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# Need, effort, or integration? The development of intuitive distributive justice decisions in children, adolescents, and adults

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## Abstract

This study examined the criteria children, adolescents, and adults intuitively apply when they distribute a resource between two protagonists who differ systematically in need and effort. Two main questions were investigated: (a) Do the allocation criteria (equality, need, effort, integration of need and effort) differ by age? (b) Do the allocation criteria of adolescents differ in accordance with whether they attend a vocational or an academic-track school? A total of $N = 481$ participants took part in two experiments. In each, they had to make 18 decisions about how to allocate a resource fairly. The experiments differed in their operationalization of need (amount of sweets in Experiment 1 vs. number of toys in Experiment 2). In Experiment 1, allocation decisions made on the basis of need information alone occurred primarily in 7- and 9-year-olds and became less frequent in 12- and 16-year-olds and adults. Allocation decisions made on the basis of effort information alone were rare in children and occurred with increasing frequency in adolescents and adults. An integration of need and effort was the most common principle chosen from ages 9 to 16, followed by an orientation toward integration or effort alone in adults. Adolescents' allocation patterns did not vary by the type of school they attended. In Experiment 2, only adolescents and

adults participated. Their results largely replicated those of Experiment 1. The discussion addresses the impact of cognitive development and socialization processes for the development of distributive justice.

**KEYWORDS**

equity, information integration, moral development, resource distribution, school tracking

## 1 | INTRODUCTION

The question of how to distribute resources fairly within a society or among individuals is a central topic for the cohesion of human societies. Equality, need, and equity are among the main principles people rely on when making distributive justice decisions (Damon, 1977; Deutsch, 1975; Sommerville, 2018). The principle of *equality* ensures that everybody gets the same share, whereas the *equity* principle (Adams, 1965) means that each person's share is in accordance with their input or contribution (e.g., effort or merit). According to the *need* principle, those who have less should get more. The current study aimed to address two main questions: Does the application of distribution principles (a) differ by age and (b) depend on the type of secondary school students attend?

Unlike many previous studies, which have focused on rather narrow age ranges and studied either need or equity, we examined how children, adolescents, and adults distributed resources intuitively in a third-party context in which the levels of both need and effort were systematically varied. Further, we were interested in the meaning of the school environment for distributive justice decisions.

### 1.1 | Normative development: distributive justice principles and age

An intuitive sense of distributive justice emerges as early as infancy (Sommerville, 2018). All things being equal, infants younger than 2 years prefer people who divide equally (Burns & Sommerville, 2014; Geraci & Surian, 2011) and expect resources to be distributed evenly (Schmidt & Sommerville, 2011; Wang & Henderson, 2018, Exp. 1; Ziv & Sommerville, 2017). Infants also expect distributors to allocate rewards equitably (Sloane et al., 2012, Exp. 2; Surian & Franchin, 2017; Wang & Henderson, 2018, Exp. 2). Moreover, they reward agents who protect or defend victims from aggressors (Geraci, 2020a; 2020b) and expect bystanders to reward someone for defending a victim (Geraci & Surian, 2021).

At age 3, children reward agents who work harder (Baumard et al., 2012). With respect to need, 4- and 5- but not 3-year-old children allocate a greater share of resources to needier recipients (Li et al., 2014; Paulus, 2014). Both the equity and the need principles are increasingly applied during childhood (Cowell et al., 2019; Elenbaas & Killen, 2016; Elenbaas et al., 2016; Huppert et al., 2019; Rizzo & Killen, 2016; Rizzo et al., 2016; Schmidt et al., 2016).

Studies of adolescents' distributive justice decisions have focused on the consideration of contextual information, such as explanations of poverty (Kornbluh et al., 2019), situational contexts such as work, education, and charity (McGillicuddy-De Lisi et al., 2008; Sigelman & Waitzman, 1991), or the types of resources (Meidenbauer et al., 2018). All of them found an increasing use of contextual information during adolescence.

In adulthood, contextual variables heavily influence adults' choices of distributive justice principles. Deutsch (1975) argued that equity-based decisions should be more likely when economic productivity is a primary goal, whereas need should be preferred in relationships that focus on personal welfare. Equality should be the dominant principle in solidarity-oriented groups. Kazemi et al. (2017) confirmed the relation between group goals and allocation

principles in young adults. They found that inducing economic productivity as the group goal resulted in preferences for equity, whereas inducing relational goals (e.g., harmony) resulted in preferences for equal outcomes.

The aforementioned research indicates that children, adolescents, and adults attend to the principles of equality, need, and equity when distributing resources. However, none of these studies examined the development of distributive justice decisions in an allocation context (a) involving the systematic variation of need *and* equity and (b) in which it is also possible to *integrate* (i.e., to consider two principles simultaneously). Such studies are important not only because real-world allocation recipients often differ with respect to need and equity but also because these values may conflict with one another. For example, welfare recipients do not contribute, but they are needy—how much support should they get from society?

One theory that explicitly addresses the issue of the simultaneous consideration of multiple factors is information integration theory (Anderson, 1996). This theory describes how people integrate two or more pieces of information to make an overall judgment. Studies in areas such as intuitive mathematics or physics have documented that even preschool children take two or more stimulus dimensions into account in their judgments. Adolescents and adults make almost perfect intuitive estimates of mathematical or physical laws (e.g., Ebersbach & Wilkening, 2007; Wilkening & Cacchione, 2011). In contrast to these thematic areas, there are no objectively correct or incorrect judgments in justice decisions. Therefore, the question that arises is whether an increase in integration capacity with age can also be expected in distributive justice research.

Anderson and Butzin (1978) addressed this topic by asking 4- to 8-year-old children to distribute resources between pairs of story characters on the basis of information about need and merit. All 8-year-old and even some 4-year-old children integrated need and merit in their fairness judgments.

Kienbaum and Wilkening (2009) asked 7- and 9-year-old Swiss children to allocate resources between two protagonists whose need and luck (Experiment 1) or need and effort (Experiment 2) were systematically varied. Need appeared to be the most important criterion for about half the children. Integration depended on the situational context and occurred in at most one third of the children.

In another study, 9-, 12-, and 15-year-old German children (Kienbaum, 2013) distributed resources between two protagonists who differed systematically in need and effort. Most of the elementary school children gave more to the needier protagonist—just like their peers in Switzerland. All age groups integrated need and effort, but the extent of this integration depended on participants' age and type of school.

So far, results concerning information integration in distributive justice judgments have been contradictory. Whereas Anderson and Butzin (1978) reported that 8-year-olds could already integrate to 100%, other studies (Kienbaum, 2013; Kienbaum & Wilkening, 2009) found a much lower rate of integration in childhood. According to Kienbaum (2013), whether or not integration capacity increases between childhood and adolescence depends on the type of school the adolescents attend. Studies on adults are missing. Thus, as part of the question about age differences, we examined children, adolescents, and adults to determine whether information integration increases with age.

## 1.2 | Intuitive decisions

Information integration theory further proposes that "intuitive calculations underlie judgments of deservingness and equity" (Anderson & Butzin, 1978, p. 603). The assumption that intuitive processing influences moral judgments has been intensively debated since Haidt (2001) introduced the social intuitionist model and has been confirmed several times (e.g., Van de Vondervoort & Hamlin, 2016; Ward & King, 2018). In order to capture the intuitive level of processing, we adopted a method that was already successfully applied by Anderson and Butzin (1978).

Participants' task was to spontaneously distribute 20 wooden rings between two protagonists 18 times in a row. If they did not distribute immediately, they were asked to do so entirely "by gut feeling." Thus, participants had to make a rather large number of consecutive allocation decisions in a short time period. As in other studies on information integration theory, we refer to this type of decision as intuitive because the focus is not on people's deliberate, explicit,

verbal statements but on fine-graded distributions that do not rely on conscious reasoning processes that are accessible to verbal report. In a computer-based version of the experiment that was administered to 12-year-olds (N = 38), we measured how long it took until they allocated the resource. The mean reaction time was 5.08 s, with a standard deviation of 2.57 s (Moch, 2018). We regard this as at least a preliminary confirmation that the allocation decisions are indeed made intuitively.

## 1.3 | Interindividual differences: school environment

Apart from age concerns, knowledge about the emergence of interindividual differences in the development of preferences for allocation criteria is limited. Paulus and Leitherer (2017) reported that being prosocial and having siblings were related to 5-year-old children's preference for the need principle. Kornbluh et al. (2019) found that adolescents based their resource-allocation decisions on merit when they attributed poverty to individual causes but on need when they attributed poverty to structural or a mix of structural and individual causes.

This study attempts to shed light on the possible significance of the school environment for the development of interindividual differences in preferences for allocation criteria. A study of German children and adolescents (Kienbaum, 2013) found that the distribution decisions of 12- and 15-year-olds depended on the type of secondary school they attended. In Germany, after completing elementary school, 10-year-old students are tracked into different types of secondary schools on the basis of their grades. Among them is Gymnasium, a school preparing students for university, and Hauptschule, a school preparing students for vocational training. In Kienbaum's (2013) study, older students integrated need and effort more often than younger ones only if they attended a Gymnasium, whereas those attending a Hauptschule integrated as much as fourth-graders. Furthermore, Gymnasium students allocated more frequently on the basis of effort information compared with Hauptschule students (see Table S1 in Supplement 1).

Analyses of major international comparative studies (PISA, TIMSS) have shown that early selection leads to an increase in inequality in student achievement (Woessmann, 2009). Does it also have an impact on distributive justice decisions?

Gymnasiums are associated with high performance requirements. To be successful, students need to invest a great deal of effort. This could explain the high rate at which they tended to choose the effort principle in their allocation decisions.

Students attending Hauptschules might not rely on effort as much for several reasons. Early in life, they may have found that their achievement was not sufficient to get them into a higher track school, even though they probably tried as hard as other children. Given the worse prospects that their qualification offers for the labor market, Hauptschule students may ask themselves whether effort is worthwhile at all. The negative judgments that are often expressed in public about Hauptschules (e.g., Völcker, 2016) could also reinforce unfavorable performance-related conviction patterns. Apart from this, according to the logic of early tracking, Hauptschule students should possess a lower level of cognitive development. Therefore, it might be more difficult for them to integrate need and effort.

In order to further investigate the meaning of school systems for distributive justice decisions, we conducted our study in South Tyrol, Italy, where tracking begins only at around age 14 and is not based on prior grades (Woessmann, 2009). Students can choose between two types of schools: Berufsschule, a secondary school focusing on vocational training, and Oberschule, an academic-track school. Given that later tracking is associated with less marked differences in achievement, the differences in distributive justice decisions between Italian adolescents who attend vocational versus academic-track schools should be less pronounced than between German adolescents (Kienbaum, 2013).

## 1.4 | The present study

This study analyzed how children, adolescents, and adults intuitively allocated resources between two protagonists whose levels of need and effort were systematically varied. The objectives of the study were threefold:

First, we aimed to go beyond the mere statement that people tend to consider the principles of need and equity more often as they get older. Our aim was to identify possible age-related changes in distributive justice decisions by describing whether different age groups (children, adolescents, adults) prefer different principles (equality, need, effort, integration of need and effort). On the basis of previous results from information integration theory (Kienbaum, 2013; Kienbaum & Wilkening, 2009), we expected elementary school children to rely less on effort than older participants (H1) and to prefer need over effort (H2).

We expected adolescents to rely more on effort than children because they have learned from their ongoing socialization in school that effort, rather than need, is typically rewarded. Further, due to increases in cognitive capacities, we expected adolescents to mostly integrate need and effort (H3). A similar consideration applies to adults: On the one hand, because of their cognitive capacities, we expected many adults to integrate (H4), and on the other hand, we expected them to be strongly oriented to the situational context. Given that the participants' task was to distribute resources justly between students in a school, we expected adults to prefer effort over need (H5).

Second, we examined the development of interindividual differences in distributive justice decisions, with a focus on the meaning of the school environment. Because tracking in Italy begins later than in Germany and is not based on prior grades, the abovementioned factors that might have led to a less frequent choice of the effort principle in German adolescents who attended a Hauptschule (Kienbaum, 2013) should not be at work. Thus, in contrast to German adolescents, we did not expect the distributive justice decisions of the Italian adolescents to differ markedly by the type of school they attended (H6).

Third, we asked whether the operationalization of need in terms of sweets or toys would make a difference. Most studies operationalize need with sweets, stickers, or other toys; items that are highly familiar and desirable to children and adolescents (e.g., Cowell et al., 2019; Huppert et al., 2018; Li et al., 2014; Paulus, 2014). Although these are no true needs, since they represent luxuries as opposed to necessary resources (Essler et al., 2020; Meidenbauer et al., 2018; Rizzo & Killen, 2016; Rizzo et al., 2016), to the best of our knowledge, no studies have compared whether the use of sweets versus toys yields the same results. This is unfortunate because, at least from an adult's perspective, a child with fewer toys may be considered needier than one with fewer sweets. Thus, we operationalized need in terms of both sweets (Experiment 1) and toys (Experiment 2).

## 2 | EXPERIMENT 1

### 2.1 | Method

**Participants**. Data were collected in a rural area of northern Italy. The participants ($N = 288$) were predominantly from a middle-class background and belonged to the German-speaking majority of this province. We performed a power analysis with the Superpower package (Caldwell et al., 2021). Superpower allows users to empirically determine a priori power using a simulation approach. We set the alpha level to .05, and the means were based on earlier publications (Kienbaum, 2013; Kienbaum & Wilkening, 2009) and pilot data. Using 48 participants in each subgroup (7-, 9-, and 12-year-olds; 16-year-olds from vocational and academic-track schools, respectively, and adults) resulted in 100% power for the main effects of need, effort, and subgroup, and for the interaction between subgroup and need. A power of 87.45% was reached for the interaction between subgroup and effort.

The students attended 15 German-speaking schools. Elementary-school children attended Grade 2 ($M_{age} = 7.91$, $SD = 0.35$) or Grade 4 ($M_{age} = 9.59$, $SD = 0.35$). Adolescents attended Grades 6 and 7 in three middle schools ($M_{age} = 12.48$, $SD = 0.70$), or they were in their second year of two vocational schools ($M_{age} = 16.56$, $SD = 1.12$) or two academic-track schools ($M_{age} = 16.02$, $SD = 0.56$). We chose these age groups to ensure comparability with existing studies (Kienbaum, 2013; Kienbaum & Wilkening, 2009). The adult sample ($M_{age} = 43.30$, $SD = 13.22$) was composed of half elementary-school teachers and half adults from various professions. This approach allowed us to additionally test whether there might be a correspondence between the allocation criteria of students and teachers from

elementary schools. Half of each subsample comprised female participants. The children's parents provided written consent. Participants received small gifts in return for their participation. The study followed the ethical guidelines outlined by the German Psychological Society (Deutsche Gesellschaft für Psychologie, 2016).

**Procedure and measures**. For students and teachers, the experiment was conducted one-on-one in a quiet room at their school. The adults who were not teachers could pick another location (e.g., home, work). The participants sat facing the experimenter at the opposite side of a table on which the materials were placed. The experiment required 20 min on average.

The study employed a $3 \times 3$ factorial within-subjects design (three levels of need and three levels of effort), resulting in nine stories per experimental condition. The stories told of children who had to clean up the schoolyard. The first protagonist (A) collected a small, medium, or large amount of garbage, depending on the story. The second protagonist did not collect garbage but had fewer sweets (B), an equal number of sweets (C), or more sweets (D) at home than Protagonist A. The letters in parentheses correspond with the first letter of the protagonists' names in the respective stories (see Supplement 2).

At the beginning of the experiment, the participants were told that there were no wrong answers and that we wanted only their opinion. Then three stories (1, 3, and 9, see Supplement 2) were presented as trial runs. In these, the participants learned both the framing story and the different levels of need and effort. The standardized instructions for the first trial run read as follows: "I am going to tell you a story about children at a school. One day, the children were supposed to be cleaning up the schoolyard. This is Anne. She put forth a little effort and collected a small amount of garbage. This is Betty. She did not put forth any effort and did not collect any garbage. At home, she has fewer sweets than Anne. Here is some candy left over from a birthday party. These are the pieces of candy (pointing to the wooden rings, see below). The teacher says that you may distribute them between the two children (pointing to two Playmobil® figures). Please distribute them in a way you think is fair." If the participants did not make a spontaneous distribution, they were asked to distribute "from their gut." In order to leave no doubt that the result of the work was intentional, we mentioned both effort and outcome (amount of garbage collected) in the stories.

After the trial runs, participants were asked if they had any questions. If they did not, the nine stories followed in six different random orders. After each story, the Playmobil® figures and the other materials were removed and replaced with those from the new story. The experimenter responded to each allocation decision with a neutral "Okay." Responses such as "good" were avoided so that the experimenter did not appear to be evaluating the participants.

For the purpose of calculating response consistencies and analyses of variance (ANOVAs) per individual participant (see below), the nine stories were given twice in succession. In total, each participant divided the pieces of candy 21 times, but the three trial runs were not included in the statistical analyses. The childlike structure of the experiment was explained to the adolescent and adult participants by telling them that their judgments would be used as standards against which the children's data could be compared.

Three cellophane bags filled with small, medium, or large amounts of trash (reaching mean heights of 3 cm, 7 cm, or 12 cm, respectively, in an 18-cm tall bag) represented the garbage. The sweets at home were symbolized by small ($1.8 \times 3.5 \times 8.5$ cm), medium ($4 \times 6 \times 10$ cm), or large ($5.5 \times 9.5 \times 16$ cm) paper boxes with pieces of candy painted on them. The Protagonists A, B, C, and D were symbolized by Playmobil® figures to which the corresponding letter was affixed (see Supplement 3). Each protagonist's gender corresponded to each participant's gender.

Participants' task was to distribute 20 wooden rings, each representing a piece of candy, between the two protagonists. As in Anderson and Butzin (1978), these rings had a diameter of 3.5 cm and a width of 0.8 cm and were centered on a 30-cm-long wooden bar. Protagonist A was always placed at one end, and Protagonists B, C, or D at the other end of the bar. In each trial, the participants were required to spontaneously allocate all 20 rings by sliding them to the ends of the bar.

To determine the reliability, we computed the concordance between the two experimental blocks by calculating within-participant correlations. These were transformed into Fisher's z-scores, averaged, and transformed again. The mean $rs$ were .92 (7-year-olds), .78 (9-year-olds), .79 (12-year-olds), .95 (16-year-olds from both the vocational and academic-track schools), and .97 (adults).

**FIGURE 1** Mean allocation of the 20 pieces of candy to Child A as a function of effort and need. The levels of need were lower, the same, or higher compared with the other child and are symbolized by the dotted, dashed, and solid lines in the graph, respectively. voc. = vocational school, acad. = academic-track school
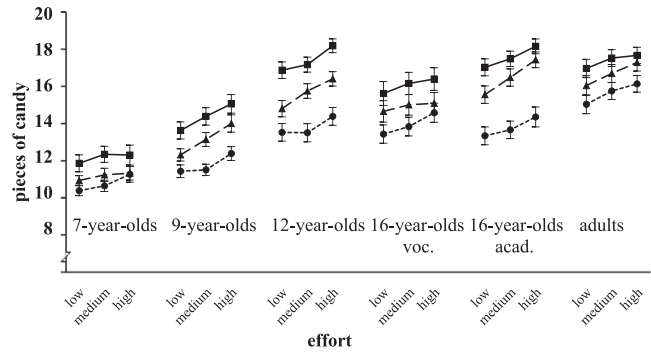


**Data analytic plan**. Data were analyzed in two ways: First, we computed repeated-measures ANOVAs on the group level. Second, in order to identify the distribution principles each *individual* participant followed, we computed ANOVAs for each participant. Because significance tests depend on sample size, and because the individual analyses were based on the 18 allocation decisions that each participant made, we followed the standard methodological procedures of information integration theory (Anderson, 1982) and set $p < .10$ as the significance level.

Depending on which main effect became significant in the individual ANOVAs, the participants were divided into the following categories: (a) allocation according to *need* alone, (b) allocation according to *effort* alone, or (c) *integration* (if both main effects for need and effort were significant). If there was no significant main effect, the raw data were inspected to determine (d) whether this was due to *equal divisions* or (e) whether the division did not follow a recognizable pattern (*no principle*). Additionally, we categorized participants as having relied on effort information alone if they allotted at least three quarters of the candy to Protagonist A on average. This was done because otherwise, the participants who ignored the differences within the effort category but gave most of the candy to the working protagonist would have remained in the no principle category.

## 2.2 | Results and discussion

**Analyses on the group level**. We computed a 3 (need: lower, same, higher) x 3 (effort: low, medium, high) x 6 (subgroups: 7-year-olds, 9-year-olds, 12-year-olds, 16-year-olds in vocational schools, 16-year-olds in academic-track schools, adults) repeated-measures ANOVA. For the effects that violated sphericity, we applied the Greenhouse-Geisser correction to the degrees of freedom. Main effects were significant for need, $F(1.49, 419.28) = 189.02$, $p < .001$, $\eta_p^2 = .40$, effort, $F(1.61, 453.98) = 102.34$, $p < .001$, $\eta_p^2 = .27$, and subgroup, $F(5, 282) = 26.05$, $p < .001$, $\eta_p^2 = .32$. These were qualified by two-way interactions between need and subgroup, $F(7.43, 419.28) = 5.59$, $p < .001$, $\eta_p^2 = .09$, and between effort and subgroup, $F(8.05, 453.98) = 1.96$, $p = .05$, $\eta_p^2 = .034$. These interactions show that the extent to which each subgroup considered need or effort differed.

Next, we calculated 3 (need: lower, same, higher) x 3 (effort: low, medium, high) repeated-measures ANOVAs separately for each subgroup. Figure 1 displays the mean number of pieces of candy given to Protagonist A on the combined basis of need and effort. The data from the first and second measurements were averaged, given the high concordance between the two blocks of the experiment.

Need had a significant effect among the 7-year-olds, $F(1.23, 57.95) = 10.30$, $p < .001$, $\eta_p^2 = .18$; the 9-year-olds, $F(1.40, 65.92) = 27.60$, $p < .001$, $\eta_p^2 = .37$; the 12-year-olds, $F(1.60, 75.22) = 78.06$, $p < .001$, $\eta_p^2 = .62$; the 16-year-olds from vocational schools, $F(1.50, 70.71) = 18.98$, $p < .001$, $\eta_p^2 = .29$; the 16-year-olds from academic-track schools, $F(1.37, 64.35) = 56.55$, $p < .001$, $\eta_p^2 = .55$; and the adults, $F(1.40, 65.70) = 26.73$, $p < .001$, $\eta_p^2 = .36$. Effort was significant for the 7-year-olds, $F(1.63, 76.56) = 3.85$, $p = .025$, $\eta_p^2 = .08$; the 9-year-olds, $F(1.55, 72.71) = 35.24$, $p < .001$, $\eta_p^2 = .43$; the 12-year-olds, $F(1.58, 74.33) = 23.24$, $p < .001$, $\eta_p^2 = .33$; the 16-year-olds from vocational schools,

**TABLE 1** Mean number of candy given to protagonist A (from 20)

| | n | M (SD) | 95% CI |
|---|---|---|---|
| 7-year-olds (elementary school) | 48 | 11.36 (2.00) | [10.78, 11.94] |
| 9-year-olds (elementary school) | 48 | 13.10 (2.27) | [12.44, 13.76] |
| 12-year-olds (middle school) | 48 | 15.64 (2.48) | [14.92, 16.36] |
| 16-year-olds (vocational school) | 48 | 14.99 (3.49) | [13.97, 16.00] |
| 16-year-olds (academic-track school) | 48 | 15.96 (2.69) | [15.96, 16.74] |
| Adults | 48 | 16.59 (2.99) | [15.72, 17.46] |

**TABLE 2** Percentages of participants who allocated according to principles of distributive justice (need operationalized as number of sweets)

| | 7-year-olds elementary school (n = 48) | 9-year-olds elementary school (n = 48) | 12-year-olds middle school (n = 48) | 16-year-olds vocational school (n = 48) | 16-year-olds acad.-track school (n = 48) | Adults (n = 48) |
|---|---|---|---|---|---|---|
| No principle | 19% | 8% | 2% | 6% | 0% | 4% |
| Need alone | 31% | 31% | 21% | 17% | 17% | 4% |
| Effort alone | 6% | 13% | 21% | 25% | 27% | 40% |
| Integration (need and effort) | 19% | 46% | 56% | 42% | 52% | 46% |
| Equality | 25% | 2% | 0% | 10% | 4% | 6% |
| **Sum need** | 50% | 77% | 79% | 59% | 69% | 50% |
| **Sum effort** | 25% | 59% | 77% | 67% | 79% | 86% |

*Note.* Sum need = need alone + integration. Sum effort = effort alone + integration.

$F(1.50, 70.38) = 9.26$, $p = .001$, $\eta_p^2 = .17$; the 16-year-olds from academic-track schools, $F(1.37, 64.39) = 30.50$, $p < .001$, $\eta_p^2 = .39$; and the adults, $F(1.13, 53.31) = 18.94$, $p < .001$, $\eta_p^2 = .29$. Thus, all subgroups considered need and effort in their allocation decisions.

Subsequently, we computed the mean number of pieces of candy allocated to Protagonist A (see Table 1). Higher mean values represent a greater consideration of effort. A one-way ANOVA comparing the means was significant, $F(5, 282) = 26.05$, $p < .001$. Post hoc Scheffé tests revealed that the 7-year-old children allocated significantly fewer pieces of candy to Protagonist A than all other subgroups besides the 9-year-olds (all $ps < .001$). The 9-year-olds allocated significantly fewer pieces of candy to Protagonist A than adults and academic-track students ($ps < .001$), middle school students ($p = .001$), and vocational school students ($p = .041$). The means of the other subgroups were not significantly different from each other.

The analyses described so far indicate that all subgroups considered need and effort when making distributive justice decisions, but to different degrees. The mean number of sweets distributed showed that 7- and 9-year-olds valued effort less than the older participants, supporting H1. The means did not differ between adolescents from vocational and academic track schools, supporting H6. In order to understand in more detail how need and effort were weighed by the different subgroups, we computed additional ANOVAS that were run for each individual participant.

**Analyses on the individual level.** Nearly one third of the 7- and 9-year-olds (see Table 2) relied on need alone when allocating the candy, whereas only 6% and 13%, respectively, allocated according to effort alone. Summing the percentages for need alone plus integration and for effort alone plus integration (Table 2, last two lines), it became clear that need predominates in childhood: Half of the 7-year-olds considered need alone or integrated need with effort, but

only a quarter considered effort alone or integrated effort with need. For 9-year-olds, these values increased to 77% and 59%, respectively. Thus, H2 was supported. Additionally, among the 9-year-olds, the number who divided equally or did not follow any discernible principle clearly dropped, whereas the number who integrated increased.

Compared with the children, the number of adolescents who relied on need alone decreased, and the number who relied on effort alone increased. The largest part, about half of the 12- and 16-year-olds, integrated need and effort, supporting H3.

The adults most commonly integrated need and effort, supporting H4, followed closely by effort alone. The number of adults who considered effort clearly exceeded those who considered need, supporting H5. The 24 elementary-school teachers allocated mostly according to effort alone (46%), followed by integration (38%). Only a few divided the candy equally (13%), and even fewer divided it according to need alone (4%). The other adults mostly integrated need and effort (54%), followed by effort alone (33%). None of them divided the candy equally, 4% divided it according to need, and 8% had no principle. Thus, integration and effort alone were the principles of allocation that the adults applied most frequently. Teachers most often chose effort alone, and the other adults most often integrated.

Using the sums of need or effort alone plus integration (Table 2, last two lines) to characterize the developmental trajectory, need dominates in childhood. In early adolescence, need and effort are about equally important. From middle adolescence on, effort dominates over need. This pattern is most clearly pronounced in adults.

The results of Experiment 1 suggest that distributive justice decisions do differ by age but that adolescents' allocation decisions do not depend on the type of school they attend. However, the decreasing importance of need as people age may be related to the operationalization of need as the number of sweets the child has at home. Sweets are luxury goods that some people would say have nothing to do with need. Therefore, we conducted a second experiment to examine whether a different operationalization of need would lead to a stronger consideration of the need criterion.

## 3 | EXPERIMENT 2

In Experiment 2, we operationalized need as the number of toys at home. Although toys are luxury items too, they are more valuable than sweets and are an indisputable part of childhood, at least in the Western industrialized world. Thus, because toys may be considered a better indicator of need, we examined whether this change in operationalization would lead to increased consideration of the need criterion among adolescents and adults because they were the ones who allocated less on the basis of need in Experiment 1. Additionally, we tested whether the results on the association between school type and preference for an allocation criterion in adolescence could be replicated.

### 3.1 | Method

**Participants**. Participants were 193 adolescents and adults from the same region as in Experiment 1. Each subgroup included 48 participants, with the exception of the 49 students from vocational schools. The adolescents attended Grades 6 and 7 in three middle schools ($M_{age}$ = 12.30, $SD$ = 0.84) or were in their second year at two vocational schools ($M_{age}$ = 16.56, $SD$ = 0.83) or two academic-track schools ($M_{age}$ = 16.22, $SD$ = 0.64). The adult sample ($M_{age}$ = 41.46, $SD$ = 10.18) was composed of half elementary-school teachers and half adults from various professions. Each subsample included 24 female participants. The sample characteristics and consent protocol were the same as in Experiment 1.

**Procedure and measures**. Participants were told the same stories as in Experiment 1, but the words "candy" or "sweets" were replaced by "toys." The sentences related to need in the first trial run were adapted as follows: "This is Betty. She did not put forth any effort and did not collect any garbage. At home, she has fewer toys than Anne. Here are some toys that a toy store donated. The teacher says that you may distribute them between the two children. Please distribute them in a way that you think is fair" (see Supplement 2 for all stories).
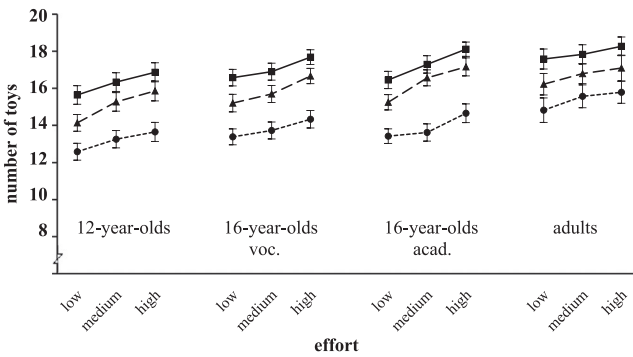
**FIGURE 2** Mean allocation of the 20 toys to child A as a function of effort and need. The levels of need were lower, the same, or higher compared with the other child and are symbolized by the dotted, dashed, and solid lines in the graphs, respectively. voc. = vocational school, acad. = academic-track school.

The presentation of the garbage that had been collected and the protagonists were the same as in Experiment 1. The number of toys was symbolized by drawings of one, a few, or many toys. The study design and response scales were identical to Experiment 1.

To determine reliability, the data from the first and second measurements were averaged for each child. The mean *r*s were .83 (12-year-olds), .81 (16-year-olds from vocational schools), .86 (16-year-olds from academic-track schools), and .96 (adults).

## 3.2 | Results and discussion

**Analyses on the group level**. The data were analyzed in the same way as in Experiment 1. A 3 (need: lower, same, higher) x 3 (effort: low, medium, high) x 4 (subgroups: 12-year-olds, 16-year-olds from vocational schools, 16-year-olds from academic-track schools, adults) repeated-measures analysis of variance (ANOVA) yielded significant main effects of need, $F(1.48, 279.53) = 186.63$, $p < .001$, $\eta_p^2 = .50$, effort, $F(1.66, 314.31) = 88.48$, $p < .001$, $\eta_p^2 = .32$, and subgroup, $F(3, 189) = 3.76$, $p = .012$, $\eta_p^2 = .06$.

Next, we calculated 3 (need: lower, same, higher) x 3 (effort: low, medium, high) repeated-measures ANOVAS separately for each subgroup. Need had a significant main effect among 12-year-olds, $F(1.29, 60.40) = 53.42$, $p < .001$, $\eta_p^2 = .53$; 16-year-olds from vocational schools, $F(1.37, 65.95) = 57.18$, $p < .001$, $\eta_p^2 = .54$; 16-year-olds from academic-track schools, $F(1.41, 66.46) = 47.66$, $p < .001$, $\eta_p^2 = .50$; and adults, $F(1.72, 80.81) = 32.37$, $p < .001$, $\eta_p^2 = .41$. Effort was significant among 12-year-olds, $F(1.52, 71.51) = 32.36$, $p < .001$, $\eta_p^2 = .41$; 16-year-olds from vocational schools, $F(1.75, 84.01) = 27.68$, $p < .001$, $\eta_p^2 = .37$; 16-year-olds from academic-track schools, $F(1.73, 81.51) = 22.71$, $p < .001$, $\eta_p^2 = .33$; and adults, $F(1.44, 67.71) = 12.63$, $p < .001$, $\eta_p^2 = .21$. Thus, all subgroups considered need and effort in their allocation decisions.

Figure 2 shows the mean number of toys given to Protagonist A on the combined basis of effort and need separately for each subgroup. Again, the data from the first and second measurements were averaged, given the high concordance between the two blocks of the experiment.

Subsequently, we computed the mean number of toys allocated to Protagonist A in the 18 stories (see Table 3). A one-way ANOVA comparing the means was significant, $F(3, 189) = 3.76$, $p = .012$. Post hoc Scheffé tests showed that the 12- year-old children allotted significantly fewer toys to Protagonist A than the adults did ($p = .013$). The means of the other groups did not differ significantly from each other.

As in Experiment 1, analyses on the group level indicated that the allocations depended on need and effort for both adolescents and adults, but the 12-year-olds valued effort less than the adults. Again, the mean number of toys that were distributed did not differ between 16-year-olds from vocational and academic track schools. In order to better understand how need and effort were weighed, we computed additional ANOVAS that were run for each individual participant.

**TABLE 3** Mean number of toys given to protagonist A (from 20)

|  | n | M (SD) | 95% CI |
|---|---|---|---|
| 12-year-olds (middle school) | 48 | 14.84 (3.05) | [13.96, 15.73] |
| 16-year-olds (vocational school) | 49 | 15.58 (2.64) | [14.82, 16.34] |
| 16-year-olds (academic-track school) | 48 | 15.84 (2.28) | [15.18, 16.50] |
| Adults | 48 | 16.67 (2.73) | [15.87, 17.46] |

**TABLE 4** Percentages of participants who allocated according to principles of distributive justice (need operationalized as number of toys)

|  | 12-year-olds middle school (n = 48) | 16-year-olds vocational school (n = 49) | 16-year-olds academic-track school (n = 48) | Adults (n = 48) |
|---|---|---|---|---|
| No principle | 8% | 14% | 4% | 6% |
| Need alone | 25% | 20% | 8% | 10% |
| Effort alone | 15% | 14% | 25% | 46% |
| Integration (need and effort) | 50% | 49% | 63% | 38% |
| Equality | 2% | 2% | 4% | 0% |
| **Sum need** | 75% | 69% | 71% | 48% |
| **Sum effort** | 65% | 63% | 88% | 84% |

*Note.* Sum need = need alone + integration. Sum effort = effort alone + integration.

**Analyses on the individual level**. Most 12- and 16-year-olds integrated effort and need (see Table 4). Adults mainly relied on effort alone in their distribution decisions, followed by integration. This pattern was the same for both the elementary-school teachers and the adults from other professions. In each group, 46% relied on effort alone and 38% integrated. Only a few divided the toys according to need alone (13% of the teachers and 8% of the other adults) or had no principle (4% of the teachers and 8% of the other adults).

Summing the percentages for need alone plus integration and for effort alone plus integration (see the last two lines of Table 4), it turned out that for the 12-year-olds, need dominated slightly over effort. For the 16-year-olds from vocational schools, need and effort were about equally important, whereas 16-year-olds from academic-track schools' distributions were more oriented toward effort. For adults, effort clearly dominated over need. Thus, operationalizing need as toys did not lead to a systematic increase in the consideration of the need criterion.

The developmental pattern of distributive justice decisions between adolescence and adulthood obtained in Experiment 2 was very similar to Experiment 1. The number of participants who considered need in their distributive justice decisions did not differ systematically between the two experiments—neither when need was considered as the only allocation criterion nor when it was integrated with effort. Furthermore, the allocation patterns for students from academic-track and vocational schools were similar: The differences with respect to the allocation criteria need alone and effort alone were larger than in Experiment 1, but the mean number of toys given to Protagonist A did not differ significantly. In sum, the developmental sequence described in Experiment 1 could be largely replicated in Experiment 2 and did not depend on whether need was operationalized in terms of sweets or toys.

## 4 | GENERAL DISCUSSION

This study investigated the development of distributive justice decisions in two experiments in which the protagonists' need and effort were systematically varied. In Experiment 1, children, adolescents, and adults allocated candy between pairs of protagonists who differed with respect to the number of sweets they had at home (need) and the amount of garbage they had collected in the schoolyard (effort). A replication with adolescents and adults took place in Experiment 2, with the only difference being that need was operationalized in terms of toys instead of sweets.

Concerning age-related changes in allocation criteria, we found that allocation decisions made on the basis of need information alone occurred mainly in childhood and became less frequent in adolescence and adulthood. Conversely, allocation decisions made on the basis of effort information alone were rare in childhood and occurred with increasing frequency during adolescence and adulthood. An integration of need and effort was the most common principle chosen from late childhood through middle adolescence, followed by an orientation toward integration or effort alone in adults. This developmental sequence was found regardless of whether need was operationalized in terms of sweets (Experiment 1) or toys (Experiment 2).

The results for childhood partly replicate results from earlier studies conducted within the framework of information integration theory. Children from both Switzerland (Kienbaum & Wilkening, 2009) and Germany (Kienbaum, 2013) relied mostly on need alone when asked to allocate a resource fairly. In our study, nearly one third of both 7- and 9-year-olds also allocated on the basis of need information alone. This is interesting as the story's context suggested the effort criterion and the elementary-school teachers allocated mostly according to effort alone. Thus, processes of model learning within the school are unlikely as causes of the child-specific distribution patterns. The preference for need can instead likely be explained by the fact that children depend on others, usually adults, to meet their needs. Therefore, satisfying needs may be particularly important in childhood compared with later in life.

The 7-year-olds' second most common choice was equality. Given the 21 allocation decisions they had to make, this might have been the easiest way for some of them to complete the task. The 9-year-olds made virtually no equal allocations; instead, the number of those who integrated rose to almost half. This finding is consistent with literature suggesting a decreasing preference for equality throughout childhood (e.g., Huppert et al., 2019; Schmidt et al., 2016).

Adolescents relied less on need alone and more on effort alone compared with the children, but adolescents usually integrated the two values in their distributive justice decisions. Different processes probably play roles in this developmental pattern: One is socialization in school, which is accompanied by a continued emphasis on effort. Another process is an increase in cognitive abilities, thus making it easier to simultaneously process two pieces of information.

Adults integrated or made their distribution decisions on the basis of the information about effort alone. In sum, more than 80% in both experiments considered effort either alone or integrated with need, whereas only around 50% allocated on the basis of need alone or integrated with effort. As described in previous studies (Deutsch, 1975; Kazemi et al., 2017), contextual variables tend to exert a strong influence on adults' distributive justice decisions. Because the story for which the participants were asked to decide how to make a fair allocation involved a school, it makes sense that the effort criterion was more important for the adult participants than need.

Either need or effort appeared to be the sole distribution criterion, or else they were combined in an integration. Looking at the number of participants who considered need or effort in one way or another as the basis for their allocations, it became clear that the relationship between need and effort reverses between childhood and adulthood: Whereas need dominates in children, effort dominates in adults. In adolescence, need and effort are more or less in balance. Thus, as children grow up, need seems to lose its relative importance as an allocation criterion in favor of effort. The increasing importance of effort in school and working life are obvious potential explanations for this age trend—at least with respect to allocation decisions in these or similar contexts and these or similar cultures.

The developmental patterns described above for adolescents held for students from both vocational and academic-track schools. The mean number of sweets (Experiment 1) or toys (Experiment 2) adolescents distributed did not differ significantly from each other, in contrast to the same-aged students from Germany attending an academic-track or

vocational school. Yet, especially in Experiment 2, the students from the Italian vocational schools relied less on effort (both by itself and integrated with need) than the students from the academic-track schools, but the difference was much smaller than the one obtained in Germany (Kienbaum, 2013; see Supplement 1 for results). This finding supports the assumption that early school tracking on the basis of grades leads to differences in the evaluation of effort, subsequently affecting distribution decisions. Conversely, young people from a school system with later tracking that is not based on grades differ from each other to a much smaller degree, presumably because differences in performance are not emphasized as much. It would be interesting to include countries where tracking does not occur until age 16 to see if the differences between school types would be even smaller there.

The present study extends previous research on moral development by documenting that the allocation criteria need and effort are not simply applied more frequently with increasing age (Cowell et al., 2019; Elenbaas & Killen, 2016; Elenbaas et al., 2016; Huppert et al., 2019; Kornbluh et al., 2019; McGillicuddy-De Lisi et al., 2008; Rizzo & Killen, 2016; Rizzo et al., 2016; Schmidt et al., 2016) but that they are often integrated with each other. Integration occurred in 19% of the 7-year-olds, which is surprising in light of Anderson and Butzin's (1978) Experiment 3, where all 8-year-olds were found to integrate information about need and merit. In addition to age and cultural as well as historical features that might account for this difference, half of the participants in Anderson and Butzin's study had already participated in similar experiments and were therefore trained, whereas this was not the case for the present sample.

Here, the percentage of participants who integrated increased from a fifth of the 7-year-olds to about half of the 9-year-olds, adolescents, and adults. Adults did not integrate more than adolescents. Whereas various studies based on information integration theory have shown that adolescents and adults make almost perfect intuitive estimates of mathematical or physical laws (while simultaneously integrating two or three parameters; e.g., Ebersbach & Wilkening, 2007; Wilkening & Cacchione, 2011), the present study documents that for justice decisions, for which there is no objective right or wrong answer, the rate of integration is significantly lower. From this finding, it can be concluded that justice judgments are value decisions and not purely a reflection of cognitive abilities.

## 4.1 | Limitations and future research

This study has several limitations. First, both candy and toys are luxury resources. If participants had to distribute a necessary resource, they might have considered the need criterion more often because more serious consequences would have been involved (Essler et al., 2020; Noh, 2020; Noh et al., 2019; Rizzo et al., 2016). A similar consideration concerns the operationalization of need in terms of emotional rather than material needs (Chernyak & Kushnir, 2013; Malti et al., 2016). More research is needed to extend knowledge about fair distributions in the context of necessary resources and emotional needs.

Furthermore, no distinction was made between effort and outcomes (Noh, 2020). Although effort was clearly addressed in the instructions, it was always accompanied by a corresponding degree of outcome (amount of garbage collected). Further studies are warranted to disentangle these facets of equity.

As this study focused on intuitive allocations, participants did not provide rationales for their decisions. In future research, intuitive allocations should be compared with justifications for these allocations in order to see whether or not they converge (Haidt, 2001; Smetana et al., 2014).

Our participants came from a rural, rather wealthy region of northern Italy where the majority of the population speaks German. The children's results were similar to results from studies with children from the German-speaking region of Switzerland (Kienbaum & Wilkening, 2009) and Germany (Kienbaum, 2013). Because these samples had comparatively similar cultural backgrounds, there is a need to conduct replications with samples that are more culturally and socioeconomically diverse (e.g., cultures outside the Western industrialized world). It would also be desirable to compare adults from various professions in order to test, for example, whether people who work in the social sector apply the need criterion more often than others.

The number of Hauptschules in Germany has dropped in recent years; instead, new types of vocational track schools have been introduced. However, the early tracking has basically remained. Comparing distributive justice decisions in present day German students would shed light on the question of whether early tracking itself influences students' values or whether the crucial point is the specific type of school they attend. Additionally, it would be interesting not only to focus on the school environment but to examine the role of parents in making fair allocation decisions (Noh, 2020).

A final important limitation concerns the potential context specificity of the results (Sigelman & Waitzman, 1991). In order to know whether the developmental processes described here can be generalized, studies should be conducted in contexts that suggest a principle besides effort (e.g., allocations within a family) and that are not restricted to allocations between children.

## 5 | CONCLUSION

This study is the first to test age-related changes in intuitive preferences for the allocation criteria of equality, need, effort, and the integration of need and effort across a broad range of ages from childhood to adulthood. It documents that need is mostly preferred in childhood, followed by an integration of need and effort in adolescence. Adults mainly integrate or distribute on the basis of effort. It further shows that, at least in a country with later school tracking, the allocation patterns of adolescents do not differ systematically by the type of school they attend. Whether the developmental pattern found here generalizes to other contexts remains a topic for future research and so does the investigation of the roles of other significant individuals (e.g., parents) for the development of interindividual differences in preferences for allocation criteria.

### CONFLICT OF INTEREST

We have no known conflict of interest to disclose.

### DATA AVAILABILITY STATEMENT

Data will be made available on reasonable request.

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