



Socio-economic, cultural, social, and cognitive aspects of family background and the biology competency of ninth-graders in Germany



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ABSTRACT

Students' academic achievement is related to different family background factors such as socio-economic, cultural, social, and cognitive factors. Research on family background has mainly focused on socio-economic factors, often neglecting the significance of providing a cognitively activating home environment. As a supplement to a large-scale study assessing the competency of ninth-graders in Biology in Germany, 543 parents provided information on their socio-economic, cultural, and social background and worked on a domain-specific competency test. By means of hierarchical regression analyses, we established the separate and combined effects of the different background variables on students' performance. Including all predictors simultaneously in a prediction model, only two—the number of books in home ($\beta = .11$) and the biology competency of parents ($\beta = .26$)—significantly predicted differences in their children's competency in biology. Based on the results, we advocate a more comprehensive assessment of family background.

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1. Introduction

The educational success of students depends on a plethora of different factors: Cognitive factors such as fluid intelligence (Cattell, 1971), affective factors such as test anxiety, and conative factors such as motivation and interest (Ackerman, 2009). In the course of educational training, these factors mutually develop between student, school, and family (Bronfenbrenner, 1986). The influence of parental involvement in their children's education has consistently been found to be important (Jeynes, 2007; Patall, Cooper, & Robinson, 2008; Wang, Haertel, & Walberg, 1993), but the discussion has mainly focused on either socio-economic, social or cultural family background factors, leaving cognitive aspects behind.

Studies on the relationship of competencies and family background have combined process characteristics, such as communication within the family, with structural characteristics, such as socio-economic status (see Fig. 1; Watermann & Baumert, 2006). From a theoretical point of view, it has been assumed that differences in the communicative and social practice lead to differences in students' competency levels. Within the last two decades, large-scale assessments, such as the *Programme for International Student Assessment* (PISA) and the *Trends in Mathematics and Science Study* (TIMSS), have empirically investigated the relationship between student achievement and various factors of family background, often focusing on economic or socio-economic variables

(e.g., OECD, 2010; Yang & Gustafsson, 2004). Although social and cultural aspects also have been taken into account (e.g., in the construction of the *Economic, Social and Cultural Status*, ESCS, an index of economic, social, and cultural status, PISA 2003), more sociologically founded questions regarding the extent scholastic performance is determined by the economic or socio-economic background of the family are still dominating the discussion (Ivcevic & Kaufman, 2013; Jerrim, Vignoles, Lingam, & Friend, 2015). Typically, indices such as the *International Socio-Economic Index* (ISEI; Ganzeboom, De Graaf, & Treiman, 1992) are used as manifest constructs to measure SES. In the area of economic or occupational factors of family background, this formative approach (Howell, Breivik, & Wilcox, 2007) may in fact be feasible, but examining latent constructs that are not directly measurable (and that are of special interest in educational psychology) require a reflective approach. An example of a more complex construct not directly observable is parental involvement, which has become a prominent research topic within the last several years (Gonzalez, Holbein, & Quilter, 2002; Hoover-Dempsey et al., 2001; Jeynes, 2007), especially in the form of homework support (Bailey, Silvern, Brabham, & Ross, 2004; Hill & Tyson, 2009).

Although many conceptual frameworks and empirical studies have focused on different aspects of family background, one important factor has been underestimated: The literature indicates that parental support with respect to homework has a greater impact when parents are better qualified (Hill & Taylor, 2004; Hyde, Else-Quest, Alibali, Knuth, & Romberg, 2006). Parents' domain-specific knowledge can therefore be expected to be an important factor beyond pedagogical skills. The

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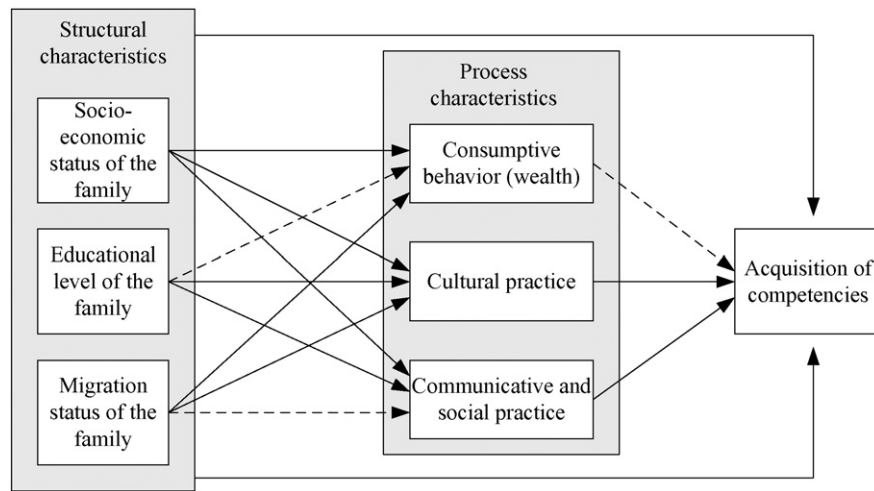


Fig. 1. Theoretical Relationship between Structural and Process Characteristics of Family Living Conditions and Competency Acquisition. *Note.* Adapted from Watermann & Baumert (2006, p. 66). Continuous lines represent relationships with empirical evidence in the research literature. Dashed lines represent assumed relationships that have not been investigated in depth.

present paper assumes that to effectively support the child's learning through providing a cognitively stimulating environment, parents themselves need a certain level of competency.

In the present study, we examined the specific effect of parental domain-specific knowledge, over and above other factors of family background, on their children's school performance. We first provide a comprehensive overview of the key findings of previous research on the different facets of family background, which can be categorized as socio-economic¹, cultural, social, and cognitive. The categories are mutually dependent rather than disjunctive.

1.1. Socio-economics and School Performance

The relationship between SES and school performance has guided a great deal of research (Marks, 2006; Ream & Palardy, 2008; Sirin, 2005; White, 1982). In general, economic factors are operationalized by sociological aggregates. For example, large-scale assessments, such as PISA and TIMSS, use the EGP class schema (Erikson, Goldthorpe, & Portocarero, 1979), which provides information on the professional situation of a person based on the socially perceived status of that occupation. In addition, PISA also uses the ISEI (Ganzeboom et al., 1992), which ranks professions hierarchically.

The effect of SES on academic achievement is especially pronounced in the tracked school system of Germany, where education is strongly linked to the socio-economic resources of the family, and school recommendations are influenced by the social status of the parents (Klieme et al., 2010). Usually, SES is considered a multidimensional construct (Sirin, 2005). Entwistle and Astone (1994) recommended the use of different indicators of financial (e.g., monthly rent), human (e.g., highest completed grade in school) and social capital (e.g., relation to poverty line) to measure SES. In short, SES is often an aggregate of sociological indicators and, thus, an amalgam of conceptually different family background variables. Moreover, SES is strongly related to other family constructs. For instance, parents with high SES tend to invest more social capital in intensively supporting their children and to be more academically qualified than parents with low SES (Ream & Palardy, 2008). In other words, the positive relationship between socio-economic status and academic achievement is not necessarily explained entirely by the financial situation of the family because it is closely tied to other factors of family background such as cultural values.

¹ This paper uses the concepts of Bourdieu (1973, 1986, 1989), who distinguishes between economic, social and cultural capital. In educational research, a more socio-economic, rather than a purely economic approach, has been established.

1.2. Cultural Factors as Determinants of School Performance

The focus of research on cultural factors of family background is usually on migration status. However, cultural influences on family background include other aspects as well. The often-used term *cultural capital* (Bourdieu, 1973; Coleman et al., 1966; DiMaggio, 1982; Lareau, 1987) is rather broad and abstract. It is expressed by educational credentials or cultural possessions such as encyclopedias or works of art (Barone, 2006; Sullivan, 2001; Wildhagen, 2009), or by specific cultural interests and activities such as reading to a child or visiting a museum (Graaf, Graaf, & Kraaykamp, 2000; Katsillis & Robinson, 1990; Tunmer, Chapman, & Prochnow, 2006). The appreciation for and the use of cultural goods have been shown to exert a significant impact on school achievement (DiMaggio, 1982; DiMaggio & Mohr, 1985; Dumais, 2002). However, different explanations have been offered for this finding (Crosnoe, Johnson, & Elder, 2004; Kalmijn & Kraaykamp, 1996; Oates, 2003). For example, because students of families with a high cultural capital usually communicate more fluently, teachers also tend to perceive them as better students (Wildhagen, 2009). Furthermore, cultural aspects also play a role in students' self-selection in educational settings. Because cultural capital is linked to increased educational aspirations, students with high cultural capital often continue their education beyond state-required schooling (Wildhagen, 2009). However, such career-related expectations are in fact highly dependent on parents who transmit their own ideas, values, and expectations by becoming involved in the learning processes and scholastic efforts of their children.

1.3. The Role of Parental Involvement in School Success

The concept of *social capital* is a theoretical concept based on ideas of Bourdieu (Bourdieu, 1973, 1986, 1989; Bourdieu & Znanotti, 1968), but was also shaped by others (Coleman et al., 1966; Portes, 1998). Social capital in the original sense of the term includes social relationships, especially membership in certain groups (e.g., family and peers). It can broadly be defined as services and relationships that people utilize to sustain quality of life (Gibson & Bejinez, 2002; Kozoll, Osborne, & García, 2003; Salinas, 2013; Stanton-Salazar & Dornbusch, 1995). Different authors consider parental involvement as part of social capital. For example, Portes (1998) distinguished three basic sources of social capital: (a) social control, (b) family support, and (c) benefits through extra-familial networks. He also stressed the importance of parental support (as social capital) on educational achievement. Although overlapping with cultural capital, "parental involvement can clearly be conceptualized as social capital" (p. 220, McNeal, 1999). In this context, the

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