
dyad25	session2	59	58	-12.953	-182.040	1
dyad26	session2	65	63	-18.489	30.956	2
dyad27	session2	50	46	-26.261	-17.758	4
dyad28	session2	53	63	4.185	-10.202	-10
dyad29	session2	68	59	-123.116	-160.366	9
dyad30	session2	45	70	-46.185	-82.227	-25
dyad31	session2	75	68	-65.402	32.515	7
dyad32	session2	65	54	65.768	-33.001	11
dyad37	session2	60	70	22.348	-22.220	-10
dyad42	session2	41	51	23.985	-99.609	-10