

**Effect of Experimentally Induced Choice on Motivation
in Middle Childhood**

The Moderating Role of Teacher and Student Characteristics

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ABSTRACT

Objectives. Based on Self-Determination Theory (SDT), many studies have investigated the effects of choice provision on people's intrinsic motivation. However, the number of experimental studies is still limited and many questions concerning moderating factors are still open. Therefore, we set up an experimental field study to examine the effect of choice provision, versus choice deprivation, on the intrinsic motivation of elementary school children. In doing so, we addressed the role of teacher (i.e., child-teacher relatedness and teachers' general autonomy-supportive teaching style) and child (i.e., indecisiveness) characteristics.

Methods. In a group of elementary school children ($N = 104$), we induced an experimental manipulation of choice in which the teacher allowed half of the children to perform their preferred painting activity (i.e., the choice condition), while the other half was obliged to do another one (i.e., the deprivation of choice condition). After actually performing the activities, we assessed levels of intrinsic motivation, need satisfaction, and psychological well-being through questionnaires.

Results. Results showed that children in the choice condition displayed enhanced intrinsic motivation, higher levels of need satisfaction, and more vitality in performing the painting activity. In addition, the perceptions of choice and the experience of competence satisfaction mediated these main effects of choice provision. Further, multiple regression analyses showed that high-indecisive children benefitted less from choice provision in terms of intrinsic motivation.

Conclusion. This study identifies choice provision as a contextual factor to enhance children's intrinsic motivation and reveals the attenuating effect of indecisiveness. Limitations and directions for future research are discussed.

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Motivation is what moves people into action and what guides and directs their behavior. It is an important determinant of behavior and affective experiences in multiple life domains (e.g. sport, school, work) and it has been described in several psychological theories (e.g., Bandura, 1996; Hull, 1943). One major theory of motivation, Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000), provides a conceptual framework for understanding both the quantity and quality of motivation. In the current study, we focus on the hallmark of high quality motivation: intrinsic motivation (Deci, 1975; Deci & Ryan, 1985; 2000). With intrinsic motivation, behavior is based on interests, feelings of enjoyment, and experiences of challenge inherent in the behavior itself. Numerous studies demonstrated the beneficial role of intrinsic motivation for students' learning performance (e.g., Pintrich & Schunk, 1996), task engagement (e.g., Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008) and well-being across different ages (e.g., Deci & Ryan, 2008). Of particular importance for the current study, intrinsic motivation is associated with positive developmental outcomes in early and middle childhood, a period in which children acquire many skills at school and meet new social contexts, (e.g. Carlton & Winsler, 1998; Erikson, 1968).

Given the beneficial role of intrinsic motivation in students' outcomes, it is of key importance to identify sources of influence on this type of motivation. According to SDT, the degree to which social conditions either support or thwart the basic psychological needs for autonomy, competence, and relatedness is crucial to understand whether these social conditions enhance or impair intrinsic motivation (Deci & Ryan, 2000). Consistent with this prediction, research has shown that need-supportive conditions in the context of schools (such as the degree to which teachers take an empathic stance towards students and provide a rationale for tasks) positively affect students' learning strategies, performance, task-engagement, and attitude towards school (e.g. Deci & Ryan, 2000; Skinner et al., 2012).

One often cited, yet controversial, strategy to enhance students' intrinsic motivation is the provision of choice (e.g., Patall, Cooper, & Wynn, 2010). Remarkably, studies demonstrated somewhat divergent effects of choice on motivation (Patall, Cooper, & Robinson, 2008). As such, there is a need for systematic experimental research on the effects of choice, particularly in middle childhood, a developmental period in which intrinsic motivation is very important (Gottfried, Fleming, & Gottfried, 2001). This inconsistency in effects of choice also raises the question whether certain student and teacher characteristics play a moderating role. Is the provision of choice motivationally beneficial mainly (or even only) for some students or in combination with certain teacher characteristics?

The current research involves an experimental field study (a) examining the effects of the provision (versus deprivation) of choice on intrinsic motivation and (b) examining three

plausible moderators for the motivational effects of choice in the classroom. First, we address the role of the quality of the relatedness between children and teachers. Second, we look into the role of teachers' general use of an autonomy-supportive teaching style. Third, we examine whether the motivational impact of choice among children depends on the personality factor indecisiveness.

Self-Determination Theory and Motivation for School

Intrinsic Motivation and the Psychological Needs

Philosophical background. SDT is rooted in a positive view on human development (Deci & Ryan, 1985; Ryan & Deci, 2017; Ryan, 1993) and is consistent with other developmental theories highlighting the importance of an integration process in personal growth (e.g., Werner, 1948). This integration process refers to the continuous and lifelong 'absorption' of new information in the form of mental representations (Piaget, 1952). Importantly, the degree to which individuals' natural capacity for integration unfolds is a function of both individual (e.g. genetic) and environmental (e.g. informative environment) factors. As part of this integration process, people have the innate drive to explore unknown features of an object and, subsequently, to construct more complex mental representations of that object. For example, a child's first mental image of a spoon (e.g. an object) is adapted by additional information and experiences garnered through different actions (e.g. eating, swinging) during subsequent years. Through these various experiences with an object, knowledge about it refines and becomes more complete. Consistent with this developmental view on the development of representations, a key assumption in SDT is that people gain a better and more differentiated understanding of themselves and their environment as they grow older, with this understanding being driven largely by an innate desire for knowledge and a spontaneous tendency to explore the environment.

Intrinsic Motivation. According to the SDT, a central manifestation of this natural and active drive to obtain knowledge is the concept of intrinsic motivation (Deci, 1975; Deci & Vansteenkiste, 2004; Piaget, 1952; Ryan & Deci, 2017; White, 1959). People display intrinsic motivation when their reasons for behaving are inherent to the activity or task itself. The enjoyment, challenge, and experiences of fun are the primary reasons for activity engagement (Deci & Ryan, 2000). A great number of studies have demonstrated associations between intrinsic motivation and positive learning-related and general outcomes, including more engagement in the classroom, higher-quality learning, more commitment with others, and even

less problem behavior such as disruptive behavior in class (e.g., Battistich, Solomon, Kim, Watson & Schaps, 1995; Battistich, Schaps, Watson, & Solomon, 2000).

While intrinsic motivation is assumed to be a natural and spontaneous psychological process, it requires energy and environmental support (Deci & Ryan, 2000). In this regard, SDT assumes that people are equipped with three basic psychological needs that fuel intrinsic motivation and that are necessary for psychological growth and mental health more broadly (Deci & Ryan, 1985, 2000). Specifically, people are more likely to be intrinsically motivated when they experience a sense of self-determination (autonomy), effectiveness (competence) and belongingness (relatedness) in performing behavior (Deci & Ryan, 1985).

Autonomy. The psychological need for autonomy refers to the experience of psychological freedom and to the experience that behavior is based on authentic and personally endorsed values (deCharms, 1968; Deci, 1975, 1995; Kauffman, 2000; Ryan, 1993; Ryan & Connell, 1989; Sheldon & Elliot, 1999; Van Petegem, Beyers, Vansteenkiste, & Soenens, 2012). When experiencing autonomy, behavior is self-regulated and congruent with a person's volition (Deci & Ryan, 1985; Ryan & Deci, 2000; Ryan & Lynch, 1989). Importantly, autonomy as defined in SDT is different from independence (Van Petegem et al., 2012). While independence refers to the degree to which people depend on others for advice, help, and assistance, autonomy as defined in SDT refers to the degree of volition in behavior. It refers to an inherent need that can manifest both in situations of independence and dependence. For example, a child may deliberately choose to finish his homework with help from parents (thereby being voluntarily dependent) or without help from others (thereby being voluntarily independent).

Competence. The psychological need for competence involves the need to experience personal effectiveness while performing behavior and to master difficult challenges (e.g. White, 1959). Finding challenges or provoking personal boundaries triggers people's natural curiosity. When people feel effective in performing a task, the behavior underlying this performance is more likely to be intrinsically motivated. According to Vansteenkiste, Niemiec and Soenens (2010), the needs for autonomy and competence are considered to be the most direct and fundamental foundations of intrinsically motivated behavior. However, research revealed that relatedness might sometimes play a role in people's intrinsic motivation.

Relatedness. The need for relatedness refers to the experience of being loved and experiencing reciprocal care in close relationships (Baumeister & Leary, 1995; Ryan, 1993). The presence of beloved others may result in higher feelings of enjoyment and interest in an activity, thereby also contributing (much like autonomy and competence) to intrinsic motivation. However, this sense of warmth and belongingness is not required for each activity

to be intrinsically motivating. For example, relatedness has a less substantial role for people's motivation while reading a book compared to participating a team sport like rugby. Because the need for relatedness plays a somewhat more distal and conditional role in intrinsic motivation (compared to the two other needs), the focus in this study will be mainly on the needs for autonomy and competence.

Research on the Role of Intrinsic Motivation in Academic Adjustment

A large number of studies have demonstrated that intrinsic motivation is crucial and beneficial for learning and school engagement (Taylor et al., 2014). In several correlational studies with elementary school children, levels of intrinsic motivation were positively related with overall school achievement (Froiland & Worrell, 2016; Gottfried, 1990), high-quality learning (Reeve, Ryan, Deci, & Jang, 2007), and levels of persistence during learning (Vallerand & Bissonnette, 1992). In the context of mathematics in particular, levels of intrinsic motivation were associated positively with more effective math strategies (e.g. estimating) while solving a math problem (Montague, 1992). Similarly, experimental studies found more positive attitudes for doing homework (Froiland, 2011) and greater conceptual learning (Grolnick & Ryan, 1987) when students were in a condition fostering pleasure and interest for school-related activities. Furthermore, correlational studies showed that high levels of intrinsic motivation were related with more prosocial behavior, more commitment to others and a stronger sense of school belonging among adolescents (e.g., Battistich, Solomon, Kim, Watson & Schaps, 1995; Battistich, Schaps, Watson, & Solomon, 2000).

Although numerous studies associated high-quality motivation with positive outcomes in the classroom, many teachers are trained to provide tangible rewards as a motivation-enhancing strategy (La Guardia & Ryan, 2002). This is unfortunate because a meta-analysis by Deci, Koestner and Ryan (1999) revealed negative effects of rewards on students' motivation when students were initially intrinsically motivated. In contrast, increased levels of intrinsic motivation were found when teachers supported student-initiated learning strategies in class instead of giving the answer right away (Deci, 1975; Reeve & Jang, 2006). These findings underscore the importance of challenging students and of triggering and sparking their intrinsic interest in the classroom. Therefore, SDT specifies different social conditions that serve to support students' basic psychological needs (and the needs for autonomy and competence in particular), thereby enhancing students' intrinsic motivation for school.

Autonomy-Support. Deci and Ryan (2002) argued that autonomy-supportive classroom practices are key to enhance students' intrinsic motivation and to create a school-engaging climate (see also Reeve, 2009). Autonomy-support is essentially about the degree to

which teachers take students' frame of reference, encourage initiative, and create room for students to be themselves. More specifically, students whose teachers encouraged group discussions, who acknowledged students' perspectives, and who provided enough time for independent work perceived the teacher as autonomy-supportive and reported more interest for the subject in class (Grolnick, Kurowski, McMenemy, Rivkin, & Bridges, 1998; Reeve & Jang, 2006; Reeve, Nix & Hamm, 2003). In addition, such autonomy-supporting teaching styles have been associated positively with academic achievement (e.g. Miserandino, 1996), perceived competence (e.g. Deci, Schwartz, Sheinman, & Ryan, 1981; Ryan & Grolnick, 1986; Williams, Wiener, Markakis, Reeve, & Deci, 1994), creativity (Amabile, 1985) and flexible thinking (McGraw & McCullers, 1979). Autonomy-supportive teaching practices can be contrasted with more controlling strategies that impair students' motivation, like the use of controlling-teacher language (Reeve, Deci, & Ryan, 2004; Reeve & Jang, 2006). When teachers used words such as "have to", "must" or "need to", students showed less engagement and less autonomous motivation (e.g. Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Urdan & Schoenfelder, 2006). In addition, the use of guilt induction (De Meyer, Soenens, Aelterman, De Bourdeaudhuij, & Haerens., 2016) or the provision of evaluative and comparison-based feedback such as grades (Urden & Schoenfelder, 2006) resulted in the frustration of adolescents' autonomy.

Structure. 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, Michou, Vansteenkiste, & Lens, 2013; Ryan, 1993). When teachers implemented such structuring characteristics, children reported higher feelings of competence, effectiveness and enhanced intrinsic motivation (Anderman & Leake, 2005; Ryan & Deci, 2013; Urden & Schoenfelder, 2006). Another strategy relevant to structure is the provision of positive and constructive feedback (e.g., Hewett & Conway, 2015). Research found that high school students who received performance-based and improvement-promoting feedback reported higher feelings of responsibility and higher levels of perceived competence (Legault, Green-Demers, & Pelletier, 2006).

Summary of the SDT View on Motivation for School

SDT-based research identified a great number of contextual conditions that are associated with enhanced intrinsic motivation of students. When teachers take the perspective of their students, provide time for discussion, and encourage students' initiative, they support the need for autonomy and, thereby, enhance students' intrinsic motivation and task-engagement (e.g. Tsai et

al., 2008). Further, the provision of optimal challenges, constructive feedback and the provision of guidance and structure are parts of a competence-supportive environment that also increases students' effort and intrinsic motivation (e.g., Ryan & Deci, 2013). While research generally supports the importance of contextual support for autonomy and competence for intrinsic motivation, there is debate about a number of specific practices that potentially support these needs. One of the most heavily debated and controversial practices in this regard is the provision of choice. Several studies found increased motivation among students when they were able to choose (e.g. Patall, Cooper, & Wynn, 2010; Zuckerman, Porac, Latin, Smith, & Deci, 1978). Such findings suggest that choice is another potentially need-supportive strategy that teachers could apply in the classroom. However, there is no consensus on the motivational impact of choice and the literature still debates about several controversial assumptions.

The Motivational Impact of Choice in the Classroom

Choice as Key to Enhanced Motivation

Much like Deci and Ryan (1987), several scholars proposed that the provision of choice is generally beneficial for people's psychological functioning and motivation (e.g., Cordova & Lepper, 1996; Zuckerman et al., 1978). When teachers applied choice in the classroom, students were found to display more interest, more effort and increased engagement (e.g., Flowerday & Schraw, 2000). For example, teachers provided choice by presenting different classroom activities (Anderman & Leake, 2005) and different physical education exercises (e.g. Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011). In other studies, teachers deliberated with high school students how and when to complete homework (Patall, Cooper, & Wynn, 2010) and what to work on in class (Urdan & Schoenfelder, 2006). Such ways of providing choice were found to enhance students' motivation primarily in samples of high school students (Meng & Ma, 2015; Patall, et al., 2010; Reeve, Jang, Carrell, Jeon, & Barch, 2004) and middle school students (Oginsky, 2003). Elementary school children received less attention. One exception is a study by Mouratidis et al. (2011), which found in a sample of elementary school children that the presence versus denial of choice during physical education affected students' levels of vitality and enjoyment. The provision of choice resulted in enhanced intrinsic motivation and increased psychological well-being.

However, several authors called into question the motivational impact of choice, thereby arguing that factors like culture and societal developments qualify effects of choice. For instance, Schwartz (2000) argued that the excess of choice we face on a daily basis in contemporary society leads to increased feelings of stress and anxiety. Moreover, Iyengar and

Lepper (1999) argued that people who live in collectivistic cultures benefit less from choice. People with a collectivist cultural background are thought to be more sensitive to the social consequences of making a choice, compared to people from individualistic culture who have more independent and self-oriented values (Markus & Kitayama, 1991). In line with this idea, they found that, unlike in European American children, Asian American children's motivation was not undermined when a close social figure (e.g. teacher) made a choice in their place. Probably because these children strongly value the opinion of close others, they do not suffer from a denial of choice when such close others make the choice. However, it should be noted that even these children with a collectivist cultural background displayed impaired intrinsic motivation when the choice was imposed by an unfamiliar person. Thus, at least some forms of choice denial seem to undermine motivation irrespective of cultural background.

Against the background of these controversies in the literature of choice, it is important to further clarify the SDT view on choice, thereby providing a nuanced perspective on the effects of choice on motivation and on the boundary conditions of these effects.

A Further Clarification of the Concept of Choice in Self-Determination Theory

First, it is important to differentiate clearly between the concepts of *choice provision* and *perceived choice* in order to comprehend the interplay between choice and the psychological needs for autonomy and competence. *Choice provision* refers to the contextual presence of multiple options from which people select one. *Perceived choice* is the subjective experience of having an opportunity to choose (Patall & Yang, 2016). This differentiation is important because, although choice provision typically or often results in the feeling of having a choice, this is not necessarily the case. Although the subjective experience of choice is considered essential for people to experience autonomy and competence, the two key needs behind intrinsic motivation, not all provision of choice actually gives rise to feelings of choice. Thus, according to SDT it is important to distinguish between the actual contextual affordance of choice and the subjective interpretation and experience of this contextual affordance as having a feeling of choice (Deci & Ryan, 1987; Van Petegem, Soenens, Vansteenkiste, & Beyers, 2015). Both the nature of the choice provided (e.g., the number and meaningfulness of options) as well as contextual variables surrounding the provision of choice (e.g., the general teaching style context and students' personal characteristics) can determine the degree to which the provision of choice actually results in a subjective feeling of choice (Patall & Yang, 2016). The degree to which the provision of choice results in subjectively felt choice will also determine the effect of provided choice on experiences of autonomy and competence and subsequent intrinsic motivation.

Choice as a Potential Source of Autonomy. According to SDT, the notions of choice provision and experienced autonomy are strongly related, but are not synonyms. Not every contextual opportunity for choosing equals subjectively experienced support for autonomy. Effects of choice as an autonomy-supportive strategy depend on the extent to which a person can express self-endorsed behavior by making that choice (e.g. Katz & Assor, 2007; Reeve, Nix, & Hamm., 2003). For example, when choices are not meaningful or personally relevant, they do not match people's internal values and interests (Moller, Deci, & Ryan, 2006). An illustration of this point can be found in the study of Iyengar and Lepper (1999), which relied on the manipulation of trivial choices, such as choosing between two pencils. Possibly because of the trivial nature of the options that were provided, effects of choice were only modest and inconsistent. Further, it is important for people to feel entirely free to choose when being offered choices rather than be manipulated in a certain direction or feeling that there are 'strings attached' to a certain choice. In a study by Baumeister, Bratslavsky, Muraven and Tice (1998), participants were asked to choose one perspective towards a controversial issue that was presented. Because choice felt forced and externally regulated, participants did not perceive the provision of choice as an opportunity to function voluntarily. Furthermore, the options did not include personally relevant values, which resulted in a lack of self-determination (e.g. Reeve, Nix, & Hamm, 2003; Ullmann-Margalit, & Morgenbesser, 1997). Thus, the provision of choice will only contribute to autonomy need satisfaction and intrinsic motivation when the choices are meaningful and allow people to choose on the basis of deeply endorsed preferences, interests, or values. In addition to autonomy, several studies showed significant effects of choice on the need for competence (Leotti, Iyengar, & Ochsner, 2010; Tafarodi, Milne, & Smith, 1999).

Choice as a Potential Source of Competence. In addition to a potential contribution of choice to autonomy, choice provision entails an opportunity to perceive a feeling of competence (Patall & Yang, 2016). Patall, Cooper and Wynn (2010) indeed found that high school students felt more competent after they had the opportunity to choose between homework options. Other research showed that people experienced competence when they could select the most challenging option, thereby matching the option to their abilities in an optimal way (e.g. Deci & Ryan, 1985; Pintrich & Schunk, 2002; Weiner, 1992). In contrast, options that were too easy or too complex did not result in high levels of competence (Iyengar, Huberman, & Jiang, 2004). Similar findings were obtained when options included too many (negative) consequences (e.g. Eccles & Wigfield, 1995). At that moment, participants chose at random, transferred the choice to someone else, or even refused to choose (e.g. Bereby-Meyer, Assor, & Katz, 2004). The number of options is also important in this regard. According to the meta-analysis of Patall, Cooper and Robinson (2008), studies including choice show the largest beneficial effect on

intrinsic motivation when participants made a single choice out of 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. Furthermore, the study of Patall, Sylvester and Han (2014) showed significant differences between choosers who felt generally competent in performing an activity and choosers who felt incompetent. The feeling of being incompetent attenuated the effect of provided choice on intrinsic motivation and performance.

Summary of the SDT View on Choice. The concept of choice has received much attention in SDT-based literature and beyond. According to this literature, the contextual provision of choice has the potential to contribute to satisfaction of the needs for autonomy and competence, but does so only under certain circumstances (Patall & Yang, 2016). For instance, the number of options needs to be limited and the options need to be meaningful, allowing for an evaluation of the options against deeper preferences, interests, and values. Essentially, when the provision of choice results in a feeling of perceived choice and subsequent psychological need satisfaction, choosing enhances intrinsic motivation (e.g., Zuckerman et al, 1978). While we already discussed the importance of a number of features of choice provision itself (e.g., number and nature of options), the motivational effect of choice also depends on factors surrounding the provision of choice (Patall & Yang, 2016). In the current study, we focus on three contextual factors, with each factor largely corresponding to one SDT-based psychological need. Specifically, we look into the role of child-teacher relatedness and the degree to which the teacher is generally perceived as having an autonomy-supportive teaching style. While these two contextual factors represent aspects of the teaching context, we also addressed a characteristic of the child, that is, indecisiveness. This personality feature reflects children's competency to choose.

Contextual and Individual Factors Potentially Qualifying the Motivational Effects of Choice Provision

Child-Teacher Relatedness. First, we address the role of child-teacher relatedness as a possible moderating factor in the current study. It has been argued that the absence (or even deprivation) of choice is less harmful for intrinsic motivation when a student feels closely connected to the person who makes the choice instead of the student (Iyengar & Lepper, 1999). In a study by Boa and Lam (2008), Chinese children had to work on anagrams that were chosen by themselves or by their teacher. In line with the general literature, results showed enhanced intrinsic motivation for children who performed the self-chosen anagram. However, there was also an interaction between the provision of choice and the child-teacher relatedness in the

prediction of intrinsic motivation. When children had a close relationship with their teacher, children whose teacher made the choice reported equally high levels of intrinsic motivation as children who made the choice by themselves. Only children with no close relationship reported undermined intrinsic motivation and felt less autonomous in performing the task. Although Bao and Lam (2008) argued that this moderating role of teacher-child relatedness is particularly relevant in a collectivist cultural context, they only examined this moderating role in Chinese children and not in children from a more individualist cultural context. Because SDT assumes that relatedness is, much like autonomy and competence, a universal psychological need (e.g. Keller, 2012; Ryan & Deci, 2000), perhaps the moderating effect of relatedness could show up also in countries with a more individualist cultural climate such as Belgium. This possibility will be tested in the current study.

Teacher Autonomy-Support. As discussed before, the provision of choice can be part of a larger autonomy-supportive teaching climate from which children benefit motivationally. Patall, Cooper and Wynn (2010) indeed found positive associations between students' general perception of the teacher as being autonomy-supportive and the extent to which the teacher provides choice in class (e.g. "My teacher allows me to choose how to my work in the classroom"). However, providing choice is not necessarily part of a generally autonomy-supportive teaching climate, and sometimes teachers might also offer choice while they are generally less inclined to support students' autonomy. This possibility raises the question whether the effects of choice provision depend on teachers' more general tendency to support children's autonomy. Does a generally autonomy-supportive teaching climate contribute to the beneficial effects of choice? Possibly, choice provision is indeed most effective when teachers are generally perceived as autonomy-supportive, while the motivational impact may diminish in a less autonomy-supportive context (e.g. Reeve; Nix, & Hamm, 2003). Alternatively, the provision of choice may have a stronger motivational impact in the context of a less autonomy-supportive teaching climate. The provision of choice may then serve a compensating role in a context which is perceived as being generally low in autonomy support (Black & Deci, 2000).

The Role of Indecisiveness. On the intra-individual level, people differ in the degree to which they are capable of making choices. Much like every person has a different perception of his own general competence and worth as a person (Patall & Yang, 2016), people differ in the degree to which they feel able to make choices. While some people feel competent to assess options and confident to select one of them, others feel insecure about this and experience feelings of stress while choosing. Therefore, we are interested in the question how the motivational effect of choice is affected by the extent to which students are dispositionally indecisive (Iyengar & Lepper, 1999). Research showed that indecisive people felt better when

they have to make fewer choices (Iyena & Lepper, 1999) or when others made choices for them (Beattie, Baron, Hershey, & Spranca, 1994). In the current study, we investigate this idea for the first time (at least to the best of our knowledge) in a population of elementary school children. Specifically, we address the question whether high-indecisive children would benefit less from the provision of choice (e.g. Beattie et al., 1994).

The Present Research

In the current study, we aim to examine the effects of choice provision, relative to choice deprivation, on intrinsic motivation of elementary school children. Although middle childhood is a crucial period for the development of a positive orientation towards school and for the acquisition of school-based skills (e.g. Erikson, 1968; Lemos & Verissimo, 2014; Lepper, Corpus, & Iyengar, 2005), this age group has received little attention in research on choice.

Specifically, we attempt to contribute to the literature in four ways. First, we investigate the effects of choice provision in an ecologically valid context, that is, students' own school. To increase the chance of eliciting choice effects on motivation, we provide a limited number of options (i.e., three) (Patall, Cooper, & Robinson, 2008) and we provide options that are personally relevant and meaningful to children in middle childhood (i.e. painting activities that were pre-tested in a series of pilot studies in terms of interest and enjoyment) (Patall & Yang, 2016).

Second, we operationalize intrinsic motivation in three different ways, that is, using both a direct measurement of children's experiences of enjoyment and interest and an indirect measurement 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, 1971). In addition, we include a measurement of an affective experience typically co-occurring with intrinsic motivation, that is, vitality. Ryan and Frederick (1997) define vitality as the experience of having energy and feeling alive. Because with intrinsic motivation people can be fully themselves and act upon their deepest interests, they are expected to feel more vital. By using these three operationalizations, we tap into the direct motivational experiences of intrinsic motivation as well as into its behavioral and emotional manifestations.

Third, we include measurements of the needs for autonomy and competence to examine their mediating role in effects of provided and perceived choice on intrinsic motivation. In line with the literature, provided choice is assumed to affect students' intrinsic motivation through the perception of the opportunity to choose and subsequent experiences of satisfaction of the

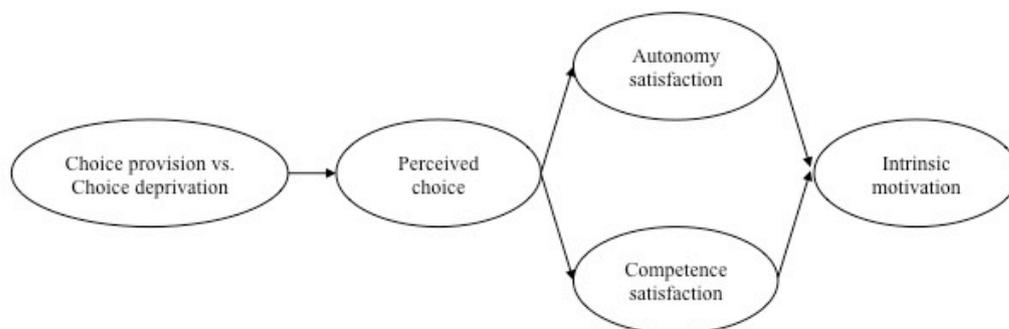
needs for autonomy and competence. This hypothesized mediation sequence is displayed graphically in Figure 1 and will be tested formally in this study.

Fourth and finally, we include measures of three plausible moderating factors that each are related to the psychological needs for relatedness, autonomy and competence. From these measures, two factors deal with teacher characteristics (child-teacher relatedness, and generally perceived autonomy-supportive teaching) and one is related to child characteristics (indecisiveness).

The current research has an experimental design and samples elementary school children. First, children will be asked to choose between several interesting school activities. At this moment (prior to the experimental induction), we assess children's general perception of the autonomy-supportive style of the teacher, their relatedness with the teacher, and their level of indecisiveness. Next, we experimentally induce choice, with half of the children being allowed to do their activity of initial preference and with the other half of the children being denied their initial choice and being told that their teacher has chosen a different option for them.

Based on this experimental design, we propose three sets of research questions. The first research question refers to the main effects of experimentally induced choice (versus deprivation of choice) on participants' intrinsic motivation (using direct and indirect measurements). Children in the choice condition are expected to display higher levels of perceived choice, autonomy and competence need satisfaction, and intrinsic motivation (as operationalized in different ways), compared to the group of children whose choice was deprived (hypothesis 1). The second research question concerns the mediating role of perceived choice and satisfaction of the needs for both autonomy and competence. In line with the SDT-

Figure 1. Hypothesized model of the mediation sequence of need satisfaction in the current study.



based assumption that the needs are essential nutrients for intrinsic motivation (Deci & Ryan, 1985), we hypothesize that the provision of choice contributes to perceived choice and subsequent high levels of autonomy satisfaction and competence satisfaction, with satisfaction of these needs in turn relating to more intrinsic motivation (hypothesis 2). Third, we address the role of three moderating factors in the current design. In contrast with the two previous hypotheses, the third research question is addressed in a somewhat more exploratory way because few previous studies are available on this matter. First, we hypothesize that that a close relationship with the teacher buffers the undermining effect on motivation of choice deprivation (hypothesis 3a). Second, we anticipate that children in a generally more autonomy-supportive teaching climate will benefit more strongly from choice provision (hypothesis 3b). Finally, it is expected that indecisive children will benefit less from choice provision (hypothesis 3c).

METHODS

Participants

Participants were 126 children (66 girls) from the fourth ($N = 56$; 23 girls), fifth ($N = 44$; 18 girls) and sixth ($N = 26$; 13 girls) grade of an elementary school in Hamme, Belgium. They had a mean age of 10.8 years (range: 9 - 12).

Procedure

Pilot Studies

In order to select relevant and potentially intrinsically motivating activities, I first conducted a series of pilot studies. This was deemed important because, as discussed in the literature review, the provision of choice is beneficial or motivating only when the options are meaningful and potentially of interest to people (Patall, Cooper, & Robinson, 2008). At the same time, it was deemed important to select activities that were relatively similar in terms of students' initial interest.

Specifically, three pilot studies were performed in three different elementary schools. Using a questionnaire, the experimenter presented a list of activities by a short text and 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 to be (e.g. "To what extent do you think this activity is challenging?") on 4-point scales. In Study 1 ($N = 99$; $M_{\text{age}} = 9.94$ years), I presented two different themes, each including four activities. The

theme ‘circus’ contained the activities *Rola rola* (i.e. “keeping balance using a board on a pipe”), *Juggling* (i.e. “throwing multiple balls in the air while catching others”), *Chinese dishes* (i.e. “balancing a dish on a small stick”) and *Diabolo* (i.e. “juggling a diabolo using a string attached to two hand sticks”). In the second theme ‘painting activities’, the activities *Graffiti* (i.e. “painting with an aerosol on the wall”), *Painting in the dark* (i.e. “painting with glowing-in-the-dark paint”), *Painting without hands* (i.e. “using the paint-brush with your mouth”) and *Painting Mix* (i.e. “painting with sand, glue and sugar”) were presented. Results showed that only *Graffiti* and *Painting in the dark* displayed sufficiently high scores for both attractiveness ($M_{\text{graffiti}} = 3.41$, $M_{\text{painting in the dark}} = 3.35$) and challenge ($M_{\text{graffiti}} = 2.62$, $M_{\text{painting in the dark}} = 2.84$).

Because all circus activities had rather low levels for challenge, the goal of Study 2 ($N = 69$; $M_{\text{age}} = 10.25$ years) was to find a third appropriate painting activity. Therefore, I presented the activities *Graffiti* and *Painting in the dark* once more, replaced *Painting Mix* with a new activity *Painting with garbage* (i.e. “Use different kinds of garbage, like bottles or papers, as paintbrushes”) and adjusted the activity *Painting without hands* by adding more body parts (i.e. “holding the paintbrush with the elbows, knees, mouth, etc.). Similar to the results of Study 1, only *Graffiti* and *Painting in the dark* had appropriate scores for attractiveness ($M_{\text{graffiti}} = 3.46$, $M_{\text{painting in the dark}} = 3.32$) and challenge ($M_{\text{graffiti}} = 2.62$, $M_{\text{painting in the dark}} = 2.72$).

In Study 3 ($N = 52$; $M_{\text{age}} = 10.05$ years), four new painting activities were added to the questionnaire, next to the activities *Graffiti* and *Painting in the dark*. This time, I presented the new activity *Body paint* (i.e. “using body paint to paint a certain body piece of each other, to complete a human piece of art”), *Music painting* (i.e. “making different paintings, following the feelings and rhythm of different music genres”), *Handicap* (i.e. “painting while being dressed according to a certain physical inability”) and *Bouncing* (i.e. “using bouncy balls and marbles, stamped in paint, to make a painting”). Three activities displayed high scores on attractiveness: $M_{\text{graffiti}} = 3.37$, $M_{\text{painting in the dark}} = 2.98$, and $M_{\text{bouncing}} = 3.58$ and high scores on challenge: $M_{\text{graffiti}} = 2.60$, $M_{\text{painting in the dark}} = 2.77$, and $M_{\text{bouncing}} = 2.42$. However, there are still differences on both variables between activities. For example, we notice that the activity *Painting in the dark* had a lower score on attractiveness compared to *Graffiti* and *Bouncing* in the current results. Given the high score on challenge and the high scores on attractiveness in Study 1 and Study 2, we decide to select the activity *Painting in the dark* next to *Graffiti* and *Bouncing* 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 including an approval form. Parents were informed about the purpose

of the study (i.e. the goal, who, why, what) and were asked to provide active consent for their child to participate. We emphasized that the participation was completely voluntary, that data would be handled confidentially and that children could quit the experiment without consequences and at any moment. In total, sixty-two parents did not approve their child to participate. All teachers were informed with a detailed letter and were asked to participate passively with the current design of the experiment. All participating children completed an informed consent. The study received ethical approval from the Ethics Committee of the Ghent University.

At the day of the experiment, the experimenter introduced himself in each of the seven participating classes and informed all participating children about the day schedule. Children were told that three teams of coaches would guide a certain painting activity in the afternoon. After describing each painting activity shortly, we asked children to mark individually their most favorite activity on a choice form. To avoid primacy effects, we varied the order in which the painting activities were presented to students on the choice form. Thus, we used three different versions of the choice form, with each version presenting the activities in a different sequence. After returning all choice forms, children were asked to complete the first questionnaire, including the measurement of the child-teacher relatedness, the teacher's overall level of autonomy-support in class, and children's personal indecisiveness.

Manipulation

In a second phase of the experiment, the experimenter induced the manipulation of choice. This was done during lunch break, shortly after all children had lunch. Children were still in the school cafeteria and received instructions from the experimenter collectively. In short, the experimenter reminded the children about the day schedule, including the three activities from which they had to choose one, following this explanation: "Because there are so many children today for a limited number of activities, not everyone will be able to do his or her chosen activity. 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". Half of the children were assigned at random to the choice condition, while the other half of the children were assigned to the no-choice condition. In this latter group, all children were assigned to an activity other than the activity they indicated as their initial preference. This assignment was done in a balanced fashion and ensuring that roughly equal numbers of students would be in the three different activities (see

Table 1 for a detailed description of how students were allocated to the different activities). Children were informed about their assignment to condition (choice or denial of choice) and to a certain activity (one of the three painting activities) by means of short letters that were prepared with the following instructions:

Provision of Choice 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).”

Deprivation of Choice 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).”

Table 1
Manipulated distribution of children across activities and conditions

	Manipulation		Total
	Choice provision	Choice deprivation	
Bouncing	3	32	35
Painting in the dark	17	15	32
Graffiti	36	1	37
Total	56	48	104

Activities

During lunch break, eighteen coaches (six for each activity) prepared the painting activities at different locations in the school. These coaches were first grade students following a course on occupational science at the Artevelde university college in Ghent. For receiving a grade as part

Picture 1. Image of the activity *Painting in the Dark*



of this course, they had to create an activity matching the abilities of a certain age group. The experimenter contacted these students and instructed them carefully about how to perform the three painting activities with the children. The experimenter also closely monitored the preparation of the activities to avoid confounds in the current experiment. In addition, all coaches were informed extensively about the study and received detailed instructions about how to do the activities with the students.

In the activity *Painting in the dark*, children created a painting by using black light paint. After 40 minutes, the room was darkened and a black light was used to lighten their painting (see Picture 1). For the activity *Graffiti*, the school principal made available an old wall. First, the coaches demonstrated the use of the sprays, followed by a short opportunity to practice on a cardboard by the children for 15 minutes. For the next 30 minutes, children used the sprays on the wall and created a painting in the current theme of the school (i.e. “Building together”) (see Picture 2). In the activity *Bouncing*, children used bouncy balls, stamped in paint, on a white cloth. After 20 minutes, they switched to another room in which they used marbles, stamped in paint, to make a painting on the ground (see Picture 3). Each activity took approximately 45 minutes.

Picture 2. Image of the activity *Graffiti*

Post-Experimental Questionnaire and Debriefing

After the activities, all children gathered in their classrooms. They completed the second questionnaire, concerning the measurement of perceived choice, need satisfaction, and the different measures of intrinsic



motivation. Finally, the experimenter explained the real goal of the study. He explained that the children had been misled and that not the teacher, but the experimenter himself had divided the children randomly across activities. In addition, he emphasized that some of the children had been given the opportunity to do their initial activity of choice while other students had to do a different

Picture 3. Image of the activity *Bouncing*



activity. All children and teachers were thanked for their helpfulness. The experimenter stayed in the classroom until the procedure and its goal was entirely clear to students and until there were no more questions about this.

Measures

Background Variables

At the first page of each questionnaire, we asked children to write down their name, gender (1 = boy; 2 = girl), 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, next to the experimenter, would be able to see the content of the questionnaires and that the data would be treated in all 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*).

Pre-Experimental Variables

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

Teacher's General Autonomy-Support. This scale taps into the extent to which the teacher generally communicates to students in an autonomy-supportive fashion and provides choice in the classroom. Specifically, we used a 14-item questionnaire, which was a combination of the Autonomy Support Scale from the Teacher As Social Context Questionnaire (TASCQ; Skinner and Belmont, 1993) and a number of items tapping into the general provision

of choice developed specifically for the purpose of this study (e.g., “*My teacher lets me choose when I can finish my homework*”; $\alpha = .76$).

Child-Teacher Relatedness. To measure the quality of relatedness between children and their teacher, we applied a selection of items from the 14-items People In My Life questionnaire (PIML; Ridenour, Greenberg, & Cook, 2006). Specifically, we selected 5 items which 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 (item 9, 13) to measure how much participants enjoy making decisions (e.g., “*I like to make decisions*”) and one item measure the anxiety to make decisions (item 17; e.g., “*I was 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*”). Answers indicate whether participants remembered the painting activity and the assigned condition correctly. We used the latter item to examine whether the manipulation of choice was successful.

Perceived Choice. The motivational effect of provided choice is expected to be driven by the subjective experience of having the opportunity to choose (e.g. Patall & Yang, 2016). To measure this experience, we used the subscale *perceived feeling of choice* (6 items; e.g. “*It was my own choice to do the painting activity*”; $\alpha = .84$) of the Intrinsic Motivation Inventory (IMI; Ryan, 1982; McAuley, Duncan, & Tammen, 1989).

Need Satisfaction. To measure children’s experiences of psychological need satisfaction during the activities, we used abbreviated versions of two subscales from the well-validated Basic Psychological Needs Scale (BPNS; Chen et al., 2015), that is, the scales tapping into satisfaction of the needs for autonomy and competence. Both satisfaction of the need for autonomy (e.g., “*I feel that my decisions reflect what I really want*”; $\alpha = .70$) and satisfaction of the need for competence (e.g., “*I feel confident that I can do things well*”; $\alpha = .93$) were

measured with 2 items. We also calculated a total score of Need Satisfaction (4 items), Cronbach's alpha of which was .90.

Intrinsic Motivation. The questionnaire included a direct and two relatively more indirect measures of intrinsic motivation. First, we measured children's intrinsic motivation directly by means of the subscale *Interest and Pleasure* (7 items; e.g. "I enjoyed doing the painting activity very much"; $\alpha = .91$) from the IMI (Ryan, 1982; McAuley, Duncan, & Tammen, 1989). Second, we measure students' intention to persist in the painting activity by assessing children's interest to receive more information about an activity-corresponding club and to sign up for such a club. They could report their level of interest on a 4-Likert scale 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* (2 items; $\alpha = .81$). Third, we assessed vitality as a positive affective experience that often accompanies intrinsic motivation. Therefore, we used 3 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's (1997) Subjective Vitality Scale (SVS). For the total score of intrinsic motivation (12 items), Cronbach's alpha was .93.

RESULTS

Preliminary Analyses

Manipulation check

There was a strong and significant association between students' actual assignment to the conditions and their self-reported recollection of which condition they belonged to, $X^2(4) = 201.97, p < .001$. This finding indicates that the manipulation was generally successful. Specifically, results from this manipulation check showed that 104 (out of 126 = 83%) participants (54 girls) reported correctly about the experimental condition in which they have participated. However, twenty-two participants (12 girls) reported incorrectly. To provide an accurate test of our hypotheses, these participants were excluded from the dataset and we only retained participants who reported correctly. Strikingly, from the group of participants who reported incorrectly, twenty participants were originally assigned to the choice deprivation condition, while the other two participants were assigned to the choice provision condition, $X^2(1) = 14.73, p < .001$.

Removing the 22 participants who failed to report correctly about their condition assignment resulted in a final sample of 104 participants ($M_{age} = 10.20; SD = .91$; range: 9 - 12).

Using the G*Power Version 3.1 software for performing statistical power analysis (Faul, Erdfelder, Buchner, & Lang, 2009), this sample size showed sufficient statistical power ($1 - \beta$ err prob = 0.98).

Randomization

All participants were divided across conditions at random. 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 (teacher autonomy-support, child-teacher relatedness and indecisiveness). This was done using chi-square difference tests for categorical variables (grade and gender) and with independent samples t-tests for continuous variables (all other variables). Results indicated that the randomization was successful (all X^2 and t-values had $p > .05$).

Table 1 shows the distribution of participants across conditions and activities. In spite of the extended pilot testing, children's initial choice was not distributed equally in the main experiment. A large group of children (70.2%) chose for *Graffiti*, another group (26.9%) chose for *Painting in the dark* and a small group (2.9%) chose for *Bouncing*. Although the mean level scores for interest in the three activities were fairly similar in the pilot studies, when students had to make a single choice in the actual experiment, they predominantly chose for *Graffiti* as the most popular activity. In further analyses, we will take this uneven distribution of initial preferences into account by examining whether children's initial preference for the most popular activity (*Graffiti*) versus the two other activities 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, with age as a covariate, and with all pre- and post-experimental study variables as dependent variables) showed no effects of gender across variables in the current study (see Table 2). At the level of univariate analysis, we found one significant difference with girls reporting to be more indecisive than boys. No significant associations were found between age and all study variables. In further analyses, both background variables are included as control variables.

Table 2.
Analyses for all variables with background variable Gender and Age as covariate

	Boys	Girls	<i>F</i> (1, 89)	η^2
1. Teacher autonomy-support	2.98 (.58)	3.08 (.53)	.66	.01
2. Child-teacher relatedness	3.92 (.75)	4.17 (.68)	2.76	.03
3. Indecisiveness	2.43 (.62)	2.85 (.55)	11.92***	.12
4. Perceived choice	3.17 (1.28)	3.19 (1.31)	.02	.00
5. Autonomy satisfaction	3.49 (1.56)	3.43 (1.43)	.01	.00
6. Competence satisfaction	3.43 (1.59)	3.52 (1.45)	.08	.00
7. Direct measure of intrinsic motivation	3.54 (1.33)	3.53 (1.23)	.00	.00
8. Intended persistence	2.52 (1.07)	2.58 (1.00)	.08	.00
9. Vitality	3.45 (1.50)	3.61 (1.27)	.35	.00

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Correlations

Descriptive statistics and Pearson correlations can be found in table 3. The correlation matrix displays a positive correlation between an autonomy-supportive teaching style and child-teacher relatedness. The more teachers are perceived as autonomy-supportive, the closer children experience the relationship with the teacher. Next, we observe substantial correlations between all variables measured after the experimental induction. The subjective feeling of having a choice is positively associated with levels of need satisfaction (including both autonomy and competence) and with all three indicators of intrinsic motivation. Next, measurements of autonomy satisfaction and competence satisfaction are highly interrelated and satisfaction of both needs is related positively to the three indicators of intrinsic motivation. This indicates that, as expected, experiences of both autonomy and competence satisfaction are associated with enhanced levels of intrinsic motivation. In addition, both direct and indirect measurements (i.e. intended persistence and vitality) of intrinsic motivation are correlated positively, indicating that these measurements indeed tap into the same underlying construct.

Primary analyses

Research question 1: What are the effects of experimentally induced choice provision, relative to choice deprivation, on intrinsic motivation?

To examine effects of choice provision, versus choice deprivation, on post-experimental variables (i.e. perceived choice, need satisfaction, intrinsic motivation), we performed a multivariate analysis of variance (MANOVA) with condition as fixed factor and with age and gender as covariates. Means with standard deviations, F values and effect sizes are presented in table 4.

Results show a significant multivariate effect, Wilks' Lambda = .35, $F(6, 90) = 27.99$, $p < .001$ as well as significant differences between conditions concerning all study variables. First, children in the choice condition report higher levels of perceived choice in comparison with children whose choice was deprived. Specifically, this indicates that the objective provision of choice results in different subjective experiences in having the opportunity to choose between conditions. In addition, children in the choice provision condition report significantly higher levels of need satisfaction, relative to children in the choice deprivation condition. They report more feelings of autonomy and competence in performing the painting activity. Finally, significant differences are found between conditions for each indicator of intrinsic motivation. Children in the choice condition (relative to those in the choice deprivation condition) score higher on the direct measurement of intrinsic motivation, display a stronger

Table 3.
Descriptive statistics Mean (Standard Deviations) and Pearson correlations

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.
1. Autonomy-Support Teacher	3.03	.55	-							
2. Child-Teacher Relationship	4.05	.73	.60**	-						
3. Indecisiveness	2.66	.61	-.11	-.10	-					
4. Perceived Choice	3.26	1.33	-.07	.09	.00	-				
5. Autonomy satisfaction	3.45	1.50	-.06	.13	-.02	.73***	-			
6. Competence satisfaction	3.50	1.51	.03	.20	-.17	.59***	.83***	-		
7. Direct measure of intrinsic motivation	3.58	1.28	-.04	.09	-.12	.80***	.76***	.80***	-	
8. Intended persistence	2.57	1.04	.18	.22*	-.01	.52***	.57***	.60***	.65***	-
9. Vitality	3.57	1.38	-.05	.14	-.10	.68***	.75***	.80***	.85***	.63***

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.

Means (Standard Deviations) of Main Variables as a function of Condition together with F values and effect sizes

	Choice provision	Choice deprivation	F	η^2	d
Perceived choice	4.22 (.79)	2.13 (.85)	105.17***	.62	2.54
Need satisfaction					
Autonomy satisfaction	4.25 (1.08)	2.46 (1.34)	79.58***	.36	1.49
Competence satisfaction	4.08 (1.26)	2.80 (1.53)	40.28***	.18	0.92
Intrinsic motivation					
Direct measure of intrinsic motivation	4.30 (.80)	2.68 (1.17)	65.80***	.41	1.63
Intended persistence	3.01 (.93)	2.04 (.93)	22.94***	.22	1.26
Vitality	4.25 (.95)	2.71 (1.36)	58.50***	.41	1.02

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. We measured two types of effect sizes. η^2 refers to eta-squared as the proportion of variance in dependent variables that is explained by the manipulation of choice. Cohen's d refers to the standardised difference between two means.

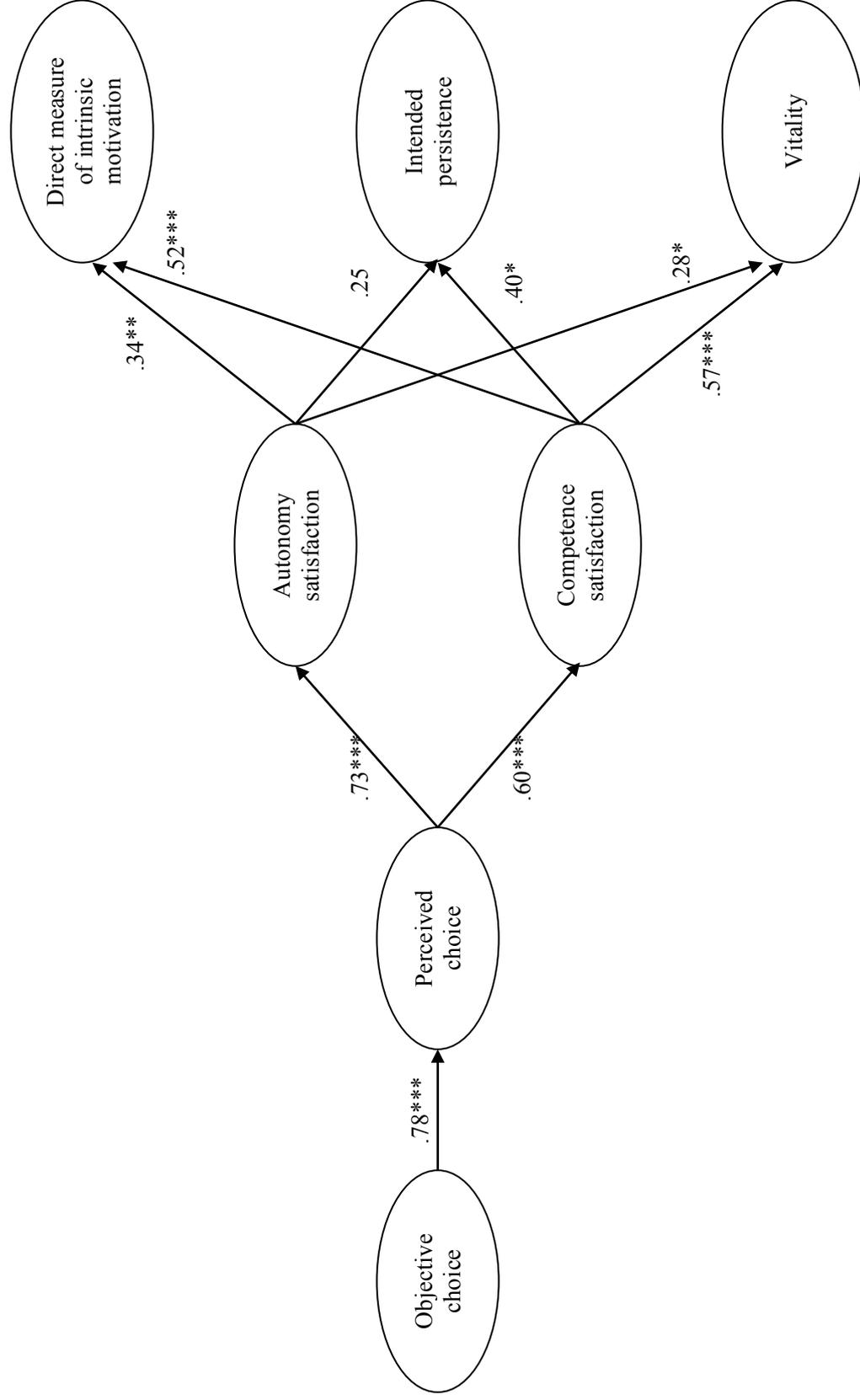
intention to persist with performing the painting activity and, experience higher levels of vitality. Confirming Hypothesis 1, these results indicate substantial effects of choice provision, relative to choice deprivation, on post-experimental variables in the current study. Inspection of the effect sizes (table 4) indeed shows that the manipulation of choice explains a large amount of variance in the variable perceived choice, followed by the measurement of intrinsic motivation and, at last, need satisfaction. Based on Cohen (1988) and Sawilowsky (2009), we can consider these effect sizes as large (Cohen's $d > .80$) to very large (Cohen's $d > 1.00$) for all study variables.

By performing several post-hoc analyses, we aim to verify these main effects of choice provision. First, we examined whether the exclusion of 22 participants who failed to correctly answer the manipulation check item affected the results. To do so, we conducted the same analyses again including the full population ($N = 126$). We found similar (and significant) results for choice provision, compared to choice deprivation, on all study variables (all F values were significant, $p < .001$). This finding indicates that our results are not driven entirely by the exclusion of these 22 participants. Second, we aim to test whether the main effects of choice provision are affected by the uneven distribution of the initially 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 choice remained (all F values were significant, $p < .001$). Moreover, none of the interactions between initial preference and the provision of choice were significant (all $p > .05$), indicating that participants' initial preference did not affect or qualify the main effects of choice provision.

Research question 2: What is the mediating role of perceived choice and satisfaction of the need for both autonomy and competence?

To examine the mediating effects of perceived choice and both autonomy and competence satisfaction, we performed structural equation modeling with Mplus (Muthén & Muthén, 1998 – 2012). The hypothesized structural model (displayed in Figure 2) includes an association between the objective choice provision (i.e. the choice provision condition or the choice deprivation condition) and the subjective experience of having a choice (i.e. perceived choice) which, in turn, relates to autonomy satisfaction and competence satisfaction. Satisfaction of both needs then finally predicts all three indicators for intrinsic motivation (i.e. direct measurement for intrinsic motivation, intended persistence and vitality). In this model, we also allowed correlations (a) between autonomy and competence need satisfaction and (b) among the three

Figure 2. The hypothesized structural model of the current study.



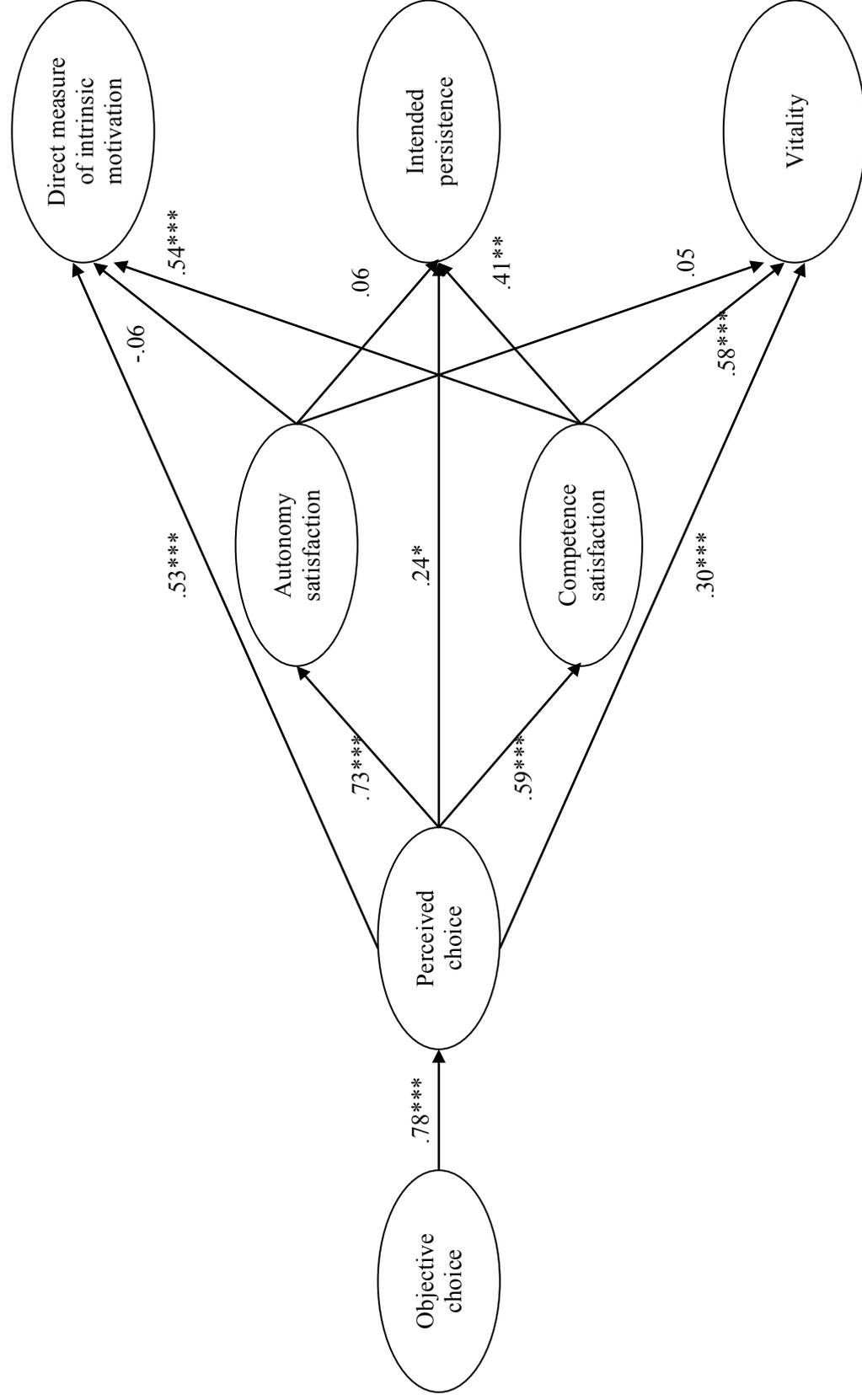
Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

indicators of intrinsic motivation. For clarity of presentation, these correlations are not shown in the figures. In order to check the fit of the model, we selected a cut-off value of 0.95 for the comparative fit index (CFI), a cut-off value of .06 for the root mean square error of approximation (RMSEA) and a cut-off value of .09 for the standardized root mean square residual (SRMR) (Kline, 2010).

Initial estimation of the model yielded the following fit in the current sample: CFI = .91; RMSEA = .23; SRMR = .07; $\chi^2(8) = 50.04$, $p < .001$. The objective provision of choice was positively associated with the level of perceived choice which in turn was related to both autonomy satisfaction and with competence satisfaction. Next, competence satisfaction is positively associated with the direct measurement of intrinsic motivation, level of intended persistence and vitality. Similarly, autonomy satisfaction is positively associated with the direct measurement of intrinsic motivation and vitality. No significant association was found with intended persistence. Although most of the anticipated associations were significant, the fit of this model was suboptimal (particularly in terms of chi-square and RMSEA).

Because the fit of the initial model was suboptimal, we inspected the modifications as proposed by the Mplus software to improve the model fit. These modification indices suggested to add direct paths from perceived choice to the three indicators of intrinsic motivation. Doing so resulted in a substantially better fit, CFI = .99; RMSEA = .05; SRMR = .01; $\chi^2(5) = 6.164$ (see Figure 3). Specifically, there are significant direct paths between perceived choice and each indicator of intrinsic motivation. By adding these direct paths, the effects of autonomy need satisfaction on the indicators of intrinsic motivation were no longer significant, indicating that only competence satisfaction played an intervening role in effects of choice on intrinsic motivation. In addition, we tested a model in which we also added direct paths from objective choice to indicators of intrinsic motivation in favor of improving the fit. However, adding these direct paths did not contribute to the fit of the model, CFI = .95; RMSEA = .20; SRMR = .03; $\chi^2(5) = 25.93$ and the added paths were not significant. Therefore, we selected the model depicted in Figure 3 as the final and best fitting model. In this model, there were significant indirect effects between objective choice and each of the indicators of intrinsic motivation through perceived choice and competence need satisfaction ($\beta = .25$; $\beta = .19$; and $\beta = .27$) for the direct measure of intrinsic motivation, intended persistence, and vitality, respectively, all $ps < .01$).

Figure 3. The final and best fitting model of the current study.



Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Research question 3: What are the moderating effects of child-teacher relatedness, the general autonomy-supportive teaching style and the level of indecisiveness?

To examine the pre-experimental variables *teacher's general autonomy-support*, *child-teacher relatedness* and *indecisiveness* as possible moderators for the main effects of choice, we performed multiple regression analyses with age and gender included as control variables (see table 5). We followed recommendations by Aiken and West (1991) to perform these regression analyses. That is, the predictor variables were standardized and the interaction terms were computed as the product of the standardized variables.

First of all, the regression analyses again demonstrated the significant effects of condition (i.e. the choice provision condition versus the choice deprivation condition) on all study variables. Next, the two variables representing teacher characteristics show several main effects. Children who reported to have a close relationship with their teacher show higher feelings competence satisfaction in performing the painting activity and reported higher intention of persist. The same finding concerning intended persistence was found for children who perceive their teacher as autonomy-supportive in the classroom. However, no significant interaction effects were found between the provision of choice and these teacher characteristics, indicating that the beneficial effects of choice provision occurred irrespective of teacher's general autonomy support and of the level of student-teacher relatedness.

We found several main effects for indecisiveness, such that high-indecisive children felt less competent, experienced less intrinsic motivation and felt less vital in performing the activities. Here, we found two interaction effects with indecisiveness being a significant moderator of the effects of choice provision. Specifically, the positive effect of choice provision on intention to persist and on the direct measure of intrinsic motivation was less pronounced among children with high indecisiveness (see Figure 4). Accordingly, children with high indecisiveness seem to benefit less from the provision of choice. However, simple slope analysis, applied using procedures proposed by Jeremy Dawson (Dawson, 2014), showed significant t-values ($p < .05$) for both slopes, indicating that indecisiveness attenuates, yet does not cancel out, the general beneficial effects of choice provision. That is, even children high on indecisiveness benefited from choice provision, albeit to a lesser degree.

DISCUSSION

Intrinsic motivation is a key motivational resource with beneficial effects on students' engagement, well-being, and performance (e.g. Reeve, Ryan, Deci, & Jang, 2007, Vallerand & Bissonnette, 1992). In the motivational literature and in literature based on SDT in particular,

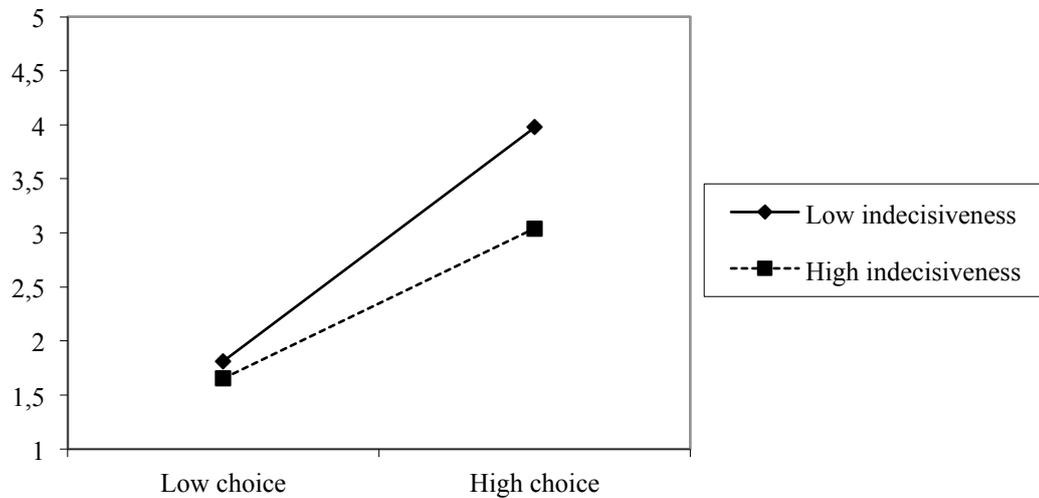
Table 5.

Regression analyses with standardized Beta coefficients of dependent variables as a function of independent variables

	Perceived choice	Need satisfaction			Intrinsic Motivation		Vitality
		Autonomy satisfaction	Competence satisfaction	Direct measure of Intrinsic motivation	Intended persistence		
Gender	.03	.01	.02	-.00	-.01	.07	
Age	.03	.03	-.00	.04	-.07	-.04	
No choice vs. Choice	.79***	.60***	.42***	.66***	.49***	.56***	
Autonomy-support teacher	-.02	-.01	.07	-.01	.20*	.00	
Interaction	.05	-.01	.00	.09	.08	-.01	
Gender	.00	-.01	-.01	-.01	-.00	.05	
Age	.01	.04	.02	.05	-.01	-.02	
No choice vs. Choice	.80***	.61***	.43***	.67***	.51***	.58***	
Child-teacher relatedness	.12 ⁺	.16 ⁺	.21*	.12	.24**	.16 ⁺	
Interaction	-.07	-.06	-.10	-.03	.00	-.05	
Gender	.06	.06	.14	.10	.10	.16 ⁺	
Age	.01	.04	.01	.04	-.00	-.03	
No choice vs. Choice	.80***	.61***	.45***	.70***	.51***	.60***	
Indecisiveness	-.09	-.09	-.26*	-.21**	-.09	-.20*	
Interaction	-.04	-.09	-.16 ⁺	-.15*	-.22*	-.11	

Note. ⁺ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 4. Graphic overview of interaction effect



Note. Interaction Indecisiveness X Condition for the direct measurement of intrinsic motivation; low choice = choice deprivation condition, high choice = choice provision condition

many studies have investigated how various external events in the classroom affect intrinsic motivation, like the use of autonomy-supportive language in providing instructions and process-based feedback (Urduan & Schoenfelder, 2006). One commonly discussed, yet somewhat controversial, motivational technique is the provision of choice. In this literature, primarily correlational studies demonstrated higher levels of psychological well-being and enhanced intrinsic motivation when choice was provided (e.g. Anderman & Leake, 2005). On the other hand, other scholars warned for potential pitfalls associated with the provision of choice, arguing for instance that choice may increase levels of stress (Schwartz, 2000) and the benefits of choice are limited to people with a certain cultural background (Iyengar & Lepper, 1999).

In the framework of the SDT, it is assumed that the provision of choice would be beneficial when it leads to students' subjective experience of choice which, in turn, would contribute to the satisfaction of the needs for autonomy and competence and subsequent 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 students. This is unfortunate because intrinsic motivation is of utmost importance in this developmental period (e.g. Erikson, 1968). 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 implemented a manipulation

of choice in which the teacher either provided or deprived children's choice. Several interesting findings emerged.

First, the results demonstrated significant effects of choice provision, such that children in the choice condition experienced more choice, displayed higher levels of satisfaction of both the needs for competence and autonomy and enhanced intrinsic motivation, relative to children whose choice was deprived. 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 large to very large in terms of effect size (see Table 4). In the light of these results, it is worth considering why effect sizes showed such large values of Cohen's *d*. One argument is that we attempted to maximize choice effects by taking both the number and the 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, Cooper, & Robinson, 2008). Additionally, we performed three pilot studies to select activities that were relatively highly attractive for the current population. Apparently, being given an opportunity to choose between generally appealing options is strongly motivating. Possibly, choosing between more boring or unattractive options 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 versus choice deprivation). Future research can implement other conditions that are situated in between the provision and the deprivation of choice, such as a neutral condition in which no mention is made of having a choice. Such a neutral condition would also provide opportunities to further clarify the actual motivational impact of choice. Based on the current design, we are not able to conclude whether choice provision results in enhanced motivation, whether choice deprivation impairs intrinsic motivation, or whether both types of effects occur simultaneously.

Second, to better understand the processes involved in effects of choice on intrinsic motivation we performed a path analysis using structural equation modeling. With this model we examined whether levels of perceived choice and satisfaction of both the needs for autonomy and competence mediate the effects of choice provision in intrinsic motivation. The model (see Figure 3) demonstrated that perceived choice and competence satisfaction played an intervening role in effects of choice on intrinsic motivation. This finding indicates that subjectively felt choice and the increased feelings of competence satisfaction following from felt choice explain largely the association between choice provision and enhanced intrinsic motivation. Indeed, when being provided a choice, people typically feel that there is confidence in their ability to make an appropriate decision (Patall, Sylvester, & Han, 2014). As such, the

structural model highlights the importance of the functional significance of choice provision in effects on intrinsic motivation (Deci & Ryan, 1985, 1987). This notion of functional significance refers to the personal meaning of attributed by people to events (i.e. perceived choice). This attributed meaning determines whether an event is motivating or not. Consistent with this notion, our results show that effects of choice provision were motivationally beneficial because the provision of choice gave rise to subjective experiences of choice and subsequent experiences of competence. However, unexpectedly no evidence was found for autonomy satisfaction as a mediator in the model. Possibly, the inclusion of both measurements of need satisfaction undermined the unique mediating role of autonomy satisfaction. There was indeed a high correlation between autonomy and competence satisfaction, suggesting that competence and autonomy need satisfaction share a large part of variance. By statistically controlling for this shared variance, a large part of the variance in the autonomy satisfaction measure was stripped, resulting in a very conservative (perhaps overly conservative) test of the intervening role of autonomy need satisfaction. In this regard, it is important to note that autonomy need satisfaction did demonstrate theoretically plausible associations with the measures of intrinsic motivation at the level of zero-order correlations. In addition, it could be important for future research to consider not only autonomy need satisfaction (“I felt that my decisions reflected what I really wanted”) as a mediator of the effects of choice but also a measure of the experience of autonomy frustration (e.g. “Most of the things I did felt like I had to”). To the extent that the effect of our manipulation is driven primarily by the deprivation of choice (an issue that could be examined with a neutral condition), perhaps autonomy need frustration is a more powerful mediator of our manipulation. Another important finding in the structural model was that direct associations remained between choice provision and intrinsic motivation, which highlights either the existence of a direct motivationally enhancing effect of choice or a mediating role of other factors such as the need for relatedness. Given that in our study choice was provided to groups of students, perhaps students who were provided with a choice felt more connected not only to their teacher but also to their peers who were also provided with choice, with the sense of belonging also contribute to interest and pleasure in the activity.

The third research question referred to the effects of three plausible moderators on the main effects of choice provision. Results showed significant interaction effects for children’s level of indecisiveness, such that high-indecisive children benefitted somewhat less in terms of directly experienced intrinsic motivation and intended persistence from choice provision compared to student low on indecisiveness. Because highly indecisive children feel less confident about their ability to make appropriate choices, the provision of choice possibly brings some stress and feelings of insecurity, with these feelings attenuating the benefits

associated with choice. However, simple slope analysis revealed that choice provision was still beneficial (albeit to a lesser extent) for children high on indecisiveness. This finding has potential practical implications for teachers. Specifically, teachers can be advised to offer choice even to students who report being indecisive. However, the way choices are introduced may need to be adjusted to these students. For example, one way to support high-indecisive children with choice difficulties is to provide advice and guidance when needed during the decision-making process. Children high on indecisiveness could also be given the option not to make the choice and to leave the choice to the teacher. In terms of the SDT, this would imply that children experience the volitional choice to either make a choice by themselves or to rely on the teacher's decision (i.e. voluntary dependency; Van Petegem, et al., 2012).

Next, results showed no evidence for both teacher characteristics *child-teacher relatedness* and *teacher's general autonomy-support* as moderators for the effects of choice. Interpreted positively, these findings indicate that the provision of choice works well irrespective of whether it is applied by teachers who are generally perceived as high or low on autonomy-support and by teachers who are experienced by children as high or low on closeness. The lack of moderation by child-teacher relatedness is particularly striking because it might indicate cross-cultural differences concerning the moderating effect of child-teacher relatedness. Indeed, our findings are in contrast with the results of Bao and Lam (2008) in sample of Chinese children. Possibly, individualistic values of independence and personal self-reliance may cancel out the role of child-teacher relatedness in dealing with choice provision or choice deprivation. That is, Belgian children would attach little importance to the bond with their teacher and instead prefer to make decisions on their own even when the teacher is generally supportive. However, an alternative explanation is that the lack of moderation is caused by the substantial situational effect of the choice manipulation, which may have overridden the role of inter-individual differences in the current study. Probably, more subtle or intermediate manipulations of choice in future research (using for instance a neutral condition as indicated before or less attractive options) could create more statistical room for finding moderating effects of individual differences. In addition, 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. For example, in the study of Bao and Lam (2008), children were told immediately if they had a choice or not, while children in the current study were able to talk and to think about their choice during the rest of the morning and the lunch break. As such, the choice denial may have had a more pervasive negative impact in our study, overriding potential moderating effects of teacher characteristics. Clearly, it would be preliminary to conclude that

teacher characteristics play no role in effects of choice and future research need to re-address these characteristics in relation to various choice manipulations.

In the next part, we address some other limitations with methodological implications for future research.

Limitations and Future Research

First, we note the homogeneity of the current population as a limitation to generalize the current findings. Participants were children from the middle (4th grade) and late (5th and 6th grade) elementary school years that 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. It remains to be examined whether choice would be equally beneficial among students with a poor school attitude or with low quality of motivation for school.

In addition, age range of the sampled group was limited, ranging only between 9 to 12 years. Although age was not associated with each of the study variables, there are several arguments to expect that late-elementary school children handle choice provision differently than children from middle-elementary school years. First, the meta-analysis of Patall, Cooper and Robinson (2008) revealed that young children benefit more from choice provision, compared to young adolescents in terms of intrinsic motivation (Patall, Cooper, & Robinson, 2008). Second, it has been found that among young adolescents there is increased development of brain regions related to decision-making and cognitive control, while younger children showed higher levels of immaturity (Bereby-Meyer et al., 2004; Padmanabhan, Geier, Ordaz, Teslovich, & Luna, 2012). Next to such differences on cognitive levels, adolescents have the increasing urge to display independence relative to other social figures, which could lead to a reduction of the role of child-teacher relatedness in perceived choice provision (Smetana et al., 2004). Future research can apply the current design to more age groups (e.g. early-elementary school children, middle- or late-adolescents) and implement more objective measurements (e.g. fMRI, EEG) to look for effects of choice provision, relative to choice deprivation, on cognitive processing and emotion regulation.

Next to the homogeneity of the current population, the current study included a manipulation of choice with the teacher as the person to provide or to deprive choices. It is interesting to examine whether choice effects would generalize to other socialization figure, such as close family members, like parents and siblings or to peers and friends. For example, the study of Bao and Lam (2008) included choice denial and choice provision of children's mother,

showing that a close child-mother relationship buffered against the negative outcomes associated with choice denial.

As a third point of discussion, the current study did not include a measurement of relatedness satisfaction as an outcome of choice provision. There are several reasons to argue for the importance of feelings of belongingness in explaining effects of the choice manipulation. For example, children received information about the painting activity 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 the assignment to the activities of each other while they, perhaps, have been discussing their choice in the morning or during the lunch break. Subsequently, the expectation of participating an activity with someone they know was disrupted for children whose choice was deprived and, thereby, could thwart the need for relatedness and, subsequently, impair intrinsic motivation (Anderman & Anderman, 1999; Carlton & Winsler, 1998).

To measure the effects of choice on children's intrinsic motivation, we included a measurement of intended persistence as behavioral indicator of intrinsic motivation. Here, we followed the Theory of Planned Behavior (Fishbein & Ajzen, 1967), which assumes it is more likely for people to perform behavior when they have the intention to perform that particular behavior. However it is unknown whether this assumption is valid and whether children's intended persistence in our study, which was measured through self-reports, would actually translate into real-life behavioral engagement. Early studies in the literature (e.g. Deci, Cascio, & Krusell, 1975) did use the duration of actual persistence as an indicator of intrinsic motivation (i.e. the longer participants persisted with the current activity, the more intrinsic motivation is assumed to be present). In line with such measurements, future research can implement another phase in the current experimental design, after completing the post-experimental questionnaire, in which children have the opportunity to really continue with the performed painting activity or not (i.e. free-choice paradigm; Deci, 1975). Based on the current results, we would expect children with choice provision to actually persist longer compared to children with choice deprivation.

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, on the attractiveness of the options, and on the differences between options. While in the current study the three activities were fairly different, children could also be presented with options that are more similar or closely related. For example, a study including the same design with puzzle themes (i.e. buildings, vehicles, furniture) showed less effects of choice manipulation on need satisfaction and even no

differences for intrinsic motivation between conditions (Mabbe et al., manuscript in preparation). Possibly, the more limited effects of choice in the latter study had to do with the fact that the options were rather similar, such that children felt that choosing was less relevant or even trivial. To the extent that choosing is indeed experienced as more trivial, it is less likely to contribute to feelings of autonomy and competence satisfaction. This is again the notion of functional significance. Further, the very nature of the activities may also matter, with choice perhaps being more motivating when the activities to choose between are in themselves more need satisfying. In terms of the SDT, puzzling is an individual activity (i.e. low relatedness satisfaction) with the goal to construct a predefined image (i.e. low autonomy satisfaction) by certain puzzle pieces (i.e. there is a required level of competence). In contrast, painting is performed more often in the presence of others and involves more personal creativity (i.e. high level of autonomy satisfaction). Yet, these assumptions have not been tested. Therefore, it might be interesting for future research to vary the level of similarity between options as well as the potentially need-satisfying nature of the activities and to assess the extent to which the choice between activities appeals to children's psychological needs as an explanation for the impact of choice on motivation. We expect to find stronger effects of choice provision, versus choice deprivation, for choices between qualitatively distinct activities and for activities that generally provide opportunities for need satisfaction.

Conclusion

The aim of this study was to examine the effects of choice provision, versus choice deprivation, on the intrinsic motivation of elementary school children. To the best of our knowledge, this study is one of the first to set up an experimental field design on this topic in this developmental group. Results showed that choice provision is beneficial for the intrinsic motivation of elementary school children, with competence satisfaction being the most important mediating factor and with highly indecisive children benefiting somewhat less. 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. These findings also elicit several new questions concerning the role of the nature of options and activities in the motivational impact of choice. We believe that the current design is a suitable base for future research in order to address these questions and to vary several features of the choice provision (e.g. other activities, different social figures, more subtle manipulations of choice). Future research could also include measures of more 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.