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Empathy, cognitive functioning, and prosocial behavior in mentored children

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Abstract
Assessing the effect mentors have on their mentees is methodologically challenging: most programs merely provide relatively short mentoring durations (typically in the range of 1 year), age ranges are usually rather small, and examining dyads with anything other than questionnaires has proven to be challenging in the past. Thus, although some excellent causal studies do exist, in general causal research is limited in the field and studies are opened up to social desirability. Using a controlled laboratory setting, the current study investigates the causal effect of a mentor's presence on the mentee's empathic accuracy, cognitive functioning, and prosocial behavior. The sample is characterized by a wide age range for mentees and long mentoring durations. Results support the hypothesis that mentees' performance is improved in all three domains when their mentor is present as compared to when their mentor is absent. Furthermore, mentoring duration was positively associated with the mentee's cognitive functioning when controlling for the mentee's age. The current findings extend our knowledge of the benefits of youth mentoring programs and demonstrate the necessity to include laboratory research when investigating mentoring dyads.

KEYWORDS
cognition, empathy, prosocial behavior, youth mentoring

Youth mentoring programs are becoming more and more common around the globe. As meta-analyses confirmed their effectiveness over a wide range of domains (DuBois et al., 2002; DuBois et al., 2011; Durlak et al., 2011; Raposa et al., 2019), youth mentoring programs have been established all over the world, for example, in Rwanda (Brown et al., 2009), New Zealand (Farruggia et al., 2011), or Canada (Larose et al., 2018). The majority of studies evaluating mentoring effects rely mostly or solely on self-reports of mentors and mentees (Pryce et al., 2020; Raposa et al., 2019). With this in mind, even considering the wide range of great mentoring research, it is difficult to rebuff arguments claiming the shown effectiveness of youth mentoring programs might be overestimated. Additionally employing measures other than self-reports could therefore help create a more convincing and accurate statement about the effectiveness of mentoring. The present work aims to create evidence based on laboratory settings and objective skill measurements. It investigates whether children, in addition to demonstrating increasing skill levels over the course of their mentoring relationship, are also better able to show these skills when their mentor is present. Following the literature suggesting that mentoring programs foster the social–emotional as well as the cognitive development of children (Rhodes, 2005), empathy, prosocial behavior, and cognitive functioning were chosen as sample domains for the assessment of skill in mentees.

1 | BENEFITS OF YOUTH MENTORING

The present work focuses on child and youth mentoring programs, in which mentors are assigned to children one-to-one. Mentors and children meet regularly, typically once a week for a couple of hours. In the best-case scenario, over time this leads to the formation of a trusting relationship between mentor and mentee (Herrera et al., 2011; Rhodes, 2005). This in turn causes the mentee to feel safe in the presence of the mentor. Given time and experience, mentors know exactly how to best support their mentee. They know when the child needs peace and quiet, or when it is time to engage and motivate the child. The children learn that their mentors have their best interest in mind and, therefore, learn to trust the mentor's guidance. This bond is thought to be the basis for the positive effects mentors can have on children. Since mentees see their mentors as role models, they learn from their example (Eddy et al., 2017; Grossman & Rhodes, 2002) in addition to active teaching (Gottman, 2001). Past research found improvements in mentored children for a wide range of areas, like feeling of self-worth (Rhodes et al., 2000), attitudes toward school (Karcher, 2005), or substance use (Rhodes et al., 2005). Meta-analyses demonstrated that mentees exhibited gains in their social–emotional and cognitive development (DuBois et al., 2002; Raposa et al., 2019). While the effectiveness of youth mentoring programs is, therefore, well established, it is still an open question precisely how effective youth mentoring programs are. As stated above, outcomes of youth mentoring programs have mostly been assessed via self-reports, which were shown to yield larger effect sizes in comparison to other sources, like school records or teachers (Raposa et al., 2019). A recent review on youth mentoring also identified this gap in past research on youth mentoring stemming from limited methodologies, asking for new research methods to make new discoveries (Pryce et al., 2020). Therefore, it seems important to assess the outcomes of youth mentoring through measures different from self-reports. One characteristic that distinguishes self-reports from other sources of information is that the latter are typically seen as a more objective measure. It is, hence, possible that when a skill itself is measured instead of a self-reported estimate of a skill, the outcomes of youth mentoring might be smaller than past research has suggested. While we expect mentees to still show improvements due to the mentoring program, it is the aim of the current study to give a more realistic estimation of

the effect sizes youth mentoring can yield. Two approaches were chosen to estimate the effectiveness: (1) investigating the dosage effect, or in other words the association between mentoring outcomes and mentoring duration, and (2) experimentally test the direct effect of a mentor's absence or presence.

1.1 | Duration of youth mentoring

A wide range of studies investigated the association between the duration of the mentoring and gains, as those discussed above, in the mentee. Past research suggests that mentoring relationships maintained for at least 12 months show more and stronger positive effects for the mentee than shorter periods (DeWit et al., 2016; Grossman & Rhodes, 2002; Lee & Cramond, 1999). Yet, while single studies found a positive association between mentoring duration and positive outcomes for the mentee, when meta-analyses investigated these associations the results were always nonsignificant (DuBois et al., 2002; Raposa et al., 2019). It is possible that the effect of mentoring duration is not linear, but rather stepwise. The recent pattern of evidence could suggest that mentor and mentee need time to build a trusting relationship before anybody can benefit from the relationship. If this bonding is successful, the mentoring dyad can then work to let the mentee reach his or her potential. As this again requires time, benefits for the mentee could be found after 1 year, but no continuous growth might have been detected over the first months. It seems likely that further leaps in the development of the mentee would occur with time. Yet, few studies investigate longer lasting mentoring relationships. Already few evaluations are available for mentoring durations of 18 months (Brown et al., 2009; Schmidt et al., 2007), and additionally some of these studies include the time span needed to match with a mentor, resulting in an average mentoring duration of just above the year threshold (Grossman & Tierney, 1998; Herrera et al., 2011). To the best of our knowledge, only two studies covered a longer mentoring duration, namely 5 years (Eddy et al., 2017; McCord, 1992). Both studies found no improvements in the mentee's social behavior. Nevertheless, it is difficult to compare these results with the remaining body of evidence concerning mentoring programs as both studies depict programs employing professional paid mentors. In these programs, children might have changed their mentor over time, which is different from most other evaluated mentoring programs. Most mentoring programs rely on volunteers as mentors (Dutton et al., 2018; Herrera et al., 2011; Leyton-Armakan et al., 2012) and a child would typically not be matched with multiple mentors if the first mentor quits.

Therefore, while evidence suggests that there is a positive association between mentoring outcomes and the duration of the mentoring, the exact relationship is still unclear. This is especially the case due to the lack of studies evaluating relationships which have lasted for more than 18 months.

1.2 | Physical presence of the mentor

In addition to assessing the mentoring outcome through the dosage effect, it can also be assumed that a more direct effect of the mentor's presence could exist. More precisely, due to the trusting relationship between mentor and mentee (Herrera et al., 2011; Rhodes, 2005), the mentee should feel more secure and confident in the mentor's presence. Mentors have come to know their mentee very well and will know how to support them in the best way possible, thereby enabling the children to show their full potential. Hence, not solely relying on testing the mentoring effect classically as the improvement of a child over time, but also as an instantaneous increase in performance due to the mentor's presence, might

provide a closer insight into the effectiveness of youth mentoring programs. If the child is in fact able to harness their full potential in the mentor's presence, it would foster future learning as the child's ability to process new information is elevated in the mentor's presence. To the best of our knowledge it has not yet been investigated whether mentees perform better in the presence of their mentors. Taken together we hypothesize that mentees perform better the longer they have had a mentor, and their performance increases further when the mentor is present. In order to test these hypotheses for a wide range of skills, empathy, prosocial behavior, and cognitive functioning were chosen as sample domains. These skills cover the social–emotional as well as the cognitive development of children, which is thought to improve due to mentoring (Rhodes, 2005).

2 | ASSESSMENT OF SOCIAL–EMOTIONAL AND COGNITIVE DEVELOPMENT IN MENTORING PROGRAMS

While theories of youth mentoring agree that mentoring has positive effects on the social–emotional development of children (Rhodes, 2005; Rhodes et al., 2006), only very few studies investigated prosocial behavior in mentees. The most notable study in this regard was done by Kosse et al. (2020). They followed children over a time span of 2 years. During the first year the treatment group had a mentor while the control group did not. In addition to self- and other-ratings they also assessed the prosocial behavior of the children with behavioral measures. The authors found that in general children from families with a lower socioeconomic status were less prosocial than those from families with a higher socioeconomic status. In the mentored children this gap vanished, while it persisted in the children without a mentor. Kanchewa et al. (2018) showed that self-rated and teacher-rated prosocial behavior in mentees is associated with the mentee's trust in their mentor. A study by Chan et al. (2013) found no significant association between self-rated social behavior and the quality of the mentoring relationship. Taken together, there is very little evidence concerning prosocial behavior in mentored children. The studies which did investigate prosociality would suggest that a trusting mentoring relationship should enable a child to act more prosocially.

While empathy has been discussed as a pathway for how mentoring can be effective (Rhodes, 2005), there has not been a study assessing empathy in mentees. One probable reason for that is the reliance on questionnaires in former studies. Empathy is difficult to measure with questionnaires (Wieck & Kunzmann, 2015). A wide range of other social aspects have been investigated using self-reports, like coping behavior (DeWit et al., 2016; Larose et al., 2018), relationships with parents (Grossman & Rhodes, 2002), or social support (Larose et al., 2018). Theoretical considerations and findings for related constructs would suggest that youth mentoring improves the prosocial behavior and empathy in children.

Similar things can be said for the domain of cognitive ability. Theories assume that children improve in this domain through mentoring (Rhodes, 2005; Rhodes et al., 2006), yet evidence based on the assessment of skills is lacking. Most studies investigate the cognitive domain through academic outcomes like school grades, academic self-efficacy, or the probability to repeat a school year (Choi & Lemberger, 2010; Larose et al., 2018; Wheeler et al., 2010). To the best of our knowledge there are only two studies, which directly measure cognitive ability. Karcher et al. (2002) assessed the reading and math skills of mentees, thereby, rather measuring academic achievement than general cognitive ability. The second study was conducted by Okurame and Ajayi (2017), using the Purdue Pegboard Test. While this test also requires concentration, it mainly measures manual dexterity. Both studies found positive mentoring effects. While a test of general cognitive ability is,

therefore, still lacking, the theoretical considerations and related results suggest that positive effects can be expected.

3 | THE PRESENT STUDY

Although there is ample evidence that mentoring can have beneficial effects, there are some methodological challenges. First, the typically rather short time spans in formal mentoring exacerbate the investigation of effects based on long-term trust-based relationships. Second, most mentoring programs focus on a specific age range, making it difficult to generalize results; wider age ranges in the same program would allow to control for age statistically while maintaining generalizability to different ages. Third, investigating mentoring effects other than with self-report questionnaires is challenging and opens results up to biases, that is, social desirability. In fact, when comparing self-reports to reports from other sources, effect sizes are smaller in the latter case (Raposa et al., 2019). Finally, although remarkable exceptions exist in the literature, it is very difficult to investigate causal effects of mentoring due to ethical and practical issues of designing experimental studies in this field. The present study investigates the causal effect of the mentor's physical presence and the correlational effect of mentoring duration for long to very long mentoring durations on objectively measured empathy accuracy, cognitive functioning, and prosocial behavior in a wide age range of mentees. In a controlled experimental laboratory setting, mentees perform tasks either in the presence of their mentor or a research assistant. Participants are recruited from a long-term one-to-one mentoring program in Berlin to allow for wide ranges of both mentoring duration and mentee ages. In this setting the current study investigates the hypotheses that (1) the physical presence of the mentor allows mentees to perform better in the domains of prosocial behavior, empathy, and cognitive ability, and (2) that mentees show higher skill levels in these domains the longer they have been in the mentoring dyad. The remainder of the article first provides some information on the participants, in particular of the mentoring program, of the measures used, and the analysis methods applied. Study results are presented, and their implications are discussed.

4 | METHOD

4.1 | Sample

The present study investigates the effects of mentoring in the mentoring project "biffy Berlin - Big Friends for Youngsters." The program was inspired by "Big Brothers Big Sisters of America" (Grossman & Tierney, 1998) and has been adjusted to fit German society. Mentors and mentees are free in how they spend their shared time. It is suggested that they meet once a week for a couple of hours. The program requires that the mentors commit for at least 1 year, but typically the mentoring relationship persists for multiple years. The program offers supervision and advice for all parties involved over the complete course of the mentoring relationship. Biffy follows most of the best practices found to enhance the effectiveness of youth mentoring (DuBois et al., 2002, 2011). More precisely, they match mentors and mentees based on similar interests, require and provide training for the mentors, the children are young at the time of the matching (typically in primary school), and although not necessarily the case, many children in the biffy program can be considered to be at greater individual risk; for example, 79% of them live in single mother households.

TABLE 1 Sample Description

Characteristic	*M (SD)*	
Age in years	12.33 (3.50)	
Mentoring duration in months	56.44 (33.79)	
Donation in dictator game (max = 10)	4 (1.94)	
	Mentor absent	Mentor present
Donation in prisoner's dilemma (max = 20)	7 (4.03)	15 (5.52)
Symbolic working memory (max = 50)	36 (6.60)	45 (15.41)
Spatial working memory (max = 40)	34 (6.56)	36 (4.91)
Empathy as centered ICC	-0.02 (0.07)	0.01 (0.05)

Note. $N = 18$.

Nevertheless, biffy is open to all parents and does not specialize in youth offenders or similar demographics.

All current mentoring dyads in the biffy program that could be reached via mail or telephone, roughly 150 dyads, were contacted. The study was described to them and they were asked if they would participate. The dyad was included only when the mentor, the mentee, and the parents of the mentee agreed. This resulted in a sample of 18 mentoring dyads from the biffy program. The mentees were on average 12.33 years old, the youngest being 6 and the oldest being 19 years old. The mentoring relationship had persisted for an average of 56.44 months prior to the assessment, with a range between 12 and 120 months. Two mentees were female, 16 mentees were male. One male mentee had a female mentor; the remaining mentors were of the same gender as their mentee. See Table 1 for further information on the sample.

4.2 | Design

Mentors and mentees arrived at the laboratory together. The mentees participated in the tasks described below twice, once in the presence of a research assistant and once in the presence of their mentor. Each participating mentee had one research assistant assigned to him or her, who accompanied the child for the whole duration of the experiment. The research assistant treated the child kindly while explaining the tasks and answering questions. Half of the mentees completed all tasks in the presence of the research assistant first and in the presence of their mentor second, for the other half, the sequence was reversed.

At the beginning of the experiment, mentors received instructions for the joined part of the experiment separated from their mentees. The mentors were instructed to support their mentee as well as possible and to the best of their knowledge. Instructions explicitly stated that it would be left up to them to decide what the best support for their mentee would be. If they felt their mentee performed best in silence, they were free to remain quiet. If they decided the child needed encouragement, they were free to cheer. The only limitation imposed was that they were not allowed to solve the given tasks for their mentee. Hence, each mentor was enabled to behave differently, depending on the child's needs, while the research assistants' behavior was standardized for all children. The child completed the cognitive and empathic tasks in a soundproof cubicle. Either the mentor or the assigned research assistant was in the cubicle with the child, ensuring that the child was never alone. The tasks were completed on a computer, which could also be operated from outside of the cubicle by a second research assistant. This left the assistant assigned to the child free to answer possible questions regarding the tasks. Instructions were always

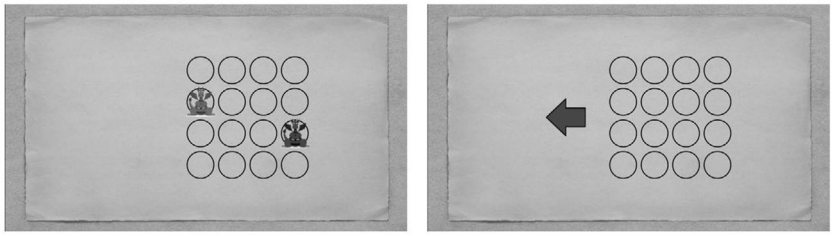

FIGURE 1 Example for the spatial working memory task

displayed on the screen, which were read aloud by the assistant for younger children. If the mentor was present, the assistant left the cubicle after the instruction phase and only entered again after the task was completed. While one of the social behavior tasks (a dictator game, see below) was also conducted in the cubicle, the other social behavior task (a prisoner's dilemma, see below) took part in a regular, more spacious room. Participants received monetary compensation. During some tasks participants could win tokens, which could later be exchanged for money, material compensation (sweets), or a mix of both. Participants were informed about this at the beginning of the experiment and were free to choose between these options once they had finished all tasks.

4.3 | Measures

All tasks assessing empathy and cognitive ability were programmed in Matlab. The corresponding code for each task can be found on the Open Science Framework at https://osf.io/u8j4x/

4.3.1 | Empathy

Empathy was assessed through the use of six short video clips (Wieck & Kunzmann, 2015). In each video, a person talks about an emotional situation in his or her life. Two videos each depict a mainly angry, sad, and happy situation. Participants were asked to rate the emotions of the videos' protagonists on a German translation of a 12-item PANAS scale (Watson et al., 1988). These ratings were then compared to the self-ratings of the protagonist using an intra-class correlation. More precisely, for every participant and every video clip, a Pearson correlation coefficient was computed for the ratings of the participant and those of the target. This intra-class correlation serves as a measure of empathic accuracy, the skill to correctly recognize feelings in others. Every mentee saw the clips in the same order. As the conditions were counterbalanced, it was also counterbalanced which clips the mentee saw alone and which in the mentor's presence.

4.3.2 | Cognitive ability

Two tasks were used to measure the cognitive ability of the mentees. Both tasks were created in line with Dirk and Schmiedek (2016). The first task is a measure of the spatial working memory. A four by four grid was presented to the mentees with two differently colored cartoon dragons at random distinct locations in the grid. An example is presented in Figure 1 on the left side. They were visible for 3000 ms, the grid remained visible for the whole

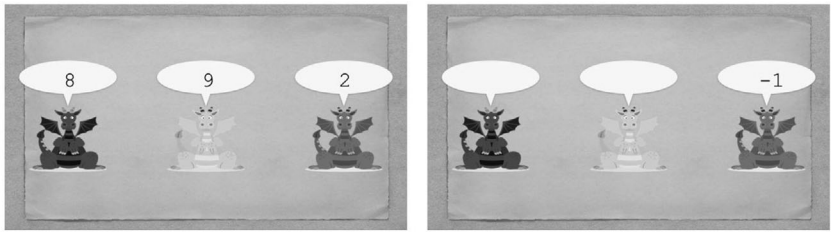

FIGURE 2 Example for the symbolic working memory task

duration of the trial. After inter-stimulus intervals of 500 ms, three updating operations were presented sequentially for 2500 ms each, for which an example is given on the right side of Figure 1. Spatial shifts to adjacent positions indicated by arrows presented next to the grid in colors corresponding to the two dragon's colors indicated the updating operations. Mentees were asked to apply the updating operations to the memorized positions of the corresponding dragon and to memorize the results. No dragon's position was updated twice in a row. At the end of each trial, mentees were asked for the location of both dragons. Mentees used the mouse to click on the correct position in the grid. They first completed three training trials before solving two blocks with 10 trials each. In each trial they were asked for two positions, resulting in a total of 40 items.

The second cognitive task was a numerical working memory task. In half of the trials, mentees saw two differently colored dragons, who each had a speech bubble. In the other half three differently colored dragons were presented. For 3000 ms a digit (1–9) was visible in each speech bubble and had to be memorized, as depicted for a sample case on the left side of Figure 2. After an inter-stimulus interval of 500 ms, an updating operation for one of the dragons was shown for 2750 ms, a sample given on the right side of Figure 2. For trials with two dragons, three updating operations were presented, while trials with three dragons had four updates. The updating operations were additions or subtractions in the range from −2 to +2. No dragon was updated twice in a row. The total was never below 1 or above 9. At the end of the trial, mentees were asked for all two or three totals. Responses were given via the number keys. Mentees completed three training trials, followed by two blocks with 10 trials each. In 10 trials they were asked for two sums, in the other 10 trials for three sums, resulting in a total of 50 items.

4.3.3 | Prosocial behavior

Two measures of prosocial behavior were used: the dictator game (Guala & Mittone, 2010) and the prisoner's dilemma (Tucker, 1983). In the dictator game, mentees were given 10 chocolate coins, presented as a reward for good results in former tasks. They received these coins from a research assistant they had not met before. The coins had been introduced at the beginning of the study to represent 0.30€, with the possibility to exchange them with actual money at the end of the study. Mentees were then left alone with the coins for 30 s. Afterwards, the same research assistant returned, claiming they had handed out too many coins by mistake, and they now had no coins left to give to a fictional child in a different cubicle. The research assistant then asked the mentee to donate some of his or her coins. The assistant handed the mentee two empty envelopes, one showing the mentee's name, one showing the name of the fictional other child. Mentees were then left alone to decide how many coins they wanted to put into the respective envelopes. It was explained clearly that they could also keep all coins since the mistake had been made by the research

assistant. Then, the assistant returned and took the donation envelope. The number of coins allocated by the mentee for the other child served as a measure of prosocial behavior.

For the prisoner's dilemma (Tucker, 1983), mentees played a game either with a research assistant (again not the one assigned to them at the beginning of the experiment), or with their mentor. A third research assistant acted as a judge and explained the game. At the beginning of each trial, each player received a token. This token could then either be donated to the other player or kept for oneself, with simultaneous and private decisions made by both players. A donated token would go to the other player. In addition, the judge would, in this case, add an additional token for the receiving player. In effect, if no player donates his or her token, each player ends up with one token for this trial. If one player donates while the other does not, the donating player has zero tokens while the defecting player has three tokens at the end of the trial. If both players donate, each player receives two tokens. The mentees played 20 trials with the research assistant and 20 trials with their mentor. At the end of the game, five tokens could be exchanged for one chocolate coin, corresponding to 0.30€. Hence, a maximum of 3.60€ could be won over 20 trials. Research assistants always followed a fixed pattern of behavior with each mentee, donating exactly 10 out of the 20 trials. Mentors were not limited in how they played. The rate with which the mentees donated served as a measure of prosocial behavior.

4.4 | Statistical analysis

All analyses are based on Structural Equation Models (SEMs), using full information maximum likelihood. Results are reported according to Bayesian statistics using a flat prior. A flat prior assumes that prior to the analysis every value for the estimated parameter is similarly likely. For every hypothesis the a posteriori probability that the effect is small or equal to zero is reported. The smaller this probability, the stronger is the support of our hypothesis from the data. Descriptive statistics were computed with SPSS, analyses were conducted using Ωnyx (von Oertzen et al., 2015). Structural equation modeling, in addition to allowing for more complex models, also unifies all classical tests using a normal distribution. In a frequentistic setting, low N may lead to a (very small) alpha inflation in the likelihood ratio test. However, frequentism is no longer the method of choice in psychology, and the alpha inflation is irrelevant for Bayesian interpretations of SEM. For this reason, we phrase all models used in the analysis as SEM and apply Bayesian estimation to those.

For each assessed skill, items are aggregated into one average score for every mentee. Difference score models are used to test whether the mentee is able to perform better with the mentor present than in the mentor's absence. The model controls for the shared variance due to repeated measures in both settings. For each investigated outcome variable, the a posteriori probability of the difference between both settings is estimated separately. The SEM of the difference score model is represented by the structural equation

$$X_{\text{alone}} = I + \varepsilon_{\text{alone}},$$

$$X_{\text{together}} = I + D + \varepsilon_{\text{together}},$$

where the intercept I, and the two errors $\varepsilon_{\text{alone}}$ and $\varepsilon_{\text{together}}$ are independent normally distributed with free variance parameters, free mean for the intercept, and zero mean for the errors. D is a constant difference parameter for which the posterior distribution is established.

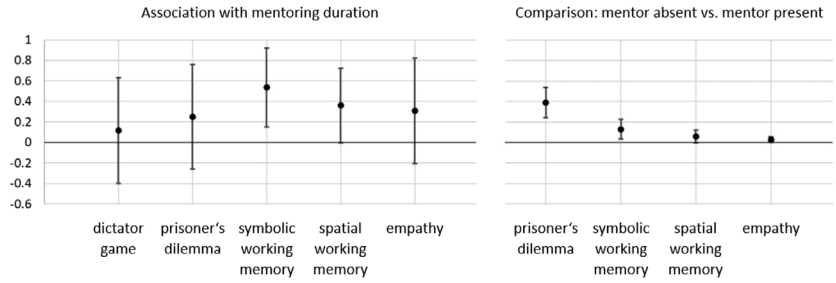

FIGURE 3 Confidence intervals of standardized main results for mentees

To test the association between mentoring duration and the different outcome variables, multiple regression models are specified, with the respective skill measure as the outcome variable and mentoring duration as well as the age of the mentee as predictors. The corresponding models are represented by the equation

$$X = \text{Age} \cdot \theta_{\text{age}} + \text{Duration} \cdot \theta_{\text{duration}} + \varepsilon.$$

Where the intercept I and the error ε are again independently normally distributed with free variances; all means are zero since the variables are mean centered. We establish the posterior distribution for both regression parameters θ_{age} and θ_{duration}.

5 | RESULTS

The result section is divided according to the three investigated aspects: empathy, cognitive ability, and prosocial behavior. For each aspect, descriptive statistics are described first. They are also summarized in Table 1. Second, the mentoring effect is investigated, computed as the difference in the performance of the mentee in the mentor's absence compared to his presence. Third, the association between the performance in the mentor's absence and the duration of the mentoring relationship is analyzed. These results are also summarized in Figure 3.

5.1 | Empathy

The six film clips were of different difficulty. The mentees achieved an average ICC of .64 for the most difficult clip, and an ICC of .94 for the easiest one. To control for these differences, all following analyses use centered values for each clip.

In the absence of their mentor, mentees showed a centered ICC of −0.017 ($SD = 0.070$). When the mentor was present, the average centered ICC of the mentees was 0.014 ($SD = 0.052$). The mentoring effect was represented as the difference between both conditions. Under a flat prior for the mentoring effect, the probability that the mentoring effect is equal to or smaller than 0 is 2.01%, $\chi^2(1) = 4.21$. The mentoring effect for empathy is of medium size, $d = 0.52$. The association between the mentee's empathic accuracy and the duration of the mentoring relationship was $r = .28$. Under a flat prior for the association, the probability that the effect is equal to or smaller than zero is 12.62%, $\chi^2(1) = 1.31$. This result does not change substantially when controlling for the mentee's age in a multiple regression analysis ($P(\theta < 0) = .127, \chi^2(1) = 1.30$).

5.2 | Cognitive ability

In the symbolic working memory task mentees on average answered 36 of the 50 items ($SD = 6.60$) correctly in the absence of their mentor, 45 in his presence ($SD = 15.41$). In the spatial working memory task they answered on average 34 of the 40 items ($SD = 6.56$) correctly when their mentor was not present, 36 when he was present ($SD = 4.91$). Under a flat prior for the mentoring effect, the probability that the mentoring effect is equal to or smaller than zero is 0.70% for the symbolic working memory task, $\chi^2(1) = 6.04$, and 4.13% for the spatial working memory task, $\chi^2(1) = 3.01$. The mentoring effect for spatial, $d = 0.44$, and symbolic working memory, $d = 0.64$, is of medium size.

The association between the performance in the spatial working memory task and the duration of the mentoring is $r = .61$. The probability that this effect is equal to or smaller than zero is 0.39%, $\chi^2(1) = 7.08$, under a flat prior. For the symbolic working memory task the association is $r = .66$. This effect is equal to or smaller than zero with a probability of 0.08%, $\chi^2(1) = 9.97$, under a flat prior. While the association with symbolic working memory does not change substantially when it is controlled for age ($r = .59$, $P(\theta < 0) = .00031$, $\chi^2(1) = 7.50$), it declines for spatial working memory ($r = .39$, $P(\theta < 0) = .056$, $\chi^2(1) = 2.54$).

5.3 | Prosocial behavior

When the mentees played with a research assistant they donated in the prisoner's dilemma on average in 7 out of 20 trials ($SD = 4.03$). When they played with their mentor, they donated in 15 out of 20 trials ($SD = 5.52$). Further, mentees donated on average 4 of their 20 coins in the dictator game ($SD = 1.94$). The mentoring effect is equal to or smaller than zero for the prisoner's dilemma with a probability of 0.003%, $\chi^2(1) = 16.15$, under a flat prior. For the prisoner's dilemma a large mentoring effect can be found, $d = 1.26$.

Exploratory analyses suggest that this mentoring effect is influenced by the fixed donation scheme of the research assistant and the flexible playing style of the mentor. The mentors donated on an average of 18 of the 20 trials ($SD = 3.79$), while the research assistant always donated on 10 of the 20 trails, when playing with the mentees. In the condition when the mentoring dyads played together, donation rates between both players were positively associated, $r = .79$, $P(\theta < 0) = .0025$, $\chi^2(1) = 16.45$. This suggests that mentees might have donated more often when playing with their mentor as the mentors themselves donated more often than the research assistant. This is supported by the data, as the size of the mentoring effect substantially declines when donation rates of the opposing player are controlled for. In that case the mentoring effect is equal to or smaller than zero with a probability of 33.74%, $\chi^2(1) = 0.18$, under a flat prior. Yet, an inspection of the raw data indicates that the association between the donation rates of the players is mostly driven by the 10 mentors who donated in 100% of the cases. It is possible that the association is nonlinear in the shape of a logistic association or that full cooperation constitutes a special case or outlier. Given the small sample size, these explanations cannot be tested in the present sample.

In the condition where mentees played with a research assistant, the association between the donation rate in the prisoner's dilemma with the duration of the mentoring relationship was $r = .22$. The probability that this effect is equal to or smaller than zero is 18.48%, $\chi^2(1) = 0.80$, under a flat prior. The association was $r = .05$ for the donation rate in the dictator game. Under a flat prior for this association, the probability that this effect is equal to or smaller than zero is 41.40%, $\chi^2(1) = 0.05$. These results do not change substantially when the age of the mentee is controlled (prisoner's dilemma: $r = .25$, $P(\theta < 0) = .169$, $\chi^2(1) = 0.92$; dictator game: $r = .12$, $P(\theta < 0) = .329$, $\chi^2(1) = 0.20$).

6 | DISCUSSION

The present study investigated the effect of youth mentoring when performance measures are used instead of questionnaires. It postulated that the presence of the mentor causes an increase in the mentees' performance in the domains of empathy, cognitive ability, and prosocial behavior. Further, it was assumed that a longer mentoring duration is associated with higher performance of the mentee even in the mentor's absence. The results strongly support the first hypothesis. In all three domains, the mentees performed better with their mentor present. The second hypothesis was supported strongly for the cognitive domain, but only with some remaining error probability for the domains of empathy and prosocial behavior.

6.1 | Mentoring effect

The current study provided some insight into questions left unanswered by nonexperimental designs. Results indicate that the presence of a mentor causes improved performance in children in a wide range of domains and for a wide age range of children. To a lower quantitative degree present results indicate that children perform better the longer their relationship lasts, which in this study, due to the long-term mentoring program used, was considerably longer than typical time spans found in the existing literature. All measures in this study were assessed objectively and in controlled conditions, so that (1) the effect of social desirability was diminished (see Raposa et al., 2019, for the importance of this), and (2) measures were reliable enough to provide strong quantitative evidence even with a fairly small sample size.

6.1.1 | The mentor as a safe haven

The experimental setting varying the presence of the mentor allowed to better investigate the effects of the mentoring relationship than former studies did. While theories concerning mentoring assume that a trusting relationship forms between mentor and mentee (Rhodes, 2005), to the best of our knowledge no former study tested the direct effects of this trust. While other studies have shown self-ratings of the mentees improve in a mentoring relationship (DeWit et al., 2016; Grossman & Rhodes, 2002; Larose et al., 2018), the present study shows that mentees also perform better with their mentor present. Results showed that mentees are able to show higher empathic and cognitive skills, as well as behave more prosocially in the presence of their mentor. This can be seen as an indicator for a beneficial relationship between mentor and mentee. It seems that the mentor acts as a "safe haven" for the child, in the sense that the presence of the mentor makes the children feel protected and thus able to concentrate on the task at hand, allowing them to show their full potential.

There are two possible pathways for these findings to translate to real-world settings. First, mentor and mentee often explore new activities, locations, and abilities together or increase existing abilities of the mentee. If the mentee is able to better concentrate and perform cognitively in the presence of the mentor, the corresponding learning effects will be stronger. Second, positive behavior the mentee shows in the presence of the mentor (even if initially only to please the mentor) will likely be internalized and thus might become positive autonomous behavior of the mentee. Given time and experience, the physical presence of the mentor may no longer be needed; the mentor may become available as an internal resource for the mentee at any time.

The medium to large effect sizes found in the present study are larger than the typically small effect sizes found when mentored children are compared to nonmentored children using self- and other-reports (Raposa et al., 2019). While these are different ways to assess the mentoring effect, we still expected opposite results, since past research indicated that performance measures typically yield smaller effects. Yet, at least in the experimental setting, effects were actually larger. This could be due to a more reliable assessment of skills contrary to self-reports. It is, further, possible that performance-based measures are better suited to capture improvements within the mentees than self-reports, as the mentees themselves might be unaware of the full influence of the mentor. Another explanation might lie in the different setting of the comparison. It is possible that the immediate effect of a trusted person close to oneself is larger than the general effect of having such a person in one's life. It is further noteworthy that the effect sizes would likely have been even larger if the presence of a complete stranger would have been compared to the presence of the mentor instead of the research assistant assigned to the child. Such a setting would be difficult in an experimental setting due to ethical considerations. Yet, it is not an unlikely situation in the child's everyday life to be confronted with unknown strangers while having to perform cognitive tasks.

It is noteworthy that mentees' prosocial behavior in the condition when playing with their mentor is statistically partially explained by prosocial behavior by the mentor, more precisely, the effect of this condition is reduced when controlling for the prosocial behavior of the other player. One likely explanation is that the mentors acted as prosocial role models, and the mentees copied this behavior. Another possible explanation is that the mentees wanted to reciprocate the mentor's behavior or were confident in anticipating the mentor's prosocial behavior. In addition, the raw data gives some indication that the association between prosocial behavior shown by interaction partners might not be linear, but rather logistic or stepwise. The small sample size in this study does not allow for a more detailed investigation of the exact association, which leaves this question open for future studies to answer, potentially with including an experimental condition in which mentors and research assistants behave similarly prosocial.

The effect of the presence of the mentor, particularly in the noncognitive measures, on the mentee could also be seen as a form of social desirability, where the mentee wants to act more socially desirable when his or her mentor is watching. In fact, this is part of the effect a mentor should have and which, through internalizing this behavior, may lead to positive long-term change. Thus, social desirability in this sense is part of the effect investigated rather than a methodological artefact.

6.1.2 | Long-term effects of youth mentoring

In the cognitive domain, one sees a medium effect size of the relationship between mentoring duration and performance, with a very large a posteriori probability that the association is, in fact, positive, while controlling for age. This effect is stronger than what is typically found for the effect of mentoring in this domain. Measuring the dosage effect is methodologically similar to comparing mentored to nonmentored children. However, (1) mentoring durations in this study are considerably longer than typically found (Raposa et al., 2019), and (2) it is reasonable to assume that objective measures in a controlled environment are more reliable than questionnaires. This most likely explains why such strong effect sizes are obtained. These results, therefore, supplement the existing literature on the cognitive effect of mentoring by adding the facet of longer mentoring durations and controlled environments to the more natural, but less precise measures by self-report or other-reports on relatively short mentoring time spans.

The effects point in the same direction, but effect sizes are considerably smaller for the social–emotional domain assessed through empathy and prosocial behavior. Both aspects yielded small effect sizes, with higher probabilities of the effect being nonexistent around 20 %. Future studies, especially with higher sample sizes, are needed to clarify whether these effects exist, and what the distribution of the effect in the population is.

Nevertheless, even for the social–emotional development effect sizes were of comparable size to those found using self-reports (Raposa et al., 2019). This may be interpreted as a first indication that self-reported data are differently well suited to assess the mentoring effect in different domains.

6.1.3 | Summary

The present study indicates that mentees perform better due to the presence of their mentor. As mentor and mentee spend considerable time together every week, this finding suggests that during these meetings the children manage to exploit more of their full capacity to grow and learn. It can be concluded that mentees will be able to benefit more from joint activities with their mentor as compared to exploring new terrain on their own.

When the mentoring relationship continues over time, mentees' cognitive abilities increase even in the physical absence of their mentor. Thus, youth mentoring programs appear to be suitable for increasing children's cognitive abilities, while simultaneously having a good time and socializing with an important adult in their lives. Note that studying for academic tests is explicitly not a goal of the mentoring program participants were recruited from. Hence, it seems plausible that implicit learning occurring during dyad meetings is a suitable approach to develop cognitive skills.

Social–emotional skills appear to improve less during the duration of a mentoring relationship. The present results suggest that a small association might exist, but further data is needed to support this hypothesis. Note that social–emotional skills are strongly relevant in many different aspects of life over the course of the whole lifespan. If further studies confirmed even small benefits in this domain, it would imply that youth mentoring programs help to prepare the mentees for their future life to an important degree.

6.2 | Limitations and Future Directions

The present study furthers our understanding of the effects of youth mentoring programs by investigating mentees in an experimental laboratory setting. The usage of behavioral measures extends our knowledge concerning the effects of youth mentoring. Nevertheless, some limitations need to be addressed.

The investigation of youth mentoring programs depends on a relatively small population of mentoring dyads. Combined with the amount of time and effort necessary to participate in the present study, this constitutes an increased difficulty for the recruitment of participants. The consequently relatively small sample size in the current study limits the generalizability of the results, even though a wide age range and reliable measurement conditions attenuates this to some degree. The limited sample size did not allow to control our results for the gender of the mentee, which would have been beneficial as former studies found larger effect sizes for male mentees (DuBois et al., 2011; Raposa et al., 2019). Future studies should further the experimental investigation of mentoring dyads.

Second, while our cognitive measure is a more general assessment of cognitive ability than school grades, it still only depicts one aspect, namely working memory. It might be interesting to see whether the present findings can be replicated for other aspects of

cognition, like processing speed or general knowledge. This is similarly true for our assessment of prosocial behavior. The prisoner's dilemma constitutes an artificial game situation, especially as a mentor might share his winnings with his or her mentee, while a research assistant would not. Further, the research assistants using their fixed protocol acted less prosocial than most mentors did on average. Future studies could instead investigate mentee's likeliness to help a stranger versus helping their mentor.

The wide age range in this study, although important to allow for generalizability over age ranges, is a challenge when creating tasks, in which ceiling effects for older and floor effects for younger participants need to be avoided. Most of the tasks in the current study were mostly successful in this, however, the spatial working memory task shows some ceiling effect for the older participants in a QQ plot. Future studies might be able to depict gains in the cognitive domain more accurately with slightly more difficult tasks.

7 | CONCLUSION

The present study sheds further light on the benefits of youth mentoring programs. Mentees are better able to show their full potential in the cognitive and social–emotional domain with their mentor present. Further, their cognitive skills improve over the duration of the mentoring program. The current findings further provide some indication that social–emotional skills might also improve albeit to a lesser degree over time, but these findings need to be supported by further data before a final conclusion can be drawn. In summary, youth mentoring programs appear to be a suitable and increasingly accessible method to enable children to develop and show more of their potential in multiple areas.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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