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# The effects of experimentally induced choice on elementary school children's intrinsic motivation: The moderating role of indecisiveness and teacher–student relatedness

Joachim Waterschoot *, Maarten Vansteenkiste, Bart Soenens

*Department of Developmental, Personality and Social Psychology, Ghent University, 9000 Ghent, Belgium*

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ABSTRACT

Although the effects of choice provision on intrinsic motivation have been intensively studied, the number of experimental studies, in particular with elementary school children, is limited. Moreover, many questions regarding the boundary conditions of the effects of choice remain unresolved. Grounded in self-determination theory, the current experimental field study examined the effect of choice provision, versus choice deprivation, on the intrinsic motivation of elementary school children, thereby also addressing the role of child–teacher relatedness and children's indecisiveness as potential moderators. After elementary school children ($N = 126$, $M_{age} = 10.8$ years) indicated their preference for one of three different painting activities, half of the children were allowed (so said by the teacher) to perform their preferred activity (i.e., the choice provision condition), and the other half were deprived of their choice and instead obliged to engage in a nonpreferred activity (also so said by the teacher). After having performed the activities, children's intrinsic motivation, autonomy and competence need satisfaction, vitality, and intended persistence were assessed. Children in the choice provision condition, relative to those in the choice deprivation condition, reported enhanced intrinsic motivation and vitality because they experienced more autonomy and competence need satisfaction during the painting activity. Furthermore, because highly indecisive children did not benefit from choice in terms of competence satisfaction, the indirect effect of choice through competence on two indicators of intrinsic motivation

* Corresponding author.
*E-mail address:* joachim.waterschoot@ugent.be (J. Waterschoot).

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was not significant among these children. Relatedness with the teacher did not play a moderating role. Limitations and directions for future research are discussed.



## Introduction

Intrinsic motivation is a key motivational resource with beneficial effects on students' engagement, well-being, and performance (Ryan & Deci, 2000a,b,c). In the motivation literature, and in the literature based on self-determination theory (SDT) in particular, many studies have investigated how various external events affect intrinsic motivation (Deci & Ryan, 1987; Ryan & Deci, 2017). One commonly discussed, yet still controversial, strategy to enhance students' intrinsic motivation is the provision of choice (Patall, Cooper, & Robinson, 2008; Ryan & Deci, 2000a,b,c). On the basis of SDT, it can be expected that choice contributes to the satisfaction of the psychological needs for autonomy and competence and, through this experience of psychological need satisfaction, to enhanced intrinsic motivation.

To the best of our knowledge, to date no experimental research tested this hypothesized mediation model of the effects of choice among elementary school children. This is unfortunate because the development of intrinsic motivation is of utmost importance for children's adjustment in school (Bouffard, Marcoux, Vezeau, & Bordeleau, 2003). In addition, middle childhood is characterized by an increase in independent decision making, indicating that children increasingly want to make more decisions for themselves (Wray-Lake, Crouter, & McHale, 2010). Thus, the provision of choice might be an age-appropriate motivational strategy meeting elementary school children's developmental needs. Moreover, many questions concerning the boundary conditions of choice remain, with scholars arguing that contextual and personal factors may alter effects of choice (Patall & Hooper, 2017). The current experimental field study sought to examine the effect of choice on elementary school children's intrinsic motivation, thereby also addressing the potential moderating role of one contextual factor (i.e., child–teacher relatedness) and one personal factor (i.e., indecisiveness).

### *Intrinsic motivation and psychological need satisfaction*

SDT is based on an organismic view on human development (Deci & Vansteenkiste, 2004; Ryan, 1993; Ryan & Deci, 2017) and is consistent with other developmental theories highlighting children's spontaneous tendency to explore and manipulate the environment and to acquire knowledge (e.g., Piaget, 1971; Werner, 1948). According to SDT, intrinsic motivation is a central manifestation of this natural and active growth process (Deci, 1972; White, 1959). Children display intrinsic motivation when their reasons for behaving are inherent to the task itself, that is, when they find the activity to be interesting, enjoyable, and/or challenging in itself. Although children naturally gravitate toward intrinsically motivating activities, this growth process also needs to be energized by the social environment (Deci & Ryan, 2000; Ryan & Deci, 2000a,b,c).

A large number of studies have demonstrated that intrinsic motivation contributes to learning and school engagement (e.g., Taylor et al., 2014). Although intrinsic motivation is critical across different developmental periods, it gains additional importance during middle childhood, when a key developmental task for children is to develop academic skills and to acquire knowledge in the context of school (Eccles, Roeser, Wigfield, & Freedman-Doan, 1999; Erikson, 1968). In several correlational studies with elementary school children, intrinsic motivation was related positively to overall school achievement (Froiland & Worrell, 2016; Gottfried, 1990) and high-quality learning (Reeve, Ryan, Deci, & Jang, 2008). Similarly, experimental studies showed that children display more positive attitudes for doing homework (Froiland, 2011), greater conceptual learning (Grolnick & Ryan, 1987), and higher achievement (Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005) when their pleasure

and interest (i.e., intrinsic motivation) for school-related activities was induced experimentally. Because students high on intrinsic motivation can be fully themselves and act on their deepest interests, they feel more vital, a feeling that is defined as the experience of having energy and feeling alive (e.g., Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011; Ryan & Frederick, 1997). Moreover, students with greater intrinsic motivation for school display higher intentions to persist in courses and in their school careers (Vallerand & Bissonnette, 1992).

SDT assumes that people are equipped with three basic psychological needs, the satisfaction of which fuels intrinsic motivation and contributes to individuals' psychological growth more broadly (Deci & Ryan, 2000; Ryan & Deci, 2017). Specifically, people are more likely to be intrinsically motivated when they experience a sense of volition and psychological freedom (i.e., autonomy satisfaction), personal effectiveness and mastery (i.e., competence satisfaction), and belongingness and reciprocal care (i.e., relatedness satisfaction) while performing behavior (Ryan, 1995; White, 1959). The needs for autonomy and competence are thought to be more centrally involved in intrinsic motivation than the need for relatedness because children can also be intrinsically motivated for solitary activities (e.g., reading a book, building a construction on their own) (Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010).

Numerous studies have shown that students display higher intrinsic motivation when teachers make use of autonomy-supportive classroom practices (Aelterman et al., 2019; Niemiec & Ryan, 2009). Specifically, when teachers encourage group discussions, acknowledge students' perspectives, and provide enough time for independent work, students report more interest for the subject in class (Reeve & Jang, 2006), presumably because such strategies are conducive to students' experience of volition and psychological freedom.

Another set of strategies to enhance students' motivation highlights teachers' support for competence, which in SDT is referred to as structure (Jang, Reeve, & Deci, 2010). The provision of guidance and optimal challenges (i.e., challenges that match one's abilities) characterizes a structuring and, hence, competence-supportive class climate (e.g., Mouratidis, Vansteenkiste, Michou, & Lens, 2013; Ryan, 1993). When children experience the classroom climate as well-structured, they report higher feelings of effectiveness and enhanced intrinsic motivation (Anderman & Leake, 2005; Ryan & Deci, 2013; Urdan & Schoenfelder, 2006).

### *The role of choice*

Although research generally provided evidence for the role of autonomy and competence support in intrinsic motivation, there is ongoing debate about a number of specific practices that potentially support these needs. One of the most heavily debated and controversial practices is the provision of choice (Patall et al., 2008; Patall, Hooper, Vasquez, Pituch, & Steingut, 2018). Much like Deci and Ryan (1987), several scholars proposed that the provision of choice is beneficial for people's motivation (Cordova & Lepper, 1996; Zuckerman, Porac, Lathin, & Deci, 1978) and a meta-analysis by Patall et al. (2008) indicated that, on average, choice comes with an array of benefits. To illustrate, when teachers applied choice in the classroom, high school students were found to display more interest, more effort, and increased engagement (Flowerday & Schraw, 2000). When teachers allowed their students to choose how and when to complete homework after practical sessions (Patall, Cooper, & Wynn, 2010) and what to work on in class (Urdan & Schoenfelder, 2006), students reported more engagement as they experienced a greater sense of choice in doing the activity. Furthermore, several studies showed significant effects of choice on choosers' competence (Leotti, Iyengar, & Ochsner, 2010; Tafarodi, Milne, & Smith, 1999). For instance, Patall et al. (2010) reported that high school students felt more competent after they could choose between homework options.

The provision of choice was primarily studied among high school students (Meng & Ma, 2015; Patall et al., 2010; Reeve, Jang, Carrell, Jeon, & Barch, 2004) and middle school students (Oginsky, 2003), but it received relatively less attention among elementary school children. Notable exceptions are the studies by Mouratidis et al. (2011) and Reynolds and Symons (2001), who found choice to increase children's levels of vitality and enjoyment in the context of physical education and the quality of their searching strategies in the context of reading motivation, respectively.

Although choice provision can have beneficial effects, Patall et al. (2008) meta-analysis showed that there is substantial variation in the effects of choice, with some studies demonstrating no effects (e.g., Reeve, Nix, & Hamm, 2003) and other studies even demonstrating negative effects on motivation (e.g., Flowerday & Schraw, 2003). This observation of heterogeneity in effects of choice has led to an examination of factors that determine the motivational effectiveness of choice. One such (methodological) factor is the comparison group used in experimental research. An experimental condition in which children choose an option and actually receive their preferred option (i.e., a typical choice condition) can be compared either with a neutral condition (where participants are just assigned to an activity without being aware that there were options) or with a condition in which participants are aware about the options but no choice was provided or choice was even actively deprived. Patall et al. (2008) meta-analysis showed that effects of choice were more pronounced when compared with the latter type of condition than when compared with a neutral condition, probably because a choice-depriving condition has an undermining effect by itself. Because our study is among the first to examine experimentally manipulated effects of choice during middle childhood, we contrasted the two most opposing conditions (i.e., choice provision and choice deprivation) so as to maximize potential effects.

Another (more substantive) boundary condition of the effectiveness of choice provision is individuals' competence for the task in which choices are offered. In a series of experiments, Patall, Sylvester, and Han (2014) showed that the provision of choice is beneficial for motivation when people feel effective in the activity at hand, yet it undermines motivation when people do not feel competent. According to Patall et al. (2014), this is because making choices is overwhelming (rather than empowering) when people generally feel incompetent on a task.

Because of the complexity and heterogeneity of effects of choice, some scholars began to question the motivating impact of choice more fundamentally (Markus & Schwartz, 2010), arguing that effects of choice are entirely determined (i.e., moderated) by factors such as culture (e.g., Schwartz, 2000) and personality (Beattie, Baron, Hershey, & Spranca, 1994), an issue to which we turn next.

*Contextual and individual factors potentially qualifying the effects of choice*

Schwartz (2000) argued that the effects of choice are paradoxical in that choice has the potential to both foster and undermine motivation. Indeed, when people are confronted with a broad number of daily choices (as is often the case in contemporary society), they may feel overwhelmed, thereby being more at risk for decisional stress and anxiety. Considered from a cognitive self-regulatory perspective, choice would deplete individuals' limited resources for decision making and ultimately give rise to helplessness and adverse affective consequences. In line with these arguments, individuals were found to score worse on a math test after a period of choosing during a shopping trip (Vohs et al., 2008). Similar findings were obtained in a group of college students who were able to choose the pace of reading a text compared with a group whose pace was induced by the experimenter. Again, students in the choice condition performed worse on a cognitive test (Flowerday & Schraw, 2003).

Taking a cross-cultural perspective, Schwartz (2000) also argued that choices would be primarily beneficial in individualistic cultures that emphasize personal responsibility and independence. The notion that culture can moderate effects of choice was also central in research conducted by Iyengar and Lepper (1999). They reasoned that the denial of choice would not be harmful in a collectivist cultural context, where interdependence and harmonious close relationships are valued more strongly than independent decision making. In line with this reasoning, they found that choice provided by a familiar person (compared with denial of choice) affected Asian participants' intrinsic motivation less than European American children's intrinsic motivation (Iyengar & Lepper, 1999). However, it should be noted that also children with a collectivist cultural background displayed impaired intrinsic motivation when the choice was imposed by an unfamiliar person.

In line with these findings, Bao and Lam (2008) found in a follow-up study evidence for an interaction between choice provision and child–teacher relatedness in the prediction of intrinsic motivation. When children had a close relationship with their teacher, children whose teacher made the choice for them reported equal levels of intrinsic motivation as children who made the choice by themselves. Thus, only children who lack a strong bond with their teacher reported undermined

intrinsic motivation and felt less autonomous when choice was denied to them. These findings are in line with the notion that close relationships can offset the harmful consequences of a lack of choice, presumably because one volitionally accepts the choice made by others to whom one feels well-connected (Van Petegem, Beyers, Vansteenkiste, & Soenens, 2012). Bao and Lam (2008) argued that this moderating role of teacher–child relatedness is particularly relevant in a collectivist cultural context. Yet, given that relatedness is a universal psychological nutrient (e.g., Keller, 2012; Ryan & Deci, 2000a,b,c), the observed moderating effect of child–teacher relatedness may generalize to children living in a country with a more individualist cultural climate. This possibility was tested in the current study, which was conducted in a Western European country (Belgium).

Apart from child–teacher relatedness, we also considered the potentially moderating role of people's capacity to make choices, as indexed by the notion of indecisiveness (Germeijs & De Boeck, 2002). Consistent with Patall et al. (2014) finding that the provision of choice is affected by individuals' sense of competence for a task, it seems likely that indecisive people, who feel less competent to inspect and weigh options and less confident to select an option, benefit less (or even suffer) from the provision of choice. Preliminary evidence for the moderating role of indecisiveness in choice provision was reported by De Muynck et al. (2019). In an experimental study with late adolescent rope skippers, indecisiveness dampened the effect of choice on feelings of volition. To the best of our knowledge, the current study is the first to address the potential moderating role of indecisiveness in a population of elementary school children. Specifically, we investigated whether highly indecisive children would benefit less from the provision of choice (Beattie et al., 1994).

*Toward a nuanced perspective on the effects of choice*

At first sight, the SDT perspective on choice (which highlights mainly the beneficial effects of choice) may seem diametrically opposed to more skeptical accounts of choice (emphasizing the limits and even potentially harmful effects of choice). It is important to note, however, that SDT provides a rather nuanced view on the effects of choice. SDT acknowledges that the provision or affordance of choice (as a contextual source of influence on motivation) does not by definition result in the feeling of having a choice (as a subjective phenomenological experience).

Although SDT holds the general assumption that choice should, on average, be conducive to perceived choice and felt volition as well as to subsequent intrinsic motivation, the critical question is how the offer of choice is interpreted, that is, which *functional significance* (Deci & Ryan, 1985) it carries for the chooser. As a participative strategy, it may be experienced as a burden and a difficult endeavor, thereby taxing an individual's limited resources, or it may be perceived as a welcomed opportunity to realize one's preferences, interests, and values. As a result, there might exist quite some variation around the average motivation-conducive effect of choice (Katz & Assor, 2007; Vansteenkiste, Aelterman, Haerens, and Soenens, 2019, chap. 4).

Indeed, the degree to which contextual choice provision gives rise to experiences of volition and perceived choice is said to depend on a number of moderating factors (Patall & Hooper, 2017). For instance, effects of choice depend on the extent to which a person can express self-endorsed behavior by making that choice (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Katz & Assor, 2007; Reeve et al., 2003). When options are not meaningful or personally relevant (e.g., when people choose between trivial options), the choices made by people do not reflect their internal values and interests and, as such, do not substantially promote high-quality motivation (Moller, Friedman, & Deci, 2006). In addition to personal relevance and the feeling of self-expressiveness (see Waterman, 2005), the number of options provided to people also was found to be important. Patall et al. (2008) meta-analysis revealed that choice yields the largest beneficial impact on intrinsic motivation when participants can make a single choice among three to five options. Consistent with Schwartz (2000) reasoning, when people are provided with too many options (more than five), they risk feeling overwhelmed and unable to make an appropriate choice. To maximize the potential motivating effect of choice provision, in the current study, we provided a limited number of options (i.e., three) in the context of a meaningful activity with high relevance to elementary school children (e.g., painting).

Consistent with the nuanced SDT-based perspective on choice, we considered the possibility that the hypothesized motivating effect of choice provision could depend to some extent on the

child–teacher relatedness and indecisiveness displayed by students. Two important notes need to be made with regard to these potential moderators (Soenens, Vansteenkiste, & Van Petegem, 2015). First, on the basis of SDT, it can be expected that the moderating effects of child–teacher relatedness and indecisiveness, if any, would be mainly a matter of *gradation.* Rather than canceling out (or even reversing) effects of choice provision, the moderators would affect the degree to which choice provision (vs. choice denial) fosters motivation. Thus, the provision of choice is not expected to be demotivating, but students may benefit from choice to different degrees. Second, the moderators are assumed to play a role primarily in effects of the contextual provision of choice on autonomy and competence need satisfaction rather than in effects of these need-based experiences on intrinsic motivation. Indeed, SDT assumes that as soon as people experience their psychological needs (which are considered universally important) being met, they are likely to display enhanced quality of motivation. Thus, as displayed in Fig. 1, we assumed that there would be more room for moderation in effects of condition on need-based experiences than in effects of need-based experiences on intrinsic motivation. Technically speaking, the model shown in Fig. 1 assumes a process of moderated mediation. According to this model, the degree to which students benefit from choice (in terms of intrinsic motivation) would depend on their appraisal of the provided choice (in terms of need-based experiences). For instance, students high on indecisiveness would be less inclined to see the choice as an opportunity to express their personal preferences (resulting in a less pronounced effect on autonomy need satisfaction) and would experience less confidence that they can do the activity well (resulting in a less pronounced effect on competence need satisfaction). Because these need-based experiences would be prompted to a lesser extent when students are provided choice, they would (indirectly) benefit less from the provision of choice in terms of intrinsic motivation.

### *The current research*

In the current study, we aimed to examine the effects of choice provision, relative to choice deprivation, on intrinsic motivation among elementary school children. We focused on this age group because research has shown that there is a linear increase in children's tendency to make independent decisions between 9 and 12 years of age (Wray-Lake et al., 2010). Although the provision of choice may meet children's increased need to make decisions for themselves, this age group has received little attention in educational research on choice. This is also unfortunate because middle childhood is a

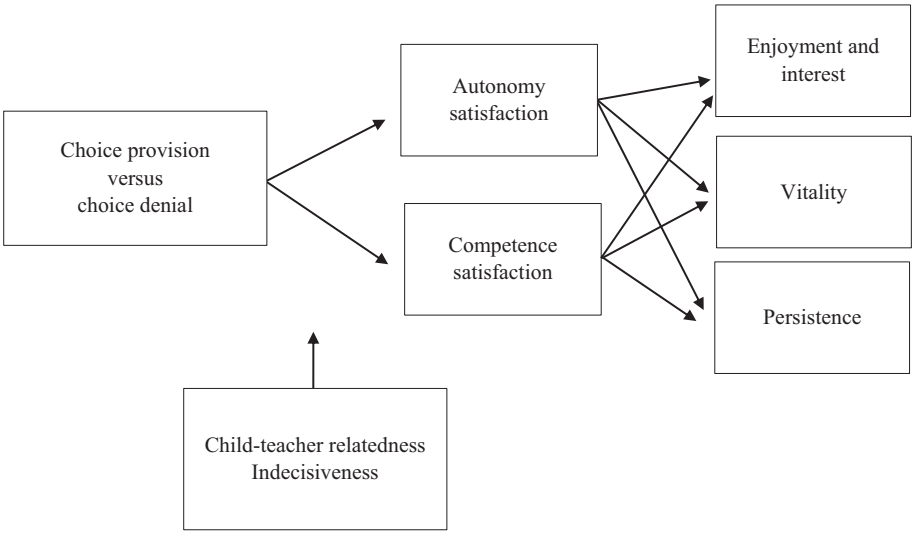


**Fig. 1.** Conceptual moderated mediation model of the variables in the current study.

crucial period for the development of a positive orientation toward school and for the acquisition of school-based skills (e.g., Erikson, 1968).

We investigated the effects of choice provision in an ecologically valid context (i.e., children's own school) and with regard to options that are personally relevant and meaningful to children during middle childhood (i.e., painting activities that were pretested in a series of pilot studies in terms of interest and enjoyment) (Patall & Hooper, 2017). We operationalized intrinsic motivation in three different ways. First, we used a direct measurement of children's experiences of enjoyment and interest. Second, we relied on an indirect measure assessing children's anticipated behavioral persistence for the painting activity. The intention to persist in an activity is indeed considered a manifestation of intrinsic motivation (Deci, 1972). Third, we included a measurement of an affective experience typically co-occurring with intrinsic motivation, that is, vitality (Ryan & Frederick, 1997). By using these three operationalizations, we tapped into the direct motivational experiences of intrinsic motivation as well as into its behavioral (i.e., persistence) and emotional (i.e., vitality) manifestations.

The conceptual model guiding the current study is displayed in Fig. 1 and shows that we expected choice provision (relative to choice deprivation) to foster autonomy and competence. The latter effect would occur because the deprivation of choice by students may signal a lack of trust and confidence in children's capacity to perform the chosen painting activity. In turn, autonomy and competence satisfaction would be expected to relate to (the different manifestations of) intrinsic motivation and to play a mediating role in effects of provided choice on intrinsic motivation. In a somewhat more explorative fashion, we also examined the role of two plausible moderating factors, one of which deals with the quality of teacher–student interaction (child–teacher relatedness) and one of which involves a child characteristic (indecisiveness). These moderating factors were considered with respect to the relation between contextually provided choice and need-based experiences (i.e., first part of the sequence) as well as between felt autonomy and competence and intrinsic motivation (i.e., second part of the sequence). Theoretically, we expected that moderation effects, if any, would manifest primarily in effects of experimentally manipulated choice on the need-based experiences.

## Method

### *Participants*

Participants were 126 Dutch-speaking children (66 girls) from the fourth grade ($n$ = 56; 23 girls), fifth grade ($n$ = 44; 18 girls), and sixth grade ($n$ = 26; 13 girls) of an elementary school in Belgium. Students were in seven different classes. They had a mean age of 10.8 years (range = 9–12).

To ensure that the current design and the planned statistical analyses including two groups had sufficient statistical power, we performed an a priori power analysis using G*Power (Version 2; Faul & Erdfelder, 1992). This analysis showed that a sample size of 128 is sufficient to obtain a statistical power of .80 to detect significant main and interaction effects with a medium effect size ($f$ = .25) using an analysis of covariance (ANCOVA).

### *Procedure*

#### *Pilot studies*

To select different activities for the main study that have sufficient personal relevance (Patall et al., 2008), we first conducted a series of pilot studies. Using a questionnaire, we presented a list of painting activities (e.g., graffiti) and circus activities (e.g., juggling). Each activity was explained with a short text and illustrated with an image. Children were asked to rate each activity in terms of its attractiveness (e.g., "To what extent do you like this activity?") and in terms of how challenging they thought it would be (e.g., "To what extent do you think this activity is challenging?") on 4-point scales. In the first pilot study ($N$ = 99; $M_{age}$ = 9.94 years), results showed that only *graffiti* and *painting in the dark* displayed sufficiently high scores for both attractiveness ($M_{graffiti}$ = 3.41, $M_{painting\ in\ the\ dark}$ = 3.35) and challenge ($M_{graffiti}$ = 2.62, $M_{painting\ in\ the\ dark}$ = 2.84). Because all circus activities had rather low scores for challenge and because the study did not include a third appropriate painting activity, we

performed a second pilot study ($N = 69$; $M_{age} = 10.25$ years) including two new painting activities (i.e., *painting with fingers* and *painting with thrash objects*). Again, only graffiti and painting in the dark had appropriate scores for attractiveness ($M_{graffiti} = 3.46$, $M_{painting\ in\ the\ dark} = 3.32$) and challenge ($M_{graffiti} = 2.62$, $M_{painting\ in\ the\ dark} = 2.72$). A third study ($N = 52$; $M_{age} = 10.05$ years) was conducted including four new activities to increase the chance of arriving at three comparably attractive painting activities. This time, three activities displayed appropriate scores on attractiveness ($M_{graffiti} = 3.37$, $M_{painting\ in\ the\ dark} = 2.98$, and $M_{bouncing} = 3.58$) and appropriate scores on challenge ($M_{graffiti} = 2.60$, $M_{painting\ in\ the\ dark} = 2.77$, and $M_{bouncing} = 2.42$). Given that the scores on both variables (attractiveness and challenge) were at least moderately high and fairly similar among these three activities, they were selected as the most appropriate activities for the main experiment.

*Initial choosing*

One week before the experiment, all children ($N = 188$) from the elementary school received a detailed information letter and a parental consent form. In total, 62 parents did not allow their children to participate. These children were invited to perform an alternative task in the classroom. All teachers were informed about the study with a detailed letter and a manual instruction. All participating children completed an informed consent. In all communication, it was emphasized that participation in the study was voluntary and that children could stop participation at any moment (without consequences). The study received ethical approval from the ethics committee of Ghent University.

On the day of the experiment, children were told in the morning that three teams of coaches would guide a painting activity in the afternoon. After describing each painting activity briefly, we asked children to indicate individually their most favorite activity on a choice form. We used three different versions of the choice form that were distributed randomly across participating children, with each version presenting the activities in a different order to avoid primacy effects. After returning all choice forms, children were asked to complete a first questionnaire, including the measurement of the background variables and the questions tapping into teacher–child relatedness and indecisiveness. After filling out the questionnaire, children took their classes as they would usually do.

*Manipulation*

In a second phase of the experiment (at noon), the experimenter induced the manipulation of choice. Shortly after all children had lunch, they received instructions from the experimenter collectively in the school cafeteria. The experimenter explained to the children that not everyone would be able to do his or her chosen activity due to the limited number of places in the activities. The following explanation was given: "Because we do not know you personally, we have been discussing this with your teachers during lunch break. We will now provide you with a letter indicating whether your teacher allows you to do the activity you chose or whether your teacher decided that you need to do a different activity. When you hear your name, please come forward and read the letter you will receive very carefully." About half of the children were assigned at random to the choice condition ($n = 58$), whereas the other children were assigned to the choice deprivation condition ($n = 68$). In this latter group, all children were assigned to an activity other than the activity they indicated as their initial preference. Specifically, we used a yoking procedure where the activity of each child in the choice deprivation condition was matched to the same activity as a child in the choice condition. This procedure was used to ensure that equal numbers of students would be assigned to the three different activities (see Appendix A for a detailed description of how students were allocated to the different activities). Children were informed about their assigned condition (i.e., choice confirmation or choice removal) and to a certain activity (i.e., one of the three painting activities) by means of short private letters on paper (see Appendix B).

*Activities*

During lunch break, 18 coaches (six for each activity) supervised the painting activities at different locations in the school. The experimenter informed these coaches extensively and instructed them carefully about how to perform the three painting activities to ensure that the activities would be provided in a standardized fashion. In the *painting in the dark* activity, children created a painting by using black light paint. After 40 min, the room was darkened and a black light was used to lighten their

painting. For the *graffiti* activity, the school principal made available an old wall. The coaches first demonstrated the use of the sprays, followed by a short opportunity to practice on cardboard by the children for 15 min. For the next 30 min, children used the sprays on the wall and created a painting in the current theme of the school (i.e., "building together"). In the *bouncing* activity, children used bouncy balls, stamped in paint, on a white cloth. After 20 min, they switched to another room in which they used marbles, stamped in paint, to make a painting on the ground. Each activity took approximately 45 min.

*Post-experimental questionnaire and debriefing*

After the activities, all children gathered in their classrooms. They then completed a second questionnaire concerning the measurement of perceived need satisfaction and the different indicators of intrinsic motivation. Finally, the experimenter debriefed the participants, revealing the real goal of the study and explaining that some of the children had been given the opportunity to engage in their activity of choice, whereas other students needed to do a different activity. It was also explained to children that the experimenter (and not the teacher) had decided, in an arbitrary fashion, whether children would do their preferred activity or not. Finally, the experimenter provided the opportunity to ask more questions concerning the experiment. All children and teachers were thanked for their participation. All materials, data, and syntaxes are available at https://osf.io/nvp5f/.

## Measures

*Background variables*

On the first page of each questionnaire, children were asked to write down their name, gender, age, and class. This information was used to link the pre- and post-experimental questionnaires correctly. We explained both in the oral instructions and in the written instructions on the first page of the questionnaire that nobody, other than the experimenter, would be able to see the content of the questionnaires and that the data would be treated with confidentiality. In both questionnaires (pre- and post-measurements), participants indicated the extent to which they endorsed each item on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). All items can be found in Appendix C.

*Pre-experimental variables*

The first part of the questionnaire, which was administered prior to the experimental induction, included measures of the factors that were examined as moderators of the effects of choice.

*Child–teacher relatedness.* To measure the quality of relatedness between children and their teacher, we used a selection of items from the 14-item People in My Life questionnaire (PIML; Ridenour, Greenberg, & Cook, 2006). Specifically, we selected five items that tapped most directly into closeness and warmth in the teacher–student relationship (e.g., "My teacher likes me"; $\alpha = .76$).

*Indecisiveness.* Indecisiveness refers to individuals' perceived capacity to choose. To measure general indecisiveness, we used the well-validated 22-item questionnaire developed by Germeijs and De Boeck (2002) (e.g., "I delay deciding"). We also added two items (which were reverse scored) to measure how much participants enjoyed making decisions (e.g., "I like to make decisions") and one item to measure anxiety in making decisions (i.e., "I am anxious to make a decision"). In the current study, Cronbach's alpha was .85 for the total score of indecisiveness.

*Post-experimental measures*

After the painting activities, children were administered a second questionnaire asking them specifically about their experiences during the activities.

*Manipulation check.* In the second questionnaire, we asked children to report the activity they actually performed (i.e., "Which activity did you do this afternoon?") and to report whether they were allowed to do the activity they had initially chosen or not (i.e., "I was able to do my chosen activity/The teacher assigned me to another one"). Participants' answers on these questions indicate whether they remem-

bered the painting activity and the assigned condition correctly. We used the latter item to examine whether the manipulation of choice was successful.

*Autonomy and competence satisfaction.* Children's subjective experience of autonomy satisfaction was measured using the subscale *perceived feeling of choice* (six items; e.g., "It was my own choice to do the painting activity"; $\alpha = .84$) from the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989; Ryan, 1982). We used the subscale *competence* from the IMI to measure children's experience of feeling competent in performing the painting activity (six items; e.g., "During the painting, I had the feeling I was doing well"; $\alpha = .84$).

*Intrinsic motivation.* The questionnaire included a direct measure and two relatively more indirect measures of intrinsic motivation. First, we measured children's intrinsic motivation directly by means of the subscale *enjoyment and interest* (seven items; e.g., "I enjoyed doing the painting activity very much"; $\alpha = .91$) from the IMI. Second, we measured students' intention to persist in the painting activity by assessing children's interest in receiving more information about an activity-corresponding club and to sign up for such a club (see Vansteenkiste, Simons, Soenens, & Lens, 2004). They could report their level of interest on a 4-point Likert scale ranging from 1 (*totally not interested*) to 4 (*totally interested*). The two items tapping into interest and intention to join a club were positively correlated ($r = .67$, $p < .001$) and were combined into a variable representing *intended persistence* (two items; $\alpha = .81$). Third, we assessed vitality as a positive affective experience that often accompanies intrinsic motivation. Therefore, we used three items measuring children's level of vitality as a positive affective outcome (e.g., "I felt very energetic"; $\alpha = .80$). Items were taken from Ryan and Frederick (1997) Subjective Vitality Scale (SVS).

## Results

### *Preliminary analyses*

#### *Manipulation check*

There was a strong and significant association between students' actual assignment to the conditions and their self-reported recall of the condition to which they belonged, $\chi^2(1) = 56.18$, $p < .001$. This finding indicates that the manipulation was generally successful. Specifically, results from this manipulation check showed that 104 of the 126 participants (83%) reported correctly about the experimental condition to which they were assigned. However, 22 participants reported incorrectly. Interestingly, from this latter group, 20 participants were originally assigned to the choice deprivation condition, whereas the other two participants were assigned to the choice provision condition, $\chi^2(1) = 14.73$, $p < .001$. Because we aimed to test the effect of choice in a real-life setting and because students' failure to correctly perceive a contextual manipulation is inherently part of an intervention in an ecologically valid setting, we decided to still perform analyses on all participants in the conditions to which they were randomized. This decision, which is consistent with an intention-to-treat approach (Fisher, Dixon, Herson, Frankowski, Hearron, & Peace, 1990), resulted in a total sample of 126 participants.

#### *Randomization*

All participants were assigned to conditions randomly. To examine whether randomization was successful, associations were examined between condition membership and both background variables (age, grade, and gender) and pre-experimental study variables (child–teacher relatedness and indecisiveness). This was done using chi-square difference tests for categorical variables (grade and gender) and using independent-samples $t$ tests for continuous variables (all other variables). Results indicated that the randomization was successful (all $\chi^2$ and $t$ statistics had $p$ values > .05).

In spite of the pilot testing in which we selected three similarly attractive activities, children's initial choices were not distributed equally in the main experiment (see Appendix C). A large group of children (68%) chose *graffiti,* another group (29%) chose *painting in the dark,* and a small group (3%)

chose *bouncing*. Although the mean level scores for interest in the three activities were fairly similar in the pilot studies, when students needed to select one of them in the actual experiment, they predominantly chose graffiti as the most popular activity. In further analyses, this uneven distribution of initial preferences was taken into account by examining whether children's initial preference for the most popular activity (graffiti) versus the other two activities (painting in the dark and bouncing) affected the effects of choice provision.

*Background characteristics*

In a next set of analyses, we examined effects of the background variables on the study variables. Because evidently there was a strong association between age and grade, we used only age (as the most direct and continuous indicator of chronological age) as a control variable in addition to gender. Results from a multivariate analysis of covariance (MANCOVA; with gender as a fixed factor, age as a covariate, and all pre- and post-experimental study variables as dependent variables) showed no effects of gender across variables in the current study. At the level of univariate analysis, we found one significant gender difference, with girls ($M = 2.87$, $SD = 0.54$) reporting to be more indecisive than boys ($M = 2.46$, $SD = 0.58$), $F(1, 117) = 15.93$, $p = .001$. No significant associations were found between age and all study variables. In further analyses, both background variables are included as control variables.

*Correlations*

Descriptive statistics and Pearson correlations can be found in Table 1. There were substantial correlations among all variables measured after the experiment. Autonomy satisfaction and competence satisfaction were positively correlated with one another and with all three indicators of intrinsic motivation. In addition, both direct and indirect measurements (i.e., intended persistence and vitality) of intrinsic motivation were correlated positively.

*Primary analyses*

*Effects of experimentally induced choice*

To examine effects of induced choice provision (vs. choice deprivation), on the post-experimental variables (i.e., autonomy, competence, and intrinsic motivation), we performed a multivariate analysis of variance (MANOVA) with condition (two levels) as a fixed factor and with age and gender as covariates. Means with standard deviations, confidence intervals, $F$ values, $p$ values, and effect sizes are presented in Table 2.

Results show a significant multivariate effect of condition, Wilks' lambda = .69, $F(5, 117) = 10.38$, $p < .001$, as well as significant univariate effects on all dependent variables. As hypothesized, children in the choice condition reported higher levels of autonomy and competence and higher scores on each indicator of intrinsic motivation compared with children in the choice deprivation condition. Inspec-

**Table 1**
Means, standard deviations, and correlations among the measured variables.

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Baseline measures | | | | | | | | |
| 1. Child–teacher relatedness | 4.04 | 0.78 | | | | | | |
| 2. Indecisiveness | 2.68 | 0.59 | −.05 | | | | | |
| Experimental measures | | | | | | | | |
| 3. Autonomy satisfaction | 3.42 | 1.31 | .10 | .08 | | | | |
| 4. Competence satisfaction | 3.78 | 1.04 | .19* | −.17 | .52*** | | | |
| 5. Pleasure and interest | 3.69 | 1.26 | .10 | −.07 | .78** | .72*** | | |
| 6. Intended persistence | 2.60 | 1.03 | .18* | .05 | .44** | .55*** | .60*** | |
| 7. Vitality | 3.63 | 1.35 | .16 | −.04 | .65** | .67*** | .83*** | .59*** |

* $p < .05$.
** $p < .01$.
*** $p < .001$.

**Table 2**
Means (and standard deviations) of dependent variables together with *F* values and effect sizes eta squared and Cohen's *d*.

| | Choice provision | Choice deprivation | *F* | *p* | $\eta^2$ | *d* |
|---|---|---|---|---|---|---|
| Autonomy satisfaction | 4.15 (1.30) | 2.78 (0.84) | 48.38 | <.001*** | .28 | 1.25 |
| Competence satisfaction | 4.06 (0.88) | 3.55 (1.11) | 7.98 | .001** | .06 | 0.51 |
| Intrinsic motivation | 4.30 (0.84) | 3.17 (1.32) | 31.58 | <.001*** | .20 | 1.01 |
| Intended persistence | 3.03 (0.91) | 2.25 (1.00) | 19.88 | <.001*** | .14 | 0.81 |
| Vitality | 4.21 (0.97) | 3.13 (1.43) | 23.18 | <.001*** | .16 | 0.87 |

** $p < .01$.
*** $p < .001$.

tion of the effect sizes (Table 2) shows that, according to Cohen (1988) and Sawilowsky (2009) criteria, the observed effect sizes can be considered moderate (Cohen's $d > .50$) to large (Cohen's $d > .80$). As such, these results indicate substantial effects of choice on the post-experimental variables in the current study. We repeated these analyses with a reduced sample from which participants who failed the manipulation check were removed. As can be seen in Appendix D, results were essentially similar.

We then verified these main effects of choice provision by testing whether the main effects of choice provision were affected by the uneven distribution of initial chosen painting activities. Therefore, we contrasted children with an initial preference for *graffiti* ($n = 73$) with children who initially preferred the less popular painting activities *painting in the dark* and *bouncing* ($n = 31$). We included this variable, next to condition, as a fixed factor in the MANOVA. For all study variables, main effects of experimentally offered choice remained significant (all *F* values were significant, $p < .001$). Moreover, none of the interactions between initial preference and the provision of choice were significant (all *p*s > .05), indicating that the unequal distribution of initial preference did not affect the main effects of choice.

*Mediating role of autonomy and competence need satisfaction*

To examine the mediating effects of perceived autonomy and competence, we performed structural equation modeling (SEM) with the *lavaan* package in R (Rosseel, 2012). The hypothesized structural model (displayed in Fig. 1) includes an association between the experimentally induced choice provision (vs. choice deprivation) and the subjective experience of choice (i.e., autonomy) and competence. Next, both indicators of need satisfaction were modeled as simultaneous predictors of all three indicators of intrinsic motivation (i.e., direct measurement for intrinsic motivation, intended persistence, and vitality). We allowed the model to include correlations among all indicators of intrinsic motivation. To check the model fit, we selected a cutoff value of .95 for the comparative fit index (CFI), a cutoff value of .06 for the root mean square error of approximation (RMSEA), a cutoff value of .09 for the standardized root mean square residual (SRMR), and a nonsignificant chi-square test (Kline, 2010).

Initial (maximum likelihood) estimation of the model yielded the following fit in the current sample: CFI = .991, RMSEA = .11, SRMR = .04, $\chi^2(3) = 7.10$, $p = .069$. In a following step, an inspection of direct pathways from condition to the outcomes revealed a significant direct effect on intended persistence ($b = .45$, $SE = .18$, $\beta = .22$, $p = .01$). Adding this path ameliorated the model fit and resulted in a final model that included both autonomy and competence satisfaction as mediators and one direct pathway from condition to intended persistence, CFI = .999, RMSEA = .05, SRMR = .02, $\chi^2(2) = 2.65$, $p = .27$. As can be seen in Fig. 2, the experimental provision of choice was positively associated with both autonomy and competence satisfaction, which in turn were related to the three outcomes. Only one association was not significant, namely the association between autonomy need satisfaction and *intended persistence*. We used a procedure available in lavaan to estimate indirect effects (Rosseel, 2012). All indirect pathways were significant (*p* values < .01) except for the indirect pathway from condition to intended persistence via autonomy satisfaction ($b = .13$, $SE = .10$, $\beta = .06$, $p = .21$), for which a direct effect pathway was observed.

*Moderating role of child–teacher relatedness and indecisiveness*

To determine whether the mediation effects differ between groups in terms of the pre-experimental variables child–teacher relatedness and indecisiveness, we tested moderated mediation.

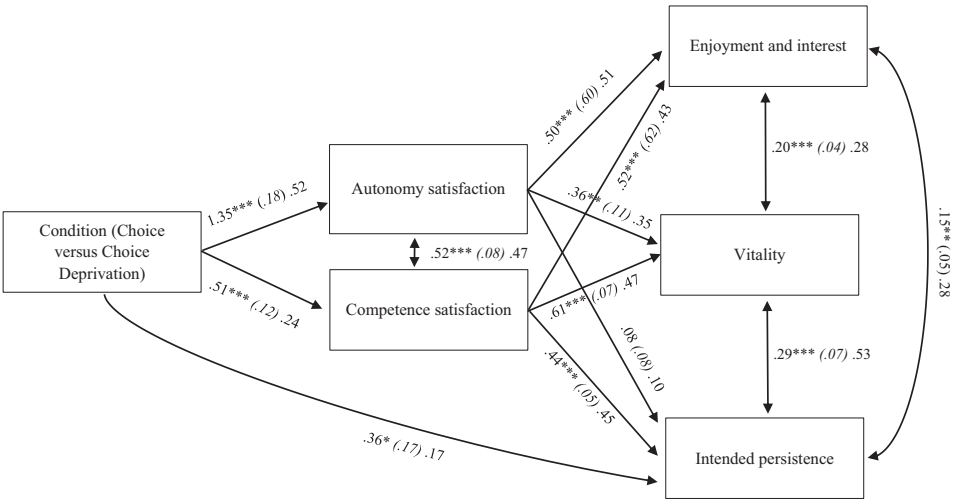


**Fig. 2.** Graphical presentation of the structural equation model, represented with unstandardized path coefficients (standard errors) and standardized path coefficients. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

In the SEM framework of the lavaan package in R (Rosseel, 2012), we followed a three-step procedure. In the first step, an initial model was tested with condition, the moderator, and the outcomes without the mediators autonomy and competence satisfaction. Whereas no significant interaction effects with condition were found for child–teacher relatedness, two significant interaction effects between condition and indecisiveness appeared in the prediction of enjoyment and interest ($b = -.74$, $SE = .34$, $p = .029$) and intended persistence ($b = -.88$, $SE = .28$, $p = .002$). Simple slope analyses showed that the effects of choice provision, relative to choice deprivation, were more outspoken for children scoring low on indecisiveness (one standard deviation below the mean; $b_{\text{pleasure\_interest}} = .82$, $SE = .15$, $p < .001$; $b_{\text{intended\_persistence}} = .69$, $SE = .12$, $p < .001$) relative to children scoring on average ($b_{\text{pleasure\_interest}} = .59$, $SE = .10$, $p < .001$; $b_{\text{intended\_persistence}} = .42$, $SE = .09$, $p < .001$) and scoring high on indecisiveness (one standard deviation above the mean; $b_{\text{pleasure\_interest}} = .36$, $SE = .14$, $p = .01$), even resulting in a nonsignificant effect for children scoring high on indecisiveness in terms of intended persistence ($b_{\text{intended\_persistence}} = .15$, $SE = .12$, $p = .22$). In the second step, we added autonomy and competence as mediators to the models, testing whether moderation effects would appear in the effects of condition on these need-based experiences. A significant interaction effect between condition and indecisiveness was found in the prediction of competence satisfaction ($b = -.63$, $SE = .23$, $p = .007$). As can be seen in Fig. 3, children scoring low on indecisiveness experienced more competence satisfaction after choice provision compared with children scoring high on indecisiveness. Simple slopes analyses indicated that the effect of choice was significant at low levels of indecisiveness ($b = .49$, $SE = .13$, $p < .001$), at average levels of indecisiveness ($b = .29$, $SE = .09$, $p < .001$), but not at high levels of indecisiveness ($b = .08$, $SE = .13$, $p = .53$). Again, teacher–child relatedness did not moderate effects of condition on the psychological needs. In a third step, we formally tested whether indecisiveness would moderate the indirect effects in the mediation model. Estimation of indirect effects of participants scoring high, average, and low on indecisiveness revealed that indirect effects of condition (through competence) on enjoyment and interest and vitality were significant for children scoring low ($b_{\text{enjoyment\_interest}} = .42$, $SE = .12$, $p < .001$; $b_{\text{vitality}} = .53$, $SE = .16$, $p < .001$) and average ($b_{\text{enjoyment\_interest}} = .25$, $SE = .09$, $p = .008$; $b_{\text{vitality}} = .31$, $SE = .12$, $p = .008$) on indecisiveness, whereas these indirect effects were not significant for children scoring high on indecisiveness ($b_{\text{enjoyment\_interest}} = .07$, $SE = .16$, $p = .50$; $b_{\text{vitality}} = .09$, $SE = .14$, $p = .50$). The indirect effect of condition on intended persistence (through competence need satisfaction) was not moderated by indecisiveness.

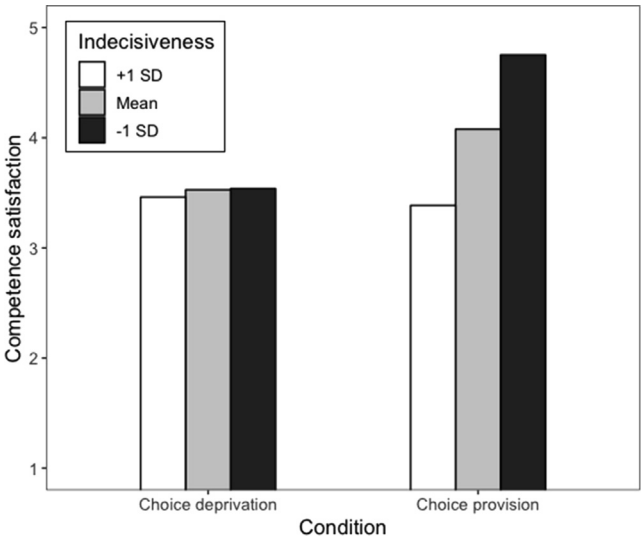


**Fig. 3.** Graphical presentation of the interaction effect between condition and indecisiveness.

Finally, we explored whether indecisiveness and child–teacher relatedness would moderate the effects of the mediators on the outcomes. However, none of the interaction effects was significant (all *ps* > .05). Thus, although indecisiveness affected to some extent the effect of experimentally induced choice on competence satisfaction, it did not qualify the effect of subjectively experienced choice or the effect of perceived competence on the outcomes.

## Discussion

Intrinsic motivation is a key motivational resource with beneficial effects on students' engagement, well-being, and performance (Reeve et al., 2008; Vallerand & Bissonnette, 1992). In the motivational literature and in literature based on SDT in particular, many studies have investigated how various external events in the classroom affect intrinsic motivation, including the use of autonomy-supportive language in providing instructions (e.g., Vansteenkiste et al., 2004) and the provision of process-based feedback (e.g., Urdan & Schoenfelder, 2006). One commonly discussed, yet somewhat controversial, motivational strategy is the provision of choice. At the correlational level, an extensive number of studies demonstrated that autonomy satisfaction relates positively to intrinsic motivation and well-being (e.g., Anderman & Leake, 2005; Patall et al., 2018). On the other hand, other scholars warned about potential pitfalls associated with the provision of choice, arguing, for instance, that choice may increase stress (Schwartz, 2000) and that the benefits of choice are limited to people with a certain cultural background (Iyengar & Lepper, 1999).

In SDT, it is assumed that the provision of choice is beneficial when it leads to students' subjective experience of autonomy and competence, which in turn contributes to individuals' intrinsic motivation. Up until today, to the best of our knowledge, no experimental research tested this detailed and integrated model of the effects of choice among elementary school children. This is unfortunate because intrinsic motivation is of utmost importance during this developmental period (e.g., Erikson, 1968) and declines during the transition to high school (Lepper, Corpus, & Iyengar, 2005). In addition, many questions concerning contextual factors that affect choice effects on intrinsic motivation are still open. Therefore, we set up an experimental field study in the context of an elementary school and we implemented a manipulation of choice in which the teacher either provided or deprived children's choice. Several interesting findings emerged.

*Motivating effects of choice*

First, the results demonstrated significant effects of choice such that children in the choice provision condition, relative to those in the choice deprivation condition, experienced a greater sense of autonomy satisfaction as well as greater effectiveness and mastery. In addition, they reported enhanced intrinsic motivation relative to children whose choice was removed. As indirect measurements of intrinsic motivation, children with choice provision reported more intended persistence and more vitality in performing the painting activity. These effects were moderate to large in terms of effect size (see Table 2). One explanation for these rather large effect sizes is that we attempted to maximize choice effects by taking both the number and nature of provided options into account. Specifically, we provided three different activities, a number that was found to have the most beneficial effect on intrinsic motivation in past research (Patall et al., 2008). In addition, we performed three pilot studies to select activities that were relatively attractive for the current population. Apparently, being given an opportunity to choose between generally appealing options is strongly motivating, whereas choosing between more boring or unattractive options possibly does not yield similar effects. Another reason for the fairly strong effects obtained involves the inclusion of two extremely varying conditions of choice in the current design (i.e., choice provision vs. choice deprivation). Our findings are consistent with results from Patall et al. (2008) meta-analysis showing that effects of choice are indeed larger when contrasted with a choice deprivation condition (as opposed to when effects are contrasted with a neutral condition). However, because we compared only these two extreme conditions, we cannot determine whether induced choice provision resulted in enhanced intrinsic motivation, whether induced choice deprivation impaired intrinsic motivation, or whether both types of effects occurred simultaneously. Therefore, future research can implement other conditions that are situated in between the provision and deprivation of choice such as a neutral condition in which no mention is made of having a choice. The inclusion of a neutral condition is also important because one may wonder about the real-life value (i.e., the ecological validity) of a choice deprivation condition. Although the deprivation of choice may occur every now and then in classroom practice (such as when children sign up for a sport activity, after which a teacher finds out that too many students chose the same activity and then denies some students from doing their preferred activity), it is probably less prevalent than a situation in which students are simply assigned an activity without knowing that there were alternatives. Finally, the provision of choice may have yielded strong effects in this study because participants were in a developmental period characterized by an increased tendency to make independent decisions (Wray-Lake et al., 2010). Because research has shown that the desire for independent decision making steadily increases throughout adolescence (Qin, Pomerantz, & Wang, 2009; Smetana, Campione-Barr, & Daddis, 2004; Soenens, Vansteenkiste, & Beyers, 2019), future research would do well to examine effects of (experimentally manipulated) choice also during later developmental stages.

Second, to better understand the processes involved in effects of induced choice provision on intrinsic motivation, we examined whether autonomy and competence satisfaction would account for the effects of induced choice provision on intrinsic motivation. The results confirmed that perceived autonomy and competence need satisfaction indeed played an intervening role in associations between the contextual provision of choice and intrinsic motivation. These findings highlight the importance of the functional significance of choice provision (Deci & Ryan, 1985, 1987) because ultimately the attribution of a personal meaning to events (i.e., perceived autonomy and competence) was found to be of utmost importance to intrinsic motivation. Indeed, our results showed that effects of induced choice provision were motivationally beneficial because the provision of choice gave rise to subjective experiences of choice and volition as well as competence and effectiveness.

*Moderating role of indecisiveness and teacher–child relatedness*

Given the complexity of choosing, we also sought to examine two plausible moderators of the effects of induced choice. Results showed significant interaction effects for children's level of indecisiveness such that children scoring high on indecisiveness did not benefit in terms of experienced competence satisfaction compared with children scoring low on indecisiveness. Because highly

indecisive children feel less confident about their ability to make appropriate choices, the provision of choice apparently does not enhance their confidence that they would be able to do the chosen activity well. Moderated mediation analyses further demonstrated that indirect effects of choice on two indicators of intrinsic motivation (through competence satisfaction) were not significant among highly indecisive children. These results suggest that highly indecisive children ultimately benefit less from the provision of choice (in terms of intrinsic motivation) because they derive less competence from choice compared with children low on indecisiveness. It should be noted, however, that indirect effects of choice on intrinsic motivation through autonomy need satisfaction were not qualified by indecisiveness. Overall, then, even highly indecisive children still tended to benefit from choice provision, albeit through only one pathway (instead of two pathways). Because this study is among the first to demonstrate this moderating effect and because it did not occur on all indicators of intrinsic motivation, it is important to replicate the current findings in future research.

If replicated, this finding has potential practical implications for teachers. Specifically, teachers can be advised to offer choices even to students who report being indecisive. However, the way that choices are introduced may need to be adjusted to these students. For example, one way to support highly indecisive children with choice difficulties is to provide advice and guidance, that is, provide structure when needed during the decision-making process (Aelterman et al., 2019; Vansteenkiste et al., 2012). Children high on indecisiveness could also be given the option not to make the choice and to leave the choice to the teacher. As such, children could freely decide to either make a choice by themselves or to volitionally rely on the teacher's decision (i.e., voluntary dependency; Van Petegem et al., 2012).

Notably, although indecisiveness moderated some of the effects of actual choice provision, it did not moderate effects of need-based experiences on intrinsic motivation. This finding is in line with the notion that there is more room for personality to moderate effects of actual contextual conditions than effects of subjective appraisals of these conditions (Ryan, Soenens, & Vansteenkiste, 2019; Soenens et al., 2015). As soon as children interpret and perceive a context (i.e., the actual provision of choice) as conducive to their psychological needs, they are likely to benefit in terms of intrinsic motivation. Experiences of psychological need satisfaction in particular are considered to be universal nutriments of optimal motivation (Deci & Ryan, 2000), leaving limited room for interindividual differences in the rather proximal associations between perceived need satisfaction and intrinsic motivation (see Van Assche, Van der Kaap-Deeder, De Schryver, Audenaert, & Vansteenkiste, 2018).

Next, results showed no evidence for child–teacher relatedness as a moderator of the effects of choice. Interpreted positively, these findings indicate that the confirmation of choice works well irrespective of whether it is applied by teachers who are experienced by children as high or low on closeness. On the other hand, the lack of moderation by child–teacher relatedness is striking in light of cross-cultural research on the effects of choice. Indeed, our findings are in contrast to the results of Bao and Lam (2008) obtained with Chinese children. In samples of Chinese children, high levels of teacher–student relatedness did dampen the negative consequences of choice deprivation. It is possible that individualistic values of independence and personal self-reliance may cancel out the role of child–teacher relatedness in dealing with choice provision (vs. choice deprivation). That is, Belgian children would attach little importance to the bond with their teacher and instead would prefer to make decisions on their own even when the teacher is generally supportive. Another possibility is that, in an individualistic cultural context, child–teacher relatedness can better be conceived as an outcome of choice rather than as a moderator. The provision of choice by a teacher is likely to be perceived as a sign of the teacher's caring and warmth, especially among individualistic children who attach great importance to independence (Chirkov, Ryan, Kim, & Kaplan, 2003).

Another explanation for the lack of moderation with teacher–child relatedness is that the situational effect of the choice manipulation, which was quite substantial, may have overridden the role of interindividual differences in the current study. Probably, more subtle or intermediate manipulations of choice in future research (using, e.g., a neutral condition as indicated before or less attractive options) could create more statistical room for finding moderating effects of individual differences. Another implication for future research is to vary the time between the moment children indicate their initial preference and the moment they are denied their choice. In Bao and Lam (2008) research children were told immediately whether they were assigned the preferred option or not, whereas

children in the current study were able to talk and think about their choice during the rest of the morning and lunch break such that many of them were excitedly looking forward to engaging in the chosen painting activity. As such, the choice deprivation may have come as a real disappointment to them, thereby carrying a more pervasive negative impact and overriding potential moderating effects of teacher characteristics in our study. Finally, because in this study the initial options were provided to the students by an experimenter (rather than by the teacher) and because the teacher's decision was delivered to students through a written note (not in a face-to-face contact), the role of the teacher in the choice process was somewhat distal. This may have reduced the role of teacher–student relatedness in the model. Clearly, it would be premature to conclude that teacher characteristics play no role in effects of choice, and future research needs to readdress these characteristics in relation to various choice manipulations.

*Limitations and future research*

A first limitation of this study is the homogeneity of the sample, which limits generalization of the current findings. Participants were children from the middle (fourth grade) and late (fifth and sixth grades) elementary school years who were recruited in the same school. Children had a generally positive attitude toward school and toward participating in the experiment, and teachers reported no significant problems concerning school grades. Therefore, it remains to be examined whether choice would be equally beneficial among elementary school children with a poor school attitude or with low quality of motivation for school. It is worth noting that Mouratidis et al. (2011) found the offer of choice in an authentic physical education class to be most need satisfying and intrinsically motivating for those children who enjoy physical education. Consistent with these findings, Patall, (2013) also found that only college students who reported to be interested in the task benefitted from having a choice.

Another limitation deals with the nature of the manipulation of choice used in the current study. Children in the choice condition not only indicated their choice in the morning (thereby being provided with a choice) but also received their preferred option at noon. As such, this manipulation combined the provision of the choice with having one's preference met. This raises the question of whether the effects obtained in this study are really due just to the provision of choice as such or are also due, at least to some extent, to the fact that children in this condition received their preferred and most interested option (Mouratidis et al., 2011; see Wilde et al., 2018 for a discussion of the importance of this distinction). As such, future research would do well to further disentangle effects of choice from the realization of one's preferences, for instance, by including a condition in which children simply indicate their preference for different activities (e.g., measured by Likert scales indicating to what extent children rate the activity as fun) without being told that they can choose which activity to do later (e.g., Wilde et al., 2018).

Related to the previous comment, it should be noted that also children in the choice deprivation condition initially had the opportunity to indicate their choice (and as such were initially provided with choice). In the second phase of this experiment, however, their choice was overruled. In this regard, it might be more accurate to refer to the conditions used in this study as a choice confirmation condition (where students initially indicated their choice and also received the choice of their preference) and a choice removal condition (where students also indicated their choice yet were denied their preferred option later on) (see also Ward, Wilkinson, Graser, & Prusak, 2008). Future research could rely on more straightforward manipulations, where one group of students is allowed to choose between options and another group of students is totally unaware of different options and simply gets an activity assigned.

Next, although relatedness satisfaction was not included as a mediator, feelings of belongingness may also help to explain the observed effects of choice in the current study. Presumably, children whose initial preference was denied may have felt a reduced sense of relatedness. Specifically, children received information about the assigned painting activities collectively just before they performed the activities. All coaches read the names for each activity out loud, followed by the provision of the condition-corresponding letter. Apart from this letter, children witnessed each other's assignment to the activities, whereas they may have been discussing their choice in the morning or

during the lunch break. Subsequently, the expectation of participating in an activity with someone they know was violated for children whose choice was deprived and, thereby, could have thwarted the need for relatedness and, subsequently, impaired intrinsic motivation (Anderman & Anderman, 1999; Xiang, Agbuga, Liu, & McBride, 2017; Carlton and Winsler, 1998).

Furthermore, rather than solely making use of self-report measures to tap into intrinsic motivation, future research may also make use of a behavioral indicator. Such measures have been typically obtained through the free choice paradigm during which children have the opportunity to actually continue with the performed painting activity or not (Deci, 1972).

Finally, future research would do well to further address the nature of the provided activities and options. Specifically, it is important to determine whether the effects of choice provision depend on the amount of options (Patall et al., 2008), on the attractiveness of the options, on the differences between options (e.g., De Muynck et al., 2019), and on the type of choice (i.e., action vs. option choice; Reeve et al., 2003). Whereas in the current study the three activities were fairly different, children could also be presented with options that are more similar or closely related.

### *Conclusion*

The aim of this study was to examine the effects of induced choice provision, versus choice deprivation, on the intrinsic motivation of elementary school children. Results showed that induced choice provision (relative to choice deprivation) is beneficial for the intrinsic motivation of elementary school children, with psychological need satisfaction mediating this effect. Highly indecisive children benefited less from choice provision because they derived relatively less feelings of competence from receiving a choice. Based on these results, teachers can be encouraged to implement choice provision in the classroom and, in doing so, to take into consideration students' level of indecisiveness. Future research could include measures of other personal and contextual factors that may moderate the main effects of choice (e.g., need satisfaction inherent to activities and other child personality variables). Such research is of utmost importance to classroom practice because the provision of choice has the potential to optimally motivate students and, ultimately, to contribute to their learning and well-being.

## Appendix A

See Table A1.

**Table A1**
Overview of condition assignment across painting activities.

| | Choice confirmation | Choice removal | Total |
|---|---|---|---|
| Bouncing | 5 | 37 | 42 |
| Painting in the dark | 17 | 25 | 42 |
| Graffiti | 36 | 6 | 42 |
| Total | 58 | 68 | 126 |

## Appendix B

Nonverbal instructions in experiment manipulation

Choice confirmation condition:

"Dear [name]. Today, our team has organized several painting activities in your school. This morning, you were able to choose the activity you want to do this afternoon. However, there are a lot of children for a limited number of activities. For this reason, not everyone will be able to do his or her preferred activity. Because we don't know you personally, we have discussed this situation with

your teacher. Your teacher has decided that you are allowed to do the preferred activity you chose this morning, namely [activity].

Choice removal condition:

"Dear [name]. Today, our team has organized several painting activities in your school. This morning, you were able to choose the activity you want to do this afternoon. However, there are a lot of children for a limited number of activities. For this reason, not everyone will be able to do his or her preferred activity. Because we don't know you personally, we have discussed this situation with your teacher. Your teacher has decided that you have to do a different activity than the preferred activity you chose this morning, namely [activity].

## Appendix C

See Table C1.

**Table C1**
Overview of the scales with related items, translated from Dutch into English.

| Pre-experimental measures |
|---|
| *Child–teacher relatedness* |
| My teacher . . . |
| . . . provides me choice. |
| . . . understands me. |
| . . . stimulates me to work with tasks in my personal way. |
| . . . provides me different tasks from which I can choose which one I want to make. |
| . . . asks me whether I want to learn things in a different way. |
| . . . provides me attention. |
| . . . lets me choose in class. |
| . . . lets me make choices about the sequence of tasks. |
| . . . provides me the choice with whom I complete certain tasks. |
| . . . likes me. |
| . . . lets me choose when I can sign in specific tasks. |
| . . . provides me choice about the kind of homework I have to make. |
| I like my teacher. |
| *Indecisiveness* |
| I find it easy to make decisions. |
| It is hard for me to come to a decision. |
| I don't know how to make decisions. |
| I know which steps to take when making a decision. |
| I would characterize myself as an indecisive person. |
| I don't hesitate much when I have to make a decision. |
| While making a decision, I feel certain. |
| While making a decision, I feel uncertain. |
| It takes a long time to weigh the pros and cons before making a decision. |
| I make decisions quickly. |
| I delay deciding. |
| I don't postpone making decisions to a later date. |
| I try to avoid making a decision. |
| I don't avoid situations where decisions have to be made. |
| I tend to leave decisions to someone else. |
| I cut the knot myself in a decision instead of leaving the decision to others. |
| Once I have made a decision, I stick to that decision. |
| I often reconsider my decision. |
| Once I have made a decision, I stop worrying about it. |
| After making a decision, I can't get it out of my mind. |
| After I have decided something, I believe I made the wrong decision. |
| After making a decision, I don't regret the decision. |
| I like to make decisions. |
| I am anxious to make a decision. |

(*continued on next page*)

**Table C1** (*continued*)

| Post-experimental measures |
|---|
| *Manipulation check* |
| Which activity did you do this afternoon? |
| I was able to do my chosen activity/The teacher assigned me to another one |
| *Autonomy satisfaction* |
| I was able to choose which painting activity I wanted to do. |
| It was my own choice which painting activity I performed. |
| I had no choice about which painting activity I did. (R) |
| I had the feeling that I had to perform the painting activity. (R) |
| I performed the activity because I wanted it by myself. (R) |
| I did the painting activity because I had no other choice. (R) |
| *Competence satisfaction* |
| I believe I was good in doing the painting activity. |
| I believe I was quite good in doing the painting activity in comparison with others. |
| During the painting activity, I had the feeling that I was doing well. |
| I had the feeling I was succeeding in doing the painting activity. |
| The painting activity did not go very well. (R) |
| *Enjoyment and interest* |
| I enjoyed doing this activity very much |
| This activity was fun to do. |
| I thought this was a boring activity. (R) |
| This activity did not hold my attention at all. (R) |
| I would describe this activity as very interesting. |
| I thought this activity was quite enjoyable. |
| While I was doing this activity, I was thinking about how much I enjoyed it. |
| *Intended persistence* |
| To what extent are you interested in a brochure with more information about a club that is specialized in the painting activity you did this afternoon? |
| What is the chance that you would sign up for such a painting club? |
| *Vitality* |
| During the painting activity . . . |
| . . . I felt alive and vital. |
| . . . I felt lifeless. (R) |
| . . . I felt energetic. |

Note. (R) refers to reverse scoring.

## Appendix D

We tested whether the results of the current study would differ when removing the 22 participants who failed to report correctly about their condition assignment. This removal resulted in a sample of 104 participants ($M_{age}$ = 10.20 years, $SD$ = 0.91, range = 9–12), of whom 56 were in the choice condition and 48 were in the choice deprivation condition. As can be seen in Appendix Table D1, we found similar (and significant) results for choice, compared with choice deprivation, on all study variables (all $F$ values were significant, $p < .001$).

**Table D1**
Means (and standard deviations) of dependent variables as a function of condition together with $F$ values and effect sizes.

| | Choice provision | Choice deprivation | $F$ | $p$ | $\eta^2$ | $d$ |
|---|---|---|---|---|---|---|
| Autonomy satisfaction | 4.22 (0.79) | 2.13 (0.85) | 151.09 | <.001 | .63 | 2.61 |
| Competence satisfaction | 4.04 (0.89) | 3.29 (1.13) | 12.91 | .001 | .12 | 0.74 |
| Intrinsic motivation | 4.33 (0.79) | 2.69 (1.18) | 65.83 | <.001 | .42 | 1.70 |
| Intended persistence | 3.37 (0.92) | 2.31 (1.09) | 26.99 | <.001 | .26 | 1.19 |
| Vitality | 4.25 (0.94) | 2.76 (1.39) | 43.17 | <.001 | .30 | 1.31 |

## Appendix E. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2019.104692.

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