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formal und inhaltlich überarbeitete Version der Originalveröffentlichung in:
formally and content revised edition of the original source in:
Child indicators research : the official journal of the International Society for Child Indicators 8 (2015) 2, S. 425-438

Children at Risk of Poor Educational Outcomes: In Search of a Transdisciplinary Theoretical Framework

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Abstract

In most western countries, the number of 'children at risk' for poor educational outcomes seems to have been increased in recent years. Nearly 20 % of the students in those countries meanwhile fail to acquire the levels of literacy, mathematics and science achievement that are required to effectively participate in today's knowledge-based society. Thus, there is a strong need to extend research focusing on the identification of risk factors associated with these undesired educational outcomes in children. Although attempts have been made to conceptualize the issue of 'children at risk' for poor educational outcomes from the perspective of different scientific disciplines, the interplay of multiple risk factors located on the different levels focused by different disciplines has been rarely addressed. Thus, we advocate for more transdisciplinary activities integrating multiple scientific perspectives on the concept of 'children at risk' for poor educational outcomes. These activities should include at least three dimensions affecting developmental trajectories being important for children's individual academic outcomes: (1) individual characteristics including both biological as well as psychological features, (2) contextual factors, as well as dynamics defined by (3) time changes and interactions between individual and contextual categories of risk factors.

Keywords: Children at risk, Educational achievement, Risk factors, Multidisciplinary perspectives

1 Introduction

International studies like the Programme for International Student Assessment (PISA) show that in the course of their school careers nearly 20 % of students in western countries do not acquire the achievement levels in literacy, mathematics or science that are required to participate effectively in today's knowledge-based society (OECD 2006a, 2010a). Despite approaches that have been taken to reduce this percentage, up to the present, the proportion of students with poor educational outcomes has remained broadly the same (OECD 2010). Thus, one of the major issues in this context is to extend our knowledge about the risk factors and developmental trajectories associated with these undesired educational outcomes. However, in recent years this issue has been addressed from different perspectives. For example, while most approaches of social scientists concentrated on risk factors lying outside the individual and took into account diverse contextual factors, developmental psychologists and neurocognitive researchers primarily focused on individual risks arising from characteristics within single individuals. Both approaches revealed substantial impact of both categories of factors on children's academic success. However, research on the the interplay of internal and external factors affecting children's academic success especially in its dynamic changes in time are rare of not missing.

2 Dimensions of Risk Factors

During the last couple of years, the present paper's authors intensively discussed number of disciplinary theoretical approaches to the concept of children's risk for adverse educational outcomes within the new established Center for Research on Individual Development and Adaptive Education of Children at Risk (IDeA) in Frankfurt/Main, Germany. This discussion brought us to distinguish between three somehow independent dimensions which interact in complex and multiple respects when affecting children's developmental trajectories that are important for their individual academic achievement. Each dimension includes a variety of different elements or factors. The two dimensions spanning the theoretical framework we would like to introduce are (1) individual characteristics and (2) contextual factors related to the children's family, their neighborhood and peers, the educational institutions they attend, and the societal circumstances and the political context, in which they live (see Fig. 1). Although, these factors are somehow distinct, they seem to simultaneously effect children's behavior in academic settings and thus seem to be worthwhile to be considered simultaneously in research activities aimed at the better understanding of the risk factors of poor educational outcomes in children.

2.1 Individual Characteristics

Dimension 1 covers a wide range of individual preconditions of successful learning. Among others, educational psychologists carried out much research to identify individual competencies and characteristics that influence children's academic achievement. From the current state of research, the individual competencies being most relevant for educational achievement can be subdivided into three main categories: (1) a cognitive, (2) a motivational-volitional, and (3) a social-emotional category.

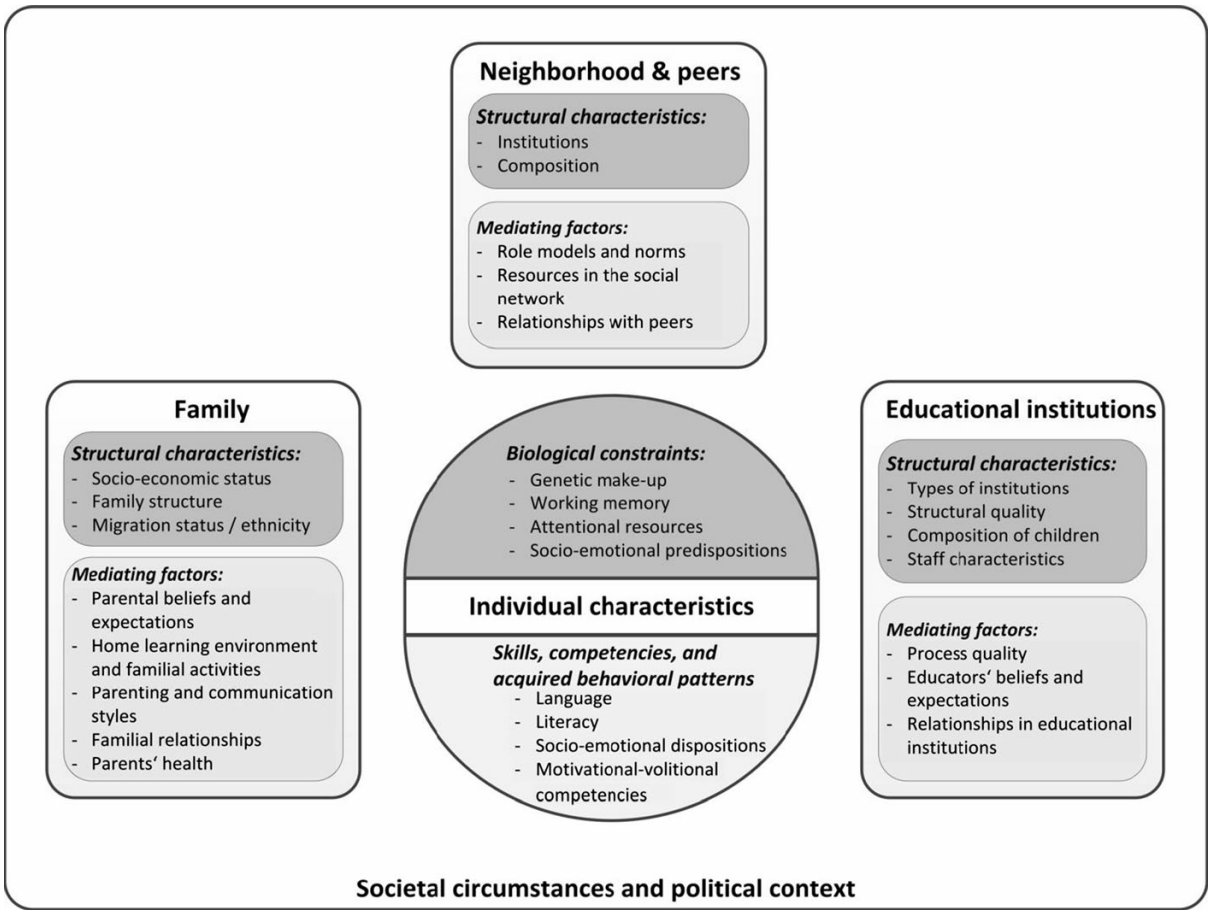

Fig. 1. A framework to describe individual and contextual risk factors of poor educational outcomes in children

The cognitive category can be broadly grouped into three main areas: (1.1) Intelligence, selective attention and working memory; (1.2) prior knowledge; and (1.3) the usage and metacognitive regulation of information processing strategies. Using a computer analogy to describe these three areas of cognitive competencies, one might talk about the hardware (intelligence, selective attention, and working memory), the data (prior knowledge), and the software (strategies) of the individual's information processing system that is supervised by a central processing unit (metacognitive regulation). Empirical studies focusing on cross-sectional as well as longitudinal associations between all three aspects and academic achievement consistently show moderate to strong relationships (e.g., for intelligence: Naglieri and Bornstein 2003; Strenze 2007; for attention: Duncan et al. 2007; for working memory: Alloway and Alloway 2010; for prior knowledge: Kuyper, Werf, and Lubbers 2000; for (meta-)cognitive strategies: Veenman, Van Hout-Wolters and Afflerbach 2006).

In addition to cognitive competencies, motivational orientations are crucial preconditions for successful learning. Especially, the quality of the individual achievement motive system, which describes the processes that orient and energize individuals' competence strivings, forms one of the most important motivational preconditions for successful learning. The achievement motive system can be described from three perspectives: first, by looking at the extent to which the motive is characterized either by a hope for success or by a fear of failure (McClelland et al. 1953); second, and closely related to the first, by looking at the style of attribution (Weiner 1979); and third, by looking at the individual's ability self-concepts (Marsh, Byrne and Shavelson 1988). Research has shown, that irrespective of the considered domain, the predictive power of motivational constructs to explain

academic success is nearly comparable to cognitive competencies such as intelligence (e.g. Steinmayr and Spinath 2009).

However, somehow independent from their achievement motive system, individuals can still fail to realize their intended learning objectives. One of the main reasons discussed in the research for incomplete realizations of intentions are suboptimal volitional self-control competencies such as the ability to effectively delay gratifications for the sake of more valuable but temporally delayed outcomes (e.g. Mischel 1961). Many decisions in children's everyday lives are influenced by self-control competencies like the ability to delay gratifications: for example, to play with friends or to do homework; to blur out the answer to a question in the classroom or to wait to be called on. In line with this, research has shown that higher volitional self-control abilities are predictive of a wide range of developmental outcomes including academic achievement (e.g. Neubauer, Gawrilow, Hasselhorn 2012).

In addition to cognitive and motivational-volitional dispositions, social-emotional characteristics also contribute substantively to individuals' educational success. Most social-emotional characteristics of the individuals can not completely be understood without considering the transactional role of structural environmental factors (family members, social and societal conditions) and emotional-behavioral influences like attachment systems, educational style, or couple relationship (Reichle and Gloger-Tippelt 2007). Concerning the earliest roots of social-emotional development, different areas should be considered: early affect regulation as social biofeedback processes in parents affect mirroring (Fonagy 2007), the development of self and object representations (Stern 2010), attachment (Cassidy and Shaver 2008), the capacity to mentalize and to integrate aggressive destructive impulses (Twemlow et al. 2011) as well as early moral development (Emde 2011). In addition, the influence of the psychopathology of parents as well as traumatizations (due to violence, abuse and emotional neglect) as sources of threat for successful development has been demonstrated (Bohleber 2011; Leuzinger-Bohleber 2009). All these individual characteristics that underlie successful learning are themselves influenced by and related to multiple factors on different levels such as the individual genetic makeup, as well as multiple contextual factors.

2.2 Contextual Factors

Dimension 2 covers a broad range of contextual factors. The societal and political context builds the broadest category that structures the opportunities and alternatives of the individuals within this context. Moreover, in this broader context legitimate understandings of the child and 'children at risk' are negotiated and produced (Betz, in this issue) and not only education policy shapes the ways of children through the educational system. Apart from this political level, Fig. 1 mentions the most important contexts for children: the family, the neighborhood and peer group and also educational institutions. Structural characteristics of these contexts are often associated with children's educational outcomes. However, these associations are usually mediated by other, more proximal factors. Therefore, it seems to contribute to a more comprehensive understanding of contextual factors to differentiate between structural and mediating characteristics.

2.2.1 Family Settings

Structural and Distal Factors Parents' socioeconomic status (parents' education, occupation and income). It is one of the most replicated findings in empirical educational research that children of higher educated parents and from higher social classes show, on average, better developmental

outcomes in different domains and better school achievement (e.g., Bradley and Corwyn 2002; Conger, Conger and Martin 2010; Feinstein, Duckworth and Sabates 2004). A large body of research also demonstrates detrimental effects of low income and poverty on children's development and educational achievement (see Conger et al. 2010; Schoon, Hope, Ross and Duckworth 2010). Poverty and a lack of household resources lead to fewer opportunities to participate: in the family itself, in which children already register material pressures and existential worries very precisely; at school, in which individual support to help compensate for disadvantages is lacking; in the less attractive areas in which they live; and in terms of opportunities to join clubs and associations or to take advantage of courses in the arts (also see mediating factors).

A further frequent finding is that maternal employment in the first year of the children's life for at least some groups has negative developmental consequences while sometimes positive effects are found for older children (for an overview see: Waldfogel 2002). However, these results about maternal employment are not always consistent and by no means generalizable (Feinstein et al. 2004; Waldfogel 2002).

Migration status / ethnic origin. In most Western countries, children of immigrants and ethnic minorities demonstrate lower levels regarding academic achievement and educational attainment compared to native-born children of the majority society, although there are large differences between countries and ethnic groups (Heath and Brinbaum 2007; OECD 2006b). In immigrant families, several characteristics of the families' migration biography like age at migration and generational status are also associated with children's developmental and educational outcomes (Chiswick and DebBurman 2004; Glick, Batesa and Yabikua 2009).

Family structure. Single parenthood is negatively correlated with children's development and educational success (see Dunifon and Kowaleski-Jones 2002). However, the main causes behind this association are probably the economic situation and instability of relationships (Feinstein et al. 2004). In addition, some studies revealed that children with more siblings achieve slightly worse in school than children from smaller families (see Downey and Condron 2004).

Mediating and Proximal Factors Parental attitudes, beliefs, aspirations and expectations. A part of the association between family structural characteristics and children's educational success, school readiness and also their early attendance in institutional settings like preschools, nursery schools or pre-kindergartens is mediated by parents' attitudes, beliefs, aspirations and expectations (Bodovski and Farkas 2008; Vincent, Braun and Ball 2008). There is also some evidence that especially for immigrants – especially when associated with an ethnic minority status – the experience of being marginalized, discriminated against, and treated disrespectfully by members of the majority society constitute a risk factor in its own right (Leseman 2009).

Home learning environment and stimulating familial activities. A large body of research focuses on the role of stimulating familial activities (like reading to children, visiting museums etc.) as a mediator between the social origin and children's outcomes (Bradley and Corwyn 2002; Conger et al. 2010; Feinstein et al. 2004). Many studies have demonstrated a positive influence of such activities on children's development in various domains including school achievement (e.g., Melhuish et al. 2008). For example, the children's home literacy environment includes language use and explanation or joint activities and conversation which are related to the development of the children's language competence and to further educational outcomes (e.g., Umek, Podlesek and Fekonja 2005). Relying on concepts like "concerted cultivation" and "accomplishment of natural growth" (Lareau 2003) activities are described at the family level and are strongly related to children's educational

achievement (e.g., Bodovski and Farkas 2008; Cheadle 2009). Children from families with low socioeconomic status (SES) are more frequently left to their own devices. They lack support, stimulation, and guided encouragement resulting in daily lives with a one-sided focus on television or other types of media consumption (Andresen, Hurrelmann and Schneekloth 2014). In contrast, children from high SES families have greater scopes for shaping their lives, and the educational background of their families provides access to a varied and creative range of leisure-time activities almost as a matter of course. These children correspondingly have a much greater trust in their own learning competencies and thus learn to make their own decisions on how to tackle their lives (Lareau 2003; World Vision 2007, 2010).

Parenting and communication styles. Parents differ enormously in the way they interact and communicate with their children. Differences in home language and literacy are among the most relevant factors for differences in children's academic achievement. The amount of parental talk to their children as well as its complexity and richness is associated with the families' social background and influence children's language skills (Hart and Risley 1995; Hoff 2006). A further mediator between social and ethnic origin and children's development are parenting styles (see Bradley and Corwyn 2002; Brooks-Gunn and Markman 2005). A supportive and warm parenting style is according to research results associated with positive child outcomes while a harsh and inconsistent parenting style is associated with negative developmental trajectories (see Conger et al. 2010; Feinstein et al. 2004).

Parent-child relationship. Empathy of the primary care givers has proven to be the most influential source for the development of a secure attachment as well as of the capacity to mentalize, both central protective factors for infant development (e.g. Tronick 2007; Cassidy and Shaver 2008; Sodian and Ziegenhain 2012). The adaptivity of the primary care givers to the infant proves to stimulate the development of early affect regulations and the development of an emergent self (Stern 2010). Severely depressed or traumatized care givers, e.g., are not capable to cope with such individual differences and needs of the infant: They fail to interprete the infants behavior adequately which has an enormous influence on the early infant-parent interaction and the early social-emotional development (e.g. Ramsauer et al. 2011). Thus severe psychopathologies of the care givers restrict the social-emotional development already in the first years of life (Laucht, Esser and Schmidt 1994). Moreover, the quality of the parental relationship also affects the social development of the child, particularly if severe unsolved conflicts determine the family clima during a long period of time (Reichle and Gloger-Tippelt 2007). Especially during their early school years the interest and support parents are able to give to their children's learning process are crucial. Freedom granted to the children by their parents' childrearing style and a balance between care and autonomy – that is e.g. choice – could be seen as influential factors for child well-being especially for children at risk (Andresen et al. 2014; Bradshaw 2011).

Health / Stress. A well-established strand of research concentrates on parental stress and mental health as a mediator between parents' SES and various child outcomes (Bradley and Corwyn 2002; Conger et al. 2010; Feinstein et al. 2004). Families with low social background are more frequently confronted with stressful events in life which might lead to emotional problems and conflicts. These parental conflicts affect their parenting behavior and hereby also their children's development (Conger et al. 2010). Risk factors include also marital conflict or job stress (Leseman 2009). There is also evidence that low family income and economic insecurity increases parental stress which enhance the probability of the emergence of anxiety, depression, and substance abuse among children and also domestic violence (The Annie E. Casey Foundation 2011).

2.2.2 Neighborhood and Peers

Structural Characteristics Several studies reported statistical associations between characteristics of neighborhoods and children's educational outcomes although these are much smaller compared to family effects (Nettles, Caughy and O'Campo 2008). The two underlying mechanisms for this finding are the availability of institutions and the composition of individuals in the neighborhoods (Feinstein et al. 2004).

Institutions. Access to various institutions and resources depend on the neighborhood where families live. The availability and condition of preschools, schools, health care institutions, libraries, museums, theatres, sports facilities etc. differ between neighborhoods (Leventhal and Brooks-Gunn 2000). The attendance or non-attendance of these institutions has an impact on educational achievement of children.

Composition. Also the composition of individuals differs by residential context. Rental prices in a certain area, the average socioeconomic composition of the people living there and other local features like the unemployment rate, crime rate etc. are usually correlated. How safe a neighborhood is for children and how it offers a child's mobility seems to be important not only for child well-being as different studies show (e.g. Bradshaw 2011; World Vision 2007).

Mediating Factors Role models, norms and resources in the social network. The composition of individuals in the neighborhood can have different indirect effects on children (Friedrichs, Galster and Musterd 2003): Model learning via social ties and relationships (characteristics of social networks, peer groups etc.), socialization and collective efficacy (norms etc.) and perceptions of deviance such as crime. Especially the characteristics of peers are likely to influence children's behavior, development (also see school composition effects below) and educational decisions within school. The social network can also provide access to various resources such as information about local institutions and their quality (see Vincent, Braun and Ball 2008).

Peer relations. Research in the context of childhood studies focus more on the impact of peer relations. In some surveys children reported more contacts with adults than with peers (Bradshaw 2011; World Vision 2010). What is interesting with respect to academic achievement is how children spend their time after school or day care. Whether a child was growing up in an environment more strongly shaped by contacts with children seems to depend on the residential situation, the time spaces available, and freedom of mobility. There is a connection between the number of contacts to peers and how independently a child is able to move around in his or her environment.

2.2.3 Educational Institutions

Structural Characteristics Types of institutions / preschool attendance. The attendance of preschools, nursery schools, pre-kindergartens or similar early educational institutions is usually not mandatory. However, not attending such early educational institutions (or only for a short period of time) is usually regarded as a risk factor for children's school readiness. Many studies report positive short-term effects of preschool attendance on children's development and some also find long-term influences on educational outcomes (Burger 2010). However, results about the age at entry and duration of preschool attendance are often not consistent (Burger 2010; Roßbach, Kluczniok and Kuger 2008). Moreover, such preschool effects vary by preschool characteristics (like type of

institution or quality) and child and family characteristics (like social background) (Burger 2010; Feinstein et al. 2004; Roßbach et al. 2008).

Structural quality of educational institutions and staff characteristics. With regard to preschool education, there is evidence that structural characteristics like the child-staff ratio and educators' education and training are associated with the process quality in preschools and, therefore, indirectly influence children's development (see NICHD 2002; Vandell 2004; for a detailed discussion on different models for early education provision and their effectiveness: Leseman 2009). Nearly the same findings are observable for the school context.

Composition of children in educational institutions. Only few studies focus on the effects of children's composition in preschools. Biedinger, Becker and Rohling (2008) reported data suggesting that a higher proportion of children from high-SES backgrounds in preschool is associated with higher levels of school readiness. Similar findings are reported for the school context: A higher proportion of children from higher social backgrounds and a higher average competence level in class positively influence pupils' school achievement – even if the individual social background and cognitive competency is taken into account (Baumert, Stanat and Watermann 2006; Dumay and Dupriez 2008). Also special institutional regulations that affect the student composition can influence children's school performance: Tracking and ability grouping seem to increase the attainment gap (Baumert, Stanat and Watermann 2006; Feinstein et al. 2004). Moreover, the match between educator and child with respect to their respective ethnic and/or social origin seems to be a source of outcome differences. For example, Morris (2005) reported effects of the composition of students in a school. In a predominately racial/ethnic minority school, black teachers typically perceive white students rather as good students, whereas the white teachers tended to view their students as members of low income families and rather poor achievers. Obviously, there is a strong link to the educators' beliefs (see also below).

Mediating Factors Process quality. Process quality of educational institutions usually refers to interactions in these contexts and the way how children are fostered with regard to their individual development. It is usually measured by observation with the help of standardized checklists. Regarding the preschool context, many studies indicate that a high process quality positively influences children's development in various domains (Roßbach et al. 2008; Vandell 2004; Feinstein et al. 2004; Leseman 2009). Within school context comparable findings are reported.

Educator's beliefs and expectations. Although there is no doubt that general teacher's beliefs about teaching and learning, childhood and students affect their academic achievement (Woolfolk Hoy, Davis and Pape 2006), many issues surrounding the underlying mechanisms – as in the case of specific teachers' beliefs of early mathematics (Lee and Ginsburg 2007) – are still unexplored. For children at school age, there is multiple evidence for the influences of teacher expectations and stereotypes on children's school achievement. Teachers tend to perceive pupils from different social and ethnic background differently and also treat them differently. Obviously, there is less amount of teacher's time and attention as well as less reinforcement for children from low-SES families (Bradley and Corwyn 2002; Feinstein et al. 2004; Morris 2005; Schofield 2006).

Educator-child relationship / educators' responsiveness. Attachment theory postulates an antagonism among two basic motivational systems: an attachment and an exploration system. If a child feels secure it is capable to explore and to learn. If it feels insecure and threatened the attachment system is activated. As a consequence, the child looks for an attachment figure and is not capable to learn anymore. This model is also fruitful for the educator-child relationship. It is well known that a positive relationship with the educator is essential for any kind of learning and development (e.g.

Raufelder and Mohr 2011). Psychoanalytic studies also have illustrated that the early relationship of the child to the care giver is the model for those with the educators particularly in kindergarten and in elementary school (Leuzinger-Bohleber 2009). In the best case these models develop further and become more and more adaptive. In the case of severe violence and abuse, the so called "attachment trauma" (Fonagy 2007), the relationship with the educators mostly will be difficult caring the risk to repeat the original traumatic relationship with the primary care givers in the relationship with the educator. Feldman (2012), Ammaniti et al. (2012), Mayes (2012) and Schacter (2012) have summarized many studies in the field of oxycotin and stress research showing how the relationship with caregivers, educators and institutional structures, and, of course, traumatic events, influences the development of children, their social-emotional as well as their learning capacities.

2.2.4 Societal Circumstances and Political Contexts

The broadest context for children's development and educational attainment is the societal context which (indirectly) affects some of the more proximal processes. Policies in the area of education, family, labour market etc. frame the opportunities and restrictions for the individuals within the society. For example, specific characteristics of the educational system like early tracking are associated with higher levels of educational inequality (Schlicht, Stadelmann-Steffen and Freitag 2010; Schütz, Ursprung and Wößmann 2008).

Also prevailing norms and attitudes that are shared from the majority or from large and influential groups in the society can influence individual behavior, development and the treatment of children at risk. For example, the prevailing attitude about maternal employment or the perception of early extra-familial child care as beneficial or harmful for children's well-being may influence not only parents' child care decision (see Pungello and Kurtz-Costes 1999) but also the framing of child care policies in countries. Therefore, the norms and attitudes of parents and also the attitudes and beliefs of relevant stakeholders in society produce substantial differences in education and care arrangements of children at risk and also their pedagogical and psychological treatment (e.g., Betz 2012; Stefansen and Farstad 2010).

3 Time Changes of Dimensions and Their Interactions

Obviously, there are multitude and complex interactions among the sketched risk factors, both, within and between the different levels (individual and contextual). The nature and the strength of these interactions regarding children's educational outcomes is still an open question for research. This makes predictions regarding the fulfillment of anticipated poor educational outcomes in light of the applicable risk factors rather impossible both, on the level of particular cases as well as on the level of subpopulations. But this is not the only reason why irrespective of our broad knowledge about single risk factors hampering the success of learning efforts at school it is still utterly impossible to make valid predictions of the school careers and other educational outcomes of children. Even if we would be able to assess reliably all the individual characteristics and all the contextual factors described in the preceding sections of this paper as well as a broad spectrum of educational outcome variables within a large and representative sample of children to do all the statistical analyses to disentangle the complexity of interactions this will not allow us to resolve definitely the posed issues. This is because of the time dependent dynamics of the mentioned risk factors affecting not only each of the factors in its specificity as well as in its impact on children's learning activities and their adaptation to educational devices and institutions, but also their

combined effectiveness and their contribution to the complex interactions with other risk factors. We feel that one of the most challenging tasks of future research with regard to children at risk of poor educational outcome is to uncover the most relevant time changes of the risk factors included in the transdisciplinary framework presented here. We advocate to make use of longitudinal designs to address these issues and to develop them further to adapt them to the needs of the different disciplines contributing to our contemporary understanding of what are the factors making a substantial number of children to children at risk of poor educational outcomes.

4 Summary and Overview

The aim of the present paper was to stimulate transdisciplinary discussions on issues surrounding children at risk of poor educational outcomes by providing a rough sketch of factors that offers a starting point to disentangle important mechanisms that produce poor educational outcome in order to identify opportunities to reduce the detrimental ramifications of risk factors. The framework distinguishes between three dimensions that affect those developmental trajectories that are important for children's individual academic outcomes: the two categories (1) individual characteristics, and (2) contextual factors, as well as dynamics defined by (3) time changes and interactions between the two categories of risk factors.

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