INTRODUCTION

Prosocial behaviors are behaviors intended to benefit another person or society in general (Eisenberg, 2000; Penner et al., 2005). Helping (also referred to as instrumental or targeted helping) is a specific type of prosocial behavior in which an individual enables another to attain a goal they cannot achieve alone (De Waal, 2008; Greenberg et al., 2010; Warneken & Tomasello, 2009). Research across domains (e.g., development of children’s academic and social skills) states that behavior is a function of the interaction between cognitive ability and motivation (Van Iddekinge et al., 2018).

Specifically, this research suggests that cognitive ability may grant individuals the ability to take on a behavior, yet they may refrain from doing it unless motivated to do so (Van Iddekinge et al., 2018). This claim has been tested in multiple life contexts, including perceptual and psychomotor performance (Fleishman, 1958; Locke et al., 1978), judgment (Libby & Luft, 1993), job management (Van Iddekinge et al., 2018), children’s learning (Ehrlich et al., 1993; Kreitler et al., 1995; Urfali Dadandi & Ungan, 2022) and social skills (Itskovich et al., 2021; Pinderhughes & Zigler, 1985). For example, in reading comprehension, both cognitive and motivational factors were found to be important, though...
some cognitive factors (vocabulary and prior knowledge) were found to be more predictive than motivation (Urfali Dadandi & Ungan, 2022). Within the specific context of helping behavior, the same claim may apply. To help, individuals should be able to pay attention to, and identify, the other’s obstructed goal. At the same time, they should also be motivated to take on an action that may be rewarding to the other person and not themselves. These two factors – task-relevant understanding and motivation – have been identified in helping behaviors of human infants and chimpanzees ( Warnke & Tomasello, 2006), but to the best of our knowledge, researchers have not looked at children during middle childhood. Nor have previous studies investigated task-free cognitive ability or motivation measures (thus indicating stable individual differences) as predictors of helping behavior.

We investigated personal values and sustained attention, motivational and cognitive factors (respectively) which were previously associated with child behavior ( Abramson et al., 2018; Ellis et al., 2004; Pérez-Edgar et al., 2010; Vecchione et al., 2016). Specifically, we examined their unique role and the interaction between them in promoting or hindering helping behavior. We investigated this in a sample of 162 children between the ages of 8 and 9 years, an age of rapid developmental improvement in executive, cognitive and social abilities (Davis et al., 2016; McHale et al., 2003; Pener-Tessler et al., 2022).

1.1 Development of helping behavior

Prosocial behavior emerges early in development ( Kartner et al., 2010; Svetlova et al., 2010). During early childhood, its nature gradually changes from passive compliance and responsive actions into spontaneous, mutual, and reciprocal cooperation ( Hay & Cook, 2007). Helping behavior specifically originates in the second year of life ( Kartner et al., 2010; Svetlova et al., 2010), and as early as 18 months, toddlers help both familiar and anonymous adults ( Hepach et al., 2017). Helping then develops gradually from ages three to six and expands by middle childhood, as children find different ways to help others. For example, while toddlers are largely limited to instrumental helping (i.e., helping the other person achieve their goal), older children may offer help in other ways, such as by expressing empathy ( Bar-Tal, 1982; Svetlova et al., 2010).

1.2 Values and prosocial behavior

How are motivations associated with the development of helping behavior? Values (e.g., care for others, achievement, creativity, safety) are desirable, abstract, and trans-situational goals that vary in importance and motivate behavior ( Schwartz, 1994, 1999, 2010). Schwartz’s model of personal values contains 10 basic values, each conveying a broad motivation ( Schwartz, 1992). The single values can be organized into four higher-order groups, reflecting two bipolar dimensions: self-transcendence versus self-enhancement (i.e. concern for the welfare of others and the social and natural world vs. the pursuit of one’s own relative success and dominance versus others, respectively; Schwartz, 1999), and openness-to-change versus conservation (i.e. promotion of one’s own independent thought and action and favoring change vs. preservation of traditional practices and protection of stability, respectively; Schwartz, 1999). The 10 values can be mapped into a circular structure (Figure 1). The location of each single value in the circle reflects its relations with other values: the closer two values are to each other (e.g., achievement and power), the more compatible their underlying motivations, while distance reflects conflict (e.g., self-direction vs. conformity; see Figure 1). The Schwartz model of values has been tested and validated in hundreds of studies among adults in over 60 countries ( Schwartz, 2012).

Studies indicate that at the age of five to 6 years, children’s value system has a similar structure to that of adults ( Cieciuch et al., 2016). Moreover, children’s values interrelate, in the manner suggested by the Schwartz model, across multiple cultures ( Daniel et al., 2020; Döring et al., 2015). Children’s value priorities also correspond to those of adults and show adult-like gender differences ( Döring et al., 2015, 2016).

Importantly, children’s values predict their behavior. In a study by Vecchione et al. (2016), values predicted a variety of behaviors among 11-year-old children. Specifically, the results showed positive correlations between values and behaviors with shared motivational goals (e.g., self-transcendence values and self-transcendence behaviors) and negative correlations between values and behaviors with conflicting motivational goals (e.g., self-enhancement values and self-transcendence behaviors).

Two studies have investigated the associations between values and prosocial behaviors among children. First, in a study by Abramson et al. (2018), placing importance on self-transcendence versus self-enhancement values was positively related to five to 12-year-olds’ costly sharing of valuable resources. Interestingly, the same values were associated with peer nominations of prosocial behavior in a sample of six to 12-year-old children, such that peers nominated children in their class who valued self-transcendence as helpful, kind, or cooperative ( Benish-Weisman et al., 2019). These studies suggest high levels of self-transcendence values and low levels of self-enhancement values are associated with prosocial behavior.
We conceptually replicated these studies by measuring values-prosocial behavior associations, and we expanded on them by specifically measuring helping behavior, whereas Abramson et al. (2018) focused on values-sharing associations. Moreover, we extended upon other prior studies (e.g. Benish-Weisman et al., 2019), by measuring an observed, rather than reported, prosocial behavior.

Our work is novel in another area as well. The findings on the associations between prosocial behavior and the value dimension of openness-to-change versus conservation are inconsistent across ages and genders during middle childhood. Abramson et al. (2018) found that attributing high importance to openness-to-change versus conservation was related to sharing more resources with an anonymous child in costly sharing circumstances only among girls. Benish-Weisman et al. (2019) found that age moderated the values-prosociality association: in a sample of six to 12 year olds, while valuing conservation predicted higher prosociality among younger children aged 6 to 7 years old, valuing openness-to-change predicted more prosociality among older children, aged 10–12. This shift in how openness-to-change vs. conservation values relate to prosocial behavior across ages suggests a possible developmental change in the motivations guiding prosocial behaviors. Examining the midpoint of this age-range may help to understand when, across development, this change happens. We therefore studied children aged 8 to 9 years, aiming to shed light on the interaction between openness-to-change values and prosocial behavior, specifically, helping behavior.

1.3 | Sustained attention and prosocial behavior

Helping behavior requires cognitive processes, as mentioned above (Warneken & Tomasello, 2006, 2007). In classic studies on the “bystander effect”, possibly the best-known research on spontaneous helping behavior in social psychology (Darley & Latané, 1968; Latané & Rodin, 1969), researchers rank “noticing a critical situation” as the first condition for helping (Fischer et al., 2011; Latané & Darley, 1970). Indeed, for one person to help another, attention is necessary to recognize and identify the other’s need.

Sustained attention (or vigilance) (Barkley, 1997; Pardo et al., 1991) is defined as the cognitive ability that allows individuals to focus on a specific task (especially a long and monotonous one), while avoiding external distractions and maintaining a relatively consistent performance over time (Avisar & Shalev, 2011; Barkley, 1997; Stern & Shalev, 2013; Tsal et al., 2005). Sustained attention develops rapidly in early and middle childhood and stabilizes around the age of 10 (Betts et al., 2006; Lin et al., 1999).

Sustained attention functions are a necessary condition for other abilities: without continuous focus, information crucial for a subsequent behavior cannot be represented
in the mind and will not be processed. Therefore, deficits in sustained attention hinder cognitive functioning, such as learning and memory (Fortenbaugh et al., 2015, 2017). Specifically, in the case of helping behavior, sustained attention may be required for the continuous focus on the social situation and the needs of others within it.

Sustained attention can be identified at different levels. First, sustained attention is a neutral, domain-free inter-individual stable ability. It is considered a low-level ability, that is, a resource required for functioning across tasks (Avisar & Shalev, 2011; Barkley, 1997). Second, attention can be defined and measured within a context. In this case, its level will be specific to a task or domain (e.g., joint attention behaviors including eye contact and gesture while communicating with others; Langton, 2000; Salley & Colombo, 2016). Nevertheless, the unique contribution of the attention aspect to the performance in domain-specific tasks is not yet clear, as it is hard to separate it from behavioral or motivational aspects. It is thus impossible to compare domain-free (neutral) stimuli and domain-specific (social) stimuli (Langton, 2000; Salley & Colombo, 2016). As a result, domain-free sustained attention is preferred by cognitive researchers over domain-specific measures because of its highly reliable measurement (Shalev et al., 2011), allowing association with a wide range of behaviors (Fortenbaugh et al., 2015, 2017; Stern & Shalev, 2013). Accordingly, we focused on a domain-free attention measure and examined its associations with prosocial behavior and values.

Past research has documented associations between attention and prosocial behavior (Ellis et al., 2004; Pérez-Edgar et al., 2010; Sheese et al., 2008). A study of sustained attention specifically found that sustained attention in infancy (9-months-old) moderated the association between behavioral inhibition in childhood (4 and 7 years old) and social discomfort when helping an unfamiliar peer in adolescence (around 14 years old), such that childhood inhibition predicted adolescent social difficulties only for children who showed low sustained attention in infancy. Importantly, the helping score was not analyzed separately but as part of a variety of social behaviors, such as inviting an unfamiliar teen to a group activity and receiving a compliment from a hypothetical teen (Pérez-Edgar et al., 2010). Other attention abilities in childhood, like behavioral inhibition and executive attention, also predict later development of social skills, including prosocial behavior at a range of ages, from 3-4-year-old children to 16-17-years-old adolescents (Ellis et al., 2004; Pérez-Edgar et al., 2010; Sheese et al., 2008; Wilson, 2003).

We are not aware of research on the association between sustained attention and helping behavior. Importantly, most research on the attention-behavior association has focused on early childhood (e.g., Bennett Murphy et al., 2007; Wilson, 2003; Xie et al., 2019) or the beginning of middle childhood (Steinbeis, 2018; Steinbeis & Over, 2017). A few studies investigating late childhood (Andrade & Tannock, 2014; Blake et al., 2015) suggested individual differences in attention are associated with prosocial behavior during middle childhood and early adolescence (Musser et al., 2013; Velő et al., 2021). However, attention processes in these studies were mostly reported (e.g., by parents; see Blake et al., 2015; or by teachers; see Andrade & Tannock, 2014), and not measured directly. Finally, this line of research has focused on specific aspects of attention (mostly inhibitory control) and neglected other crucial aspects for functioning, such as sustained attention. We aimed to fill these gaps by focusing on directly-measured sustained attention in middle childhood, testing its relations with helping behavior and its interaction with prosocial motivation, or values.

1.4 Cognitive and motivational predictors of behavior

Among children, the combined effect of motivation and cognition has mostly been tested in school achievement contexts (e.g. reading comprehension, Urfali Dadandi & Ungan, 2022), emphasizing the important predictive role of cognitive ability, alongside motivation among specific groups of children (e.g., poor achieving children at seventh grade (Ehrlich et al., 1993), girls (Kreitler et al., 1995). The combined effects of cognition and motivation have been explored in social contexts as well. Itskovich et al. (2021) found deficits in cognitive ability predicted lower levels of social functioning among both autistic and neurotypical children between the ages of 3–12, although social motivation was positively correlated with social functioning among autistic children only. Lavoie et al. (2017) examined the interplay between socio-cognitive ability (theory of mind) and social functioning, measured by parents’ reports on a combination of positive social behaviors, such as cooperation and responsibility, and negative behaviors, such as externalizing and internalizing problems) on children’s (aged 4-14) tendency to tell the truth or lie in instrumental (i.e., motivated to benefit the self) or polite (i.e., motivated to benefit the other) circumstances. They found an effect for age: polite liars tended to be older and to have higher socio-cognitive ability than instrumental liars. However, they had similar levels of social skills. In both contexts, motivational and cognitive factors interacted to predict positive functioning. Nevertheless, there is a general lack of studies testing the effect of the interplay on social functioning (Itskovich et al., 2021), and our search of the literature did not discover a direct test of the cognitive and
motivational factors predicting helping, a key prosocial behavior in social life.

1.5 | The present study

We investigated the association between 8- and 9-year-old children’s personal values, sustained attention, and helping behavior, addressing the question of the combined effect of motivation and cognitive ability on prosocial behavior. We hypothesized that attributing high importance to self-transcendence values and low importance to self-enhancement values would be directly and positively related to children’s helping behavior (H1). Based on the literature on the multiple aspects of attention during childhood, we also hypothesized that children’s helping behavior would be positively associated with sustained attention ability (H2). Last, we hypothesized that sustained attention and values would interact in predicting helping behavior, with increased helping behavior found among children with high sustained attention and self-transcendence (vs. self-enhancement) values (H3).

Building on the framework suggested by Schwartz’s personal values model (Schwartz, 1992), we tested the role of an additional motivational axis – openness-to-change versus conservation values – in helping behavior. We investigated the direct association between these values and helping behavior, as well as their interaction with sustained attention in predicting helping behavior; however, we did not set a directional hypothesis due to the conflicting previous findings (Abramson et al., 2018; Benish-Weisman et al., 2019).

2 | METHOD

2.1 | Participants

2.1.1 | Sensitivity analysis

The sample size was determined based on resource constraints. For our post-hoc sensitivity analysis, we used G*Power3.1 (Faul et al., 2007). As our study was novel in testing the interaction between personal values and sustained attention, we could not assume effect sizes based on previous studies, especially not the interaction effect between the independent variables, which requires larger samples than main effects (Aiken et al., 1991). Thus, we calculated sensitivity based on the conservative medium effect size, 0.45 (Bloom, 1995). Assuming two-tailed $\alpha$ and $\beta$ values of 0.05, the required sample size was 107.

A total of 172 children participated in the study as part of a longitudinal twin study (108 children in the total sample had twins in the sample; an analysis controlling for family membership is detailed below). Due to time restrictions stemming from the need to coordinate several families (see details below), seven participants did not perform the values task. These children were excluded from the analysis. Three participants who had a very low score in the sustained attention task (i.e., their performance accuracy was three standard deviations below the sample mean) were also excluded. Thus, the final sample included 162 participants (83 females [51.2%], mean age = 8.81, SD = 0.43). Participants performed tasks measuring temperament, prosocial behavior, and parent–child interactions (see blinded reference for further details), including the tasks relevant to this study. Participants performed the tasks individually, in separate rooms. A subsample of the participants ($n = 99$) were recruited during school holidays in open laboratory events for twins, which included several families conducting the study simultaneously. During these events, participants performed the sustained attention task together with 2–3 more participants in the same room (the rest of the tasks were transmitted in separate rooms).

2.2 | Measures

2.2.1 | Helping task

The aim of this task was to test spontaneous helping behavior. When the participant was sitting in one of the laboratory rooms awaiting their next task, the experimenter opened her bag, took out a box containing pieces of a puzzle and said: “Let’s move on to our next game!” Holding the puzzle box along with several other items, the experimenter (ostensibly by accident) dropped the box, and puzzle pieces spread over the floor. Saying “Oops”, she looked at the puzzle parts and arranged her experimental papers for 20 seconds. If the participant did not help to collect the puzzle pieces spontaneously during the 20-second period, the experimenter collected them herself for 10 seconds, while saying: “Oh, the puzzle pieces fell down. I’m so clumsy”. If child did not help the experimenter at all, they received a score of 0; if they helped before the experimenter started collecting the puzzle pieces herself, they got a score of 1; if they helped after the experimenter had already started collecting the puzzle pieces, they got a score of 0.5.

2.2.2 | Picture-based value survey for children (PBVS–C; Döring et al., 2010, 2015)

We presented participants with 20 pictures accompanied by captions, each depicting a child behaving in line with
one of the 10 values of the Schwartz model (see Figure 1 for exemplary items); each of the 10 values was represented by two pictures. Participants were asked to rank the values according to the relative importance they attributed to each value in their lives, on a scale from 1, “not important at all”, to 5, “very important”. The task was split into two sets of 10 items each to ease participants’ cognitive demands. In each set, children were requested to rank one as “very important”, and one item as “not important at all”. Then, they were requested to rank two items as “important” and two as “not important”. Finally, they were then requested to place the remaining items in the middle of the ranking scale. $n = 63$ participants completed a computerized version of the task, and $n = 99$ completed a printed version.

We calculated two value scores, each representing one of the two bipolar dimensions of the Schwartz values theory (Schwartz, 1992): the self-transcendence versus self-enhancement (ST vs. SE) score was an average of the items measuring universalism and benevolence and the reversed items measuring achievement and power. The openness-to-change versus conservation (OP vs. CO) score was an average of the items measuring self-direction, stimulation, and hedonism, with the reversed items measuring conformity, tradition, and security.

### 2.2.3  | Sustained attention

We measured participants’ sustained attention using the “cat-mouse” version of the go/no-go task (Simpson & Riggs, 2006). The task was conducted individually in front of a computer. In each trial, an image of a cat or a mouse appeared on the screen. We instructed the participants to press the space bar when a go cue (i.e., a mouse) appeared and not to press any key when a no-go cue (i.e., a cat) appeared. Four practice trials preceded the test trials (in the order of go, no-go, go, no-go), and the experimenter gave feedback on performance. After the practice trials, children completed three test blocks, each consisting of 24 trials. Each block comprised 18 go and six no-go trials, presented in random order (but invariant across children). No feedback was provided during the test blocks. Sustained attention scores reflected the number of omissions in the go trials; the maximum score was zero, and one point was taken off for each omission to press the button in the go trial, resulting in a minimum score of $-12$ (i.e., higher score indicates better performance).

### 2.3  | Procedure

The procedure and all materials were approved by the Institutional Review Board at the Hebrew University of Jerusalem. The experimental session was conducted in the lab by a female research assistant who was not familiar to the children. Participants performed the tasks described above as part of a larger study on prosocial development, in addition to other tasks beyond this paper’s scope (Vertsberger et al., 2019). The values and helping tasks were performed in a separate room, so participants could not see other children’s responses (including, when applicable, their own twin’s responses). In the open lab event days, the computerized sustained attention task was performed in a room with four computers, and four children could perform the task simultaneously. One experimenter was in the room during task completion and explained the task individually to each child. In the subsequent regular lab visits, each child performed the sustained attention task individually, in the same room where they performed the other tasks. The order of the tasks was counterbalanced. At the beginning of the session, participants’ parents provided informed consent. As a reward for participation, children received small prizes during the session (between tasks), while parents received coupons in the sum of 160–200 Shekels (approximately 50 dollars).

### 2.4  | Preliminary results and analysis plan

Before the main analyses, we conducted an intra-class correlation analysis to estimate the extent to which dependence between twins was associated with prosocial behavior. This analysis yielded an ICC of 0.33 ($p < .001$, 95% CI [0.18, 0.46]), indicating a moderate dependence between co-twins in prosocial behavior. Family membership was thus entered as a random effect in all further analyses.

We then conducted a hierarchical linear regression analysis to test the hypotheses. The variables were entered into the regression analysis in two steps. First, we entered the independent variables of number of omissions in the sustained attention task, ST versus SE values and OP versus CO values (centered), and gender as a control variable. Second, we entered the interaction terms between ST versus SE values and sustained attention; OP versus CO values and sustained attention; ST versus SE values and OP versus CO values; and the three-way interaction of all independent variables. Both models included dependence between twins as a random effect using the lme4 package in R program.

We tested the models separately among participants studied at the lab versus during open lab events. The results remained similar across locations. In addition, because the dependent variable includes a three-level scale,
we conducted the same analysis only for ordinal scale, using the `clmm` R package. All main effects and interactions were in similar directions and showed similar significance levels as those reported below, except that the interaction between the two value dimensions was not significant.

3 | RESULTS

3.1 | Descriptive statistics and correlations

Data and analysis script are openly available at [https://osf.io/s4jep/?view_only=95defcfe1104f09be63d07aaed12a1](https://osf.io/s4jep/?view_only=95defcfe1104f09be63d07aaed12a1). The ranges, means, standard deviations, and correlations among the study variables are presented in Table 1. In line with H1, self-transcendence versus self-enhancement (ST vs. SE) values were significantly and positively related to helping behavior, for both genders. They were also significantly and positively related to sustained attention (indicated by lower number of omissions in the go trials). There were significant correlations between gender and helping behavior and between gender and ST versus SE values. Specifically, girls demonstrated higher levels of helping behavior and ST versus SE values than boys.

3.2 | Regression analyses

As shown in Table 2, a significant and positive main effect of ST versus SE values on helping behavior was evident in both steps of the regression analysis, supporting H1. In the case of OP versus CO values, there was no significant main effect in the first model and a marginally significant positive main effect in the second. Gender had a significant main effect in both models, with girls more likely than boys to help the experimenter. Lastly, there was no main effect of sustained attention on helping behavior in either regression model; thus, H2 was not supported.

To test H3, we analyzed the effect of the interaction between each value dimension (ST vs. SE, and OP vs. CO) and sustained attention on helping. We found ST versus SE values and OP versus CO values both significantly interacted with children’s sustained attention (i.e., number of omissions, Table 2). We probed the interactions and conducted simple slope analyses to examine each of these interactions separately.

Figure 2 shows the moderating role of ST versus SE values in the relations between number of omissions (indicating low sustained attention) and helping behavior. The association was significant and positive among children attributing high importance to ST versus SE values (+SD; $b = 0.05$, SE $= 0.02$, $p = .05$), indicating that for children who ascribe high importance to ST, low sustained attention relates to higher prosocial behavior. In contrast, this association was not found for children attributing low importance to those values (−SD; $b = −0.02$, SE $= 0.02$, $p = .22$). H3 was not supported, as this interaction effect shows a different pattern than predicted.

Figure 3 shows the moderating role of OP versus CO values in the relations between number of omissions (indicating low sustained attention) and helping behavior. The association was significant and positive among children ascribing high importance to OP versus CO values (+SD; $b = 0.05$, SE $= 0.02$, $p = .03$), indicating that for children who ascribe high importance to OP, low sustained attention relates to higher prosocial behavior. In contrast, this association was not found among children attributing less importance to these values (−SD; $b = −0.02$, SE $= 0.02$, $p = .23$).

### Table 1 Range, means, standard deviations, and correlations of study variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Range</th>
<th>Boys ($N = 79$)</th>
<th>Girls ($N = 83$)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prosocial behavior</td>
<td>0–1</td>
<td>0.61</td>
<td>0.45</td>
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<tr>
<td>2. Self-transcendence vs. Self-enhancement values</td>
<td>2.25–5</td>
<td>3.52</td>
<td>0.57</td>
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<td></td>
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<td>3. Openness to change vs. Conservation values</td>
<td>2–5</td>
<td>2.96</td>
<td>0.40</td>
<td></td>
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<td>4. Number of omissions</td>
<td>0–12</td>
<td>1.51</td>
<td>2.04</td>
<td></td>
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<td>5. Gender (0 = male, 1 = female)</td>
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*p $\leq .01$
3.3 | Exploratory analyses

In addition to the previously reported analyses, we conducted an exploratory analysis of the interaction between the value dimensions and helping behavior. Figure 4 presents the interaction between ST versus SE values and OP versus CO values in predicting helping behavior. If children rated ST versus SE values highly, they were more likely to help, but the association was found only when the children also rated OP versus CO highly (+SD; $b = 0.23$, $SE = 0.07$, $p < .001$). Among children who valued OP versus CO to a lesser extent, the association between ST versus SE values and helping behavior was not significant ($-SD; b = 0.04$, $SE = 0.09$, $p = .65$).

4 | DISCUSSION

This study investigated mechanisms underlying helping behavior during middle childhood, looking specifically at the role of personal values and sustained attention in the helping behavior of 8- and 9-year-old children. The results point to an association between personal values and helping behavior, as well as surprising and complex...
interactions between motivational factors (i.e., personal values) and cognitive abilities (i.e., sustained attention).

4.1 The role of values in helping behavior

Attributing high importance to self-transcendence versus self-enhancement values positively predicted helping behavior: children who attributed high importance to the welfare of others provided more help to the experimenter. This finding joins the relatively scarce literature in the children’s values field. In early adolescence, the value-behavior association was previously established for a wide variety of behaviors, including but not limited to, prosocial behaviors (Vecchione et al., 2016). Results in middle childhood, in contrast, are more limited, as past studies have noted an association between self-transcendence versus self-enhancement values and sharing behavior (Abramson et al., 2018) and between self-transcendence versus self-enhancement values and peer reports of prosociality (Benish-Weisman et al., 2019).

Thus, the present finding emphasizes the association between values and social behavior among children, highlighting that they are internally motivated to benefit the other. Our study is the first to establish an association between children’s values and helping behavior, thus adding to previous work which focused on sharing behaviors (Abramson et al., 2018) or genosociability (Benish-Weisman et al., 2019). This contribution is important, as sharing and helping are different aspects of prosocial behavior that may stem from different antecedents (Eisenberg et al., 1999, 2015; Gross et al., 2017; Knafo-Noam et al., 2018). Moreover, this is one of the first studies to show relations between values and observed behaviors in children, as opposed to self- or peer-reports.

We did not establish a clear association between openness-to-change versus conservation (OP vs. CO) values and helping behavior. Past studies have found varied

FIGURE 3 The moderating role of sustained attention in the relations between openness-to-change values and helping behavior; low number of omissions = high attention score, high number of omissions = poor attention score. The shaded areas represent SEs.

FIGURE 4 The interaction between ST vs. SE and OP vs. CO values in predicting helping behavior. The shaded areas represent SEs.
findings regarding the associations between openness-to-change values and prosociality, depending on children’s age and sex. One study found the tendency to share in costly situations was higher for children (5–12 years of age) who valued openness-to-change, but only among girls (Abramson et al., 2018). Another study of six to 12-year-old children found a moderating effect of age: openness-to-change values and prosocial behavior were negatively associated among younger participants, but positively associated among older participants (Benish-Weisman et al., 2019). Our study supports the latter results; we found the association between openness-to-change versus conservation values was positively related with helping in children of similar ages to those in Benish-Weisman et al.’s (2019) study.

The exploratory analysis revealed children who valued self-transcendence over self-enhancement values were more likely to help if they also ascribed high importance to openness-to-change versus conservation values (in the hierarchical regression but not in the ordinal scale analysis, as detailed above). As mentioned, the children in our sample were 8 and 9 years old, corresponding in age to the middle group of participants in Benish-Weisman et al.’s (2019) study; thus, our findings may corroborate the previous results. Arguably, at the beginning of middle childhood, children’s prosocial behavior may result from compliance with social demands, while older children’s helping behavior may derive more from authentic internal motivation (Eisenberg et al., 2016). As openness-to-change values stress independence of thought, self-respect, and autonomic decision making, high ranking of these values may indicate higher authenticity, thus indicating the importance of transcendence values.

In addition, prosocial behavior is often linked with extroversion; that is, children who are more prosocial tend to behave in more outgoing and energetic ways (Carlo et al., 2005). For example, a recent study found a correlation between shyness and less prosociality in toddlerhood (Eisenberg et al., 2019). In our study, children were required to behave extrovertly in order to help; they had to initiate a behavior to assist an unknown adult. The extroversion trait was previously associated with high openness-to-change and low conservation values (Parks-Leduc et al., 2015; Roccas et al., 2002). In other words, it is possible that within this study’s context, children helped more when they were motivated to care for others (valued self-transcendence vs. self-enhancement) but were also open to initiate and express self-directed behavior (valued openness-to-change vs. conservation) (Knafo & Israel, 2012).

We found girls more likely than boys to attribute high importance to self-transcendence values and act according to them (i.e., to provide help). These results are consistent with previously established gender differences in values (e.g., Döring et al., 2015) and prosocial behavior (Eagly, 2009).

4.2 | Values-attention interactions

Attributing high importance to helping others was correlated with a high attention score in our sample, a result that supports former findings of positive relations between other aspects of attention and prosocial behavior (e.g., Wilson, 2003). However, these relations were found for motivation (i.e., valuing self-transcendence vs. self-enhancement), but not for the prosocial behavior itself.

We were surprised to find an interaction effect whereby children who were lower in sustained attention helped more if they attributed higher importance to helping others (i.e., valuing self-transcendence vs. self-enhancement). This finding stands counter to our hypothesis and in contrast to the developmental literature showing positive associations between high attention and prosocial behavior in early childhood. However, the literature on adults may shed some light on these results. Prosocial behavior is posited as typically beneficial for individuals in daily life, and for that reason, it becomes automatized and intuitive. According to this argument, in situations where prosocial behavior does not benefit the individual in the short term, deliberation—an action characterized by intensive attention control—“blocks” the tendency to cooperate and help (Decety et al., 2016; Zaki & Mitchell, 2013). Rand et al. (2014) demonstrated this phenomenon using aggregated data from 15 studies; they found participants acted more prosocially when they were under time pressure (i.e., when their cognitive resources were restricted, constraining their ability to make calculated choices), than when they were not, as well as when they made rapid decisions (Rand et al., 2012). Furthermore, priming an intuitive processing style (i.e., participants were asked to recall a situation when they acted immediately without a conscious or reasoned thinking process) promoted cooperation in a social dilemma game (Lotz, 2015). A recent study of toddlers’ helping is consistent with these findings as well. Children who helped more rapidly showed more prosocial behavior, as indicated by more frequent helping than those who were slower to help (Grossmann et al., 2020). By the same token, a study of sharing behavior among young children (aged 3-, 5-, and 7-years old) found they shared more stickers under time pressure than when instructed to take their time and consider their decision (Plötner et al., 2021).

Importantly, the association between intuitive thought and prosocial behavior has not been replicated consistently among adults, as shown in a number of studies...
manipulated attention abilities assessed for each participant. Specifically, researchers suggest intuitive cognitive processes are more strongly related to prosociality among individuals inclined to prosocial behavior. For example, adults with a high social value orientation, but not those focused on the self, may be more likely to cooperate intuitively (Mischkowski et al., 2019). Similarly, a study of adults found self-transcendence values were positively associated with donation behavior, and the relations between self-transcendence values and donation were moderated by cognitive load (Miles, 2015). Specifically, among participants valuing self-transcendence, those under high cognitive load tended to donate more than those under low cognitive load. Based on these findings, Miles (2015) suggested values represent people's intuitive dispositions; thus, when people are in a situation that limits their available cognitive resources, they are more likely to act on their intuitive inclinations (i.e., their values). We suggest our findings may be similar. Children in our study were more likely to act intuitively and help if they had little cognitive resources (i.e., low sustained attention), but only if they valued self-transcendence more and self-enhancement less.

The link between this literature and our findings is not direct and may be speculative. In the studies described above, attention was manipulated within the experimental setting (Miles, 2015; Verkoeijen & Bouwmeester, 2014), while we focused on the non-manipulated attention abilities assessed for each participant. However, some researchers consider attention to be a resource (Franconeri et al., 2013; Reynolds et al., 1999) that can be limited both by situational reasons (i.e., manipulations that cause intuitive processing, e.g., fatigue) as well as by one's stable original ability. In light of this claim, our finding suggests that when cognitive resources are limited, and the person's motivational tendency is prosocial, their intuitive behavior will be prosocial.

Another difference between our studies and the intuitive-prosocial literature is our focus on children at the ages of eight to nine (Miles, 2015; Rand et al., 2016). As previously mentioned, studies have found positive associations between attention measures and prosociality mainly among young children (e.g. Ellis et al., 2004; Pérez-Edgar et al., 2010). In contrast, intuitive prosociality has mostly been studied among adults (Miles, 2015; Rand et al., 2014). It is possible that the intensive developmental processes taking place during the first years of school in attention (Betts et al., 2006) and values (Cieciuch et al., 2016) enable children’s intuitive behavior to become more prosocial, resembling adults’ behavior. Future studies should further test this hypothetical link.

In our study, children who showed less sustained attention were more likely to help if they rated openness-to-change values highly; we did not find this association among children with higher sustained attention. As this was the first study to examine the moderating role of openness-to-change motivations in the association between attention and prosocial behavior, our results require replication and elaboration. Previous results suggest that in late childhood, openness-to-change values become motivators of prosocial behavior (Benish-Weisman et al., 2019). Thus, it is possible that the mechanism suggested above, intuitive prosociality, may be relevant here as well. Children motivated by openness-to-change may be more likely to behave prosocially when they act intuitively and without deliberating their behavior.

Alternatively, our explanation of extroversion-introversion differences between children in the interaction between value dimensions may be relevant for explaining the interaction between attention and values. Previous work found less attentive children may be more extroverted than more attentive children (Égan et al., 2020). As the helping measure we used requires extroversion to some extent, children who valued openness-to-change and were less attentive, thus most likely to be extroverts, were more inclined to help the experimenter.

### 4.3 Strengths, limitations, and future directions

This study has several notable strengths. First, we investigated the full system of values, by measuring not only the role of self-transcendence versus self-enhancement values but also the role of openness-to-change versus conservation values. This second motivational dimension provided a new theoretical perspective on the interaction between attention and values in their roles as promoting social behavior. Specifically, we showed that attention interacts with openness-to-change values in a way similar to self-transcendence values.

Second, we measured the effect of attention directly and did not rely on reports. Individual differences in attention are relatively stable, and they affect an individual’s functioning (Barkley, 1997; Tannock, 2013). Direct measurement has good validity, while reports are sometimes biased, so our findings make a substantial methodological contribution to the literature. Future research could use both methods to clarify the associations between them.

Third, the participants in our study were eight to 9 years old. Former studies in this age group tested only the effect of attention on prosociality or personal value priorities on prosociality, and did not test...
their interaction. Such interactions are critical, as demonstrated in other fields in which ability and motivation interact to predict children’s behavior (Ehrlich et al., 1993; Itskovich et al., 2021; Kreitler et al., 1995; Urfali Dadandi & Ungan, 2022). As noted earlier, attention and values develop intensively during middle childhood (Betts et al., 2006; Cieciuch et al., 2016; Zarr & Brown, 2016), and are reciprocally related (e.g., Caemmerer & Keith, 2015). In the past, the effect of intuitive action, values, and prosociality has been tested among adults (especially young adults) in manipulated-attention studies. Our work adds to this literature by opening a window onto motivation-ability dynamic associations in a critical developmental period that was not investigated before.

Among the limitations of the study, we should note that while instrumental helping is a core measure of prosocial behavior, it does not reflect the entire prosocial behavior construct. Additional types of prosocial behavior include other helping behaviors (e.g., altruistic and empathetic) and non-helping behaviors (e.g., sharing and comforting; Dunfield et al., 2011; Knafo & Plomin, 2006; Paulus, 2014; Paulus & Moore, 2014). Moreover, the different aspects of prosocial behavior are not always positively correlated (Gross et al., 2017). Thus, our results cannot be generalized to all types of prosocial behavior. Future studies should examine the role of attention and values in other forms of prosocial behavior, as well as the individual origins of self-initiated versus compliant prosocial behavior (e.g. Eisenberg et al., 1981; Knafo et al., 2011).

Similarly, our results cannot be generalized to other types of attention abilities. Sustained attention functions as a core attention mechanism, and impairment in sustained attention has a strong negative effect on daily functioning ability as working memory and self-regulation (Barkley, 1997). However, given the surprising interaction effects we found, exploring other attention networks would yield broader insight into the dynamics between attention, values, and helping behavior. In addition, we chose to measure sustained attention in a domain-free task to increase reliability of the measure (Shalev et al., 2011) and tap into the individually-stable aspects of attention, as the ability to isolate attention in social attention tasks has not been systematically examined, and researchers often refer to these measures as indications for behavior and motivation rather than attention (Salley & Colombo, 2016). This choice, of course, influenced our results. Future studies should examine the association using domain-specific measures as well (i.e., measures that are functionally relevant to helping behavior).

In conclusion, we examined the combined effect of personal values and sustained attention on children’s instrumental helping behavior. First, we found a main effect of valuing self-transcendence versus self-enhancement on helping. Second, we found that this pattern was especially true for children with lower sustained attention: they helped more if they attributed high importance to self-transcendence versus self-enhancement values, and also if they valued openness-to-change versus conservatism values. We therefore suggest that children may perform helping behavior if their initial internal motivation is prosocial. Overall, the findings demonstrate the complex interactions between personal motivation and cognitive ability in promoting children’s prosocial behaviors.

**AUTHOR CONTRIBUTIONS**
The theory-driven hypothesis was suggested by Kinneret Misgav, Reut Shachnai and Ella Daniel, to be tested by Reut Shachnai and Lior Abramson on existing data sets. Data was collected by Lior Abramson and Ariel Knafo-Noam. Writing of the manuscripts was conducted by all authors.

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**CONFLICT OF INTEREST**
None.

**ETHICS STATEMENT**
The procedure and all materials were approved by the Institutional Review Board at the Hebrew University of Jerusalem.

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**REFERENCES**


