

Mastery motivation, parenting, and school achievement among Hungarian adolescents

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Abstract Children’s motivation to master challenging tasks is an important predictor of school success, and yet, such motivation declines during adolescence. It is therefore important to identify ways to intervene to reduce this decline. One malleable factor that is associated with motivation is parenting. The present study used structural equation modeling (SEM) to predict Hungarian seventh graders’ ($n = 296$) school grades from both youths’ and mothers’ perceptions of parenting (care/warmth, support of youths’ volitional functioning, and support of youths’ independence) and mothers’ and youths’ perceptions of the youths’ mastery motivation. Youth-rated parental care/warmth predicted youth ratings of their motivation, and mother-rated parental care/warmth predicted maternal ratings of their youth’s motivation (both of which predicted youth achievement). In addition, youth-rated parental independence encouragement predicted mother-rated motivation and both directly and indirectly predicted school achievement. In contrast, maternally rated volitional support predicted both youth-rated and maternally rated motivation, which, in turn, both predicted higher achievement. Results suggested that it is important to go beyond youth report in assessing parenting and motivation, in that results differed depending on rater. Nevertheless, despite some rater differences, findings highlighted the importance of parental care/warmth and volitional support in mastery motivation, and of mastery motivation in achievement.

Keywords Parenting · Mastery motivation · School achievement · Adolescence

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Introduction

Early adolescence is a time of many changes and challenges. Not only do youths undergo physical changes associated with puberty; they normatively desire increased autonomy from their parents, engage in increased conflict with their parents, and yet, maintain strong emotional connections with their parents (e.g., Gutman and Eccles 2007). At the same time, their school experiences typically change dramatically, as they move from a small school with one familiar classroom to a large school with many classes, peers, and teachers and more emphasis on grades. A concomitant of all of these changes, observed across a variety of cultures and using a variety of instruments, is a decline in school motivation (e.g., Józsa et al. 2014; Eccles and Roeser 2009).

Given that motivation is strongly predictive of success in school and life (e.g., Froiland and Worrell 2017; Taylor et al. 2014), it is crucial to address this decline. To the extent that normative change in parent-child dynamics occurs during early adolescence and parenting affects motivational development, it would seem important to intervene with parents, to impact motivation. Although parenting interventions aimed at helping parents foster their children's academic motivation and success do exist, many have focused simply on increasing parents' school involvement or their support for their children's involvement in particular subjects, such as STEM (see Affuso et al. 2017; Grolnick 2016; Harackiewicz et al. 2012).

Parenting interventions that trained parents to highlight the utility value of STEM increased their adolescents' interest in and likelihood of taking STEM coursework (Harackiewicz et al. 2012), their performance in STEM courses, and their likelihood of pursuing STEM careers (Rozek et al. 2017). Moreover, parents' self-reported amount of monitoring of their children's academics was associated with youths' increased self-determined motivation and academic self-efficacy (Affuso et al. 2017).

Grolnick (2016) noted, however, that simply examining *the amount of* parental involvement in/monitoring of their adolescent children's academics oversimplifies the role of parenting; it is important to know what *types* of involvement are most associated with positive outcomes, as well as the mechanisms through which these types of involvement exert their effects. Haimovitz and Dweck (2017) recently reviewed research on the mechanisms through which parents' and teachers' *growth mindsets* do (or do not) foster children's development of such mindsets. They noted that adults' mindsets did not significantly predict their children's mindsets in several key studies (e.g., Hooper et al. 2016; Park et al. 2016; Sun 2015) even though the relation was found in other studies. They concluded, based on their literature review, that adults' growth mindsets predicted children's growth mindsets *if* they led the adult to focus on the *process* of learning, rather than the product, when interacting with their children. So, specific parenting interaction styles mediated the effects of parent mindset on child mindset (Haimovitz and Dweck 2017).

Grolnick (2016) also noted that although one might think that parents' direct involvement *in their child's academics* would most strongly predict children's success, actually, the types of parental involvement that foster *motivation*, such as parents showing they value children's school performance and effort, are even more effective. She added, however, that even beyond showing they value children's schooling, the way parents convey such valuation is of critical importance. Parents could convey this by strongly controlling children's involvement with schoolwork, but this would undermine children's autonomy and should therefore reduce children's sense that *they themselves* want to do well or try hard in school. In fact, they found that although children of highly controlling parents tended to do what their parents instructed them to do, they were less creative and more perfectionistic and reported greater depression (Grolnick et al. 2002; Kenney-Benson and Pomerantz 2005).

In summary, these findings suggest that (1) the *way* that parents relate to their children may be more important than *how much* they are involved directly with children's homework and cognitive skills and (2) parents' controlling and pressuring behaviors versus their warm, autonomy-supportive interaction patterns may be important to study further.

The present study provides further information to address these issues, by examining the pathways through which important parenting variables predict mastery motivation and mastery motivation predicts school achievement. It is important to note, moreover, that although research exists on parenting and motivation, there is a paucity of research on the role of parenting in the particular type of motivation that is the focus of the present study, *mastery motivation*. Although mastery motivation is similar to other types of motivation, there are some important differences. Before discussing the literature providing the basis for this study, it is therefore important to give our definition and conceptualization of the central motivational variable used in this study, mastery motivation.

Mastery motivation and related concepts

How is mastery motivation different from other types of learning-related motivation? Morgan et al. (1990) defined mastery motivation as a multifaceted psychological force that stimulates an individual *to attempt to master a skill or task that is at least moderately challenging for him or her*. A key feature distinguishing this approach to motivation from others is its focus on *persistence on challenging tasks in particular domains* (e.g., Morgan et al. 1995). Persistence despite challenge, particularly cognitive challenge, seems crucial for academic development. In the present study, we will focus on *cognitive persistence*, a child's motivation to persist at, and master cognitive and school-related tasks, because it is particularly relevant to school achievement. In addition to cognitive persistence, Barrett and Morgan (1995); Wang and Barrett (2013) emphasized the importance of persistence in other domains and affective aspects of mastery motivation; however, these aspects of mastery motivation will not be a focus of the current investigation.

Importantly, although similar, mastery motivation is different from mastery *goals* in the literature on achievement goal orientations (e.g., Elliot and McGregor 2001; Harackiewicz et al. 2002). In this latter approach, people have either primarily a *mastery-goal* approach to competence, with their own standards for achievement, or a *performance-goal* approach, in which they seek to perform better than others. The achievement goals approach further distinguishes mastery approach goals (e.g., increasing learning) from mastery-avoidance goals (e.g., striving to avoid errors) and performance-approach from performance-avoidance goals (see Elliot and McGregor 2001; Urdan 1997). In the achievement-goal approach, then, the emphasis is on the type of competence one hopes to achieve (mastery or performance), and whether behavior is directed toward achieving that competence goal (approach) or avoiding failure in achieving that goal (avoidance). In contrast, in the mastery motivation approach, the emphasis is on the process of ongoing, persistent attempts to master despite *challenge/difficulty*, and the contribution of emotions to continued approach/mastery attempts versus withdrawing and giving up (avoidance).

The mastery motivation approach also is similar but different from the expectancy-value approach of Eccles and colleagues (1983). In this latter approach, people choose achievement pursuits because they value them and have the expectancy that they can succeed at them. These researchers have studied the effects of the context, including parental beliefs, on adolescent achievement motivation and achievement (e.g., Jacobs and Eccles 2000;

Simpkins et al. 2015). They highlight the importance of parents' beliefs about efficacy, values regarding the skills in question, expectations regarding their child's achievement, perceptions of their child's abilities, perceptions of their child's interests, and socialization goals for their child, in their child's developing sense of efficacy and valuation of the skills in question.

Youths' efficacy beliefs, values, and goals do seem to be important correlates of their choices in achievement contexts (Simpkins et al. 2015). However, rather than focusing on *the choices* people make and their *beliefs about these choices*, mastery motivation research focuses on their *persistence in the mastery activities in which they actually engage*, despite (moderate) challenge. Unfortunately, people (especially children) are not always able to *choose* which activities they need to master, and they may engage in some that they do not feel self-efficacious in pursuing. In fact, to the extent that they only pursue those at which they feel efficacious, they will be exposed to limited opportunities for growth. Thus, although the expectancy-value approach has yielded important information about parents' role in achievement motivation, it has not addressed the same issues as those investigated in the present study. A valuable contribution of the expectancy-value approach, however, has been in establishing that parents' and their children's beliefs/perceptions may differ, with different implications for motivation and behavior (see Simpkins et al. 2015). We will examine this in the present study.

Mastery motivation also is similar but different from self-determination theory (SDT). SDT has focused on three needs that foster motivation: autonomy, relatedness, and competence (e.g., Deci and Ryan 2000). In contrast, mastery motivation theory has viewed inclination to master as a motive in itself, and self and relationships as two mastery domains (Wang and Barrett 2013; Józsa and Molnár 2013). Nevertheless, a point of similarity between SDT and mastery motivation is the acknowledgment that even apparently autonomous striving may be rooted in parent-child or other social interactions (e.g., Ratelle et al. 2004). Thus, the present study focuses on the role of parenting variables in mastery motivation and school achievement.

Importance of mastery motivation Shonkoff and Philips' (2000) influential report highlighted mastery motivation as a key factor in development. In particular, children's mastery motivation is an important predictor of school success (e.g., Gilmore et al. 2003; Mercader et al. 2017; Mokrova et al. 2013). Some studies indicate that mastery motivation may be a better predictor of cognitive development than intelligence, playing a crucial role in school achievement (Józsa and Molnár 2013; Yarrow et al. 1975). In spite of the crucial importance of the construct, there have been few recent empirical studies based on this approach to motivation, especially of school-age children and adolescents. Those that have been done confirm its utility (Busch-Rossnagel and Morgan 2013; Józsa and Molnár 2013; Józsa and Morgan 2014). Mastery motivation has a fundamental impact on cognitive, social, and psychomotor development (Busch-Rossnagel and Morgan 2013; Wang and Barrett 2013).

It is therefore concerning that, as mentioned earlier, learning-related motivation declines during late childhood and adolescence, in many countries and using related but different measures (e.g., Józsa and Morgan 2014; Józsa et al. 2014; Gottfried et al. 2013; Harter 1981; Lepper et al. 2005). Such findings strongly support the need to find and intervene with malleable environmental influences on mastery motivation.

The present study studies the role of such a malleable factor, parenting, in mastery motivation and school success. We already presented evidence that parenting variables like warmth and autonomy support influence similar forms of motivation more than teaching-focused parenting. There is some evidence that relationship variables predict mastery motivation as well: feeling loved/valued is associated with greater mastery motivation in toddlers

(Busch-Rossnagel et al. 1995; Wang et al. 2014). Unfortunately, similar research has not yet been conducted with early adolescents. SDT has made predictions regarding the role of parenting in motivation that seem very pertinent to mastery motivation, highlighting the importance of parent-child relationship development and parental support for autonomy/volitional functioning (e.g., see Grolnick 2016).

Parenting and motivation

Parental promotion of volitional autonomy versus independence and motivation There is evidence that youths' perceptions that their parents are overprotective and/or controlling are associated with negative academic consequences and lower wellbeing (e.g., Chew 2016; Grolnick 2016; Roth et al. 2009). These findings are typically interpreted to mean that overcontrol makes children overly dependent on others and unlikely to independently strive to achieve. Perceived parental overcontrol has, thus, been viewed as opposite to parents' promotion of independence (e.g., Silk et al. 2003). However, according to SDT, independence is not the most important type of autonomy for motivational development. Rather, the most important aspect of autonomy for motivation is freedom to voice one's own opinions and make one's own decisions. Thus, autonomous motivational development is expected to be enhanced by parents' promotion of youths' volitional functioning (cf. Deci and Ryan 2000; Grolnick 2003).

Recent research provides some evidence that youths' perception of their parents' greater support of their volitional functioning is distinguishable from parental encouragement of independence. Moreover, volitional support is associated with positive outcomes, including wellbeing, motivation, and competence (e.g., Fousiani et al. 2014; Grolnick et al. 1991; Ng et al. 2004; Soenens et al. 2009). In contrast, youths' perceptions of parental encouragement of independence/separate functioning were *not* systematically related to youths' motivation and performance (e.g., Fousiani et al. 2014; Soenens et al. 2007). Such research highlights the importance of distinguishing between parents' promotion of youths' volitional functioning and their promotion of independence, yet this has only rarely been done. This distinction will be made in the present study.

Parental care/warmth In addition to parents' support of their children's volitional functioning and/or their independence, the degree to which parents are emotionally supportive has been deemed important. SDT's emphasis on relational needs suggests that parental care/warmth is important for their children's motivational development (Grolnick 2016). Warmth, care, or low hostility has been examined in relation to many areas of functioning, including motivation, dysfunctional attitudes toward achievement and failure, and performance (e.g., Otani et al. 2014). Drawing on the SDT framework, warm parenting will not only support children's relational needs but will also help children feel valued and capable, promoting the development of volitional functioning. Some support for this prediction has been found, using youths' report. Students who showed a stable high level of identified regulation (which is experienced as autonomous regulation) reported that their parents were more involved/warm, as well as autonomy-supportive. Similarly, students who became more motivated and who became more intrinsically motivated during college had parents who were reportedly warmer/more involved and more autonomy-supportive (Ratell et al. 2004). These findings were based solely on college students' reports of parenting. As with parent-adolescent relationships as influences on

mastery motivation, research has not yet addressed the role of parental autonomy support in mastery motivation during early adolescence, the age for the present study. Moreover, beyond the fact that research has not addressed the role of autonomy support in mastery motivation, most work on the role of autonomy support in learning-related motivation more generally has construed autonomy as independence from adults rather than volitional autonomy. In the present study, we examine parenting characteristics relevant to all three of the SDT needs, in relation to perceived mastery motivation and school achievement.

Parental Bonding Instrument The present study uses the Parental Bonding Instrument (PBI), based on Parker's (1979, 1983) model of parenting. His original model focused on two parenting factors: care and protection. *Care* is characterized by affection, emotional warmth, empathy, closeness, and reciprocity. *Parental protection* involves control and overprotection: parental intrusion, infantilization, excessive contact, and prevention of independent behavior (Parker 1983; Parker et al. 1979; Shpiegel et al. 2012).

However, research using the PBI with European samples supports a three-factor solution (Arrindell and Engebretsen 2000; Heider et al. 2005; Narita et al. 2000; Qadir et al. 2005; Rimehaug et al. 2011; Tsaousis et al. 2012). In a Hungarian sample, Tóth and Gervai (1999) labeled the three factors as care, control, and overprotection. Interestingly for the present study, the items on this *control* factor involve control versus volitional autonomy, and the items on the *overprotection* factor involve low independence promotion. In the present study, we will test a structural model in which this three-dimension solution predicts mastery motivation and school achievement.

Youth report versus parental report of parenting As suggested earlier, most research on the role of parenting in motivational development has been solely based on youths' own perceptions of their parents (e.g., see Chew 2016; Grolnick 2016; Roth et al. 2009). Although such perceptions are important, they may be affected by some of the very outcomes that are being assessed. Youths who are not very motivated to engage in important tasks such as schoolwork might perceive their parents as forcing them to engage in these tasks (i.e., it is against their will, because they are not very motivated). Thus, they might view their parents as low in volitional support even if their parents only rarely manifest controlling behavior, because parents engage in it more than their children want them to.

On the other hand, youths' perceptions could be accurate reflections of their experience because parents' promotion of volitional functioning leads to their greater autonomous motivation, because youths' lower volitional functioning leads parents to take over control, or both. If youths perform poorly and/or seem relatively low in self-motivation, parents may deny them volitional control because they feel that their children would choose not to complete important tasks, such as schoolwork. Recent findings indicate that parents of children who scored lower on reading achievement in fifth grade became more controlling when helping those children with homework at seventh grade (Dumont et al. 2014).

Although the most accurate assessment of parental volitional support would be extensive behavioral observation of parent-child interaction, one way of increasing the validity of measurement of parenting is to obtain reports of the same behaviors by different reporters. One would expect that if parents actually strongly promote their children's volitional functioning, this should be found in both youth and parental reports. However, youths' and parents' reports typically are not highly correlated and often differentially predict child outcomes (e.g., Collishaw et al. 2009; Jafari et al. 2014). The present study investigates the extent to which

parents' and youths' perceptions of parenting are similar and the extent to which each predicts motivational and academic functioning.

Parental influences on mastery motivation There has been some limited research on the relation between parenting and mastery motivation. Busch-Rossnagel et al. (1995) found that toddlers showed higher persistence during a challenging task and expressed more mastery pleasure when the relationship between mother and child was reciprocally positive. Wang et al. (2014) also found that toddlers' mastery motivation was higher when their parents were higher in *interactive parental behavior* (sensitivity to children's cues and promotion of social-emotional and cognitive growth).

In addition to these studies supporting an important role of warm parenting in mastery motivation, some studies have examined the role of parental control in mastery goal orientation. Moorman and Pomerantz (2008) found that maternal control was inversely associated not only with concurrent kindergarten mastery orientation but also with mastery orientation half a year later.

Finally, Luo et al. (2013) showed that parental control was negatively associated with persistence and positively associated with anxiety in school-age children. They hypothesized that when parents exert high control, children have less opportunity to solve challenges on their own; moreover, parents communicate to them that they cannot influence their environment. As a result, they propose, children give up. However, Luo et al. (2013) acknowledged that this relationship may involve the opposite direction of effects—more parental control because of the child's low motivation. Of note, like many researchers, Luo and colleagues contrasted high control with high independence, which, as pointed out, may be less pertinent to motivation than volitional autonomy.

Parental influences on children's school achievement

Our study is aimed at predicting school achievement. Although there is little research on motivation as a mediator of the effects, there is a sizable literature relating parenting to school achievement. Masud et al. (2015) recently reviewed the literature regarding the relationship between parenting and adolescents' school achievement (without considering motivation). They found a strong relationship between parenting practices and children's academic success. Arënliu et al. (2014), de Bruyn et al. (2003), Masud et al. (2015), and Spera (2005) found positive relations between authoritative parenting style and school achievement. In contrast, authoritarian style predicted lower school achievement (Arënliu et al. 2014; Hickman et al. 2000; Turner et al. 2009). Given that authoritative parenting is characterized by high warmth and moderate support of volitional functioning and authoritarian parenting involves high control and low warmth, this provides some evidence that relevant parenting dimensions are associated with success in school (Matejevic et al. 2014; Masud et al. 2015; Spera 2005). Pinquart's (2015) meta-analysis also established that autonomy granting positively predicted academic achievement, and that harsh control, psychological control, and neglect negatively predicted achievement, again supporting positive roles of parental warmth/care and autonomy granting.

Although these studies support parenting styles as predictors of school achievement, an important variable to control for is parental education, which could impact both parenting and achievement. There is much evidence that parental socioeconomic status (SES), including parental education, predicts child educational outcomes (e.g., Bradley and Corwyn 2002; Dahl and Lochner 2012; El-Sheikh et al. 2013; Magnuson 2007). Particularly relevant to the present study, parenting behavior mediates the effect of maternal education on children's achievement, whereas

variables such as material hardship mediate family income's prediction of achievement (e.g., Gershoff et al. 2007; Magnuson 2007). Although SES is not a focus of the present investigation, parental education will be included in the models as a potential confounding variable.

Mastery motivation and school achievement

Several researchers have proposed children's motivation as a mediator of the relationship between parenting and school achievement (De Bruyn et al. 2003; Luo et al. 2013; Pinquart 2015; Turner et al., 2009). Moreover, Harackiewicz and colleagues' parenting intervention improved both motivation and subsequent achievement (Harackiewicz et al. 2012; Rozeka et al. 2017). Further, a significant relation has been found between motivation and concurrent achievement (Józsa and Morgan 2014; Bernardo et al. 2015; Covington 2000; Renaud-Dubé et al. 2015; Steinmayr and Spinath 2009; Zhu and Leung 2010).

More specifically, in both cross-sectional and longitudinal studies, *mastery* motivation, especially cognitive persistence, predicted school achievement. In cross-sectional studies, Józsa and Molnár 2013; Józsa 2014 found an association between mastery motivation and school achievement. Further, in longitudinal work on mastery motivation (persistence), Gilmore et al. (2003) predicted school-related skills, Mokrova et al. (2013) predicted both language and math skills, and Józsa and Morgan (2014) predicted grade point average (GPA) in grade 8 from persistence in grade 4. Thus, although these studies did not examine parenting, they established the promise of mastery motivation as a potential mediator of the effects of parenting on achievement.

The present study

Goals

The present study examines the role of maternal parenting in mastery motivation and school success in early adolescence. It addresses important gaps in the literature on the psychology of education by

1. Integrating predictions based on disparate but closely related concepts of learning-related motivation regarding parenting predictors of motivation and achievement
2. Distinguishing between two types of adolescent autonomy support to see which is more predictive of motivation and school success—*independence* from adults or *volitional* autonomy
3. Assessing maternal support of these two types of autonomy, as well as warmth/care, using both student and maternal reports, to better understand the role of perception
4. Examining the differential role of maternal and youth perception of parenting in mastery motivation and school success, to guide appropriate intervention

Hypotheses

1. Mothers' care/warmth will positively predict youths' mastery motivation and school achievement (see Otani et al. 2014; Wang et al. 2014).
2. Mothers' support of volitional functioning (lower parental control) will positively predict youths' mastery motivation and achievement (see Fousiani et al. 2014; Grolnick et al. 1991; Ng et al. 2004; Soenens et al. 2009).

3. Mothers' independence encouragement (low overprotection) will not be significantly associated with youths' mastery motivation and school achievement (see Fousiani et al. 2014; Soenens et al. 2007).
4. Mothers' care/warmth and volitional support predict achievement *indirectly, through mastery motivation* (De Bruyn et al. 2003; Luo et al. 2013; Pinquart 2015; Turner et al. 2009).

Method

Participants

The sample included 296 seventh graders (age: $M = 13.10$, $SD = 0.57$) and their mothers ($N = 296$) from four schools in two Hungarian towns. Although fathers were recruited, too few participated to enable inclusion of fathers in the sample. The distribution of parents' education levels accurately represented the national distribution in Hungary (Józsa 2004). We were unable to inquire about family ethnicity, as this is prohibited by Hungarian law; however, the majority of families were of European descent, with the largest other ethnicity being Roma. All of the children lived with both parents, and all were native Hungarian speakers. The percentage of the sample that was girls was 51%. Mothers' mean age was 39.49 years ($SD = 5.27$).

Procedure

Data collection took place at the beginning of the Spring semester, 2016, as a part of ordinary school-based educational assessment. Youths' teachers administered the instruments at school, during one class period (45 min). Mothers filled out the questionnaires in groups during parent-teacher conferences. The project was approved by a university IRB. The anonymity of the participants was assured.

Instruments

Dimensions of Mastery Questionnaire We used the cognitive persistence scale of the Hungarian Dimensions of Mastery Questionnaire 17 (Hungarian-DMQ17; Józsa and Molnár 2013; Józsa and Morgan 2014), consisting of five, 5-point Likert items, to measure mastery motivation. The original instrument was developed by Morgan (1997; see Morgan et al. 2011 for the English version of DMQ17). Two versions were used: youth self-report and maternal report. The students' and parents' versions included the same statements, reworded slightly to both refer to the youth ("this child" versus "I"). Examples are in Table 1. We used the cognitive persistence scale because it shows the strongest connection with school achievement (Józsa and Molnár 2013; Gilmore et al. 2003; Mokrova et al. 2013).

Parental Bonding Instrument Youths and their mothers also rated parenting style, using the Hungarian Parental Bonding Instrument (H-PBI; Tóth and Gervai 1999) for youths and the Child-Mother Bonding Instrument (CMBI; Danis et al. 2005) for mothers. The original PBI, developed by Parker (1979, 1983), measures youths' perception of their mother's parenting style on three factors: care (12 items), volitional support (versus control) (3 items), and encouragement of independence (versus overprotection) (4 items). Youths rated their mothers'

parenting behaviors on 4-point Likert scales. The CMBI is based on the H-PBI, worded from the parents' perspective (Table 1). It includes the same dimensions as the H-PBI.

We used confirmatory factor analyses (CFAs) to test the measurement model for latent factors and observed items. Based both on our interest in distinguishing support of volitional functioning from encouragement of independence, along with evidence that the three-factor model is more useful with Hungarian samples, our model included the three-factor solution of the H-PBI and CMBI (care, control versus volitional support, and overprotection versus independence encouragement; see Arrindell and Engebretsen 2000; Heider et al. 2005; Tóth and Gervai 1999; Tsaousis et al. 2012). We also tested the two-factor model, but found, as predicted, that it did not fit as well as the three-factor model.

There were a few items that did not fit well, based on the confirmatory factor analysis; hence, we omitted them from the final analyses. We omitted two items from the mastery motivation scale, two items from the control/volitional support, and also two items from the overprotection/independence scales. Cronbach's α reliabilities for the resulting scales were acceptable for volitional support and independence encouragement parenting scales and excellent for the care parenting scales and the mastery motivation scales (Table 2). Reliabilities for the H-DMQ were comparable to the original American (Morgan et al. 2013; Busch-Rossnagel and Morgan 2013) and Hungarian (Józsa and Molnár 2013; Józsa et al. 2014) ones.

The reliability of care was also higher than the reliability of the other two scales in earlier studies (e.g., Tóth and Gervai 1999).

Parental education Mothers reported their own and the fathers' years of education on a 1–6-point scale (see Table 3).

School achievement School grades in mathematics, Hungarian literature and grammar, and science from the just-completed previous semester comprised the measures of school achievement (obtained from school records contemporaneously with the other measures). These grades are on a 1–5-point scale in Hungary, with higher numbers referring to higher achievement.

Analyses

Mplus 7.31 (Muthén and Muthén 2010) was used to address the hypotheses using structural equation modeling (SEM; see Fig. 1). In addition to our focal predictors, we controlled for parental education as a predictor of parenting characteristics, motivation, and school achievement. Parenting variables were hypothesized to predict achievement both directly and

Table 1 Sample items of the questionnaires

Scale	Rater	Example items
Mastery motivation	Mother	Works on a new problem until he or she can do it.
Mastery motivation	Youth	I work on a new problem until I can do it.
Care	Mother	I speak in a warm, friendly voice to my youth.
Care	Youth	Speaks to me in a warm and friendly voice.
Volitional support	Mother	I let my youth do whatever he/she feels like doing.
Volitional support	Youth	Let me do those things I like doing.
Independence	Mother	I would like my youth to never grow up.
Independence	Youth	Does not want me to grow up.

Table 2 Means, standard deviations, and reliabilities of the scales

Scale	Rater	<i>N</i> of MV	<i>M</i>	<i>SD</i>	Min-max	Cronbach's α
Mastery motivation	Mother	5	64.24	19.68	5–100	.86
Mastery motivation	Youth	5	66.77	19.87	10–100	.84
Care	Mother	12	83.31	11.13	28–100	.77
Care	Youth	12	88.08	13.78	3–100	.84
Volitional support	Mother	3	69.11	17.68	0–100	.63
Volitional support	Youth	3	60.77	19.92	0–100	.63
Independence	Mother	4	74.13	18.65	0–100	.64
Independence	Youth	4	61.88	22.30	0–100	.64

MV manifest variables

indirectly through mastery motivation, over and above the role of parental education. Importantly, we included both youth report and maternal report of parenting and motivation variables as separate factors both because most studies find low to moderate correlations between them (e.g., Jafari et al. 2014) and because we wanted to allow for different predictions from youth and maternal reports¹ (Table 4).

Thus, the following ten latent variables were included: (1) parental education level, (2) youth-rated parental care, (3) mother-rated parental care, (4) youth-rated parental volitional support, (5) mother-rated parental volitional support, (6) youth-rated parental encouragement of independence, (7) mother-rated parental encouragement of independence, (8) youth-rated youth mastery motivation, (9) mother-rated youth mastery motivation, and (10) youth school achievement.

The model was tested, utilizing maximum likelihood estimation procedures. To analyze the model fit, based on Brown's (2006) and Schreiber et al.'s (2006) work, we considered the following goodness-of-fit indicators: Root Mean Square Error of Approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). Following on Awang (2012), Hair (2010), and Hu and Bentler (1999), we regarded the model as having an acceptable fit if the following conditions were met: RMSEA and Standardized Root Mean Square Residual (SRMR) ≤ 0.06 CFI and TLI ≥ 0.90 .

Descriptive statistics are also shown in Table 4. We reversed the direction of the control parenting scales, to be interpretable as volitional support, and the overprotection scales, to be interpretable as independence encouragement. Means were calculated for each scale, and then linear transformations were conducted on these means to create scales ranging between 0 and 100.

Results

Correlations among variables

The correlations between the latent variables were consistent with our hypotheses (Table 5). Youths' mastery motivation was positively correlated with parental care, academic success,

¹ We also tested models using the two-factor solution for parenting items instead of the three-factor solution and/or pooling the items rated by the children and the parents together. Moreover, we tested the measurement models of mastery motivation with parents' and students' items analyzed together, with one latent variable. In all cases, the measurement model fit better when we used our predicted model of the data (three factors for parent-rated parenting, three factors for youth-rated parenting, one parent-rated mastery motivation factor, and one youth-rated mastery motivation factor), rather than any of the other possibilities.

Table 3 Students' distribution based on the parents' level of education (%)

Level of education	Father	Mother
Not finished primary school (< 8)	1	–
Finished primary school (8)	8	10
Vocational school (11)	29	46
Academic secondary school (12)	42	25
BA (15)	17	12
MA (17 or more)	3	7

Numbers in parentheses refer to how many years did the parents spend in school in the case of the given education level. Vocational schools and academic secondary schools are parallel school types in the Hungarian school system. Vocational schools are from grades 9 to 11, while academic secondary schools are from grades 9 to 12

and parental volitional support, for both maternal and youth ratings. Parental care was also positively correlated with school achievement and the other two parenting styles, and the other two types of parenting were also positively correlated with achievement and with each other. Note that correlations between parent and youth measures of the same parenting dimensions, while significant and positive, are relatively low, as is often true (e.g., Józsa et al. 2014; Kis and Józsa 2014; Collinshaw et al. 2009). In contrast, youth-rated motivation was fairly highly correlated with maternally rated motivation. Contrary to prediction, mothers' independence support also was correlated with youths' motivation.

Testing the model

Our hypothesized² model included direct and indirect effects, cross effects (parent reports predicting youth reports of outcomes and vice versa), and inter-rater correlations. Results show that the model fits well; RMSEA = .042, CFI = .921, TLI = .911, SRMR = .057, and $\chi^2(590) = 904.63$ ($p < .001$).

Significant associations among latent variables are shown in Fig. 2. The model explained 29% of the variance in youth-rated mastery motivation and 38% of parent-rated variance. The explained variance was 66% for school achievement.

As expected based on the literature, parental education positively predicted parental care, as rated by both youths ($\beta = .27$, $p < .001$) and mothers ($\beta = .27$, $p < .001$). It also positively predicted youth-rated parental volitional support ($\beta = .22$, $p = .005$) and, more strongly, mother-rated parental volitional support ($\beta = .47$, $p < .001$). Parental education similarly predicted youth- and mother-rated parental independence encouragement [$\beta = .31$ ($p < .001$) and $\beta = .44$ ($p < .001$), respectively]. Finally, parent education directly and positively predicted youth's school achievement ($\beta = .39$, $p < .001$).

² We also tested four models nested in our central hypothesized model. The first model (mother rating only) included parental education, the parenting and youth motivation variables rated by only the mother, and the youth's achievement. The second model (youth rating only) included parental education, the parenting and motivation variables rated by only the youth, and the youth's achievement. In the third model, mother reports of parenting predicted youth reports of motivation. Finally, in the fourth model, youths' ratings of parenting predicted mothers' reports of motivation. In no case did any of the nested models fit significantly better than the complete model, and the nested models could not provide clarity about all of the predictive relationships. Thus, given our interest in ascertaining the relations among all of the maternally reported and youth reported variables, we report only the combined model.

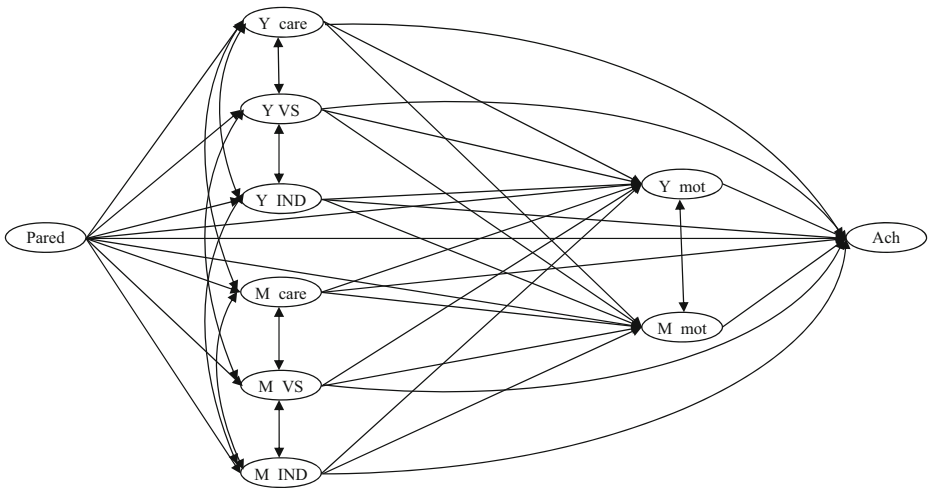


Fig. 1 Hypothetical structural model. Pared parents’ education level, Y care parental care rated by the youth, M care parental care rated by the mothers, Y VS volitional support rated by the youth, M VS volitional support rated by the mothers, Y IND independence rated by the youth, M IND independence rated by the mothers, Y mot youth’s motivation rated by the youth, M mot youth’s motivation rated by the mothers, Ach youth’s achievement

In terms of intra-rater associations among parenting dimensions, youth-rated parental care was positively associated with parental volitional support ($r = .17, p = .029$) and independence encouragement ($\theta = .41, p < .001$), and there was a positive association between volitional support and independence encouragement ($\theta = .35, p < .001$). The same associations held for mother ratings: parental care was associated with parental volitional support ($\theta = .22, p = .014$) and independence encouragement ($\theta = .47, p < .001$), and there was a positive association between volitional support and independence encouragement ($\theta = .22, p = .038$).

More central to this study was the ability of parenting variables, rated by the youth and by the mother, to predict motivation and to predict achievement (directly and indirectly, through motivation), even after parent education was taken into account. Interestingly, reports of care/warmth only predicted motivation as rated by the same rater. That is, youth-rated parental care predicted only youth-rated mastery motivation ($\beta = .26, p = .001$), and mother-rated parental care predicted only mother-rated motivation ($\beta = .22, p = .010$). In contrast, youth-rated parental independence encouragement predicted mother-rated but not youth-rated mastery motivation ($\beta = .28, p = .003$) and also predicted school achievement ($\beta = .23, p = .007$). Mother-rated independence encouragement, on the other hand, as predicted, did not predict motivation or achievement. Thus, youths’ beliefs that their parents encourage independence (but not

Table 4 Model fits of the measurement models

Model	χ^2	df	RMSEA	CFI	TLI	SRMR
Parenting						
1. 3 factors, rating by youth	62.32	41	0.042	0.973	0.964	0.043
2. 3 factors, rating by parent	82.23	41	0.058	0.938	0.917	0.056
Mastery motivation						
3. Rating by youth	12.94	5	0.053	0.986	0.971	0.022
4. Rating by parent	24.03	5	0.063	0.969	0.938	0.029

Each factor loading was significant ($p \leq .01$)

Table 5 Correlations of the latent variables

Variables	1	2	3	4	5	6	7	8	9	10
1. PARED										
2. M MOT	.28**									
3. Y MOT	.18**	.53**								
4. M care	.18**	.36**	.27**							
5. Y care	.20**	.19**	.34**	.24**						
6. M VS	.29**	.38**	.30**	.24**	.18**					
7. Y VS	.12*	.19**	.26**	.12*	.21**	.22**				
8. M IND	.30**	.32**	.25**	.37**	.08	.26**	.14*			
9. Y IND	.17**	.30**	.28**	.14*	.34**	.27**	.26**	.15*		
10. Ach	.46**	.60**	.51**	.28**	.24**	.41**	.22**	.27**	.38**	

PARED parents' education level, *M MOT* youth's motivation rated by the mothers, *Y MOT* youth's motivation rated by the youth, *M care* parental care rated by the mothers, *Y care* parental care rated by the youth, *M VS* parental volitional support rated by the mothers, *Y VS* parental volitional support rated by the youth, *M IND* parental independence rated by the mothers, *Y IND* parental independence rated by the youth, *Ach* youth's achievement

* $p \leq .05$; ** $p \leq .01$

maternal-rated independence encouragement), contrary to expectation, were related to their mothers' views that they are mastery motivated (but not their own), as well as to objective measures of school performance.

For parental support of children's volitional functioning, in contrast to findings for independence encouragement, mothers' ratings predicted both youth-rated ($\beta = .22, p = .030$) and mother-rated ($\beta = .33, p < .001$) mastery motivation. Importantly, mastery motivation, as rated both by the children ($\beta = .27, p < .001$) and by the mothers ($\beta = .30, p < .001$), positively predicted school achievement.

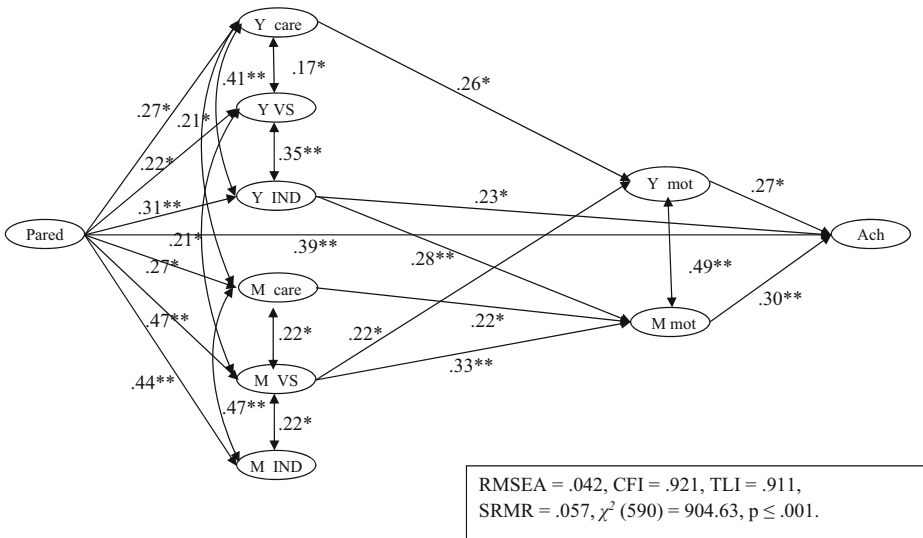


Fig. 2 Standardized coefficients for the model with only the significant relations indicated. Pared parents' education level, Y care parental care rated by the youth, M care parental care rated by the mothers, Y VS volitional support rated by the youth, M VS volitional support rated by the mothers, Y IND independence rated by the youth, M IND independence rated by the mothers, Y mot youth's motivation rated by the youth, M mot youth's motivation rated by the mothers, Ach youth's achievement. All of the standard errors are under .1

Thus, to summarize, youth-rated parental care/warmth predicted their own ratings of their motivation, whereas mother-rated parental care/warmth predicted their ratings of their youth's motivation (both of which predicted achievement). With regard to the other parenting variables, youth-rated parental encouragement of independence predicted mother-rated motivation and both directly and indirectly predicted school achievement. In contrast, maternally rated support of volitional autonomy predicted both youth-rated and mother-rated motivation, which, in turn, both predicted higher achievement.

Discussion

We examined youths' and their mothers' perceptions of parenting and of the youths' mastery motivation. As also found by Barnhart et al. (2012), Collishaw et al. (2009), Józsa (2014), Józsa and Morgan (2014), Józsa et al. (2014), Kis and Józsa (2014), and Leung and Shek (2014), it proved important to distinguish maternal and student ratings. Although maternal and youth reports were significantly correlated, they were correlated at relatively low levels, and several results were different for the same variables as rated by mothers and youths.

Of our four hypotheses, all but one were confirmed. With regard to ratings of parental care/warmth, we expected and found that mothers' care/warmth predicted youths' mastery motivation and school achievement. However, raters mattered: *youths'* ratings of care predicted *their own* ratings of their motivation but not their mothers' ratings, whereas *mother-rated* parental care/warmth predicted *their* ratings of their youth's motivation but not the ratings by their child. One interpretation of these findings, based on SDT and attachment theory, is that children who perceive their parents as warmer build positive working models about themselves and their capabilities and are therefore better able to persevere in the face of challenge (e.g., Deci and Ryan 2000). It is also possible that shared method variance contributed to these findings (e.g., see Podsakoff et al. 2003); youths who perceive more care from their parents may also feel more positive about their own behavior, as reflected in higher ratings of their motivation. Similarly, parents' ratings might be more reflective of their feelings toward their children, which are also reflected in their beliefs about their children's motivation. Additional research more directly testing these hypotheses longitudinally, using both report and observations of parenting and mastery motivation, is needed to further test these possibilities. *Regardless, motivation, as rated by both mothers and youths, predicted children's school grades, so the relation to achievement was robust.*

We had hypothesized, based on Fousiani et al. (2014) and Soenens et al. (2007), that independence encouragement would not predict motivation and achievement. This hypothesis was only partially supported; youth-rated (but not mother-rated) independence encouragement predicted only mother-rated motivation and also directly and indirectly predicted school achievement. It seems possible that youths' ratings are accurate and that parents who believe their children to be relatively motivated believe such children can handle independence, and/or they may be reluctant to grant independence to less motivated youth. Moreover, one reason for parents' perceptions that their children are motivated may be their higher school performance. Alternatively, parents who discourage independence of their children may reduce their children's opportunities to take chances, undermining their motivation and achievement (see Luo et al. 2013; Sparks et al. 2012).

Given that only youths' ratings of independence encouragement predicted only mother-rated motivation, it is possible that youths who are accurately perceived by their mothers as

unmotivated want to be left alone to avoid schoolwork and perceive parental involvement as independence stifling. Cheung and McBride-Chang (2008) proposed that children with different achievement levels also perceive parenting differently. Again, these interpretations should be tested using longitudinal, multimethod research studies.

Finally, as predicted, mother-rated support of volitional autonomy predicted both youth-rated and maternally rated motivation, which, in turn, both predicted higher achievement. These findings are supportive of SDT predictions regarding the importance of volitional functioning in motivation and performance (e.g., Fousiani et al. 2014; Soenens et al. 2007). The fact that it predicted both youth- and mother-rated motivation suggests that children whose parents tried to support their volitional functioning were more motivated. However, it is possible that the effect held primarily because youths' *low* persistence in the face of challenges led their parents to make more choices for them because they believed that their children would not make good choices. Because the parenting and motivation data were collected at the same time, it was not possible to see whether parenting variables at time 1 predicted motivation at time 2 better than motivation at time 1 predicted parenting at time 2.

In conclusion, results of the present study largely supported our hypotheses, highlighting the important role of parenting in mastery motivation and achievement, and particularly highlighting the importance of care/warmth and support of volitional functioning in mastery motivation and of mastery motivation in achievement. Moreover, contrary to hypotheses, independence encouragement, as rated by youths only, also was predictive of motivation and achievement.

These results contribute to a small, but growing literature on the role of parenting dimensions in children's motivational development and school success, showing both similarities and differences relative to extant research. In accordance with Arënliu et al.'s (2014) results and Pino-Pasternak and Whitebread's (2010) review, the more supportive of volitional autonomy the mother perceived herself to be, the more mastery motivated the child was, according to both maternal and youth report. In addition, parental warmth and reciprocity (care) was associated with higher mastery motivation, which is similar to Wang et al.'s (2014) results.

Warm and volitionally supportive parenting were not directly predictive of youths' achievement, but were predictive indirectly, through mastery motivation. The higher these parental dimensions were, the more mastery motivated the youths were; moreover, the more motivated the youths were, the better their school achievement was. Several earlier studies found similar mediators of the relation between parenting and youths' achievement (Chen, 2015; de Bruyn et al. 2003). Luo et al. (2013) found that youth-perceived lower parental volitional support, through its positive relation with performance/avoidance goal orientation, predicted low math achievement. Chen (2015) found that Chinese university students' mastery and performance goal orientations mediated the relationship between perceived authoritative parenting style and students' achievement. de Bruyn et al. (2003) also found that goal orientations mediated youth-perceived parenting behavior's role in early adolescents' school success. Similarly, mastery motivation mediated the effect of parental perceptions of their coercive control on teachers' perceptions of young children's academic competence (Turner et al. 2009; Walker and MacPhee 2011).

However, our study was unique in assessing the role of both youth- and mother-perceived volitional support, independence support, and care as predictors of mastery motivation and school grades in multiple subjects. Our results also supported our prediction, based on Józsa and Molnár 2013, that, regardless of rater, mastery motivation predicts achievement.

Limitations and directions for future research

A limitation of our study is the use of only questionnaire data. It is possible that the respondents' answers did not reflect actual behavior and/or that youths who were not doing well academically wanted to blame this on their parents. The strength of our study relative to most prior work was its inclusion of both youth and parent ratings; however, additional research is needed using behavioral observation measures of parenting and motivation as well.

We analyzed the concurrent relationships between parenting, mastery motivation, and school achievement among seventh-grade Hungarians. Our results are thus limited to Hungarian early adolescents and are limited in inferences about prediction relative to longitudinal studies. Moreover, we only analyzed the mothers' ratings and not the father's. In further research, it would be worthwhile to involve both parents, as well as additional cultural groups, and to use a longitudinal design to ascertain whether parenting at an earlier time predicts later motivation and achievement.

Our mastery motivation approach focused on persistence despite challenge, rather than intrinsic versus extrinsic motivation. Prior research from a SDT perspective has noted that what begins as extrinsic motivation can *feel* volitional and function like intrinsic motivation (e.g., Ratelle et al. 2004). This suggests that whether the motivation is intrinsic or extrinsic may be less important than whether it feels volitional versus controlled/anxiety-based. Luo et al. (2013) found that perceived parental control negatively predicted mastery goals and also positively predicted anxiety. More research is needed on affective aspects of mastery motivation, which could better speak to the role of anxiety and other negative emotions in motivation and achievement.

Our results suggest that one means of reducing the drop in mastery motivation in adolescence could be by intervening with parents to promote their caring, warm interactions with their adolescents, and fostering of youths' volitional functioning. Perhaps by supporting parents in improving these skills, we can increase children's mastery motivation; through this, we can improve school achievement as well. Leung and Shek (2014) added that not only the parents but also other family members should be taught to better facilitate youths' motivational development. Although interventions currently exist to teach teachers to promote mastery motivation (e.g., Waldman-Levi and Erez 2015), research evaluating similar interventions with parents is desirable. In conclusion, the results not only support an important role of parenting in mastery motivation and mastery motivation in school success but also support the need for additional research on this important topic.

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Current themes of research:

His major field of research is mastery motivation. He is interested in age changes in mastery motivation, and the relationship between mastery motivation, cognitive development, school achievement, and family background. With colleagues in the US, he has been developing a computer based assessment for 3 to 8 year-old children. This new measurement tool focuses on crucial aspects of school readiness: mastery motivation and executive functions.

Most relevant publications in the field of psychology of education:

- Józsa, K., Barrett, K. C., & Morgan, G. A. (2017). Game-like tablet assessment of approaches to learning: Assessing mastery motivation and executive functions. *Electronic Journal of Research in Educational Psychology*, 15(3), 665–695.
- Józsa, K., & Morgan, G. A. (2015). An improved measure of mastery motivation: Reliability and validity of the Dimensions of Mastery Questionnaire (DMQ 18) for preschool children. *Hungarian Educational Research Journal*, 5(4), 1–22.
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- Józsa, K., & Morgan, G. A. (2014). Developmental changes in cognitive persistence and academic achievement between grade 4 and grade 8. *European Journal of Psychology of Education*, 29(3), 521–535.
- Józsa, K., & Molnár, É. (2013). The relationship between mastery motivation, self-regulated learning and school success: A Hungarian and wider European perspective. In K. C. Barrett, N. A. Fox, G. A. Morgan, D. J. Fidler, & L. A. Daunhauer (Eds.), *Handbook of self-regulatory processes in development: New directions and international perspectives*. (pp. 265–304.) New York, NY: Psychology Press.

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Current themes of research:

Her research interest involves family background and parental child-rearing behaviors in connection with the children's mastery motivation and school achievement among kindergarteners and elementary school students. The purpose of her recent investigations is to describe the impact of the parental background on the children's mastery motivation in a complex way, using more aspects at the same time.

Most relevant publications in the field of psychology of education:

- Józsa, K., Kis, N., & Huang, S.-Y. (2017). Mastery motivation in school subjects in Hungary and Taiwan. *Hungarian Educational Research Journal*, 7(2), 158–177.
- Józsa, K., Barrett, K. C., Józsa, G., Kis, N., & Morgan, G. A. (2017). Development and initial evaluation of an individualized moderately challenging computer-tablet mastery motivation measure for 3–8 year-olds. *Hungarian Educational Research Journal*, 7(2), 106–126.
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- Debrecen: MTA Pedagógiai Tudományos Bizottsága és Debreceni Egyetem. Kis, N. & Józsa, K. (2014). Young adolescents' and their parents' perception of the parentchild relationship [A kiskamaszok és szüleik vélekedése a szülő-gyermek viszonyról]. *Iskolakultúra*, 2(24), 19–33.

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Current themes of research:

The primary foci of her research are emotion regulation, emotional influences on mastery motivation and self-regulation, “social emotions” (such as guilt and shame) during early development, and cultural and other socialization influences on these processes. Current ongoing research projects are in two related areas: (1) measuring motivational and selfregulatory aspects of school readiness and (2) the effect of early intervention on early socioemotional competence, school readiness, and prevention of emotion regulation difficulties.

Most relevant publications in the field of psychology of education:

- Barrett, K.C. & Morgan, G.A. (2018). Mastery motivation: Retrospect, present, and future directions. In A. Elliot, (Ed.), *Advances in Motivation Science*, Vol. 5, pp. 2-39. Amsterdam: Elsevier.
- Barrett, K.C., Józsa, K., & Morgan, G.A. (2017). New Computer-based mastery motivation and executive function tasks for school readiness and school success in 3 to 8 year-oldchildren. *Hungarian Educational Research Journal*, 7, 86-105. doi: 10.14413/herj.2017.02.06
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- Wang, J. & Barrett, K.C. (2013). Mastery Motivation and Self-regulation during early childhood. In K.C. Barrett, et al. (Eds.), *Handbook of self-regulatory processes in development: New directions and international perspectives* (pp. 337-380). New York: Taylor & Francis.