Key Factors in Early Developmental Assessment: the Conceptual Framework for Enhancing Academic Performance in Iran

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Abstract

The current research investigated the relationship between key social-emotional and cognitive factors, termed as executive functions, with academic performance. In a representative sample (N = 76) aged
7 to 9, the social-emotional development scale, the Barkley Deficits in Executive Functioning Scale-Children and Adolescents (BDEFS-CA) and Academic Performance Questionnaire (APQ) were used to measure research variables. Then, Structural equation modeling using SPSS-22 and AMOS-20 indicated that social emotional skills mediated by cognitive/executive functions were positively related to academic performance in children in the final model. Increase in academic performance was found when children are capable of better utilizing executive function strategies at academic settings. Thus, it is evident that early screening of social-emotional and cognitive/executive functions in young children can lead to identify children with difficulties in learning.

Keywords: Social-emotional skills, Executive functions, Academic performance, Children

Introduction

Assessment, interpreted as collecting data so as to take rational instructional decisions (National Research Council, 2008), is an issue of great importance in today's world. Research indicated that developmental and emotional health problems are common in young children, with an incidence of up to 18% in the general population and may lead to social and academic difficulties in later childhood and beyond (Holtz, Fox & Meurer, 2015). Early childhood assessment can simply be defined as getting to know children prior to the time they are sent off to school (Washington State Office of Superintendent of Public Instruction, 2008), which has two clear benefits; one is the possibility of the diagnosis of a forthcoming problem and the second, which might be considered even more important, is that an early diagnosis gives us plenty of time for rectification. The sooner a child is diagnosed with a coming problem, the better are the chances to

overcome those because early intervention in children with developmental and emotional problems has been shown to improve outcomes (Manning, Homel, & Smith, 2010).

Burakevych, McKinlay, Alsweiler, Wouldes, and Harding (2016) stated that childhood problems are difficult to detect during regular health check visits and clinical judgement as the low sensitive and not specific methods could not be considered as efficient ways for diagnosing these difficulties (Sheldrick, Merchant, & Perrin, 2011). As a result, children are often only identified as having a difficulty after they enter school, when they have missed the opportunity for early intervention. Therefore, many countries have implemented screening for developmental problems as part of routine child health programs to enable early diagnosis and referral to child development services (Alexander, Brijnath, & Mazza, 2013).

In Iran, which is known for its highly competitive academic environment, the earliest comprehensive assessment children receive is upon entering the first grade of elementary school when they are sent off for

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both physical and cognitive screening in an obligatory national screening program. If they cannot pass the required criteria for cognition-related part of the assessment, they have to attend schools for children with special needs. Although the process seems to be working fine, many Iranian families feel devastated when they learn about their children's academic prospects. Taking this into account, it is critical to design, collect and apply a package containing early assessment tools to help more valid screening. According to Campbell et al. (2016) we can consider key conceptual issues on early childhood assessment including cognitive (e.g. executive function) and the social and emotional domains (e.g. social competence, emotional competence and behavior problems).

Cognitive functions include all the processes of transforming, reducing, organizing, elaborating, storing, recovering, and using data and these processes as perception, memory, and reasoning have a crucial role in future preschoolers performance (Camilli, Vargas, Ryan, & Barnett, 2010). Executive function is defined as the cognitive abilities which intentionally promote goal-oriented behaviors (Garon, Bryson & Smith, 2008) and could be defined as the ability of resisting temptations and not acting impulsively assisting with cognitive flexibility (changing approaches to a problem) and working memory (holding information in one's memory and working with it mentally) (Diamond, 2013). Higher order mental processes, such as reasoning and problem-solving are built from these three (Collins & Koechlin, 2012). Executive function encompasses essential skills not only for mental and physical health but also for school-related behaviors and academic success (Ackerman & Friedman-Krauss, 2017; Diamond, 2013). Early education specialists have always been interested in the impact of preschooler's executive function, especially in regards with their behavioral regulation, learning skills and future academic performance (Stipek, Newton, & Chudgar, 2010).

As the second key competence of early assessment, emotional competence is defined as the ability to (a) express one's own emotion properly (called emotion expression), (b) perceive one's own emotions and others' emotion (named emotional knowledge) and (c)

regulate one's own emotion (which is emotion regulation) (Denham, 2006). Emotional exchanges play a key role in social and relational interaction and are essential in children's engagement in learning and as such, preschoolers' emotional knowledge is considered as an important predictor of early academic success (Denham, Bassett, Brown, Way & Steed, 2013). Emotion regulation in children is correlated with their school adjustment and academic excellence (Denham, Bassett, Thayer, Mincic, Sirotkin & Zinsser, 2012). Preschoolers capable of regulating their emotion can release personal resources allowing them to be behaviorally regulated in order to concentrate on learning tasks (Morrison, Ponitz, & McClelland, 2010).

Social competence can be defined as skills linked with successful interactions between preschoolers and their peers and teachers (Denham, Bassett, Brown, Way & Steed, 2013). In order to develop social competence, a child must learn during one's childhood to: (a) understand social cues; (b) resolve conflict; (c) cooperate; (d) have positive relationships with others; (e) communicate actions and feelings with social partners and (f) recognize and regulate emotions and actions (Yudron & Jones, 2016). Establishing constructive relationships with peers and teachers and using skilled social-emotional behavior can boost classroom learning and experts more than ever are aware of social-emotional basis for cognitive development in the course of early childhood (Seifert, 2013).

With the significance of early intervention for the children with implications for prevention, could be the ongoing debate surrounding explanation of learning disabilities and the way they may be appropriately diagnosed (Van Capelle, Broderick, Van Doorn, Ward, & Parmenter, 2017). Hence, the focus of current research was designing and testing a causal model for the main factors affecting on academic readiness aiming at improving developmental and emotional health issues. Assessing these factors that are common in young children may decrease social and academic difficulties in later childhood and beyond. Figure 1 presents the hypothetical model of the current research.
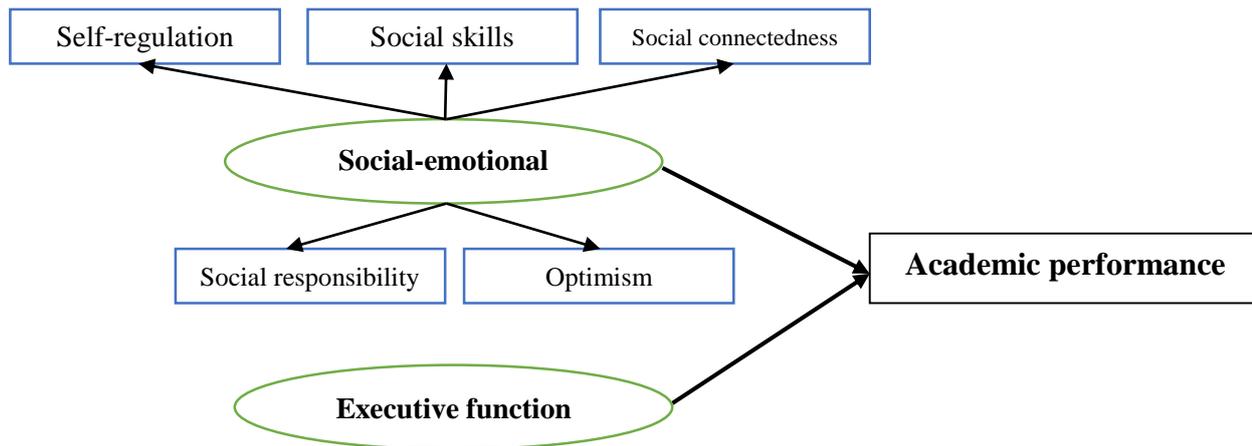
Figure 1.
The hypothetical model of current research

Method

Research Design

The present research is both cross-sectional and survey in nature. First, as a cross-sectional design, the focus is on major variables of academic readiness in students at a specific period. Further, a survey research design to assess the key factors of learning. So relationships among the variables were explored (rather than manipulated) in an attempt to develop a causal model for testing relationships between the main factors. Structural equation modeling (SEM) is an appropriate procedure for use with non-experimental data (Kline, 2015). In evaluation of the hypothetical model, four main criteria were considered including: model convergence an acceptable range of parameter estimates; fit indices; significance of parameter estimates and standardized residuals and modification indices using AMOS.

Participants

The target population of the study consisted of primary students. A total of 98 children were selected from a random sample of students from a primary school in Isfahan during the academic year 2017. Students were in the age range of 7 to 9.

Instruments

Social-emotional development scale

The 12-items social-emotional development scale introduced by Brenchley (2017) was used to assess the social-emotional skills in children inclusive of 5 sub-scales include self-regulation (2-items), social skills (2-items), social connectedness (3-items), social responsibility (2-items)., and optimism (3-items) with a 3 point Likert rating. Brenchley (2017) reported acceptable reliability coefficients for this instrument. In the current research, the reliability of the five sub-scales was supported by high Cronbach's alpha coefficients, ranging from .78 to .82, and the CFA results showed that the scale had a good data fit.

Barkley Deficits in Executive Functioning Scale-Children and Adolescents (BDEFS-CA)

The Barkley Deficits in Executive Functioning Scale-Children and Adolescents (BDEFS-CA) is an empirically based tool for evaluating clinically significant dimensions of child and adolescent executive functioning consisting of 70-items with 4 point Likert scale with the following subscales: time management, organization and problem solving, self-restraint, self-motivation., and emotion regulation. Evidence indicates that the BDEFS-CA is far more predictive of impairments in daily life activities than more time-consuming and costly traditional Executive Function (EF) tests. The BDEFS-CA offers an ecologically valid snapshot of the capacities involved in time management, organization and problem solving, self-restraint, self-motivation, and self-regulation of emotions in children aging 6 to 17. Barkley (2012) reported acceptable construct validity and reliability for this scale.

Academic performance Questionnaire

The Academic Performance Questionnaire (APQ) is a 10-item questionnaire that is completed by teachers and was designed to assess student progress in the classroom curriculum compared to other students.

Teachers scored the items on 5-point frequency scale (ranging from *well above average* to *well below average*). Bennett et. Al, (2009) reported acceptable validity and reliability indicators for this instrument.

Procedure

Participants were asked to individually answer the instruments' questions including Social-emotional development scale, Barkley Deficits in Executive Functioning Scale-Children and Adolescents, and where it was not possible for them because of their age, the participants were interviewed in a testing room in the primary school by trained examiners following the standardized procedures presented in the Scoring Manual to assure the comprehensibility of the questions on the part of the participants. Also, the Academic Performance Questionnaire was filled by the teachers. After collecting data, the correlation and structural equation modeling were run using SPSS and AMOS soft wares.

Findings

First, descriptive and correlational analyses were performed. These analyses were also performed to provide indications of relationships existing among the variables. The results are shown in Table 1. Also, the normality as a basic assumption for structural equation modeling checked with KMO indices which were non-significant (p> 0.05) for all variables in the current sample.

Table 1.
Descriptive Statistics and Bivariate-Correlations for Research Variables

	Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Social-emotional skills	24.77	10.10	___												
2	Self-regulation	4.21	1.76	.71*	___											
3	Social skills	4.08	1.82	.43*	.41*	___										
4	Social connectedness	6.10	2.40	.39*	.56*	.37*	___									
5	Social responsibilities	4.14	1.72	.41*	.41*	.12*	.25*	___								
6	optimism	6.22	2.59	.25*	.27*	.21*	.102*	.29*	___							
7	Executive functions	201.7	64.30	.27*	.22*	.23*	.11*	.16*	.28*	___						
8	Time management	39.16	12.87	.15*	.28*	.19*	.13*	.12*	.17*	.14*	___					
9	Organization & problem solving	42.86	14.93	.30*	.24*	.21*	.10*	.22*	.18*	.16*	.09	___				
10	Self-restraint	40.76	13.85	.26*	.19*	.11*	.16*	.34*	.24*	.25*	.22*	.37*	___			
11	Self-motivation	36.35	9.53	.22*	.18*	.25*	.31*	.35*	.34*	.29*	.32*	.47*	.35*	___		
12	Emotion regulation	49.62	16.95	.28*	.53*	.31*	.36*	.24*	.14*	.15*	.12*	.17*	.27*	.32*	___	
13	Academic performance	37.34	8.97	.31*	.22*	.18*	.22*	.27*	.18*	.24*	.31*	.19*	.40*	.26*	.43*	___

Note: *p< 0.05

The results of structural equation modeling for the hypothesized model indicated that goodness-of-fit indices had relatively appropriate model-data fitness except the root mean square error of approximation (RMSEA) which was higher than 0.1 (χ^2/df= 15.477, p <.05; RMSEA = 0.1; CFI= .96; NFI = .96, IFI= .91; TLI=.92; GFI= .90; AGFI= .85). The final, modified model is presented in Figure 2 considering modification indices and drawing 1 new path between social-emotional skills and executive functions. A look at the goodness-of-fit indices of the final model (RMSEA = 0.06; CFI = .97; NFI = .96, IFI= .92; TLI=.93; GFI= .98; AGFI= .93) suggests that it relatively fits the data (See Figure 2).
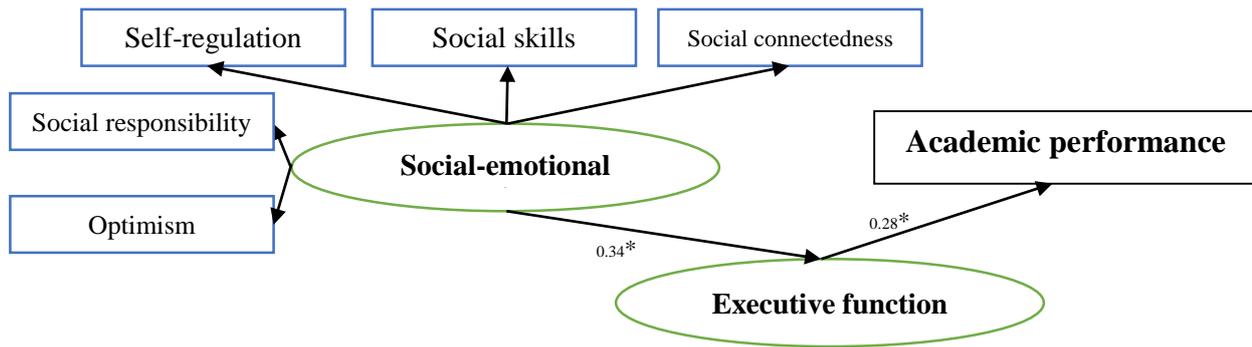
Figure 2.
Final model of the current research
Note*. Standard coefficients have been reported (all coefficients are significant at the 0.05) significance level)*

Discussion and Conclusion

The current research investigated the key factors in academic performance of primary students. The findings indicated that social-emotional skills including self-regulation, social skills, social connectedness, social responsibility, and optimism associated with executive functions can lead to higher level of academic performance in school age children. These findings are congruent with longitudinal research suggesting that social-emotional and executive functions contributes to academic achievement rather than vice versa (e.g., Best, Miller, & Naglieri, 2011, Bull, Espy, & Wiebe, 2008; Georgie & Greenfield, 2005; Hitch, Towse, & Hutton, 2001, Miller & Hinshaw, 2010). Furthermore, we found that executive functions have a mediatory role in the effect of social-emotional skills on academic achievement.

Planning and prioritizing time, organizing information, shifting approaches, and reflecting on work are essential for academic performance. According to Meltzer (2010), for students with executive function weaknesses, their conceptual reasoning abilities may be stronger than their output and productivity. Consequently, these students are inefficient with their work and have difficulty showing what they know in the classroom; their study skills and test performance are compromised; and their academic grades may not reflect their actual intellectual ability. At the middle and higher level, these difficulties will lead to mismatch between their skills and the curriculum demands. So executive functioning -as awareness of *why, where, when*, and *how* to apply learning strategies- is crucial for academic performance.

Also, the social-emotional learning factors such as motivation, effort, persistence, academic self-concept, self-regulation and self-efficacy due to cognitive and motivational processes are linked with students' ability to use executive function strategies, as well as with academic performance (Meltzer & Krishnan, 2007).

In this regard, executive function processes provide an entry point for improving academic performance when students based on their social-emotional skills, learn and apply these strategies effectively, and become more efficient and thus begin to succeed academically. Academic success in turn boosts self-confidence and academic self-concept, which results in more focused effort so that students' hard work is targeted strategically toward specific goals. In this way, a cycle of success is promoted (Meltzer, Katzir, Miller, Reddy, & Roditi, 2004). Results indicated that using executive functions can affect the self-regulated cognitive-emotional process that can help students to enhance their level of motivation, persistence, and work ethic. Hence, there is a need to understand the students' profiles of strengths and weaknesses.

For all the students, particularly for students with learning difficulties, effective strategies and focused effort on key factors will help them to bridge gaps between their skills and the academic demands they face (Graham & Harris, 2003). In other words, inferring casual relationships between developmental key factors and their outcome as academic performance will demand greater focus on the particular classification of child characteristics and presentation of a comprehensive model for screening as a prerequisite for school readiness that can be incorporated in early prevention and intervention programs

The comprehensive programs are based on the assumption that social-emotional skills associated with executive functions are critical for success in school, and will help improve the conditions of at-risk preschoolers without costly interventions. Monitoring for the key factors across the school-age is also a valuable strategy, because it identifies important

sources of dysfunction, but it can also indicate academic success. In this respect, as stated by Arrfa (2007), gifted children outperform other children on executive, but not on non-executive tests. Therefore, the current findings bring additional support to the need to include social-emotional and cognitive assessments as part of the formal (pre)school evaluations, using proper instruments which tap the multidimensional nature of this construct.

Acknowledgements

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