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Playgroups for inclusion: impacts of a playgroups intervention on child development, caregiving and connectedness goals using an experimental design

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Abstract

Playgroups are gatherings for young children and their caregivers to engage in play-based and social activities. Evidence shows significant positive impacts for playgroup participants, including diverse families and families in socioeconomically disadvantaged circumstances. Still, weaknesses in the design of previous studies limit the validity of findings. This paper describes the impacts of a playgroups intervention between 2015–2017 targeting families with children up to 4 years old not participating in any of the available Early Childhood, Education and Care (ECEC) services in Portugal on standardized international measures of child development, home environment and caregiving practices, and socialization goals. Participants included 257 children (M age at pretest = 17.74 months, s.d. 11.51 months) and caregiver dyads in five districts. After a pretest assessment, all families were randomly assigned to one of two groups: an intervention group which included 10 months of playgroup intervention; and a control group who after the 10 month post-test assessment point, received 3 months of the playgroup intervention. Children in the intervention group scored significantly higher on average on a measure of developing ability to reason through manual and visuospatial problems. Caregivers in the intervention group were, on average, more likely to endorse their children's ability to maintain positive and harmonious relationships with others. Subgroup benefits on caregiver involvement were found for employed caregivers, and receptive and expressive language for diverse ethnic

Motivation This paper describes the impacts of a playgroups intervention on children's cognitive development, home environment and caregiving practices, and caregivers' connectedness goals for children, using an experimental design. It also examines the variation in impacts by children's ethnicity and caregivers' employment status. Given the proposed focus on the psychological aspects of educational processes in informal education (i.e. playgroups), and a clear emphasis on the diversity of participating children and families and their socio-cultural contexts, there is a strong alignment between the paper and the scope of European Journal of Psychology of Education. The study also employs very strong methods, with a rich innovation value. Although other RCTs on Playgroups have been conducted, to our knowledge, the current study is the only randomized controlled trial (RCT) of a playgroups intervention in Europe, and the only RCT to test playgroup impacts on standardized international measures of child development and caregiving practices. Finally, it adds to the literature on effects of playgroups for families of infants and young toddlers.

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children. These results are aligned with intervention foci on the promotion of learning though play and positive relationships.

Keywords Playgroups · ECEC · Experimental design · RCT · Ethnicity · Unemployment

Introduction

The importance of the first years of life for later physical, cognitive, educational and social development, as well as adult productivity and health, has been well established (Harvard Center on the Developing Child, 2010; Knudsen et al., 2006). Family, community, and educational settings are critical in the early years for supporting this positive development (Bronfenbrenner, 1979). Over time, governments have increased investments in early childhood education formal programs (Britto et al., 2011; Myers, 2006; UNESCO & UNICEF, 2024), because of their potential to support early childhood development.

Despite considerable public investments in Portugal to provide all children with preschool for child under and over 3, and diversifying educational responses according to the needs of families up to age 3, in 2016/17 only 36% of the children up to three years old attended a formal education service (OECD, 2018), disadvantaged students were over 25% less likely to enroll in preschool (OECD, 2018), and the employment rates of mothers with children up to three years old were stable at 73% (OECD, 2017). There was still low coverage (49%) of care and preschool education for children up to age 3 in nurseries, child minders, and daycare providers, particularly in urban and densely populated areas (GEP/MTSSS, 2016).

Playgroup services are distinctive from other early childhood services because they are generally not provided on a daily schedule, and a family member (or caregiver) attends the service and remains responsible for the child during the session (Oke et al., 2007). In Portugal, playgroups have had very limited implementation.

Playgroups for Inclusion or "Grupos Aprender, Brincar, Crescer" (GABC, Groups where children Learn, Play, and Grow) was a pilot intervention implemented between 2015–2017, which aimed to develop, test, and disseminate an innovative educational program for Early Childhood Education and Care (ECEC). The intervention targeted families with children up to 4 years old not participating in any of the available ECEC services in Portugal. The project had a particular focus on including families belonging to minority groups, particularly Roma families, and families whose caregivers were unemployed and underemployed.

What are playgroups?

Playgroups are generally defined as organized or informal gatherings for young children (prior to school age) and their parents or caregivers to engage in social and play-based activities (ARTD Consultants, 2008a, b). Playgroups generally meet in a twice a week schedule for sessions of two or more hours, during the school year, in diverse settings such as community spaces, social institutions, religious institutions, public services or caregivers' homes. Playgroups sessions may involve a variety of activities, generally centered on the caregiver-child interaction, and are low-cost or free of cost to caregivers (Matthews et al., 2009; Williams et al., 2018).

In addition to the benefits children can derive through their involvement, playgroup sessions present opportunities for caregivers to share or receive information and foster local connections (Warr et al., 2013). Therefore, playgroups play an important role in the family support gap between childcare leave policies and a place guarantee in ECEC.

There are generally two types of playgroups: supported (or facilitated) playgroups, coordinated by early-childhood community workers or parent-facilitators (Warr et al., 2013); and community (or self-managed or parent-led) playgroups, informally organized by parents or caregivers (Mathews et al., 2009).

Playgroups may be implemented as a universal service (Oke et al., 2007), or as a targeted service for the inclusion of culturally and linguistically diverse (CALD) families, including refugees, indigenous, young mothers, families with a low socioeconomic status, experiencing substance abuse or mental illness, or with children with special needs (ARTD, 2008a).

Benefits of playgroups for children and families

Existing research on playgroup impact has often focused on either community or supported playgroups, but recent studies show that both types offer important benefits (e.g., McLean et al., 2022; Sincovich et al., 2020). Research about supported playgroup benefits demonstrates improved outcomes for participating children, such as: higher achievement in reading, writing, number, and science (Daniels, 1995); higher social and emotional functioning (McArthur et al., 2010); increased physical health, well-being, language, communication and cognitive skills (Commerford & Robinson, 2017; Lakhani & Macfarlane, 2015; Williams et al., 2020); and increased playfulness (Fabrizi & Hubbell, 2017).

The dyadic structure of both types of playgroups also creates positive outcomes for parenting, such as: increased opportunities to learn about parenting through modelling and knowledge exchange with and between parents (Jackson, 2011, 2013; Strange et al., 2014; Warr et al., 2013); increased sense of confidence in parenting (Jackson, 2011; McArthur et al., 2010); and reduced parenting stress (Williams et al., 2020). The underlying theory of change of playgroup impact assumes that practice of dyadic playgroup activities will foster higher quality and frequency of parent–child play and home learning activities (Williams et. al, 2020), which in turn will strengthen child development. For example, play-based exploration supported by quality adult–child interactions can positively affect young children's visual form perception and spatial skills (Lewis Presser et al., 2025; Yang et al., 2020). Armstrong and colleagues (2019) also found that strong relationships, information sharing, the presence of a playgroup facilitator, and peer support interact in complex ways to produce positive outcomes for both children and caregivers.

Caregivers' practices are also guided by their socialization goals for children, which, in turn, can influence children's development (Harwood et al., 1996). Socialization goals can be described as qualities that parents desire their children to develop or not cognitively, socially, physically, or morally (e.g. Tamis-LeMonda et al., 2008). For instance, connectedness goals can be understood as emphasizing children's ability to maintain positive, harmonious relationships with others (e.g., Harwood et al., 1996), and are often a perceived benefit of playgroups from the perspective of participating caregivers.

Both types of playgroups also offer benefits for caregivers beyond parenting, including increased opportunities to socialize with other adults, positive relationship building, and reduced isolation (Berthelsen et al., 2012; Gibson, 2012; Jackson, 2011, 2013; McArthur et al., 2010; McFarland-Piazza et al., 2012), particularly for migrant families (Nyland

et al., 2011; Strange et al., 2014). Caregivers also reported improved access to services (Berthelsen et al., 2012), and increased contact with diverse families and cultures (McFarland-Piazza et al., 2012).

While several studies on supported and community playgroups have demonstrated that playgroups provide benefits to children and caregivers, weaknesses in the design of these studies limit the internal and external validity of findings. McLean and colleagues' (2022) systematic literature review of 40 studies from 2010 to 2021 (90% in Australia) on both supported and community playgroups demonstrated that only ten studies employed quantitative research designs, including one randomized controlled trial (Williams et al., 2020). Much of the available research was small-scale, qualitative and mixed methods, and the measures of child and caregiver outcomes often relied on interviews and non-validated quantitative measures (McLean et al., 2022). Moreover, issues of low attendance and high dropout rate were commonly reported on supported playgroups (Berthelsen et al., 2012; McArthur et al., 2010).

Two recent RCTs of supported playgroups have started to unpack the theory of change behind playgroup effects. Li and colleagues (2017) developed an RCT assessing impacts of a village-based family-skills training for grandparents and playgroups for children up to 6 years old, and found that this combined program enhanced child development, and had reduced effects on parenting styles. Williams and colleagues (2020) tested the effects of parental involvement in supported playgroups in Hong Kong. Participants were 58 toddlers, 20 months old on average. Results showed that parents randomized to a parent-involved playgroup showed less parental stress, compared to a parent-uninvolved playgroup, while toddlers of both playgroups showed improved social-communicative behavior.

The importance of playgroups for diverse families

Playgroups have been successful in the inclusion of culturally and linguistically diverse families, including those with a cultural minority status, and families in socioeconomically disadvantaged communities or circumstances (Williams et al., 2018). Both supported and community playgroups were found to provide enhanced opportunities for diverse families to learn about parenting, and build a supportive community network (Deadman & McKenzie, 2020; Hancock et al., 2015; Sincovich et al., 2020; Strange et al., 2014;).

Interactions in diverse playgroups may differ because parents of diverse ethnic, cultural and socioeconomic backgrounds can display differences in their parenting practices, enacting the views and practices of their cultural communities (Keller et al., 2006). For instance, mothers from higher socioeconomic backgrounds were found to be less likely to endorse proper demeanour, and more likely to endorse self-maximization goals than mothers from lower socioeconomic backgrounds (Harwood et al., 1996). Mothers employed in the year before their child's birth were also more likely to endorse a self-maximization goal than those not employed (Ng et al., 2012). However, examination of how interventions impact diverse caregivers' goals has been scarce.

The present study

The goal of the present study was to estimate the impacts of Playgroups for Inclusion on children's cognitive development, home environment and caregiving practices, and caregiver connectedness goals, using an experimental design. Although other RCTs on Playgroups have been conducted (i.e., Li et al., 2017; Williams et al., 2020), to our knowledge,

the current study is the only RCT of a playgroups intervention in Europe, and the only RCT to test playgroup impacts on standardized measures of child development and caregiving practices and goals. This study looked into impacts of playgroups on caregiving-related outcomes, because these are critical for understanding processes that mediate the effectiveness of dyadic programs on child outcomes (Jeong et al., 2018). Moreover, given that participating children were on average 18 months, and 50% were younger than 17 months, it adds to the literature on effects of playgroups for families of infants and young toddlers.

Furthermore, the study aimed to determine whether playgroup impacts vary by children's ethnicity and caregivers' employment status. Research focusing on subgroup effects of early interventions allows us to determine whether interventions benefit particular groups within the population (e.g. based on demographic factors for children and caregivers) and plan for flexible program implementation in order to achieve larger effects for all children (National Scientific Council on the Developing Child, 2024).

Specifically, we addressed the following research questions:

1) What was the impact of playgroups on home environment and caregiving practices, children's cognitive development, and caregiver socialization goals?
2) Did impacts vary by child ethnicity and caregiver employment status?

Method

Intervention

Playgroups for Inclusion or "Grupos Aprender, Brincar, Crescer" (Groups where children Learn, Play and Grow) were designed to increase access to high-quality early childhood education and care for children 0–4 and their families, with a particular focus on Roma families a, and families whose caregivers were unemployed and underemployed.

In order to guarantee quality experiences for children and caregivers in playgroup sessions, facilitators were required to participate in three training sessions focused on the promotion of learning through play and the use of unstructured materials in play. The initial training focused on building positive relationships between child, caregiver, and teacher/facilitator, as well as communication skills, intercultural dialogue, and the ethics of facilitator work.

Given the adherence of families with very young children (participating children were on average 18 months, and 50% were younger than 17 months), the second training included strategies for promoting learning through play for this age group, i.e. storytelling skills and the "treasure basket" (Goldschmied & Jackson, 2006), healthy food and nutrition, and management and planning skills. The final training focused on the use of the arts (music, dance, visual arts) for learning, conflict management, wellbeing enhancement strategies, pedagogic documentation and planning, as well as topics such as gender equality, cultural diversity, and community initiatives.

Playgroups provided twice-weekly sessions in 31 playgroups during 10 months (over an academic year) with 4 to 10 families, carried out by 34 trained facilitators (two per playgroup, each involved on a maximum of 2 playgroups per district), and supervised by five qualified ECEC teachers (one per district). Families were expected to attend a single playgroup, and 17 requested a transfer to a group closer to their residence. Activities included music and singing, outdoor and free play, art and craft activities, among others.

These activities were designed with the purpose of creating opportunities to learn, socialize, develop and increase parenting skills (e.g., knowledge of parenting and child development; social and emotional competence of children), while aiming to meet families' needs and interests, in a climate of sharing and cooperation. Sessions were held in diverse settings (community spaces, schools, libraries, health centers, parish councils, among others).

The project was carried out in five districts of Portugal selected based on two criteria: 1) a high concentration of eligible families; 2) number of available community partnerships for collaboration. Following these criteria, the catchment area included two districts with semi-rural areas and three urban districts.

To evaluate the impact of Playgroups for Inclusion, a family-level randomized controlled trial was implemented. After a pretest assessment of all families, families were randomly assigned to two groups: an intervention group (designated as "Playgroup families"), which was offered 10 months of the Playgroups intervention before posttest; and a control group (designated as "Control families"), which was offered three months of the intervention after posttest. Posttest data were collected at the same time for both groups.

Outcomes for the evaluation of impact of Playgroups for Inclusion were selected according to a frequently reviewed Theory of Change, a conceptual tool to examine the congruence between the object of study, and the proposed research design(s), evaluation measures, analysis plan, etc. (Anderson, n.d.; Buitrago, 2015; Connell & Kubisch, 1998; Weiss, 1995). In its final version, the Theory of Change for Playgroups for Inclusion specified impacts of playgroups on a set of expected main outcomes, namely children's development in language and performance on hands-on problems, caregivers' responsivity, acceptance and involvement, and caregiver connectedness goals, which are discussed in this paper.

A power analysis estimating Minimum Detectable Effects (MDE) for child-level outcomes indicated a sample of 940 to 950 families in total, corresponding to approximately 188 to 190 families per district, or approximately 19 families per playgroup across the two conditions (intervention and control).

Throughout the intervention, a team of researchers developed a comprehensive study of program implementation, which is as crucial as a carefully rigorously designed impact evaluation of that same intervention (Durlak & DuPre, 2008). In the analysis of caregivers' reasons for enrolling in Playgroups for Inclusion, most mentioned opportunities for child socialization and interaction with other children, followed by opportunities for children to play and engage in activities (Barata et al., 2017).

Main results of the implementation study indicated that caregivers' attendance was quite low across the 10 months of implementation (38%) and that almost half of the subsample only attended 25% of the sessions (Barata et al., 2017). This average attendance rate is, however, similar to attendance rates at comparable programs that target high-risk groups (Baker et al., 2011; Nicholson et al., 2008). The average attendance in the first two months (October and November, 2015) of playgroup implementation was near to 50%, a level of attendance similar to other playgroups with two to four months of implementation (Berthelsen et al., 2012).

Participants

The study sample at pretest included 415 children and their caregivers. Children were on average 18.63 months (s.d. 11.63), ranging from 18 days to 51 months, and 50% were younger than 17 months. Approximately 48% were female (n = 198), 96% were Portuguese ($n = 387$), 78% were Caucasian European ($n = 299$), 14% Roma ($n = 54$), and 8% of "Other

ethnicity" ($n=32$). The group "Other ethnicity" included diverse ethnicities whose frequency was very low, which were compiled into a single group to avoid the identification of participants. Approximately 4% of the children had previously attended ECEC, but were not attending any services at the time of enrolment in playgroups ($n=18$).

Caregivers were on average 34.16 years (s.d. 10.89), 95% were female ($n=389$), 88% were Portuguese ($n=354$), 54% completed secondary education ($n=216$), 82% were cohabitating (living with a partner, $n=327$). and 30% were employed ($n=124$). The median household income was approximately between 1011€ to 1262€; and approximately 10% of the household incomes were not reported. Approximately 78% of the households income was above the minimum wage per employed adult ($n=215$). Approximately 69% of the households did not receive welfare ($n=273$). In the sample, 63% of the families were referred by entities in the community, government and social support network. Background characteristics of the pretest sample are in Supplementary Table 1.

After the pretest, 225 families were randomly assigned to the intervention condition and 190 to the control condition.

In order to assess the extent to which random assignment was successful, we compared characteristics of families assigned to the intervention and to the control conditions, using pretest data such as: child variables (age in months, gender, nationality, ethnic group, previous experience in ECEC, number of siblings), caregiver variables (age, gender, nationality, ethnic group, education level, employment status, and cohabitation status), and household variables (income and welfare use).

There were no significant differences between the intervention and control conditions in all but one characteristic (the intervention group had a higher percentage of caregivers of Portuguese nationality than the control group). These results suggest that the randomization was done with integrity, and that the pretest sample could provide the necessary confidence in the validity of the impact estimates. Background characteristics of the families by assigned randomization group are in Table 1.

Of the pretest sample, 62% ($N=257$, 115 control families and 142 intervention families) were assessed at posttest. Attriters and non-attriters had similar proportions of families in the intervention group (Barata et al., 2017). Intervention and control groups included in the posttest sample were still equivalent in pretest assessments and background characteristics. However, non-attriters were significantly different from attriters on some pretest variables. Besides having younger children, the non-attriters group had a significantly larger percentage of families directly recruited (41% not referred to by entities), caregivers who were employed, and caregivers with secondary education or more; and higher household incomes. This indicated that the posttest sample was more affluent, making the estimates of impact potentially biased. Background characteristics of the families by attrition group are in Supplementary Table 2.

Procedures

Family recruitment to playgroups was multifaceted to maximize the diversity of families within districts. While most families were directly recruited through ads and community dissemination, the majority of target group families joined the groups through referrals from entities in the community, government and social support network.

During recruitment, families and caregivers were informed that they would be randomly assigned to the intervention or control group. After the assignment, each caregiver was

Table 1 Background characteristics of participating dyads (caregivers and children), by assigned randomization group

Variables	Playgroup families		Control families			
	n	Mean/% (s.d.)	n	Mean/% (s.d.)	*t*	*df*
Child						
Age	225	19.10(11.46)	190	18.39(11.97)	−0.61	412
Female	225	50.7%	190	44.2%	−1.31	413
Portuguese	218	96.8%	185	95.1%	−0.85	401
Caucasian European	206	79.6%	179	75.4%	−0.98	383
Roma	206	13.6%	179	14.5%	0.26	383
"Other" Ethnicity	206	6.80%	179	10.06%	1.15	383
Attended ECEC	223	4.5%	189	4.2%	−0.12	410
Number of siblings	224	1.03(1.30)	189	1.14(1.23)	0.85	411
Number of siblings below age 6	210	0.30(0.54)	174	0.34(0.56)	0.72	382
Caregiver						
Age (years)	219	34.21(11.18)	187	33.90(10.68)	−0.29	404
Female	222	95.5%	187	94.7%	−0.39	407
Employed	221	30.3%	188	30.3%	0.00	407
Portuguese	218	91.3%	185	83.8%	−2.31*	401
Secondary education completed	220	56.4%	182	50.6%	−1.16	400
Cohabiting	219	80.8%	181	82.9%	0.53	398
Caregiver household						
Income (range in €)	199	3.90(2.91)	176	3.72(2.79)	−0.62	373
No welfare	213	70.0%	180	68.9%	−0.23	391

Notes: ˜ p<.10, * p<.05, ** p<.01, *** p<.001

The caregiver household income labels below and above the mean are: 3 = 758€ to 1010€; 4 = 1011€ to 1262€

contacted by a member of the team (not involved in data collection) and informed about their assigned group.

For each dyad—child and caregiver—the participation in the pre and posttests implied an evaluation by one or two research assistants, at the caregivers' home or equivalent space suggested by the caregiver. Typically, the home visit lasted two hours maximum. The evaluation protocol took 60 min on average. The remaining time was used to build trust with the family and child, as well as to observe some family practices and environment.

Research assistants were never given information concerning the experimental condition assigned to families. Information about participation in playgroups was collected only at the end of the posttest assessment protocol in order to hide group affiliation from assistants.

Measures

Child cognitive development

To measure children's cognitive development, we used the Griffiths Mental Development Scales (GMDS; Griffiths, 1954; 0–2 years old: Huntley, 2007; 2–8 years old: Luiz, et al., 2008a; Luiz, et al., 2008b; Portuguese edition: CEGOC-TEA, 2007, 2008). Two

subscales were applied: 1) Hearing and Language, 2) Performance, which measures children's developing ability to reason through manual and visuospatial problems (including working speed and accuracy in manually fitting geometric shapes, building patterns with cubes, etc.). GMDS subscale raw scores were computed by adding the total number of correct items (Huntley, 2007). Although the computation of raw scores proposed for the GMDS 2–8 years Analysis Manual (Luiz, et al., 2008) is different, the same procedure was carried out for all children to allow for comparison of results across the two age groups.

Descriptive statistics for all instruments used are in Supplementary Table 3. In previous Portuguese studies, Cronbach's alpha for the global scale was .98 and .97 (Pinto et al., 2013), and .97 (Borges et al., 2012). In the present study, Cronbach's alpha was .98 and .97 for language, and .98 and .96 for performance at pretest and posttest, respectively.

Home environment and caregiving practices

To assess the quality of the home environment and caregiving practices, we used the Home Observation for Measurement of the Environment (HOME, Caldwell & Bradley, 1984; adapted for the Portuguese population by Abreu-Lima, 2009). For the purpose of this project, we adapted and piloted a version of the inventory to adjust it to diverse families with children aged up to four years old (e.g., substituting the word "parent" with the term "caregiver", greater flexibility in the definition of some items; based on Neves, 2015).

Three HOME subscales were applied: Responsivity—caregiver's emotional and verbal responsiveness to the child (0–2 and 2–4 + years); Acceptance – caregiver's disciplinary approaches, such as the avoidance of punishment (0–2 and 2–4 + years), and Involvement – caregiver's interaction with the child during play and while working in the home (0–2 years). Items were administered according to the age of the child. Items observed or confirmed by the caregiver as occurring were scored 1; otherwise, they were scored zero. HOME subscale scores are usually computed by summing the number of occurring items (Abreu-Lima, 2009). However, because the subscales Responsivity and Acceptance are applied to age groups 0–2 and 2–4 +, and have a different number of items for each age group, we used the percent of occurring items per subscale as our total outcomes. A number of children changed from one age group (0–2) to another (2–4 +) from pretest to posttest, and we used all data available from each age group for pretest and posttest.

Cronbach's alpha varied between 0.52 and 0.72 for Responsivity, 0.41 and 0.64 for Acceptance, and 0.41 and 0.56 for Involvement.

Connectedness goals

To assess the caregivers' connectedness goals for their children, the authors adapted three open-ended questions from interview protocols from the Birth Cohort Study of the NYU Center for Research on Culture, Development, and Education (Tamis-LeMonda et al., 2007, adapted from Harwood et al., 1996; adaptation to European Portuguese with permission from the authors). Each caregiver was asked to name, define and provide examples of three qualities that they considered desirable for their children when they start elementary school.

Guided by prior research (Harwood et al., 1996; Ng et al., 2012; Wang & Tamis-LeMonda, 2003), each of the desirable qualities reported was coded into one of the following seven categories: Achievement, Self-maximization, Proper Demeanor, Connectedness, Happiness, Values, and Health. Using the quality definition and example given by caregivers as supplementary information, similar qualities were coded into 1 of 22 subcategories

(Barata et al., 2017). Qualities that were uncodable or did not fall into these major categories amounted to 4.8% (n = 19) of all units in the pretest and 2.4% (n = 6) in the posttest, and were excluded from analyses. Two coders independently coded caregivers' responses on randomly selected 30% of the sample into one of the seven categories to check interrater reliability. This was done separately for the pretest and posttest. For pretest, the agreement averaged 94.42%, and for the posttest, 92.47%.

Connectedness goals concerned qualities that emphasized children's ability to maintain positive, and harmonious relationships with others. Caregivers who endorsed a connectedness goal were assigned a 1; those who did not were assigned a 0, as per prior measure development studies (Ng et al., 2012; Wang & Tamis-LeMonda, 2003). In the present study, Cronbach's alpha was .90 and .83 for Connectedness, at pretest and posttest respectively.

Family sociodemographic characteristics questionnaire

The evaluation protocol included family sociodemographic characteristics questionnaire adapted from Pessanha and colleagues (2013)—ECCE Study Group (1997), with questions concerning the caregiver's household economic situation—income and use of subsidies (welfare or others).

Ethics

As requested by national law at the time of the study (prior to the implementation of the European General Data Protection Regulation), approval for its conduction was obtained from the National Commission of Data Protection. Before contacting families, research assistants received training on ethics and data collection, and signed a confidentiality agreement. Before data collection, caregivers and/or legal representatives of the participating child (when not the same person) were asked to sign the informed consent form. Participation was completely voluntary. Information regarding intervention and research procedures, including random assignment into control and intervention groups, were given to families orally and in written form (in the informed consent). Language was adapted for full information (e.g. the term lottery was used to describe the random assignment procedures). The participants were told about the confidentiality of their data and that they could drop out at any time. Research assistants asked for the child's assent from all children who could be assumed to understand the question and provide an answer (generally those above age 3) concerning their participation in the child assessments. Data were treated with confidentiality, pseudo-anonymized between pretest and posttest, and fully anonymized after the posttest. Participants could request access and/or deletion of their data before they were fully anonymized.

Data analytic approach

To compare outcomes for 115 control to 142 intervention families, we used multilevel linear regression models that accounted for pretest levels and other covariates, as well as for the nesting of caregivers and children within playgroups by using playgroup random effects (Bloom et al., 2007; Hedges & Hedberg, 2007; Raudenbush et al., 2007) and district fixed effects.

For all analyses, we pooled data across the five districts and used fixed effects for districts because: 1) districts were diverse and not sampled randomly; 2) fixed effects help eliminate bias by controlling for all observed and unobserved effects at the district level of analysis. We controlled for a variety of potential confounders, including child variables (gender, age

in months), caregiver variables (gender, education level, and cohabitation status). Caregivers' age was omitted from the models because it was highly correlated with other variables, and had more missing values than other alternatives. Caregiver's household economic situation—income and other subsidies (welfare or others) were not included as covariates given significant missing data. Since our analysis examined moderation effects by ethnicity and employment status, we also controlled for child's nationality (Portuguese versus not) and child's ethnicity (Caucasian, Roma, and Other), and caregivers' employment status (employed versus not employed). Including covariates in impact models is recommended practice in the analysis of randomized trials to increase precision of the impact estimates (Bloom et al., 2007).

Regarding missing data, our analysis used only cases with data on outcomes.

The Results section includes the adjusted difference between playgroups and control groups, with the standard error, level of significance, and effect size. Full model impact results using multilevel linear regression models are in Supplementary Tables 4, 5, and 6. The effect size was computed by dividing the estimated adjusted difference between groups by the standard deviation of the indicator for the control group (Gormley et al., 2005; Wong et al., 2008); it indicates the magnitude of the playgroup effect regardless of the instrument or method used. No estimates for district dummies were included for confidentiality reasons. Data were analyzed in Stata (Version 13).

We adjusted impact estimates for attrition using nonresponse propensity weights calculated in R (R Core Team, 2016). Response propensity weighting is an extension of the propensity score method proposed by Rosenbaum and Rubin (1983). We calculated nonresponse propensity weights using: number of times a family postponed the evaluation at pretest; number of contacts with family per day until successful scheduling of the evaluation at pretest; percentage of item nonresponse, and child and caregiver characteristics. Only one variable was found to be a statistically significant predictor of nonresponse (caregivers with a completed high school degree were significantly more likely to respond). When the balancing property was satisfied, the propensity scores were inverted for the non-attrited group, and subtracted from 1 and inverted for the attrited group. These new propensity scores were used as probability weights ("pweights" in Stata) in the fixed part of the models to adjust the impact estimates.

Subgroup analyses

To answer the question "Did impacts vary by child ethnicity and caregiver employment status?", we entered interactions between the intervention indicator and the specific subgroup indicator or indicators into the multilevel models specified above. Because of concerns with statistical power, we only examined interaction effects when the estimates for the intervention indicator or subgroup indicator were significant (when there was a main effect of the intervention or the subgroup). Significant interaction effects are presented in the form of a bar chart representing estimated adjusted means for all subgroups.

Results

What was the impact of playgroups on home environment and caregiving practices, children's cognitive development, and caregiver connectedness goals?

Table 2 shows the impact results of playgroups on child development, home environment and caregiving practices, and socialization goals. Supplementary Table 4 details the full model specification.

Playgroup caregivers were on average 1.684 points higher in Responsivity (s.e. = 2.730, $p. = .537$), 2.354 points higher in Involvement (s.e. = 4.353, $p. = .589$), and −2.204 points lower in Acceptance (s.e. = 3.119, $p. = .494$), than Control caregivers. Effects sizes ranged from −0.103 to 0.084.

Playgroup children were on average 0.404 points higher in Hearing and Language (s.e. = 0.762, $p. = .597$), and 1.480 points higher in Performance (s.e. = 0.464, $p. < .05$), than Control children. Effects sizes were 0.028 for Hearing and Language and 0.121 for Performance.

Playgroup caregivers were on average 15.3% more likely to endorse Connectedness Goals (s.e. = 0.066, $p. < .05$), than Control caregivers. The effect size was equal to 0.305.

Did impacts vary by child ethnicity and caregiver employment status?

Supplementary Table 5 presents the full model specification of impact results of playgroups moderated by child ethnicity on Caregiver Involvement, Child Hearing and Language, Child Performance), and caregiver Connectedness Goals. Figure 1 presents the subgroup impact results of Playgroups on child Hearing and Language, by child ethnicity. Significant subgroup effects (at trend level) for child ethnicity were found for Hearing and Language (βOther*Int = 6.329, s.e. = 3.464, $p. = .068$). Playgroup children in the "Other ethnicity" group presented a significantly (at trend level) larger difference in Hearing and Language compared to their Control counterparts of the same "Other ethnicity" group, than Caucasian children (Mint = 50.87, Mcont = 44.86 for children in "Other ethnicity"; Mint = 53.09, Mcont = 52.77 for Caucasian children). No significant subgroup effects were found for Involvement, Performance, or Connectedness Goals.

Supplementary Table 6 shows the full model specification of impact results of playgroups moderated by caregiver's employment on Involvement, Performance, and Connectedness Goals. Figure 2 presents the subgroup impact results of playgroups on Involvement, by caregiver's employment status. Significant subgroup effects for caregiver employment were found for Involvement ($\beta_{Emp*Int} = 22.612$, s.e. = 9.902, $p. < .05$). Playgroup caregivers that were employed presented a significantly larger difference in Involvement compared to their Control counterparts that were also employed, than unemployed caregivers ($M_{int} = 73.08$, $M_{cont} = 55.64$ for employed caregivers; $M_{int} = 70.95$, $M_{cont} = 76.13$ for unemployed caregivers). No significant subgroup effects for caregiver employment were found for Performance and Connectedness Goals.

Discussion

The goal of this study was to evaluate the impact of the program Playgroups for Inclusion on standardized measures of children's development, as well as caregivers' home environment and caregiving practices, and caregivers' connectedness goals for their children, using an experimental design. Results of the experimental trial indicated significant positive impacts on children's developing ability to reason through manual and visuospatial problems, and caregivers' endorsement of children's ability to maintain positive, harmonious relationships with others. Effect sizes for significant positive effects on children (0.121) and caregiver outcomes (0.305) were small (Cohen, 1988, 1992), but these magnitudes must be considered in this context of low-dosage

Table 2 Impact results of playgroups on child development, home environment and caregiving practices, and connectedness goals

Outcome	Number of Playgroups	Number of Children / Families	Adjusted mean for Intervention Group	Adjusted mean for Control Group	Diff	Sig	Effect Size
Hearing and Language	36	184	52.514	52.110	0.404	.597	0.028
Performance	36	201	53.186	51.706	1.480**	.001	0.121
Responsivity	36	203	84.544	82.860	1.684	.537	0.086
Acceptance	36	202	84.899	87.103	−2.204	.494	−0.103
Involvement	33	82	71.666	69.312	2.354	.589	0.084
Connectedness Goals	34	216	0.653	0.500	0.153*	.020	0.305

Notes: ~ p<.10, * p<.05, ** p<.01, *** p<.001

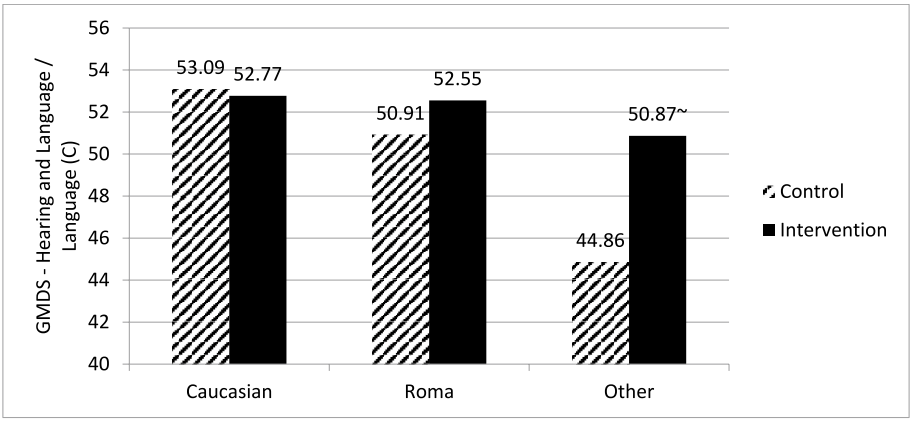

Fig. 1 Subgroup impact results for GMDS Hearing and Language by child ethnicity. ~ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

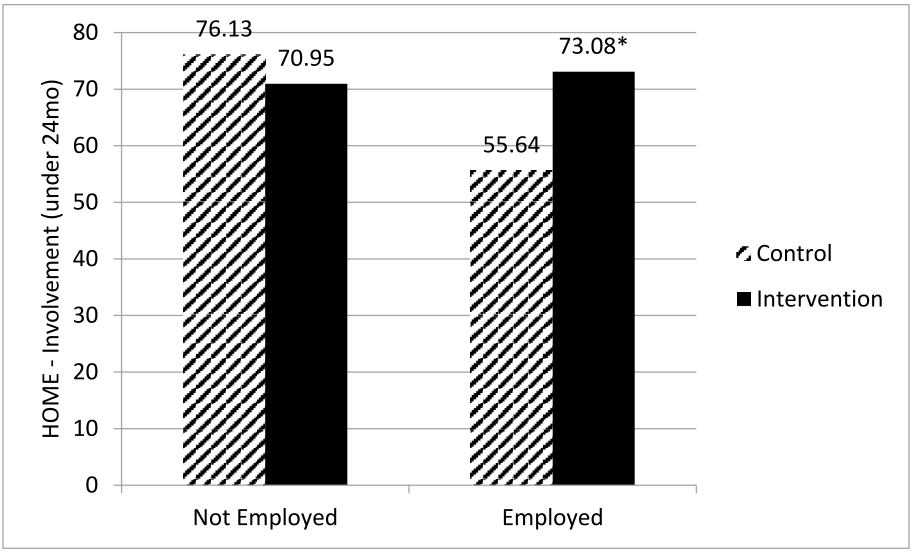

Fig. 2 Subgroup impact results for HOME involvement by caregiver employment status. ~ $p < .10$; * $p < .05$; ** $p < .01$;*** $p < .001$

intervention (four hours a week) and are within the magnitude commonly found in early childhood interventions (Hill et al., 2008).

Effects on children's developing ability to reason through manual and visuospatial problems, including working speed and accuracy in manually fitting geometric shapes, building patterns with cubes, etc., may be linked to the intervention foci on the promotion of development through play, which was at the the center of facilitators' training and practice. Play and hands-on exploration supported by adult–child interactions can positively affect young children's visual form perception and spatial skills (Lewis Presser et al., 2025; Yang et al., 2020).

The focus on play and learning was paired with intentionality to promote positive interactions between the children, caregivers and facilitators. This focus was well-aligned with caregivers' motivations to enroll in playgroups (see Barata et al., 2017), namely opportunities for children to socialize and interact with other children, as well as opportunities to play and engage in activities. This seems to have resulted in a positive and significant increase in caregivers' endorsement of children's ability to maintain positive, harmonious relationships with others. McLean and colleagues (2022) proposed that observed benefits of playgroups on outcomes for children may indeed be associated with the role of the playgroup facilitator. Playgroups can promote children's active engagement in play with others (Commerford & Robinson, 2017), which may contribute to caregivers' greater endorsement of connectedness goals.

There was also some evidence, albeit limited, of intervention effects varying by subgroup (ethnicity and employment status). Playgroups for inclusion seem to have promoted employed caregivers' skills to involve and stimulate their child in learning, namely in choosing appropriate toys and structured playtime. At the end of the playgroups intervention, unemployed caregivers had on average lower skills to involve and stimulate their child in learning than their control counterparts, when compared to their skills prior to the intervention. The benefits of playgroups for diverse families, including those in socioeconomically disadvantaged circumstances, such as unemployment, are recognised in the literature (Williams et al., 2018). The findings of the present study suggest that playgroups may also positively influence the involvement of employed caregivers. In a previous study, mothers who were employed in the year prior to their child's birth were found to more likely endorse self-maximisation goals, with an emphasis on supporting children's development and learning, than those who were not employed (Ng et al., 2012). Further research could be relevant to explore the associations between endorsement of self-maximization goals, employment status and playgroup impacts.

Playgroup children in the "Other ethnicity" group also gathered more benefits in receptive (comprehension) and expressive language, than their Control counterparts. This requires a deeper understanding of the needs of the children in the "Other Ethnicity" group. The diversity of the category may reflect some diversity in home language; by being exposed to social interactions and play in playgroups, children in the "Other ethnicity" group seem to have made more progress in their comprehension and expression of Portuguese language, than their control counterparts. In a study in Australia (an English-speaking nation), no interaction between attending a playground and having a language background other than English was found regarding language and cognitive skills; however, children who spoke English only were found to benefit more from playgroups in terms of physical health and well-being, social competence, emotional maturity, and communication skills and general knowledge (Sincovich et al., 2020). These findings highlight the relevance of researching the potential barriers and benefits experienced by children with diverse cultural and linguistic backgrounds attending playgroups.

It was somewhat surprising to not find significant impacts of the playgroups on children's language outcomes overall (beyond the subgroup effects). Prior research on playgroup impacts tends to show effects on children's language (Commerford & Robinson, 2017; Lakhani & Macfarlane, 2015; Williams et al., 2020). Playgroups offer many opportunities for the facilitator to model language, scaffold participation, and promote interactions among children and caregivers that enhance linguistic development. There might be unmeasured confounders in the association between playgroup participation and children's language development. For instance, parenting styles can influence children's experience in

playgroups, potentially affecting their impact (Sincovich et al., 2020). Future studies may look into parenting styles as potential mediators of playgroup impacts.

Limitations

The study suffered statistical power limitations. Initial power estimates assumed the recruitment of 940 to 950 families for the experimental trial. However, despite extensive recruitment efforts, and support from local entities, the sample size achieved in the pretest phase was 415 families (44% of the proposed goal). Of the pretest sample, 62% were assessed at posttest, which further limited the statistical power to examine impacts (final power estimates indicated detectable MDEs in the medium range of 0.31 to 0.43, which is seldom found in ECEC program impacts).

We found that non-attriters were significantly different from attriters on important characteristics. Specifically, children in our final sample were significantly younger than children in the group of attriters, indicating a potential bias. Younger children are more likely to be at home (instead of daycare), and may have benefited from a higher dosage of the intervention than the average (38% over the 10 months of implementation, Barata et al., 2017), indicating a potential overestimate of impact. It can also indicate an underestimate of impact, given that prior literature seems to indicate that children likely to gain the most benefit from attending a playgroup, namely from lower socio-economic groups, were those who are less likely to access these services (Daniels, 1995; Hancock et al., 2012). Non-attriters had a significantly larger percentage of families directly recruited (41%), higher rates of employed caregivers, higher household incomes, and higher levels of education than attriters (28%), making the posttest sample more affluent. It is not clear whether that indicates an over or underestimation of program effects.

Finally, there may be some concerns with the results of the study being dated, given that they were collected between 2015 and 2017. There has been considerable evolution in early care and childhood education policy in Portugal, including a groundbreaking policy in 2022 making childcare services from zero to three free of charge. Despite the timelag between collection of data and publication, as well as changes in policy, the offer of playgroups continues to be considered as a complementary, albeit temporary, solution for the care and education of very young children, and the scientific dissemination of robust scientific results is essential to this goal. For example, in 2022, several playgroups were opened in Portugal to accommodate refugee children arriving from the Ukraine, and the practices of the experiment Playgroups for Inclusion were used as inspiration (Fundação Calouste Gulbenkian, 2022). Additionally, the new free childcare policy is far from achieving full coverage (Lusa, 2025), and there is evidence that formal childcare may not address the needs of every family (e.g. Buriel & Hurtado-Ortiz, 2000).

Lessons learned and recommendations

In terms of policy and practice recommendations, benefits in children's performance and connectedness goals for playgroup families, as well as benefits in comprehensive and expressive language in children in the "Other" ethnicity group, seem to call for a universal approach that is easily available to diverse families. Programs that consider variation in effectiveness and flexible implementation have the potential to achieve larger effects for all children (National Scientific Council on the Developing Child, 2024). Moreover, providing

children and families services available to everyone can lower stigma and increase their use (Dolan et al., 2020).

This is the first experimental study we are aware of that shows the effectiveness of playgroups on standardized measures of child cognitive development, while maintaining a universal approach to the provision of this service. Previous evidence has almost entirely been focused on interventions that target specific families and from a socioeconomically disadvantaged background or implement very specific interventions (Williams et al., 2018; Sincovich et al., 2020). Given that playgroups can be implemented within communities, in existing spaces or services, playgroups seem to be an important and relatively inexpensive intervention that can help support learning and development in the early years before children enter school, and can constitute a sustainable response to promote children's development.

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Declarations

Conflict of interest The authors declare that there is no conflict of interest.

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Current Themes of Research and Most Relevant Publications

M. Clara Barata. University of Coimbra, Faculty of Psychology and Education Sciences, Center of Interdisciplinary Studies (CEIS20), Coimbra, Portugal.

Current themes of research:

Educational intervention; impact evaluation; Early Childhood Education and Care; social and emotional learning; educational policy.

Most relevant publications in the field of Psychology of Education:.

Castro, C., Barata, M.C. & Alexandre, J. Does school climate affect students' social and emotional skills? The importance of relationships. *Eur J Psychol Educ 40*, 111 (2025). https://doi.org/10.1007/s10212-025-01007-8.

Barata, M., Alexandre, J., Castro, C., & Colaço, C. (2024). Can community and educational interventions designed from the ground-up promote social and emotional learning? Experimental and quasi-experimental impacts of a country-wide Portuguese initiative. *Frontiers in Education, 8*, 1287259. https://doi.org/10.3389/feduc.2023.1287259.

Castro, C., Barata, C., Alexandre, J., & Colaço, C. (2023). Validation of a community-based application of the Portuguese version of the survey on Social and Emotional Skills–Child/Youth Form. *Frontiers in Psychology, 14*, 1214032. https://doi.org/10.3389/fpsyg.2023.1214032.

Barata, M.C. (2023). Family and community engagement in early childhood education and care in the digital age. In *Empowering Young Children in the Digital Age* (chapter 6). Paris, France: OECD Publishing. https://doi.org/10.1787/50967622-en.

Jamet, S. & Barata, M.C. (2019). Interactions between children, staff and parents/guardians in early childhood education and care centres. In *Providing Quality Early Childhood Education and Care: Results from the Starting Strong Survey 2018* (Chapter 2, co-authored). Starting Strong. OECD Publishing. Paris, https://doi.org/10.1787/301005d1-en.

Cadima, J., Aguiar, C., & Barata, M.C. (2018). Process quality in Portuguese preschool classrooms serving children at-risk of poverty and social exclusion and children with disabilities. *Early Childhood Research Quarterly*, *45*, 93-105. ISSN 0885-2006, https://doi.org/10.1016/j.ecresq.2018.06.007.

Barata, M. C., Calheiros, M. M., Patrício, J., Graça, J., & Lima, M. L. (2015). Evaluating the impact of national educational policy to reduce retention and increase achievement in compulsory education. *The Elementary School Journal*, *116* (1), 149-171. https://doi.org/10.1086/682748.

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Catarina Leitão. University of Coimbra, Faculty of Psychology and Education Sciences, Coimbra, Portugal.

Current themes of research:

Early Childhood Education and Care; family and parenting support; family-school partnerships; impact evaluation; participatory research.

Most relevant publications in the field of Psychology of Education:

Leitão, C., & Shumba, J. (2024). Promoting family wellbeing through parenting support in ECEC services: Parents' views on a model implemented in Ireland. *Frontiers in Education*, 9. https://doi.org/10.3389/feduc.2024.1388487.

Leitão, C., Shumba, J., & Scott, T. (2023). Conducting peer research: Learning from the evaluation of a parenting support intervention. *International Journal of Qualitative Methods*, 22. https://doi.org/10.1177/16094069231211775.

Leitão, C. (2023). Supporting parents with young children in Ireland: Context, policies and research-supported interventions. *Irish Studies Review*, 31(4), 571-589. https://doi.org/10.1080/09670882.2023.2265834.

Guerra, J., & Leitão, C. (2020). Roma children going to primary school: The contribution of interagency working to support inclusive education. *Orbis Scholae*, 13(3):1-22. https://karolinum.cz/en/journal/orbis-scholae/year-13/issue-3/article-7583.

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Joana Alexandre. Iscte—University Institute of Lisbon, Department of Psychology, Center for Psychological Research and Social Intervention—CIS-Iscte, Lisbon, Portugal ~.

Current themes of research:

Child sexual abuse; Social inclusion & Education; Children's rights.

Most relevant publications in the field of Psychology of Education:

Castro, C., Barata, M.C. & Alexandre, J. Does school climate affect students' social and emotional skills? The importance of relationships. *Eur J Psychol Educ 40*, 111 (2025). https://doi.org/10.1007/s10212-025-01007-8.

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Antunes, R., Alexandre, J., Guedes, M., Filipe, M. G., & Veríssimo, M. (2023). Assessing the benefits of the "Intergalactic World" social emotional learning program for 8–12-year-old children in Portugal: Perspectives from teachers and caregivers. *Frontiers in Psychology, 14*: 1233335. https://doi.org/10.3389/fpsyg.2023.1233335.

Castro C., Barata C., Alexandre, J., & Colaço, C. (2023) Validation of a community-based application of the Portuguese version of the survey on Social and Emotional Skills – Child/Youth Form. *Frontiers in Psychology, 14*:1214032. https://doi.org/10.3389/fpsyg.2023.1214032.

Russo, V., Barata, M. C., Alexandre, J., Leitão, C., & de Sousa, B. (2022) Development and validation of a measure of quality in playgroups: Playgroups Environment Rating Scale. *Frontiers in Education, 7*: 876367. https://doi.org/10.3389/feduc.2022.876367.

Guerra, R. Rodrigues, R. B., Aguiar, C., Carmona, M., Alexandre, J., & Lopes, R. (2019). School achievement and well-being of immigrant children: The role of acculturation orientations and perceived discrimination. *Journal of School Psychology, 75*, 104-118. https://doi.org/10.1016/j.jsp.2019.07.004.

Vanessa Russo, INSIGHT – Piaget Research Center for Ecological Human Development and CeiED, FCSEA, Lusófona University, Instituto Piaget and Lusófona University, Almada and Lisbon, Portugal.

Current themes of research:

Early Childhood Education and Care; Educational intervention; impact evaluation; Playgroups; Quality in Early Childhood Education and Care services, Educational Psychology.
Social Psychology

Most relevant publications in the field of Psychology of Education:

Russo, V., Barata, M. C., Alexandre, J., Leitão, C. & de Sousa, B. (2022). Development and Validation of a Measure of Quality in Playgroups: Playgroups Environment Rating Scale. *Frontiers in Education, 7*. https://doi.org/10.3389/feduc.2022.876367.

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Russo, V., Pereira, A. I. & Barros, L. (2016). Atribuições parentais em relação à ansiedade dos filhos: Estudo exploratório com pais de crianças ansiosas. Revista Portuguesa de Psicologia, 45, 3-19.

Pereira, A. I., Barros, L., Goes, R., Marques, T., Russo, V., & Muris, P. (2014). Agreement and discrepancy between mother and child in the evaluation of anxiety symptoms and anxiety life interference. *European Child & Adolescent Psychiatry*. https://doi.org/10.1007/s00787-014-0583-2.

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Bruno de Sousa. University of Coimbra, Faculty of Psychology and Education Sciences, Center for Research in Neuropsychology and Cognitive and Behavioral Intervention, Coimbra, Portugal.

Current themes of research:

Applied Statistics, Psychometric Analysis, Statistics Applications to Health and Social Sciences, Structured Additive Regression (STAR) Modeling, and Statistics in Education.

Most relevant publications in the field of Psychology of Education:

Fonseca, G., de Sousa, B., Crespo, C., & Relvas, A. P. (2024). Economic strain and quality of life among families with emerging adult children: The contributions of family rituals and family problem-solving

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Fonseca G., de Sousa B., Crespo C. & Relvas A.P. (2023) Economic strain and quality of life among families with emerging adult children: The contributions of family rituals and family problem-solving communication. *Fam Process.* https://doi.org/10.1111/famp.12884. IF: 1.4 (Q1).

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Tomás, A. L., Pinto, M., Cardoso, F., Peixoto de Almeida, M., de Sousa, B., Pereira, E., Franco, R., & Matos, O. (2019). Application of synthetic recombinant multi-epitope antigens and gold nanoparticles for a Pneumocystis pneumonia rapid diagnostic test. *Abstract in the Annals of Medicine, 51*:Sup1, 92, https://doi.org/10.1080/07853890.2018.1561853. (IF:5.435; SJR: Q1).

Prata, M. J., de Sousa, B., Festas, I., & Oliveira, A. L. (2018). Cooperative methods and self-regulated strategies development for argumentative writing. *The Journal of Educational Research*, 1-16.https://doi.org/10.1080/00220671.2018.1427037. (IF: 1.197; SJR: Q1).

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