



IUL School of Social Sciences

Department of Social and Organizational Psychology

Teacher-child interactions and children's social skills and problem behaviors:
ECEC dosage and disability status as moderators

Ana Lúcia Vidigal Paixão Aguiar

Dissertation submitted as partial requirement for the conferral of
Master in Social and Organizational Psychology

Supervisor:
PhD Cecília Aguiar, Prof. Auxiliar,
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Resumo

Vários estudos têm reportado associações entre a qualidade dos contextos de educação de infância, o grau de exposição das crianças a esses contextos e o desenvolvimento social e comportamental das crianças, com alguns desses estudos a sugerirem que esta associação pode ser particularmente forte para crianças em desvantagem social e económica. No presente estudo, investigámos a relação entre a qualidade das interações educador/a-criança e as competências sociais e problemas de comportamento das crianças, bem como os efeitos moderadores da dosagem e do estatuto de incapacidade nesta relação. Participaram neste estudo 180 crianças com desenvolvimento típico (119 rapazes) e 42 crianças com incapacidade (29 rapazes) ($M_{idade} = 63.75$; $DP = 7.77$), num total de 222 crianças, integradas em 44 salas inclusivas de pré-escolar, situadas na Área Metropolitana de Lisboa, em Portugal. Os nossos resultados indicaram que a qualidade das interações educador/a-criança não está associada às competências sociais das crianças e que a proporção de dias que a criança esteve ausente da escola está negativamente associada às suas competências sociais. Paralelamente, encontramos efeitos moderadores do número de meses com o/a educador/a e do estatuto de incapacidade na relação entre dois domínios das interações educador/a-crianças e as competências sociais das crianças. Por fim, as interações educado/a-criança não estavam associadas aos problemas de comportamento das crianças e esta relação não foi moderada pela dosagem nem pelo estatuto de incapacidade. Globalmente, encontrámos alguns resultados encorajadores, que sugerem que o grau de exposição a contextos de educação de infância pode influenciar de forma direta e indireta o desenvolvimento social das crianças.

Palavras-chave: interações educador/a-criança, dosagem, crianças com incapacidade, competência social, problemas comportamentais

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Abstract

Multiple studies have reported associations between ECEC quality and dosage and children's social and behavioral development, with some further suggesting that this association may be particularly strong for more socioeconomically disadvantaged children. In the present study, we examined the direct relation between the quality of teacher-child interactions and children's social skills and problem behaviors, as well as the moderating effects of ECEC dosage and children's disability status. Participated in this study 180 typically developing children (119 boys) and 42 children with disabilities (29 boys) ($M_{age} = 63.75$; $SD = 7.77$), in a total of 222 children, from 44 inclusive classrooms in the Metropolitan Area of Lisbon, Portugal. Our results indicated that the quality of teacher-child interactions is not associated with children's social skills and that the proportion of days children were absent from school is negatively associated with their social skills. Simultaneously, we found moderating effects of the number of months with the lead teacher and disability status in the relation between two domains of teacher-child interactions and children's social skills. Teacher-child interactions did not predict children's problem behaviors, nor did dosage or disability status moderate this relation. Overall, we found some encouraging results, suggesting that dosage may directly and indirectly influence children's social development.

Keywords: teacher-child interactions, dosage, children with disabilities, social skill, problem behaviors

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Glossary of abbreviations

CLASS – Classroom Assessment Scoring System

DGEEC – Direção-Geral de Estatísticas da Educação e Ciência

ECCRN – Early Child Care Research Network

ECEC – Early Childhood Education and Care

ICC – Intraclass Correlation Coefficients

SSRS – Social Skills Rating System

WPPSI-R – Wechsler Preschool and Primary Scale of Intelligence - Revised

Introduction

The present study is part of a larger research project, Enhancing Peer Relationships: Preschool Teachers' Ideas and Practices (PTDC/CPE-CED/117476/2010), developed in Portugal, thus differing from the majority of prior studies, conducted mainly with North American samples (Yamauchi & Leigh, 2011). This research project had four main goals: 1) to understand the ideas Portuguese preschool teachers have about what is important to promote peer relationships; 2) to document the strategies preschool teachers use to attain this goal; 3) to study the relation between the ideas and practices of preschool teachers and children's social participation in the classroom (including typically developing children and children with disabilities); 4) to investigate if children's disability profile influences the relation between the practices of preschool teachers and the social participation experiences of young children.

Over the last 30 years, Portugal has witnessed extensive investments in the ECEC system, with the purpose of increasing coverage rates (Abreu-Lima, Leal, Cadima, & Gamelas, 2013; Pinto, Pessanha, & Aguiar, 2013). From 1985 to 2012/13 coverage rates for children aged between 3 and 5 increased from 30% [Gabinete de Estatística e Planeamento da Educação (GEPE), 2007] to approximately 89% (Direção-Geral de Estatísticas da Educação e Ciência [DGEEC], 2014). In 2015, Decree-law No. 65/2015 established the universality of preschool education for children aged four or above. Similar investments have been made to increase the enrollment rates of children with disabilities in regular classrooms, with the purpose of creating an inclusive preschool system. Data from 2016 indicates that 99% of all Portuguese children with disabilities have access to mainstream education (87% in the public school system), with the majority (87%) participating full-time in regular classrooms (DGEEC, 2016). In 2015, a survey with a representative sample, indicated that about 20% of regular classrooms, in the public preschool system, served, at least, one child with disabilities (Inspeção-Geral de Educação e Ciência, 2015).

In Portugal, the preschool system is supervised by the Ministry of Education, and includes public, private for profit, and private non-profit centers. In the public and private non-profit preschool networks, the educational component is free, and most classrooms have mixed-age groups of children, contrarily to private for-profit preschool classrooms, that tend to serve children with the same age (Abreu-Lima et al., 2013). Despite increases in coverage

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rates (in 2015, approximately 77%, 91%, and 96% of 3, 4 and 5 year-olds, respectively, attended preschool [DGEEC, 2015]), Portuguese classrooms may not have the necessary assets to have a true positive impact on children's development (Abreu-Lima et al., 2013), with some studies even describing levels of quality as mediocre (Pinto et al., 2013). For that reason, further studies on ECEC quality may be needed to generate more knowledge to support educational policies and practices (Abreu-Lima et al., 2013).

The present work adds to a relatively new research trend that considers different features of children's experiences in ECEC settings (Votruba-Drzal et al., 2004). The highly inconsistent results found in the literature reveal the need to further explore the combined effects of ECEC quality and dosage on children's social and behavioral development (Zaslow et al., 2010). Accordingly, the present study explores the relation between the quality of teacher-child interactions and children's development of social skills and manifestation of problem behaviors, as well as the potential role of dosage as a moderator in the above mentioned relation. Furthermore, high-quality care effects seem to be particularly significant for children with a lower socioeconomic status, with quality operating as a buffer or a protective element (Clements, Reynolds, & Hickey, 2004), and dosage working as a reinforcement of ECEC high-quality positive effects (Votruba-Drzal et al., 2004). However, it is still unknown whether this stronger effect also applies to other subgroups of vulnerable children, like those with disabilities (Essa et al., 2008). In the present study we intend to explore the potentially stronger effects of teacher-child interactions quality and ECEC dosage on the development of social skills and in the manifestation of behavioral problems for children from lower educational backgrounds and for children with disabilities, when compared to children with higher educational backgrounds and typically developing children, respectively.

In Chapter I, we will present a theoretical and empirical framework on the effects of teacher-child interactions, ECEC dosage, and social and economic disadvantage, on children's social skills and problem behaviors, while defining in some detail each of these constructs. In Chapter II, we present the methods used in this study. We describe our sample of children and teachers, the measures used to assess children's outcomes and teacher's interactions in the classroom, the data collection and data analyses procedures. In Chapter III, we present a total of nine two-level models, testing the direct effects of teacher-child

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interactions on children's social and behavioral outcomes, and the moderating effects of ECEC dosage, and disability status on the relation between teacher-child interactions and children's social skills, internalizing behavior problems, and externalizing behavior problems. In Chapter IV, we discuss our main findings in the light of previous research on this topic; analyze the limitations inherent to our study; and discuss the implications of our study, to both research and practice.

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Chapter I - Theoretical and Empirical Framework

In Bronfenbrenner's bioecological model, human development is fostered by proximal processes, which can be defined as the interaction patterns, that occur over time, between a developing person and his/her close environments, that is, his/her microsystems (Bronfenbrenner & Morris, 1998, 2006). Competence and dysfunction are the result of such processes (Bronfenbrenner & Morris, 1998), which in turn are influenced by the person's individuality, the specificities of the context (Bronfenbrenner & Morris, 2006), and the level of exposure, in terms of duration (i.e., length of exposure), frequency (i.e., how often), interruption (i.e., predictability), timing of response, and intensity (i.e., strength of exposure) (Bronfenbrenner & Evans, 2000). In short, a person's competence develops through repeated experiences in his/her closest contexts, such as family, school, and child-care centers, among others (Bronfenbrenner & Morris, 2006).

A considerable number of studies report enduring benefits of attending high-quality early childhood education and care (ECEC) settings (e.g., Mashburn et al., 2008), one of the most relevant microsystems for young children (NICHD Early Child Care Research Network [ECCRN], 2005). Attending high-quality preschool is central to building "human capital" for the future (DeCicca & Smith, 2013), especially since the number of children spending a considerable proportion of their days in child care is steadily rising (Pianta & Hamre, 2009). Research on ECEC quality shows attending high-quality settings, defined as warm, supportive, healthy, secure, and stimulating, seemingly nurtures young children's cognitive and social skills (Votruba-Drzal, Coley, & Chase-Lansdale, 2004), with a considerable number of studies establishing a modest correlation between the quality of ECEC and child development, for example, in terms of the acquisition of socioemotional skills and decrease in behavioral problems (Peisner-Feinberg et al., 1999). Even though there appears to be only a modest correlation between ECEC quality and children's development, some longitudinal studies point to apparent lasting benefits of participating in high-quality settings, for example, in terms of self-regulation and development of pro-social behavior (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2011), visible through elementary school (Neidell & Waldfogel, 2008) and middle school (Sylva et al., 2011).

ECEC quality can be evaluated in terms of structure characteristics and/or classroom processes (Vandell & Wolfe, 2000), with the latter being of particular interest for the present study. Classroom processes can be defined as children's direct experiences in the classroom

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(Whitebook, Howes, & Phillips, 1989), which include teacher-child interactions, classroom activities, and routines (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999).

Children tend to learn better with teachers who interact with them in positive, supportive, and engaging ways (Hamre, Hatfield, Pianta, & Jamil, 2014; Mashburn et al., 2008), with several authors recognizing teacher-child interactions as one of the most influential variables on children's academic, linguistic, and social development (e.g., Mashburn et al., 2008), thus contributing for their future school success (Aytch et al., 1999; Pianta, Hamre, & Allen, 2012). Indeed, teachers have a central role in children's development. They are responsible for regulating young children's social, emotional, and behavioral states (Pianta, Hamre, & Stuhlman, 2003) through daily classroom experiences, interactions, and activities.

Social competence is developed through the relationships children establish with significant others (Boyd et al., 2005) and is crucial to children's positive adaptation (Masten & Coatsworth, 1998). For children to learn and display prosocial behaviors, they must be involved in appropriate and supportive social settings (Albrecht, Mathur, Jones, & Alazemi, 2015). Guralnick (1990, 2010) defines children's social competence as the ability to appropriately and efficiently apply social strategies, in order to achieve interpersonal goals. Rubin, Bukowski, and Parker (2006) describe social competence as the ability to successfully respond to the demands of social interactions and relationships. Socially competent children are able to attain their personal goals (Rubin et al., 2006), without restricting other's opportunities to achieve their own goals (e.g., Waters & Sroufe, 1983). To do so, they use socially appropriate and effective strategies, which are sensitive to other's needs (Rubin & Rose-Krasnor, 1992), thus allowing them to maintain positive relationships (e.g., Attili, 1989), and achieve a good outcome (Waters & Sroufe, 1983). Moreover, these children easily follow rules, successfully adapt their behavior to specific situations (Sroufe, 2005), and constructively engage in group activities and structures (Rubin et al., 2006). Social competence has been associated with social inclusion, less problem behaviors, and enhanced academic success (Webster-Stratton & Reid, 2004). Social competence may thus be defined as a higher-level (Cillessen & Bellmore, 2006), organizing construct (Rose-Krasnor, 1997), which comprises other multidimensional (Cillessen & Bellmore, 2006) social constructs, such as social skills and behaviors (Cook & Oliver, 2011).

The concept of social skills can be defined in terms of specific social behaviors (Cillessen & Bellmore, 2006), learned and developed through social interaction (Michelson, Sugai,

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Randy, & Kazdin, 1983), that are displayed in specific social situations (Rubin et al., 2006), in order to respond to specific social tasks (Cillessen & Bellmore, 2006). Socially skilled preschool children exhibit cooperative and sharing behaviors, conflict management abilities (Webster-Stratton & Reid, 2004), self-reliance, and positive affect (Saft & Pianta, 2001). Previous research found that social skills positively predict children's school adaptation by promoting positive peer (e.g., McIntyre, Blacher, & Baker, 2006) and teacher-child interactions (Saft & Pianta, 2001). On the other hand, children who lack social skills have increased difficulties establishing social relationships; however, those relationships are crucial to the further development of social skills. This means that poor social skills can negatively impact both intrapersonal and interpersonal outcomes (Rubin & Rose-Krasnor, 1992), with some studies reporting adverse effects of social difficulties throughout childhood and into adolescence (e.g., Greene et al., 1999).

Preschool teachers have a crucial role in promoting children's social skills (Guralnick, 2010). In order to accomplish that, they can use various strategies, such as: 1) training children for social exchanges; 2) prompting peer interaction; 3) use toys and other resources that supports joint play; 4) provide structure to play activities; 4) arrange the classroom space in a way that facilitates social contact (Guralnick, 2010). These and other strategies are believed to support the development of social skills (Guralnick, 2010) that allow children to effectively respond to social challenges (Rudasill & Rimm-Kaufman, 2009). As a result, higher-quality teacher-child interactions have been positively linked to the development of social skills in preschool children (Howes et al., 2008; Peinsner-Feinberg et al., 1999), with enduring effects (Peinsner-Feinberg et al., 1999).

Deficits in social competence can lead to behavioral problems, as a result of children's inability to adequately respond to environmental demands (Boyd et al., 2005), with some evidence suggesting most young children tend to exhibit challenging behaviors that, in most cases, diminish over time (Shaw, Lacourse, & Nagin, 2005), as children self-regulation competence develops (NICHD ECCRN, 2004). Nonetheless, caregivers are the primary source of influence in young children's development (e.g., Boyd et al., 2005; Pianta et al., 2012), and there is evidence suggesting behavioral problems can emerge when teacher-child interactions are not as positive or strong as desired (Pianta & Stuhlman, 2004).

Simultaneously, children who exhibit behavioral problems tend to establish more conflictive interactions with the teacher, which suggests a bidirectional relation. In contrast, when these

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interactions are positive, children generally display less behavioral problems of any kind (Zhang & Sun, 2011).

Behavioral problems can be categorized as internalizing (e.g., angst, withdrawal, inhibition) (Liu, 2004) or externalizing (e.g., aggression, anger, disobedience) (Turney & McLanahan, 2015; Yamauchi & Leigh, 2011). While internalizing behavior problems relate to anxiety and depression (Eisenberg et al., 2001), and are especially disruptive of children's psychological state (Liu, 2004), externalizing behavior problems emerge when children are unable to regulate their own behavior congruous with environmental expectations (e.g., family, teachers, society) (Tucker-Drob & Harden, 2013) and tend to have a bigger impact on their surroundings (Liu, 2004). Nevertheless, internalizing behavior problems can influence others (Liu, 2004), since interactions are reciprocal exchanges (Gleitman, Fridlund & Reisberg, 2011), and externalizing behavior problems can reflect children's psychological distress (Liu, 2004). Research on the long term effects of problem behaviors on children's cognitive and social growth is inconsistent (Turney & McLanahan, 2015). However, some studies suggest children with problem behaviors may face social adjustment difficulties (Boyd et al., 2005) and academic underachievement (Bulotsky-Shearer & Fantuzzo, 2011).

ECEC quality appears to be associated with children's cognitive, social, and educational outcomes (Burchinal, Vandergrift, Pianta, & Mashburn, 2010), with some studies suggesting high-quality education and care directly and positively influences children's linguistic development, social skills, and behavior (Mashburn et al., 2008). Therefore, further studying and understanding these interaction patterns is crucial to developing more efficient classroom processes (Pianta et al., 2003).

Hamre and Pianta (2007) proposed the Teaching Through Interactions framework, defining three domains in which the quality of teacher-child interactions can be evaluated, namely, emotional support, classroom organization, and instructional support. First of all, in highly emotionally supportive classroom environments, relationships are positive and warm, teachers are responsive to children's emotions and needs, are respectful of their opinions, and nurture feelings of competence and autonomy, making children feel safe, self-confident, and capable of exploring the world (Pianta et al., 2012). Emotional support has been linked to academic achievement, higher levels of activity engagement, and positive social development (Pianta et al., 2012), including higher relational skills (Rimm-Kaufman, Curby, Grimm, & Brock, 2009), and peer acceptance (Pianta et al., 2012). Furthermore, high-quality classrooms

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are well managed when the teacher establishes clear expectations and rules to guide children's behavior, clearly defines routines, carefully monitors children's behavior and work, and favors activities that, though consistent with their instructional goals, are also interesting to the class (Emmer & Stough, 2001). Classroom organization has been linked to children's social, academic (Pianta & Hamre, 2009), and behavioral outcomes (Rimm-Kaufman et al., 2009). Lastly, instructional support refers to teachers' ability to, adequately and effectively, implement learning activities, in a way that supports children's cognitive, academic, and linguistic development (Pianta & Hamre, 2009). For example, Howes and colleagues (2008) reported positive effects of high-quality instructional support in language and literacy development for children through preschool and kindergarten.

High-quality ECEC has therefore been associated with social competence, positive interactions with peers, less problematic behaviors (NICHD ECCRN, 2003), more pro-social behaviors, and self-regulation competence (Sylva et al., 2011). In contrast, when children attend low-quality ECEC settings, social and behavioral gains tend to be scarce and far less enduring (e.g., Sylva et al., 2011), or even nonexistent (Burchinal et al., 2010). However, this relation may not be linear (Burchinal, Vernon-Feagans, Vitiello, Greenberg, & The Family Life Project Key Investigators, 2013). Burchinal and colleagues (2013) argue that the inconsistent and seemingly modest effects of ECEC quality may point to the existence of quality thresholds, which means that quality effects may only be visible when they reach or surpass a certain level.

Potentially interacting with ECEC quality, there are a multitude of other significant contextual factors to be considered (Votruba-Drzal et al., 2004), that may help better understand why quality effects do not always seem consistent. Recently, researchers have shown a particular interest in the study of the potential effects of ECEC dosage, which essentially means ECEC exposure or quantity, on children's outcomes. Dosage can be defined in terms of cumulative and current participation in ECEC settings, with the first quantifying either the total number of hours or days of attendance over a number of years or the overall participation in a particular kind of care or program, and the latter measuring the number of hours the child spends per day, week, or current year in preschool (Zaslow et al., 2010). This line of investigation is consistent with Bronfenbrenner's proposition that the extent of exposure to proximal processes influences children's development, particularly, in terms of

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competence and dysfunction (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998).

Findings on the effects of dosage alone are particularly intriguing when exploring its association with children's social and behavioral development (Zaslow et al., 2010). A study by NICHD ECCRN (2006) found that children who spent more time in ECEC had more positive interactions with their peers at 54 months, while a recent study from Xue and colleagues (2016) found a negative effect of absence from school on children's academic outcomes, but no effect on children's social skills. Furthermore, in a few studies it was possible to establish a linear relation between dosage and behavior, with children's problematic behaviors increasing with dosage (current and cumulative) (e.g., Broekhuizen et al., 2015; Loeb et al., 2007; Torres et al., 2015), but there are also reports of behavioral benefits, such as decreases in both internalizing and externalizing behavioral problems, resulting from a higher participation in ECEC settings (Votruba-Drzal et al., 2004). However, other studies found no association between the two variables (Howes et al., 2008).

Differences in ECEC quality may be crucial to better understand dosage apparent inconsistent effects and vice-versa, since a growing body of research points to an interaction between the two variables (i.e., to combined effects), in such a way that ECEC quality seems to be more influential for children who spent more time in high-quality settings (NICHD ECCRN, 2003). For example, high-quality ECEC has been linked to children's socioemotional development, with apparent stronger effects for those who spend more time in these settings (Cunha, Heckman, Lochner, & Masterov, 2006). Yet, Xue and colleagues (2016) found no interaction effect between ECEC quality and dosage for children's social skills, when considering absence from school, number of hours per week in ECEC, and time expended in content-specific instruction as moderators. Conversely, when studying the combined effects of quality and dosage, McCartney and colleagues (2010) found a positive effect of dosage on externalizing behavior in every level of ECEC quality, with effects getting smaller as quality rose. Other studies obtained similar results, concluding that, in general, children who attend high-quality ECEC for a longer period of time tend to reveal better outcomes (Zaslow et al., 2010); more explicitly, a higher level of dosage in a high-quality ECEC setting may contribute to children's emotional stability and, consequently, to a decline in problem behaviors (Votruba-Drzal et al., 2004). However, there is also some evidence of non-significant interactions between ECEC quality and dosage on children's social outcomes

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(e.g., Broekhuizen, van Aken, Dubas, & Leseman, 2015; Xue et al., 2016). Despite the contradictory results, taken together, the body of evidence reviewed suggests ECEC quality may work as a buffer for dosage undesirable effects (McCartney et al., 2010), while dosage can reinforce the positive effects of high-quality ECEC (Votruba-Drzal et al., 2004).

Quality and dosage may have distinctive effects on different groups of children. More specifically, it seems that children who are more vulnerable tend to benefit more from high-quality care in higher dosages, when compared to other children (Zaslow et al., 2010). Guralnick (1998) defines children's vulnerability in terms of recognized disabilities, and of exposure to environmental (e.g., poverty) and/or biological (e.g., prematurity) risk factors, that may be detrimental to children's development. When analyzing the isolated effects of quality and dosage for socioeconomically vulnerable children, some researchers found that while high-quality care may function as a protective factor, providing positive development experiences, more hours spent in ECEC settings seem to also be beneficial for children with increased difficulties, that commonly show encouraging and lasting outcomes in terms of social skills and positive behaviors (Clements, Reynolds, & Hickey, 2004). For these children, a higher dosage seems to only be detrimental when ECEC quality levels are low (Votruba-Drzal et al., 2004). These findings are of particular importance since for socioeconomically vulnerable children, the risk of developing behavioral problems and adaption difficulties tends to be higher (Shaw, Dishion, Suplee, Gardner, & Arnds, 2006), as a consequence of environmental specificities (Raver et al., 2009). However, quite frequently, socioeconomically vulnerable children are exposed to ECEC settings of inferior quality (Pianta et al., 2005), and show lower levels of ECEC attendance, when compared to other children (Magnuson, Ruhm, & Waldfogel, 2007), which may compromise the potential benefits of higher-quality ECEC, for those fortunate enough to experience it (Pianta & Hamre, 2009).

Likewise, children with disabilities tend to have more difficulties adapting to the school environment, due to their particular characteristics (McIntyre et al., 2006; Ferreira, Aguiar, Correia, Fialho, & Pimentel, 2016). Children with disabilities are more prone to difficulties in regulating their emotional states, in processing complex social information, and in solving social problems (Guralnick, 1999). Consequently, they often [but not always (Odom, McConnell, & Brown, 2008)] display poorer social skills, when compared with their typically developing peers, which compromises their ability to develop positive relationships with

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others and to establish a peer network (Guralnick, 1997). As such, Aytch and colleagues (1999) defend that instructional approaches must be used to facilitate the acquisition and generalization of social skills in children with disabilities. Moreover, like children from socioeconomic disadvantaged backgrounds, those with disabilities tend to exhibit more behavioral difficulties (i.e., more dysfunctional behaviors), that might hamper their successful inclusion in school (McIntyre et al., 2006). In sum, children with disabilities tend to be less socially skilled (Guralnick, 2010) and to exhibit more problem behaviors, which puts them at greater risk of being rejected by their peers (Meyer and Ostrosky, 2016).

High-quality ECEC can potentially help increase developmental gains for all children, thus reducing initial performance gaps (Bridges, Fuller, Rumberger, & Tran, 2004). In a study conducted by Knoche and colleagues (2006), quality scores of inclusive and non-inclusive ECEC settings were compared, with the first group scoring higher. Inclusive settings are believed to be beneficial for all children, by teaching them to tolerate, respect, and accept difference, but particularly for those with disabilities, by allowing them the opportunity to interact with and learn from their typically developed peers (Barnett, Bell, & Carey, 1998). Bagnato and colleagues (2002) suggest continuous exposure to high-quality ECEC settings is highly beneficial for children's development, and, in particular, for high-risk children (children with disabilities included). Hereupon, evidence suggests vulnerable children may benefit more from ECEC (Yamauchi & Leigh, 2011), with ECEC experiences possibly supporting their social development and helping them better manage the transition to school (Broekhuizen, 2016). Yet, evidence is again inconsistent, with other studies (e.g., Howes et al., 2008) reporting no significant differences between high-risk children and other children, as far as ECEC quality effects are concerned (Burchinal et al., 2013).

In conclusion, a considerable amount of research suggests high-quality ECEC and, more specifically, teacher-child interactions, are positively related to children's social skills development and negatively related to children's behavioral problems (Broekhuizen, 2016). Furthermore, studies exploring the effects of dosage at different ECEC quality levels are growing, but the results are inconsistent, especially for social outcomes (Zaslow et al., 2010). Lastly, evidence indicates that high-risk children may benefit more from ECEC quality and dosage (Votruba-Drzal, Coley, & Chase-Lansdale, 2004), making it especially important to guarantee vulnerable children's participation in high-quality ECEC settings (Magnuson et al., 2007).

Teacher-child interactions and children's social skills and problem behaviors: ECEC dosage and disability status as moderators

Thus, the present study aims to investigate the associations between the quality of teacher-child interactions and children's development of social skills and problem behaviors, as well as the potential role of dosage, disability status, and mothers' education as moderators of the above mentioned relationship. Specifically, we hypothesize that:

(1) The positive relation between the quality of teacher-child interactions and the development of social skills is stronger for children who have spent more months with the current teacher and for children with higher attendance rates.

(2) The positive relation between the quality of teacher-child interactions and the development of social skills is stronger for children with lower educational backgrounds.

(3) The positive relation between the quality of teacher-child interactions and the development of social skills is stronger for children with disabilities than for typically developing children.

(4) The negative relation between the quality of teacher-child interactions and the manifestation of internalizing and externalizing behavior problems is stronger for children who have spent more months with the current teacher and for children with higher attendance rates.

(5) The negative relation between the quality of teacher-child interactions and the manifestation of internalizing and externalizing behavior problems is stronger for children with lower educational backgrounds.

(6) The negative relation between the quality of teacher-child interactions and the manifestation of internalizing and externalizing behavior problems is stronger for children with disabilities than for typically developing children.

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Chapter II – Methods

2.1. Participants

Two hundred and twenty two children, including 180 typically developing children (119 boys) and 42 children with disabilities (29 boys), aged between 43 and 85 months ($M = 63.75$, $SD = 7.77$), from 44 inclusive preschool classrooms in the Metropolitan Area of Lisbon, were included in the study. In each classroom, four typically developing children (generally two boys, and two girls), and one child with disabilities were randomly selected. Inclusion criteria for children with disabilities included receiving support from early childhood intervention services (under Decree-Law No. 281/2009) or early childhood special education (under Decree-Law No. 3/2008), and the absence of severe multiple disabilities. Twelve children had a global developmental delay, nine had an autism spectrum disorder, four were undiagnosed (ongoing or inconclusive assessment), three had a rare disorder, three other children had speech or language difficulties, two had Down syndrome, and seven had other disabilities (this information was missing for two children). With respect to educational background, 42% of responding mothers had an education level inferior to secondary school, while the remaining 53% completed secondary education or had a higher education degree (this information was missing for 17 mothers).

The lead teachers from each classroom (43 female), aged between 29 and 63 years old ($M = 48$, $SD = 7.6$), were also included in the study. The 44 teachers had between 7 and 35 years of experience ($M = 22.74$, $SD = 6.43$), 93% had at least one year of experience in inclusive classrooms, and close to 35% had at least one year of experience working in ECI or ECSE. Approximately 89% of the classrooms were located in public preschools, 4% were located in private non-profit centers, and 7% were located in private for-profit centers, in a total of 14 public preschools, two private non-profit centers, and two private for-profit centers. Thirteen classrooms were integrated in public preschools that are a part of the Educational Territories for Priority Intervention Program, targeting disadvantaged communities.

2.2. Measures

2.2.1. Social skills and problem behaviors. The preschool version of the Social Skills Rating System (SSRS; Gresham & Elliott, 2007) for teachers was used to assess children's social skills and problem behaviors. The SSRS is a standardized measure, composed of two scales for the preschool years: social skills and problem behaviors. The social skills scale ($\alpha = .94$, for Time 1 (T1); $\alpha = .95$, for Time 3 (T3)), includes three subscales, namely, cooperation

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(includes children's helping behaviors, sharing abilities, and respect for rules and instructions), assertion (includes children's initiating behaviors, like questioning, approaching others interactively, and responding effectively to their actions), and self-control (includes children's ability to patiently wait for their turn, and to adequately manage conflict situations and negotiate), with a total of 30 items, measured in a 3-point frequency scale (0 = never, 1 = sometimes, 2 = very often) (Gresham & Elliott, 2007). The problem behaviors scale ($\alpha = .80$, for both T1 and T3) comprises one subscale for internalizing problems ($\alpha = .60$, for T1; $\alpha = .63$, for T3; includes children's demonstrations of anxiety, sadness, isolation, and low self-esteem) and another for externalizing problems ($\alpha = .88$, for T1; $\alpha = .85$, for T3; includes children's aggressiveness towards others, low self-control, and quarreling), in a total of 10 items (four concerning internalizing problems and six concerning externalizing problems), rated using a similar 3-point frequency scale (Gresham & Elliott, 2007).

In this study, the raw scores for social skills and problem behaviors scales were obtained through the mean of the respective items. Higher scores on the social skills scale represent higher competence, whereas higher scores on the problem behaviors scale represented more behavioral problems (Gresham & Elliott, 2007).

2.2.2. Teacher-child interactions. The pre-K Classroom Assessment Scoring System (CLASS; Pianta, LaParo, & Hamre, 2008) was used to assess the quality of teacher-child interactions. The CLASS is a standardized and systematic classroom observation system that measures classroom process quality in three broad domains: emotional support, classroom organization, and instructional support (Pianta & Hamre, 2009). Each CLASS domain was rated by the observers on a 7-point Likert-type scale, divided in three quality levels: low-quality (scores of 1-2), medium-quality (scores of 3-5), and high-quality (scores of 6-7) (Rimm-Kaufman et al., 2009).

Emotional support. This first domain ($\alpha = .90$) covers the conditions influencing children's social and emotional functioning (Hamre et al., 2014; Pianta & Hamre, 2009), within four dimensions: Positive classroom climate (i.e., displays of positive emotions, such as enthusiasm, enjoyment, and respect between teachers and children), negative classroom climate (i.e., children's exposure to teachers' negative emotions, such as anger, sarcasm, and aggressiveness), teacher sensitivity (i.e., the extent to which teachers respond to children's individual, academic and social needs), and regard for student perspectives (i.e., the extent to

which the teacher chooses classroom activities based on children's motivations and interests) (Rimm-Kaufman et al., 2009).

Classroom organization. Behavior management (i.e., teachers' aptitude to use efficient strategies to constrain and redirect children's misconduct), productivity (i.e., teachers' ability to effectively manage time and routines, maximizing learning opportunities), and instructional learning formats (i.e., teachers' use of materials and activities to facilitate children's learning), are the three dimensions that make up the classroom organization domain ($\alpha = .80$) (Rimm-Kaufman et al., 2009).

Instructional support. Concept development (i.e., teaching methods used to stimulate children's higher order thinking), quality of feedback (i.e., the degree to which teachers' feedback is work focused, specific, and constructive), and language modeling (i.e., teachers' actions that promote children's language development, such as modeling or facilitation) are the three dimensions that compose this last domain ($\alpha = .85$) (Pianta & Hamre, 2009).

2.2.3. ECEC dosage. Two indicators, based on teacher's report, were used to measure dosage: the number of months children spent with the lead teacher (representing cumulative participation) and the proportion of days children were absent from school (representing current participation).

2.2.4. Verbal competence. The Portuguese adaptation (Seabra-Santos et al., 2006) of the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R; Wechsler, 2010) was used to assess children's verbal competence. The WPPSI-R is a standardized intelligence measure, composed of a verbal scale and a performance scale, each one with six subtests. In this study, only the verbal scale ($\alpha = .90$) was considered, based on four of its subtests, namely, information (measures children's knowledge about facts and objects present in their environment), comprehension (measures children's ability to verbally express their comprehension about the reasons of an action or the consequences of an event), arithmetic (measures children's comprehension of basic quantitative concepts), and vocabulary (measures children's ability to identify and name figures in a series of images and to explain the meaning of words presented to them orally).

2.3. Procedure

In order to collect data in the context of the research project aforementioned, authorization forms were submitted to and approved by the Portuguese National Authority for Data Protection (i.e., Comissão Nacional de Proteção de Dados) and by the General

Directorate of Education (i.e., Direção-Geral da Educação). Teachers and parents of participating children signed an informed consent form. Data was collected in three distinct moments, during the school year of 2013/2014: Time 1 (T1) assessments occurred between the fall of 2013 and winter of 2014 (i.e., between October and February); Time 2 (T2) assessments occurred between the winter and spring of 2014 (i.e., between February and April); and Time 3 (T3) assessments occurred during the spring (i.e., during May and July). An interval of at least five months between T1 and T3 applications was ensured for all children.

Children's verbal competence was assessed at T1. Application was conducted by research team members with a masters' degree in Psychology, at the preschool center, in a separate and quiet room, where children were assessed individually. Children's social skills and problem behaviors were assessed, based on teachers' reports, in two different occasions, at T1 and T3. Teacher-child interactions were assessed based on classroom observations, conducted at T2. Observations focused on teacher's interactions and behaviors, and were organized into four cycles, of 30 minutes each. The first 20 minutes of every cycle were spent in observation, while the remaining 10 minutes were spent filling in the observation sheet. The scores for each dimension were computed as the mean of the four cycles available for each classroom and the scores for each domain were computed as the mean of the corresponding dimensions. Classroom observations were carried out by trained and certificated observers. Around 27% of observations were scored independently by two observers, and inter-rater reliability was computed using intraclass correlation coefficients (one way random effects model). Reliability scores for CLASS domains (emotional support = .66; classroom organization = .60; instructional support = .56) were reasonable, and higher than those obtained by Pianta and colleagues (2014).

2.4. Data analyses

All statistical analyses (except effect sizes) were conducted using IBM SPSS Statistics Version 23. First, descriptive and correlational analyses were performed. Secondly, inferential statistics (paired samples t-test) and Cohen's *d* were computed for analyzing change in social skills, internalizing, and externalizing behaviors, using the means and standard deviations for T1 and T3. The magnitude of the effects was interpreted in accordance with Cohen's guidelines (1992). Next, multilevel modeling analyses were conducted, considering the hierarchical structure of the data, that is, the nesting of children within classrooms (Hox,

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2002). Moreover, in order to ensure the adequacy of a mixed-model analyses, intraclass correlation coefficients (ICC), representing the proportion of variance between classrooms (Bartko, 1976; Gulliford, Ukoumunne, & Chinn, 1999), were calculated. In a meta-analysis, James (1982) reported that ICC values usually range from 0 to .50, with an average value of .12. In the present study, ICC values were .06 for social skills, .00 for externalizing behavior problems, and .32 for internalizing behavior problems. Even though ICC values obtained for social skills and externalizing behavior problems were low, for consistency, multilevel analyses are presented for all outcomes.

Finally, 15 two-level models were computed for four outcomes: social skills at T3, problem behaviors (total scale) at T3, internalizing behavior problems at T3, and externalizing behavior problems at T3. Individual variables (i.e., level 1) included children's sex, age (months), disability status, mother's education, social skills at T1, problem behaviors at T1, externalizing and internalizing behavior problems at T1, verbal competence at T1, number of months with the lead teacher, and proportion of days absent. Classroom variables (i.e., level 2) included the three quality domains from CLASS, that is, emotional support, classroom organization, and instructional support.

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Chapter III - Results

3.1. Descriptive Statistics

Table 3.1. summarizes means and standard deviations for individual and classroom variables. Children' social skills at T1 and T3 were in the medium-high range, while internalizing and externalizing behavior problems for T1 and T3 were low. Children's social skills scores were lower at T1 than at T3 ($t_{(212)} = -5.352, p < .001, d = -0.21$), while internalizing ($t_{(212)} = 2.046, p = .042, d = 0.13$) and externalizing ($t_{(212)} = 2.518, p = .013, d = 0.13$) behavior problem scores were higher at T1 than at T3, for all children. When comparing subgroups of children, typically developing children had more social skills, at T1 ($t_{(220)} = 7.628, p < .001, d = 1.43$) and T3 ($t_{(211)} = 7.487, p < .001, d = 1.44$), and exhibited less internalizing behavior problems at T1 ($t_{(220)} = -2.428, p = .019, d = -0.45$) and T3 ($t_{(211)} = -2.675, p = .010, d = -0.48$), as well as less externalizing behavior problems at both times (T1, $t_{(220)} = -5.430, p < .001, d = -1.04$; T3, $t_{(211)} = -5.430, p < .001, d = -0.99$), than children with disabilities. Moreover, social skills increased significantly (even though the effect size was small), between T1 and T3, for typically developing children ($t_{(172)} = -4.851, p < .001, d = -0.27$), and for children with disabilities ($t_{(39)} = -2.236, p = .031, d = -0.20$), while differences in internalizing and externalizing behavior scores indicated a non-significant decrease in both types of problems, for typically developing children ($t_{(172)} = 1.960, p = .052, d = 0.13$; $t_{(212)} = 1.962, p = .051, d = 0.12$, respectively), and for children with disabilities ($t_{(39)} = 0.628, p = .534, d = 0.15$; $t_{(39)} = 1.699, p = .097, d = 0.24$, respectively), from T1 to T3.

Teacher-child interactions were in the medium-quality range for emotional support and classroom organization, and in the low-quality range for instructional support. Finally, with respect to dosage indicators, mean scores revealed that children were with the lead classroom teacher for close to a year and that the proportion of days children were absent from school was low.

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Table 3.1. Descriptive statistics.

	<i>M</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>	<i>N</i>
1. Age (months)	63.75	7.77	42.5	85.1	222
2. SSRS ^a social skills Time 1	1.39	0.40	0.07	2.00	222
Typically developing children	1.50	0.31	0.43	2.00	180
Children with disabilities	0.95	0.43	0.07	1.85	42
3. SSRS problem behaviors Time 1	0.49	0.34	0.00	1.70	180
Typically developing children	0.41	0.34	0.00	1.70	180
Children with disabilities	0.82	0.43	0.00	1.90	42
4. SSRS internalizing behavior Time 1	0.31	0.37	0.00	1.75	222
Typically developing children	0.27	0.34	0.00	1.50	180
Children with disabilities	0.46	0.46	0.00	1.75	42
5. SSRS externalizing behavior Time 1	0.61	0.55	0.00	2.00	222
Typically developing children	0.51	0.50	0.00	1.50	180
Children with disabilities	1.05	0.54	0.00	2.00	42
6. WPPSI-R ^b verbal competence Time 1	9.78	3.09	1.00	16.50	220
7. Number of months with lead teacher Time 2	10.11	8.90	1.9	40.2	217
8. Proportion of days missed Time 2	0.07	0.06	0.00	0.29	199
9. Emotional Support Time 2	5.01	0.80	2.88	6.69	217
10. Organizational Support Time 2	5.11	0.64	3.50	6.42	217
11. Instructional Support Time2	1.76	0.45	1.00	3.25	217
12. SSRS social skills Time3	1.47	0.39	0.40	2.00	213
Typically developing children	1.57	0.31	0.47	2.00	173
Children with disabilities	1.04	0.42	0.40	1.93	40
13. SSRS internalizing behavior Time 3	0.26	0.35	0.00	1.50	213
Typically developing children	0.23	0.34	0.00	1.50	173
Children with disabilities	0.39	0.35	0.00	1.00	40
14. SSRS externalizing behavior Time 3	0.54	0.49	0.00	2.00	213
Typically developing children	0.45	0.44	0.00	2.00	173
Children with disabilities	0.93	0.51	0.00	2.00	40

^a *Social Skills Rating System*

^b *Wechsler Preschool and Primary Scale of Intelligence - Revised*

3.2. Correlation Coefficients

Correlations between variables are presented in Table 3.2. The three CLASS domains were strongly and positively correlated with each other. The correlation between emotional support and classroom organization was particularly strong. Emotional support was weakly and positively correlated with mothers' education. Instructional support was weakly and negatively correlated with internalizing behavior problems at T1. No other correlations were found for the three CLASS domains. The number of months with the lead teacher was weakly and positively correlated with children's age. The proportion of days was negatively correlated with mothers' education and positively correlated with internalizing behavior problems at T1 and T3 (both weak effects). No other correlations were found for cumulative or current dosage. Disability status was negatively and strongly correlated with social skills at T1 and T3; weakly and positively correlated with internalizing behavior problems at T1 and T3; moderately and positively associated with externalizing behavior problem and problem behavior (total scale); weakly and positively correlated with sex; and negatively and strongly correlated with verbal competence. Social skills at T1 and T3 were strongly and positively correlated with each other. The same pattern was verified for internalizing behavior problems and for externalizing behavior problems at T1 and T3. Additionally, social skills at T1 were moderately and negatively correlated with both internalizing and externalizing behavior problems at T1, while social skills at T3 were strongly and negatively correlated with both types of behavior problems at T3. In turn, the correlation between internalizing and externalizing behavior problems was positive at both times (weak effect). Social skills at T1 and T3 were negatively correlated with problem behaviors (total scale) at T1 (strong effect), and with sex (moderate effect). Conversely, social skills at T1 and T3 were positively correlated with age (weak effect), and with verbal competence (moderate effect). Internalizing behavior problems at T1 and T3 were positively correlated with problem behaviors (total scale) at T1 (moderate effect), and the proportion of days absent (weak effect), and negatively correlated with verbal competence (weak effect). Externalizing behavior problems at T1 and T3 were positively correlated with problem behaviors (total scale) at T1 (strong effect) and sex, and negatively correlated with verbal competence (all moderate effects). Problem behaviors (total scale) at T1 and verbal competence were also negatively correlated with each other (moderate effect).

Table 3.2. Pearson correlation coefficients among study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Sex ^a																
2. Age (months)	-.01															
3. Disability status ^b	.15*	.11														
4. Mothers' education ^c	.01	-.09	-.13													
5. SSRS ^d social skills Time 1	-.31***	.17**	-.53***	.04												
6. SSRS problem behaviors Time 1	.31***	.00	.40***	-.09	-.56***											
7. SSRS internalizing behavior Time 1	.04	.04	.20**	-.10	-.45***	.56***										
8. SSRS externalizing behavior Time 1	.35***	-.02	.39***	-.06	-.47***	.93***	.22**									
9. WPPSI-R ^e verbal competence Time 1	-.11	-.15*	-.61***	.23**	.44***	-.36***	-.22**	-.33***								
10. Number of months with lead teacher Time 2	-.07	.18**	.10	-.07	.12	-.41	-.10	-.01	-.02							
11. Proportion of days missed Time 2	-.07	.08	.04	-.15*	-.01	-.03	.23**	-.13	-.00	-.07						
12. Emotional Support	.02	-.04	-.01	.16*	.08	-.01	-.05	.00	-.07	-.02	-.06					
13. Classroom Organization	-.01	.08	-.00	.07	.01	-.01	.00	-.01	-.10	-.13	.04	.77***				
14. Instructional Support	-.02	.10	.01	.05	.05	-.09	-.21**	-.01	-.04	.13	.03	.57***	.57***			
15. SSRS social skills Time 3	-.30***	.16*	-.52***	.06	.85***	-.52***	-.47***	-.40***	.45***	.04	-.10	.07	-.02	.08		
16. SSRS internalizing behavior Time 3	-.00	-.12	.19**	-.10	-.44***	.33***	.64***	.10	-.18**	-.05	.16*	.03	.09	-.11	-.54***	
17. SSRS externalizing behavior Time 3	.35***	-.11	.38***	-.06	-.51***	.76***	.23**	.79***	-.33***	.02	-.11	.04	.04	-.03	-.58***	.22**

* $p < .05$. ** $p < .01$. *** $p < .001$.

^a 0 = girl

^b 0 = typically developing children; 1 = children with disabilities

^c 0 = inferior to secondary education; 1 = complete secondary education or higher education

^d Social Skills Rating System

^e Wechsler Preschool and Primary Scale of Intelligence - Revised

3.3. Multilevel modeling results

From the initial 15 two-level models computed for each outcome, only nine are reported here. Three models testing the potential moderating effects of current participation, that is, the proportion of days absent, and three other models testing the possible moderating effects of mother's educational background were fitted but, due to the lack of noteworthy results, and for parsimony, will not be reported. Furthermore, since the 15 two-level models computed for the problem behaviors (complete scale), indicated no statistically significant results, the respective estimates will not be shown either (however, they are available upon request to the author).

Therefore, nine two-level models are presented for social skills, internalizing behavior problems, and externalizing behavior problems, in a total of 27 models. For each outcome, models 1 to 3 included only the main effects of individual and classroom variables. Given the particularly strong correlation between emotional support and classroom organization, the three CLASS domains were tested in three separate models. Model 1 tested the predictive value of emotional support, model 2 tested the predictive value of classroom organization, and model 3 tested the predictive value of instructional support. Models 4 to 6 also included the moderating effects of cumulative participation, that is, the number of months with the lead teacher. Model 4 tested the interaction term between emotional support and the number of months with the lead teacher, model 5 tested the interaction term between classroom organization and the number of months with the lead teacher, and model 6 tested the interaction term between instructional support and the number of months with the lead teacher. Models 7 to 9 included the moderating effects of disability status. Model 7 tested the interaction term between emotional support and disability status, model 8 tested the interaction term between classroom organization and disability status, and model 9 tested the interaction term between instructional support and disability status.

3.3.1. Multilevel modeling predicting social skills

Table 3.3. displays results for nine two-level models fitted for social skills. All nine models were statistically significant. First, three models exploring the direct effects of teacher-child interactions on children's social skills, were computed, using each CLASS domain as a predictor. Although statistically significant, contrary to our expectations, models 1 to 3 indicated no significant main effects of emotional support, classroom organization, or instructional support on children's social skills. Secondly, in order to explore the moderating

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effects of cumulative dosage on the relation between teacher-child interactions and children's social skills development, three two-level models were fitted for the number of months with the lead teacher. No direct effects of cumulative dosage on social skills at T3 were found. However, a positive and significant interaction effect was found between classroom organization and the number of months with the lead teacher, $B = 0.005$, $SE = .002$, $p = .034$ (see Model 6).

Table 4.3. Summary of multilevel analysis (SPSS Linear Mixed Models) predicting children's social skills.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Intercept	1.37***	(0.05)	1.37***	(0.05)	1.37***	(0.05)	1.38***	(0.05)	1.37***	(0.05)	1.40***	(0.05)	1.37***	(0.05)	1.38***	(0.05)	1.36***	(0.05)
Level 1																		
Sex ^a	0.05	(0.03)	0.05	(0.03)	0.05	(0.03)	0.05	(0.03)	0.05	(0.03)	0.04	(0.03)	0.05	(0.03)	0.05	(0.03)	0.05	(0.03)
Age (months)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Disability status ^b	0.09	(0.05)	0.09	(0.05)	0.09	(0.05)	0.08	(0.05)	0.09	(0.05)	0.07	(0.05)	0.09	(0.05)	0.08	(0.05)	0.10	(0.05)
Mothers' education ^c	0.00	(0.03)	-0.00	(0.03)	-0.00	(0.03)	0.00	(0.03)	0.00	(0.03)	-0.00	(0.03)	-0.00	(0.03)	0.00	(0.03)	-0.00	(0.03)
SSRS ^d social skills Time 1	0.68***	(0.06)	0.69***	(0.06)	0.68***	(0.06)	0.68***	(0.06)	0.68***	(0.06)	0.70***	(0.06)	0.69***	(0.06)	0.69***	(0.06)	0.67***	(0.06)
SSRS behavior problems Time 1	-0.06	(0.05)	-0.06	(0.05)	-0.06	(0.05)	-0.06	(0.06)	-0.06	(0.05)	-0.06	(0.05)	-0.06	(0.05)	-0.06	(0.05)	-0.05	(0.05)
WPPSI-R ^e verbal competence Time 1	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Number of months with lead teacher Time 2	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
Proportion of days missed Time 2	-0.85**	(0.28)	-0.86**	(0.28)	-0.86**	(0.28)	-0.84**	(0.28)	-0.84**	(0.28)	-0.85**	(0.27)	-0.87**	(0.27)	-0.84**	(0.28)	-0.83**	(0.27)
Level 2																		
Emotional Support	0.01	(0.03)					0.01	(0.03)	0.02	(0.05)								
Organizational Support			-0.03	(0.03)							-0.04	(0.03)	0.00	(0.06)				
Instructional Support					0.05	(0.04)									0.04	(0.05)	0.18*	(0.08)

Interactions

Emotional Support * Number of months with lead teacher	0.00	(0.00)			
Emotional Support * Disability status			-0.02	(0.05)	
Classroom organization * Number of months with lead teacher				0.00*	(0.00)
Classroom organization * Disability status				-0.04	(0.06)
Instructional Support * Number of months with lead teacher					0.00 (0.00)
Instructional Support * Disability status					-0.16* (0.08)

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a 0 = girl

^b 0 = typically developing; 1 = with disabilities

^c 0 = inferior to secondary education; 1 = complete secondary education or higher education

^d Social Skills Rating System

^e Wechsler Preschool and Primary Scale of Intelligence - Revised

Note. Variables were mean centered

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Modgraph-I (Jose, 2013) was used to graphically display this moderation effect. Single slopes computations indicated that only the slope for children who had spent fewer months with the lead teacher was statistically significant ($p = .045$). As shown in Figure 3.1., for children attending classrooms with lower-quality classroom organization, as the number of months with the lead teacher increased, children's social skills, reported by the lead teacher, decreased. More importantly, teachers struggling with classroom organization (that is, behavior and time management) seem to report significantly more social skills in an initial stage of their work with each child than teachers observed to provide higher-quality classroom organization.

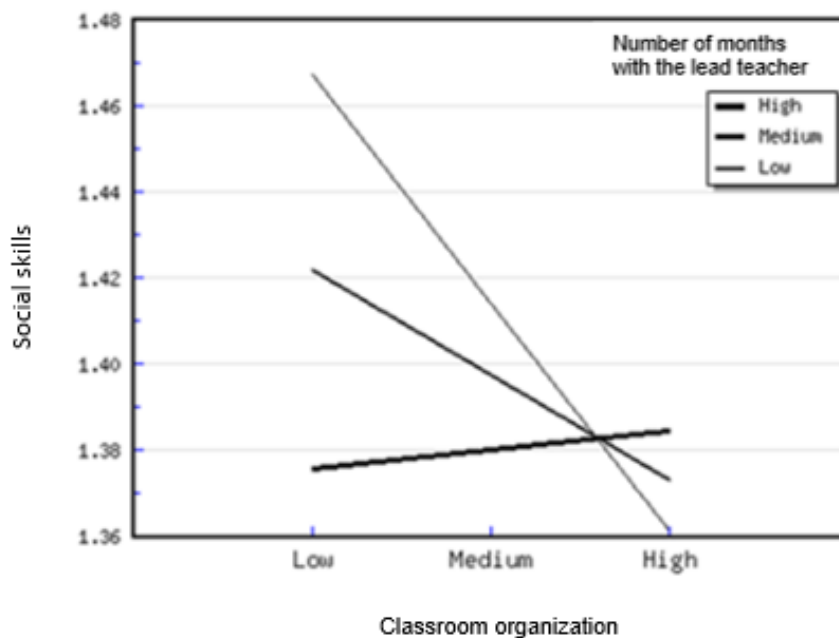


Figure 3.1. Moderating effects of the number of months with the lead teacher in the relation between classroom organization and children's social skills.

No significant interaction effects between the number of months with the lead teacher and emotional or instructional support were found (see models 4 and 8, respectively). The last three models were computed to test the potential moderating effects of children's disability status on the relation between teacher-child interactions and children's social skills at T3. Disability status did not predict social skills at T3. No significant interaction effects between disability status and emotional support or classroom organization were found (see models 5 and 7, respectively). In the last model, a significant and negative interaction effect between

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instructional support and disability status emerged, $B = -0.162$, $SE = .079$, $p = .042$. Single slopes computations indicated that only the slope for typically developing children was significantly different from 0 ($p = .025$). Figure 3.2. shows that while typically developing children had more social skills in classrooms with higher-quality instructional support than in lower-quality classrooms, the same pattern is not true for children with disabilities, whose social skills scores remained relatively stable across different instructional support quality levels.

Finally, the proportion of days absent was a predictor of children’s social skills across all models. The negative direction of the effect suggests missing more school days had a detrimental effect on children’s social skills development.

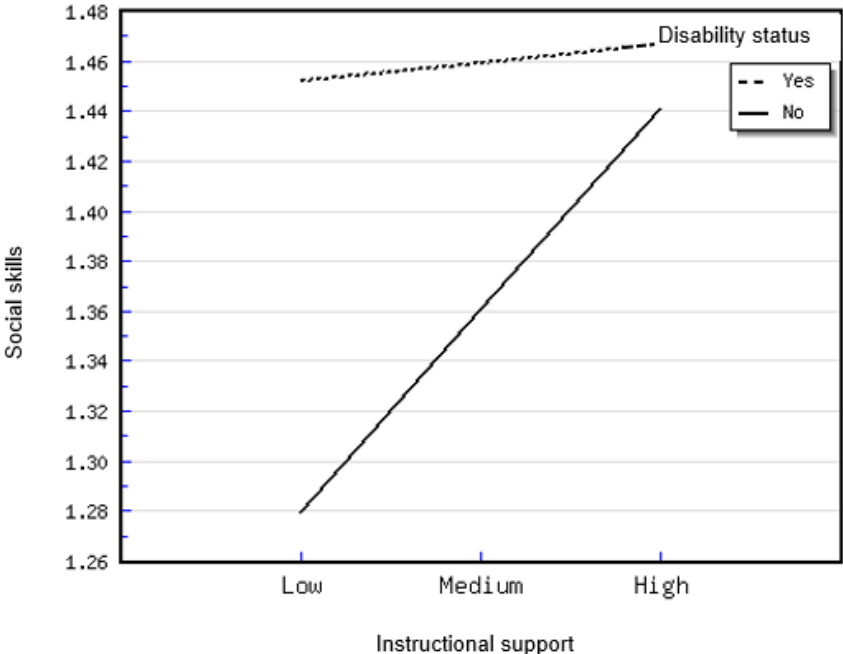


Figure 3.2. Moderating effects of children’s disability status in the relation between instructional support and children’s social skills.

3.3.2. Multilevel modeling predicting internalizing behavior problems

Results from the nine two-level models presented for internalizing behavior problems are displayed on Table 3.4. Again, all nine models were statistically significant. Models 1 to 3 showed that, against our predictions, teacher-child interactions did not predict internalizing behavior problems at T3. Similarly, as shown in models 4 to 6, no significant direct effects of the number of months with the lead teacher on children’s internalizing behavior problems were found, nor did the number of months with the teacher moderate this relationship. Results

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for the last three models, were, yet again, contrary to our expectations. Disability status did not predict internalizing behavior problems and no interaction effects between teacher-child interactions and disability status were found.

Lastly, a direct and negative effect of social skills at T1 on internalizing behavior problems at T3 was found for all nine models. This result suggests children with more social skills tended to exhibit less internalizing behavior problems at T3.

Table 4.4. Summary of multilevel analysis (SPSS Linear Mixed Models) predicting children's internalizing behavior problems

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Intercept	0.23**	(0.07)	0.23**	(0.06)	0.23**	(0.06)	0.22**	(0.07)	0.23**	(0.07)	0.22**	(0.07)	0.23**	(0.06)	0.23**	(0.07)	0.23**	(0.06)
Level 1																		
Sex ^a	0.05	(0.04)	0.05	(0.04)	0.05	(0.04)	0.05	(0.04)	0.05	(0.04)	0.05	(0.04)	0.04	(0.04)	0.05	(0.04)	0.05	(0.04)
Age (months)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
Disability status ^b	0.03	(0.07)	0.03	(0.07)	0.03	(0.07)	0.04	(0.07)	0.03	(0.07)	0.04	(0.07)	0.03	(0.07)	0.03	(0.07)	0.03	(0.07)
Mothers' education ^c	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)	-0.03	(0.04)
SSRS ^d social skills Time 1	-0.19*	(0.07)	-0.19*	(0.07)	-0.18*	(0.07)	-0.19*	(0.07)	-0.19*	(0.07)	-0.19*	(0.07)	-0.19*	(0.07)	-0.18*	(0.07)	-0.18*	(0.07)
SSRS <i>internalizing behavior problems</i> Time 1	0.47***	(0.07)	0.47***	(0.07)	0.46***	(0.07)	0.46***	(0.07)	0.47***	(0.07)	0.47***	(0.07)	0.47***	(0.07)	0.46***	(0.07)	0.47***	(0.07)
WPPSI-R ^e verbal competence Time 1	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)	-0.00	(0.01)
Number of months with lead teacher Time 2	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Proportion of days missed Time 2	0.28	(0.36)	0.27	(0.36)	0.27	(0.36)	0.27	(0.36)	0.28	(0.36)	0.27	(0.36)	0.24	(0.36)	0.28	(0.36)	0.28	(0.36)
Level 2																		
Emotional Support	0.01	(0.03)					0.01	(0.03)	0.01	(0.06)								
Organizational Support			0.02	(0.04)							0.02	(0.04)	0.07	(0.07)				
Instructional Support					-0.02	(0.06)									-0.02	(0.06)	0.02	(0.10)

Interactions

Emotional Support * Number of months with lead teacher	-0.00	(0.00)		
Emotional Support * Disability status			0.00	(0.06)
Classroom organization * Number of months with lead teacher			-0.00	(0.00)
Classroom organization * Disability status			-0.06	(0.07)
Instructional Support * Number of months with lead teacher				0.00 (0.00)
Instructional Support * Disability status				-0.05 (0.10)

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a 0 = girl

^b 0 = typically developing; 1 = with disabilities

^c 0 = inferior to secondary education; 1 = complete secondary education or higher education

^d Social Skills Rating System

^e Wechsler Preschool and Primary Scale of Intelligence - Revised

Note. Variables were mean centered

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3.3.3. Multilevel modeling predicting externalizing behavior problems

Table 3.5. shows the results for the nine two-level models fitted for externalizing behavior problems. As in the previous cases, all nine models were statistically significant. Results were, in general, close to those found for internalizing behavior problems. Externalizing behavior problems were not predicted by teacher-child interactions (see models 1 to 3). Likewise, the number of months with the lead teacher did not predict externalizing behavior problems, and no moderating effects were found either (see models 4 to 6).

Out of nine models tested, only once did social skills at T1 predict externalizing behavior problems at T3, $B = -0.148$, $SE = .075$, $p = .050$ (see model 6). This negative main effect suggesting children with more social skills tended to exhibit less externalizing behavior problems latter on should, therefore, be considered, most likely, spurious. Finally, disability status did not predict externalizing behavior problems, nor did it moderate the relation between teacher-child interactions and externalizing behavior problems.

Table 4.5. Summary of multilevel analysis (SPSS Linear Mixed Models) predicting children's externalizing behavior problems

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Intercept	0.56***	(0.07)	0.57***	(0.07)	0.57***	(0.07)	0.55***	(0.07)	0.56***	(0.07)	0.53***	(0.07)	0.57***	(0.07)	0.57***	(0.07)	0.57***	(0.07)
Level 1																		
Sex ^a	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)	-0.05	(0.04)
Age (months)	-0.00	(0.00)	-0.01	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)	-0.00	(0.00)
Disability status ^b	0.02	(0.07)	0.02	(0.07)	0.02	(0.07)	0.03	(0.07)	0.02	(0.07)	0.05	(0.07)	0.02	(0.07)	0.02	(0.08)	0.01	(0.07)
Mothers' education ^c	0.02	(0.05)	0.02	(0.05)	0.02	(0.04)	0.03	(0.05)	0.03	(0.05)	0.03	(0.04)	0.02	(0.05)	0.02	(0.05)	0.02	(0.05)
SSRS social skills T1	-0.13	(0.08)	-0.13	(0.08)	-0.12	(0.08)	-0.14	(0.08)	-0.13	(0.08)	-0.15*	(0.07)	-0.13	(0.08)	-0.12	(0.08)	-0.12	(0.08)
SSRS <i>externalizing behavior problems</i> T1	0.65***	(0.05)	0.65***	(0.05)	0.66***	(0.05)	0.66***	(0.05)	0.65***	(0.05)	0.66***	(0.05)	0.65***	(0.05)	0.66***	(0.05)	0.66***	(0.05)
WPPSI-R verbal competence T1	-0.00	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01	(0.01)
Number of months with lead teacher T2	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Proportion of days missed T2	-0.26	(0.39)	-0.27	(0.39)	-0.25	(0.39)	-0.27	(0.39)	-0.27	(0.39)	-0.24	(0.39)	-0.27	(0.39)	-0.26	(0.39)	-0.26	(0.39)
Level 2																		
Emotional Support	0.01	(0.03)					0.01	(0.03)	0.03	(0.07)								
Organizational Support			0.02	(0.04)							0.03	(0.04)	0.04	(0.08)				
Instructional Support					-0.06	(0.06)									-0.06	(0.06)	-0.10	(0.11)

Interactions

Emotional Support * Number of months with lead teacher	-0.00	(0.00)				
Emotional Support * Disability status			-0.02	(0.07)		
Classroom organization * Number of months with lead teacher					-0.01	(0.00)
Classroom organization * Disability status						-0.03 (0.08)
Instructional Support * Number of months with lead teacher						-0.00 (0.00)
Instructional Support * Disability status						0.04 (0.11)

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

^a 0 = girl

^b 0 = typically developing; 1 = with disabilities

^c 0 = inferior to secondary education; 1 = complete secondary education or higher education

^d Social Skills Rating System

^e Wechsler Preschool and Primary Scale of Intelligence - Revised

Note. Variables were mean centered

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Chapter IV – Discussion

4.1. Discussing the main results

The present study tested the moderating effects of dosage, disability status, and mothers' education, on the relation between teacher-child interactions and children's social skills and problem behaviors. According to our findings, first of all, children's social skills and problem behaviors were not predicted, in a consistent way, by the quality of teacher-child interactions. Only instructional support predicted social skills, in a single model considering the moderating effect of disability status. These results do not support our predictions, grounded in prior studies, that teacher-child interactions and children's social and behavioral outcomes would be directly associated (e.g., Mashburn et al., 2008; NICHD ECCRN, 2003). Burchinal and colleagues (2010) proposed the existence of quality thresholds and suggested that only high-quality teacher-child interactions may be robust enough to produce positive effects on children's development. Since, in our sample, quality levels were moderate for emotional support and classroom organization, and low for instructional support it may be possible that the quality of teacher-child interactions did not reach a high enough level to directly influence children's outcomes. Note that previous studies with Portuguese samples found similar levels of quality (e.g., Abreu-Lima et al., 2013).

Secondly, when analyzing the direct effects of dosage on children's social and behavioral outcomes our results were mixed. No direct effects of the number of months with the lead teacher on social skills or problem behaviors were found. Thus, the number of months with the lead teacher may not be, by itself, enough to influence children's social and behavioral outcomes. On the other hand, a negative and direct effect of the proportion of days children were absent from school was found for social skills, across all models. This result is consistent with Bronfenbrenner's proposal that human development is nurtured by proximal processes (Bronfenbrenner & Morris, 1998, 2006), and that frequency and interruption of exposure to these processes (amongst other factors) may influence children's competence development (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). In this case, children who missed more school days were evaluated as less social skilled than children who were more assiduous, which suggests that a lower level of exposure to ECEC processes may be detrimental to children's social competence development, thus reinforcing the importance of repeated experiences in close contexts. It may also be that children who miss more school days have particular characteristics that are associated with difficulties in learning and

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developing social skills (Guralnick, 1997, 1999, 2000), such as socioeconomic disadvantaged children (see Magnuson et al., 2007). Our results seem compatible with this possibility, since we did find a small, but statistically significant, correlation between the proportion of days children were absent from school and mothers' education. Conversely, no direct effects of current participation, positive or negative, were found for internalizing and externalizing behavior problems. This set of results warrants further examination. At this point, we cannot assert that current participation is not a predictor of children's behavioral development, nor can we rule out the existence of attendance thresholds (see Zaslow et al., 2010).

As previously argued, it is possible that dosage effects only become apparent when interacting with other predictors, such as quality. So, in order to test the potential moderating effects of dosage on the relation between teacher-child interactions and children's social skills and problem behaviors, we tested, separately, a total of nine models for each dosage indicator. Results partially supported our first hypothesis and refuted the third. As expected, we found a moderating effect of the number of months with the lead teacher, on the relation between classroom organization and children's social skills. Children who spent more time exposed to lower-quality classroom organization processes were less socially skilled, according to teachers' reports, which suggests that dosage may, in fact, reinforce the negative effects of experiencing lower-quality ECEC (Votruba-Drzal et al., 2004). Returning to Bronfenbrenner's proposition that proximal processes may not only determine competence, but also dysfunction, we can consider that, in this case, the increased exposure to low-quality classroom processes may have resulted in a decrease in children's social skills (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). We also found that teachers struggling with classroom organization evaluated children's social skills more positively in an initial stage of their work with the child than did teachers observed to provide higher-quality classroom organization. This finding warrants further investigation, combining teachers' reports and independent observations of children's social skills, as teacher's perceptions and their efficacy in identifying children's social behaviors may be associated with their ability to ensure high-quality classroom management. No other moderating effects of the number of months with the lead teacher were found, nor did the proportion of days children were absent from school moderate the relation between teacher-child interactions and children's social and behavioral outcomes. These last results are similar to those previously reported by Xue and colleagues (2016).

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Researchers have reported distinct effects of ECEC quality in the socio-behavioral outcomes of different subgroups of children. More specifically, a few studies found particularly positive effects of high-quality ECEC on the outcomes of socioeconomically disadvantaged children (e.g., Bridges et al., 2004; Burchinal et al., 2010; Clements et al., 2004; Pianta & Hamre, 2009).

Zero-order correlation coefficients indicated that, in our sample, children with disabilities had less social skills and exhibited more internalizing and externalizing behavior problems at T3 than their typically developing peers. The relations between disability status, deficits in social skills (e.g., Gresham, Sugai, & Horner, 2001), and more behavior problems (e.g., McIntyre et al., 2006) have been repeatedly established in the literature. However, we found that disability status did not directly predict, in any model, children's social skills or problem behaviors, after accounting for covariates. Further, we found that disability status moderated the relation between instructional support and children's social skills; however, the direction of the effect was unexpected. In our sample, while typically developing children visibly benefited from higher-quality instructional support, with social skills scores steeply increasing as quality rose, no significant effect of quality on social skills was found for children with disabilities. Considering the levels of social skills reported by teachers for children with and without disabilities, it is possible that teachers somehow inflated their evaluations of children with disabilities, to better match what they believe is socially acceptable (Fisher, 1993). Social desirability bias, which can lead to deceptive results, may be associated with the use of teacher report's on children's social skills. Disability status did not moderate the relation between emotional support or classroom organization and social skills, nor did it moderate any relation between teacher-child interactions and children's problem behaviors. Consequently, our second and fourth hypotheses were also not confirmed, since we predicted that higher-quality teacher-child interactions would be particularly beneficial for children with disabilities (i.e., we expected a compensatory effect).

Although not reported in detail here, we also tested the possible moderating effect of mother's educational background (an indicator for social status) on the relation between teacher-child interactions and children's outcomes (see Appendix A). Based on previous research with socioeconomically disadvantaged children, we expected to find stronger benefits of higher-quality ECEC, for children whose mothers had a lower-educational background. However, we found no statistically significant effects in the respective models.

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Our findings do not provide evidence of compensatory effects of ECEC for disadvantaged children and, thus, are consistent with reports by Howes et al. (2008), while contradicting expectations based on reports by Votruba-Dzarl et al. (2004), among other studies. Further investigation is clearly needed. Nevertheless, if only high-quality teacher-child interactions are linked to better outcomes for disadvantaged children (Burchinal et al., 2010), mean quality levels found in this sample may have been insufficient to produce the expected effects.

Furthermore, a direct and negative effect of social skills at T1 on internalizing behavior problems at T3 was found for all nine models, which suggests that children with more social skills tend to exhibit less internalizing behavior problems. Poor social skills have been linked to difficulties in establishing positive relationships with others (e.g., Winsler & Wallace, 2002), and, consequently, to social withdrawal and rejection in preschool-aged children (Cillessen & Bellmore, 2006). Conversely, socially skilled children have the ability to establish positive and enduring interactions with others (e.g., Winsler & Wallace, 2002), which, in turn, build up their social skills, and so on (Michelson et al., 1983). Thereby, it seems logical that social skills may be a protective factor counteracting the development of internalizing behavior problems (Cillessen & Bellmore, 2006). Following the same reasoning, we would expect to find a similar relation pattern for externalizing behavior problems, however, that was not the case. Social skills at T1 only predicted externalizing behavior problems in one particular occasion. A plausible explanation, based on a socioethological perspective of peer relationships in the preschool context (Torres et al., 2015), is that socially competent children are able to and often use different behavior strategies, in order to achieve their goals (e.g., Waters & Sroufe, 1983). This means that a socially competent child may exhibit more dominant behaviors or opt for a prosocial strategy (e.g., Hawley, 2002), depending on the contextual circumstances (e.g., Waters & Sroufe, 1983).

Finally, it is interesting to note an improvement in social skills and decrease in problem behaviors (both significant effects) for all children, from T1 to T3. However, since we found no consistent evidence pointing to clear benefits of higher-quality ECEC or dosage on children's socio-behavioral development, nor did we include a control group, as Zaslow and colleagues (2010) previously pointed out, these improvements may be a mere reflection of children's natural development, or even of measurement error (Singer & Willet, 2003). As such, we recommend caution in the interpretation of these results.

4.2. Study limitations

The present study has some limitations that should be taken into consideration when discussing our findings. First of all, due to the correlational nature of the study, we cannot establish causal effects, nor can we establish, with certainty, the direction of the reported effects. Secondly, our sample is restricted geographically and relatively small in size. Thus, it is not possible to guarantee that our sample is representative of the children served in preschools from the metropolitan area of Lisbon.

Furthermore, previous research on this topic has depended on bigger samples and found mainly small (e.g., Mashburn et al., 2008) or modest effects (Burchinal et al., 2013). It may be possible that our sample size was too small to produce statistically significant results (i.e., lacked statistical power). The scarcity of significant effects in our study may also be due to the relatively small interval of months between T1 and T3 assessments. This means that the time between applications might have been insufficient to capture the real impact of ECEC quality and dosage on children's outcomes, and that more time was needed for changes to become apparent. Moreover, we only collected data on children's outcomes in two distinct moments, which some authors believe is not enough to fully capture children's development trajectories, further arguing that any changes found between the two assessments may be due to measurement errors and not to real change (Singer & Willet, 2003).

Another important limitation of our study is the fact that we based our measures of children's social skills and problem behaviors on teachers reports, which may be biased or insufficient to fully capture children's outcomes. External validity and rating accuracy issues have been associated with this methodological option (Michelson, Sugai, Wood, & Kazdin, 1983). As Halle and Darling-Churchill (2016) refer, the accurate measurement of children's social outcomes has important implications for caregivers, scholars, and policymakers. Finally, the internal consistency for the internalizing behavior problems subscale on this study was slightly lower than the minimum value usually considered to be acceptable (i.e., .70). This low value is probably due to the reduced number of items that compose the subscale, which causes some concern about the validity and accuracy of the reported data (Tavakol & Dennick, 2011).

4.3. Implications for research and practice

Implications for research. Our findings further suggest typically developing children apparently benefit more from higher-quality instructional support. Because we also did not

find a moderating effect of mothers' education on the relation between teacher-child interactions and children's social and behavioral outcomes, we cannot exclude the possibility that quality levels of teacher-child interactions on our sample were not high enough to produce tangible, compensatory, effects on the social and behavioral outcomes of disadvantaged children. Future work on this subject would likely benefit from testing a double moderation of ECEC dosage and children's disability status, and ECEC dosage and children's socioeconomic status. Future research should also consider the use of independent measures to assess children's social and behavioral outcomes, such as behavioral observations, which may occur in the classroom or in simulated situations (Michelson et al., 1983). Moreover, as we previously mentioned, a complementary assessment using teachers' reports and independent observations may also be important to investigate a possible relationship between teachers' efficacy in evaluating children's social outcomes and their ability to provide high-quality classroom processes. Further, as previously argued, the small interval between child assessments and the fact that we only considered two assessment moments might have been insufficient to capture true change on children's outcomes. Future research, interested in studying change trajectories on children's development, should do so over a longer period of time, using three or more assessments, and conducting statistical analysis considering Time as an additional level of nesting. Lastly, other variables, besides (or instead) those controlled in this study, proven to be consistently associated with children's development, should be considered in the future. For example, we cannot neglect the possibility that mothers' education was not sufficient, or the most truthful indicator of children's socioeconomic status; hence, other indicators, beyond mother's education (e.g., family income, mother's ethnicity, professional status, etc.) ought to be used.

Implications for research. The lack of significant effects of teacher-child interactions on children's social skills and problem behaviors may suggest higher-quality levels are needed to produce significant effects. Furthermore, since previous research, with Portuguese samples (e.g., Abreu-Lima et al., 2013), found similar quality levels to those reported in this work, we must reflect on the need to improve classroom processes (Pianta et al., 2003) in our country, based on the provision of better pre-service training and professional development opportunities for teachers (Rudasill & Rimm-Kaufman, 2009). High-quality in-service professional development, which focuses on promoting specific types of teacher-child interactions, proven to positively contribute to children's development, seems to be

particularly effective in improving preschool classroom processes (Mashburn et al., 2008). Professional development practices like “mentoring, consultee-centered consultation, and program monitoring and feedback” (Mashburn et al., 2008, p. 747), should be implemented in detriment of other, more common, classroom detached practices (Haymore-Sandholtz, 2002), such as workshops (Birman, Desimone, Porter, & Garet, 2000). Although we did not find a generalized effect of dosage on children’s outcomes, we found two important effects of cumulative and current participation in the ECEC on children’s social skills. First, children who spent more time with a lead teacher observed to provide lower-quality classroom organization were perceived as less socially skilled, which suggests detrimental effects of low-quality classroom processes over time. Second, we found that children who missed more school days were perceived by the teacher as less socially skilled, which generically reinforces the importance of children’s exposure to proximal processes in their microsystems (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998). In practical terms, this finding suggests that policymakers and other stakeholders should not only strive to increase preschool coverage rates, but also to create programs that promote higher preschool attendance rates, across the entire population (Barnett & Yarosz, 2007).

4.4. Concluding thoughts

In sum, we still do not fully comprehend how ECEC quality and dosage may be linked to children’s outcomes (Zaslow et al., 2010). Consequently, further investigation is still needed, in order to better understand under which conditions ECEC experiences contribute to children’s development trajectories (Burchinal et al., 2013). Nonetheless, we found some encouraging results suggesting that dosage may, in fact, influence children’s social outcomes, both in a direct and indirect way. In addition, this study, conducted in Europe, with a Portuguese sample, provides an international perspective on this research field.

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