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CITE THIS WORK

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Parental beliefs, engagement, and time investments in preschoolers *

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March 3, 2026

Abstract

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1 Introduction

Decades of research have shown that parent-child relationship and family environment are the cornerstones of children's well-being and healthy cognitive and socio-emotional development (see, e.g., Carneiro et al. 2013; Del Boca et al. 2014; Gayle et al. 2015; Fiorini and Keane 2014; Falk et al. 2021 among the most recent contributions). The seminal work by Cunha et al. (2013) was the first in economics to formalize the idea that parental engagement in an activity is primarily driven by parents' subjective expectations of the return on this time investment. Their framework has been later expanded by several other important contributions (Cunha, 2014; Boneva and Rauh, 2018; Attanasio et al., 2019; Carneiro et al., 2019; Biroli et al., 2022), and has recently been adopted also by Bhalotra et al. (2022) and Conti et al. (2022), among others. In all these works, parental beliefs stand out as a crucial factor shaping parenting behaviours.

Here we propose a novel approach to assess parental beliefs that complements the approach adopted in economics by recent studies of Boneva and Rauh (2018) and Cunha et al. (2013). Previous contributions provide a quantitative measure of the expected returns of specific activities parents can engage in with their child. Yet, they cannot tease apart the importance of the activity itself from the role of parental engagement in the activity, as they measure the joint effect of these two elements. For instance, parents who think that going to the museum or the library is important regardless of their presence might sign up their children for labs and other organized activities. On the contrary, parents who understand their presence as crucial for the developmental process might spend time themselves in the museum or in the library with the child. Similarly, parents who share the same views on the role of drawings or playing with building blocks might differ in their beliefs about the value added associated with their own engagement in the activity. A better understanding

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of parental beliefs about the importance of their own engagement with the child seems especially relevant when parents face binding time constraints, such as working full-time, limiting their ability to actively participate in many of the child's activities. This insight could, in turn, enhance our understanding of parental time investments.

Our approach diverges from previous literature by attempting to disentangle the intrinsic value of the activity from the significance of parental engagement. To do so, we ask respondents to evaluate each activity under two alternative scenarios that differ only in terms of the presence or absence of the parent. For activities requiring adult supervision — e.g., going to the library or to a museum — respondents had to rate the importance of the activity when carried out together with the parent (e.g., the child visits a museum with her parent) and when carried out with other caregivers (e.g., the child visits a museum with the school). When no supervision is required instead, we asked them to rate the importance of the activity if carried out with the parent (e.g., the child plays with toys with her parent) or by the child alone or with other peers (e.g., the child plays with toys alone or with other children).

A second distinction is that our survey asks parents to evaluate various activities based on how much they believe these promote children's well-being, rather than their cognitive or developmental outcomes.[1] Although child development, especially in the cognitive and academic domains, has long been a focus of parenting research in western societies, parents themselves often conceptualize their goals more holistically, prioritizing the emotional, social, and relational aspects of their children's lives. In addition, well-being is perhaps a concept more intuitively accessible to caregivers than technical developmental milestones, allowing more genuine, less socially primed responses.[2] Finally, many parenting activities offer both immediate enjoyment for the child (and the parent) and long-term developmental benefits. For example, reading or outdoor play can be both pleasurable and enriching. Rather than classifying actions as either consumption or investment, framing them around "well-being"

[1]The recent report by UNICEF (UNICEF Division of Data, Analytics, Planning and Monitoring Data and Analytics Section, 2023) highlights that learning is one of the five relevant dimensions on child well-being (Survive and Thrive, Learning, Protection from Harm, Safe and Clean Environment, and Life Free of Poverty) that can capture the breadth of children's lived experiences.

[2]Previous research has highlighted that cultural differences may influence parents views on their role (see, for instance, Bornstein et al., 1998). However, our data refer to a sample of mothers (87%) of children aged 4-5, where a minority (roughly 8%) identifies as foreigner and thus we cannot explore cultural differences in more detail.

captures both aspects.

This broader perspective is increasingly echoed in recent economic research, which shows that while parents do care about developmental returns, they also value a wider range of outcomes for their children. Beuermann et al. (2023), for instance, demonstrate that when choosing schools, parents respond not only to gains in test scores but also to improvements in non-academic life outcomes—such as reduced criminal behavior and teen pregnancy, and increased labor market participation. These dimensions are particularly influential for parents of lower-achieving children, suggesting that test scores alone may miss much of what parents find meaningful. Their findings reinforce the idea that parental decisions, whether in education or everyday caregiving, are often guided by a richer set of goals than skill acquisition alone.

Based on these considerations, we enlarge the set of activities beyond those explicitly aimed at stimulating cognitive or language skills. We build on the premise that any kind of everyday parent-child interaction has the potential to promote the well-being and development of the child. Thus, we avoid restrictions to the set of domains (cognitive and non-cognitive) that parents may influence through their engagement. We included 22 different activities, for a total of 44 questions (for each activity we presented two scenarios that differ only in terms of the presence or absence of the parent). This approach also has the advantage of limiting the influence of parental perceptions on how a specific child skill is rewarded by society, for instance in the labor market, and reducing potential demand effects.

For survey administration, we developed a new web app with the help of a specialized digital agency.[3] The app offers distinct advantages over paper surveys: it has minimal implementation costs, it is widely accessible since respondents are accustomed to using apps on their mobiles, and it offers a simple user experience that can ensure a higher response rate. For these reasons, we also leveraged the same app to collect additional measures on parenting via detailed time-use diaries (Bigoni et al., 2025) and validated psychometric scales (Sansavini et al., 2025).

To obtain a set of indicators that can be used to represent and interpret parental beliefs,

[3]Indici Opponibili https://www.indiciopponibili.com/eng/home. Features of the APP are discussed in detail by Bigoni et al. (2025).

we performed exploratory and confirmatory factor analysis using a sample of about six hundred parents with preschool aged children in 2021 in Northern Italy. The exploratory factor analysis identifies four dimensions that are deemed important by parents, which we label as i) Autonomy; ii) Engagement; iii) Culture and iv) Conflict.[4] The first and second factors relate to activities such as painting, singing, and playing, carried out when the parent is absent (Autonomy) or present (Engagement), respectively. The third factor (Culture) includes activities such as going to a museum/library and playing an instrument. The last factor (Conflict) captures parents' beliefs on the importance of the child arguing and being scolded. Our analysis also reveals that parental beliefs about the added value of parental engagement vary across dimensions and among parents. For instance, cultural activities are deemed important regardless of whoever accompanies the child, while a sizable share of parents believe that their engagement in activities such as solving puzzles or playing is crucial for the child's development. Notably, we find support for this factor structure using confirmatory factor analysis also on a second sample of parents (about one thousand) interviewed in 2022.

A critical component of our assessment of beliefs is to capture parental perceptions concerning the importance of their own involvement in their child's development. Understanding these perceptions provides valuable insight into how parents prioritize and allocate their time across different activities, particularly those that require their active participation and represent opportunities of child-parent interaction. For this reason, we explore the association between these belief measures and parental time investments as measured via two detailed 24-hour parents' time diaries. We consider different measures of time investments: total time spent with the child (both in general and in activities listed in our belief survey), quality time (following the definition of Price, 2008), and engaged time (activities where the child is present and engaged).[5]

We document that time investments are not mainly driven by the beliefs about the value of an activity as such, but rather by the beliefs that parental presence (*Engagement*) is im-

[4]Each factor refers to the parental beliefs on the listed dimension and we shorten the labels for brevity. In other words, as an example, we avoid the use of long labels such as *parental beliefs on child's autonomy* or *parental beliefs on parental engagement*.

[5]For details about the time diaries' collection and these measures of time use, see Bigoni et al. (2025).

portant while children perform a particular activity. For instance, a one standard-deviation increase in parental beliefs about the importance of engagement leads to 6 more hours of engaged time, an additional 5 hours spent with the child and almost 5 more hours of quality time per week (about 30% increase in the corresponding time-use standard deviations). Such an increase is not small, if we consider that parents spend an average of 50 hours per week with their child, of which 43 hours involve active engagement of the child and 28 hours are considered quality time. On the contrary, parental beliefs on *Autonomy* do not have the same effect on parental time-use choices, and tend to operate in the opposite direction, i.e., reducing the amount of time parents spend with children. Indeed, beliefs on the importance of cultural activities where the presence of the parent is not considered salient, as well as activities that promote children's autonomy, do not have predictive power on parental time investment, regardless of whether we proxy parental investment with total time spent with the child, quality time, or engaged time. These findings indicate that it is not merely the perceived value of an activity that drives parental investment, but rather the belief in the importance of being present and engaged during the activity. This focus on engagement underscores the importance of considering parental presence as a central dimension of parenting beliefs.

The paper is organized as follows. Section 2 describes our new survey instrument and our sample. It illustrates the results from exploratory and confirmatory factor analysis that underlie the proposed beliefs indicators. Section 3 validates our scale and explores the association between parental beliefs and parental time investments, as well as parental behaviours. Section 4 concludes.

2 The parental beliefs survey instrument

The parental beliefs survey instrument is designed to elicit parents' subjective perceptions on the importance of their child's daily activities and their own level of active participation (*engagement*) in those activities, in relation to the child's overall well-being. We adopted a broader approach with respect to the object to be maximized. Instead of asking for expected economic returns from an activity, as typically done in economics, we focused on child well-

being, a concept borrowed from the psychological literature.[6] This concept captures the multifaceted nature of the skills that contribute to future success, encompassing child's emotional, mental, physical, and social health. It is accessible enough to be understood by the general public and allows us to refrain from making assumptions on how parents trade-off investments on different children's skills.

Many parental activities simultaneously have immediate and long-term effects. Reading a book to a child can be enjoyable and provide immediate satisfaction, but it also helps develop literacy skills and can be seen as an investment in the child's future. Outdoor play fosters immediate joy but also develops motor skills and socialization. Instead of rigidly categorizing activities as investment vs. consumption, well-being serves as an umbrella concept that captures both the immediate experience and potential developmental benefits. Well-being allows flexibility in acknowledging that parents might engage in these activities for both the child's immediate enjoyment and his or her long-term development without forcing a trade-off perspective, which may not reflect how parents actually think about these activities.

In sum, we conceptualize well-being as a broad measure of child flourishing, encompassing both immediate enjoyment and developmental progress (Ravens-Sieberer et al., 2014; Turner et al., 2023). While some activities may be interpreted as direct investments in human capital, others provide immediate socio-emotional benefits that indirectly contribute to long-term capabilities. This framing avoids a dichotomy between investing in the development of the child's skills and promoting his/her consumption utility, while capturing the full scope of parental influence on child outcomes.

Since any everyday parent-child interaction has the potential to enhance the child's well-being and development, we refrain from restraining ex-ante the range of activities to those that the literature has identified as most effective in fostering cognitive or language skills. For this reason, we designed a survey that takes into account a broad variety of activities, and let the exploratory factor analysis select the activities most valued by parents. The

[6]Developmental psychologists have long shown that parents' views on the determinants and dynamics of child development, as well as on the role of parenting, can predict parenting styles, home environments, and child outcomes (Benasich and Brooks-Gunn 1996; Miller 1988). This strand of the literature focuses on parents' general conceptions about how development works, and in particular on how much children's skills come from nurture and how much they are inborn, to what extent they are malleable, and if so, how they are shaped by external stimuli and which are the most relevant experiences children can be exposed to (Miller, 2019).

activities span from playing outdoors to taking care of pets/plants, from eating to singing or playing music, from drawing and using play-dough to watching TV, from going to the theater to role-playing games, from crying to being reprimanded; the complete list is presented in Table A.1 in the Appendix.

Figure 1: App MinUTo – Parental Beliefs questionnaire items examples



Note: The figure shows one example of the way the survey items were presented to respondents by the MinUTo APP. Items example in the two modalities *with* parent (left), *without* parent (right). These two scenarios are presented in different but subsequent screens.

The question we asked is the following: *We will now list a series of activities that a child 4 or 5 years old may perform over the course of a day. For each activity, we will ask you to indicate how much you think each of the activities listed below promotes or reduces the child's well-being. For each activity, place the cursor on the bar from -100 to 100, where -100 is "Reduces well-being" and 100 is "Promotes well-being".*[7]

Since the same activity could be performed by the child alone or in the company of other people (such as peers and/or other adults) or together with a parent, we presented two different but subsequent screens for each activity describing the modality *with* and *without* the parent (see Figure 1). This way, we can separately elicit parental beliefs on each activity under two alternative scenarios (*with* and *without* the parent), to distinguish how much value a respondent places on the activity itself versus the additional value derived from parental presence and engagement.

In particular, for activities that require adult supervision, such as going to the library or to a museum, respondents had to rate the importance of the activity when carried out

[7]While the scale is clearly described in the general text of the item, it is blind in the sliders. This feature helps avoid heaping at the grid points of the scale.

together with the parent and when carried out with other caregivers. When no supervision is necessary (e.g., playing with toys, building blocks, etc.) instead, they were asked to rate the importance of the activity if carried out with the parent or by the child alone or with other peers. This distinction may help to determine the relative importance of parental engagement in activities that could foster a child's autonomy, as explained below.[8]

A potential concern is that respondents may tailor their answers to align with what they believe is expected or socially desirable. However, several design features of our survey help mitigate this concern (Bursztyn et al., 2025). First, the wording of the belief elicitation questions refers generically to "a child" and "a parent," rather than the respondent and their own child, which introduces a layer of abstraction that can reduce the pressure to conform to perceived parenting norms. Second, the survey includes a broad range of daily activities, not just those typically associated with parental investment, reducing the likelihood that parents anchor their responses around a narrow set of normative expectations. Third, information on parental time investments are collected by means of time-use diaries, an approach that substantially reduces the desirability bias, as compared to retrospective surveys (Bigoni et al., 2025). Finally, the temporal separation between the belief elicitation and the time use survey (which could be completed during non-overlapping time windows) adds further distance, minimizing the risk of cross-contamination between the two sets of responses.[9] Together, these elements help alleviate concerns that belief reports and their relation with parental time investment are simply rationalizations or reflections of socially expected behaviour rather than sincere assessments.

Sample and recruitment. Our sample consists of parents of 4- and 5-year-old children enrolled in preschools in municipalities in the Emilia-Romagna region (Northern Italy). The questionnaire was administered in December 2021 via a web-based app with recruitment

[8]While distinguishing between activities done alone versus with other children could yield additional insights, we chose not to separate these scenarios to keep the survey manageable, given the already substantial length of the questionnaire and considering that our main focus was on the source of parental engagement versus that of other caregivers or peers/alone.

[9]We administered the beliefs questionnaire first, followed by the two time-use diaries. Median time gap between the survey completion and the time-use diary completion ranges between 18 days for the first time use diary and 28 days for the second time use diary. See Appendix D for more details on the features of the time-use diary survey instrument and its administration.

facilitated by local municipalities, which supported dissemination in preschools.[10]

A total of 597 parents fully completed the beliefs questionnaire. The majority of respondents were mothers (87%), with only 50 respondents (8%) identifying as foreigners. Consistent with regional demographics, 40% of respondents had only one child. The average parent was in their late thirties to early forties (mean age 39.5 years) and highly educated, with 54% holding a college degree. Fewer than 9% of the sample reported being unemployed, most of whom were stay-at-home parents. Over 63% worked full-time, 27% part-time, with an overall average of 35 working hours per week. Table B.1 in the Appendix presents the characteristics of our sample, compared to a nationally representative sample from the Survey on Household Income and Wealth (SHIW) conducted by the Bank of Italy.[11]

The highly educated sample, with the majority of respondents working full-time, allows us to examine the influence of parental beliefs on the significance of their presence in key developmental activities. These parents face binding time constraints due to their professional commitments but also possess the financial resources to outsource care-giving tasks, including educational and extracurricular activities such as museum visits, music lessons, and other cultural enrichment programs. With these data we can analyse the perceived trade-offs between parental presence and external support in activities critical for cognitive, emotional, and social development.

We used these data collected in 2021 to conduct an exploratory factor analysis to identify the factor structure. We next confirmed the factor structure using a separate sample. The additional sample used for the confirmatory factor analysis includes 951 parents of preschoolers who filled-in the survey in December 2022.[12] The characteristics of the two samples are highly comparable as detailed in Table B.1 in the Appendix.

Based on the resulting factor structure, we constructed indicators of parental beliefs and explored their association with measures of parental time investments reconstructed from detailed parental time-use diaries, as well as with parental behaviours (Section 3). All the

[10]We use baseline data collected within the project *MinUTo* (`https://site.unibo.it/minuto/en/project`). Details about the project can be found in Guarini et al. 2022. Appendix A and D provide information on the beliefs and time-use survey instruments implemented in the App.

[11]Detailed comparisons can be found in the Appendix B.

[12]We use baseline data collected within the project MinUTo in 2022: recruited parents are volunteers as for the 2021 sample used for the exploratory factor analysis.

association analyses reported in the paper are performed on the 2021 data (main sample) where we also observe measures of both parental time investments and behaviour.

Activities: Engagement vs Autonomy. Based on the average scores from our survey (Table B.4 in the Appendix), several insights emerge about how parents perceive the impact of different activities on their child's well-being, both with and without the parental engagement. Activities that are perceived to strongly promote well-being include those that are interactive, imaginative, or intellectually engaging – especially when performed with the parent. The highest-rated activities (i.e., with a score above 80) were storytelling with the parent, reading with the parent, and playing outside alone, suggesting that both shared and independent experiences can be highly valued when they foster creativity or physical engagement. Activities such as conversation, singing, painting, role play, and theater consistently scored above 70, with slightly higher ratings when done with the parent, underlining the perceived additive value of parental presence. Interestingly, for activities like puzzles and museum/library visits, scores were high in both scenarios, indicating their inherent value regardless of parental involvement, though again, a small boost is seen when the parent is present. In contrast, activities involving screens – such as TV and tablet use – received notably low scores, with tablet use rated at -57.5 (without parent) and -30.8 (with parent), suggesting strong negative perceptions, even when accompanied. Likewise, arguments, being bored, and especially lack of feedback (scoring as low as -63.4 when the parent is absent) are viewed as detrimental to the child's well-being. These negative items form a clear bottom cluster, reinforcing a consensus among parents on what detracts from positive daily experiences. Overall, the data reveal that parents see well-being as multidimensional – encompassing both cognitive and relational elements – and that parental presence tends to elevate the perceived value of many activities, particularly those that are social, creative, or intellectually enriching.

A closer examination of the differences between the "with parent" and "without parent" scenarios reveals nuanced parental beliefs about the balance between engagement and fostering autonomy (see Table B.5 in the Appendix). For many activities, respondents rate the "with parent" version higher (e.g., storytelling, eating, conversation, and reading) –

indicating that they see parental presence as significantly enhancing the child's well-being. This suggests a strong belief in the value of co-engagement, particularly in activities that involve communication, imagination, emotional connection. In this light, eating together may be seen as a moment that helps to foster connection, conversation, and sharing experiences. However, the fact that some activities still receive high scores, and even higher when performed independently – like play outside, puzzles, painting, and museum visits – shows that parents also value autonomy and recognize the benefits of children engaging in stimulating experiences on their own, especially for independent play, which could promote self-confidence, exploration, and resilience. In contrast, activities with larger positive gaps between the two scenarios highlight areas where parents perceive their presence as crucial, possibly because these interactions are seen as emotionally supportive or instructional. These variations reveal that parents view engagement and autonomy as context-dependent dimensions of well-being, assigning value to both depending on the nature of the activity.

2.1 Exploratory factor analysis

Following the standard practice used in psychology to construct a validated psychometric scale, we implemented an Exploratory Factor Analysis (EFA). We combine the analysis of the scree plot and parallel analysis and retain four factors. Next, we estimate factor loadings, imposing orthogonal factors and normalization, and perform item selection removing items that return high uniqueness and were performing poorly according to reliability indicators.[13] In the Appendix, we extensively illustrate the preliminary exploratory data analysis we performed on the raw data (Appendix B.2), and the process leading to the choice of the number of factors to retain and item selection (Appendix C). For most items, the estimated factor loading is higher than 0.7 on just one latent factor and much smaller on other factors, allowing us to detect meaningful patterns.[14]

[13] We dropped `Tablet_0`, `Tablet_1`,`TV_0`, `TV_1`, `Cry_0`, `Cry_1`, `Be_bored_0`, `Be_bored_1`, `Eating_0`, `Eating_1`, `No_Feedback_1`, `No_Feedback_0`, `Storytell_0`, `Plant_Pet_care_0`, as these had poor reliability indicators and return a high uniqueness. While we dropped `Storytell_1` and `Plant_Pet_care_1` for symmetry, we retain `Scolding_0`, `Scolding_1`, `Argument_0`, `Argument_1`, despite their reliability is similar to the dropped items because uniqueness is generally much lower than customary thresholds.

[14] The only exceptions are `Conversation_0`, `Conversation_1`, `Playout_0`, three items with similar factor loadings across three out of four factors. These items also share uniqueness around 0.65. We retain `Playout_0` for symmetry and the additional items because Cronbach α of the sub-scale increases including them.

The data driven procedure unveiled four meaningful factors: *Autonomy*, *Engagement*, *Culture*, and *Conflict*. The first and second factor include activities promoting creativity, cognitive skills, and social interaction. Examples of such activities are painting, singing, solving a puzzle, playing with toys, looking at a picture book, playing outside, and talking, which can all provide opportunities for children to engage in imaginative play, problem-solving, and communication. All these activities can be carried out both independently or collaboratively with the parent, and the first and second factor differ precisely along this dimension. The first factor includes exclusively activities carried out by the child alone or with a peer and we label it *Autonomy*. On the contrary, the second factor comprises items in which the parent is actively engaged in such activities and we refer to this factor as *Engagement*. The third factor refers to parental beliefs on the role of cultural activities for child development. This factor includes activities – such as going to a museum or a library, watching a performance for kids at the theater, playing with musical instruments – meant to stimulate intellectual curiosity, creativity, and a love for learning. Cultural activities provide children with diverse experiences that enhance their understanding of art, culture, and knowledge. We label this factor *Culture*, and we note how there is no emphasis on the role of parents in this case – i.e., cultural activities both with and without parents load on this factor. Finally, the fourth factor captures the importance of handling disagreements and we label this factor *Conflict*. This factor includes activities such as scolding and having an argument both with or without the parent, and may promote child development by helping children learn skills, such as managing conflicts, understanding boundaries, and expressing emotions. Through experiencing and resolving disagreements, children can enhance their communication abilities, empathy, and problem-solving skills, all of which are important for healthy social interactions and emotional development. The general scale we obtain has a Cronbach α of approximately 0.94, while for the sub-scales: *Autonomy* $\alpha \approx 0.89$, *Engagement* $\alpha \approx 0.87$, *Culture* $\alpha \approx 0.92$, and *Conflict* $\alpha \approx 0.80$.

The resulting structure exhibits non-zero factor loadings, with items generally loading on more than one factor (see Table C.4 and further discussion in Appendix C).

Notice that items share commonalities – as they refer to the same activities – and we cannot rule out that parental beliefs on the different dimensions correlate. One may expect

that two parents may value in the same way the importance of a given activity (say, *playing outdoors*) for the child well-being, however they may differently value the role of parental engagement in the activity. We may thus expect positive correlation between factors *Autonomy* and *Engagement*, as they are linked to items that have in common the activity performed by the child. To account for this, instead of increasing the structure complexity, we will relax the orthogonality condition between factors while performing confirmatory factor analysis in the next Section.

2.2 Confirmatory factor analysis

The Confirmatory Factor Analysis (CFA) considers the four-factor structure resulting from the analysis EFA in Section 2.1 and imposes exclusion restrictions, allowing each item to load only a single factor. The CFA is performed on our main sample (2021) and on a separate sample of parents who answered the belief questionnaire in the following year (2022). We contrast goodness of fit of models which impose orthogonal factors and models that allow correlation between factors within each sample, and goodness of fit consistently improves allowing for correlation. Estimates of the factor loadings and of the correlation between factors using data from each sample are reported in Tables C.5 and C.6, in the paper Appendix.[15] Results are remarkably consistent with those obtained in the previous exploratory factor analysis, as well as across the two years.[16] Table 1 summarizes the items loading on each factor. Our analysis provides support to the list of activities on which economists conventionally focus, as the items endogenously emerging from the factor analysis are in line with those that are usually considered.

[15]Based on the factor loadings estimates resulting from the exploratory factor analysis (see Table C.4 in the paper Appendix for details), the items with non-zero factor loadings on each of the four latent factors are, respectively: for parental beliefs on *Autonomy*: `Paint_0`, `Sing_0`, `Puzzle_0`, `Rolegame_0`, `Doll_0`, `Reading_0`, `Playout_0`,`Conversation_0`; for parental beliefs on *Engagement*: `Paint_1`, `Sing_1`, `Puzzle_1`, `Rolegame_1`, `Doll_1`, `Reading_1`, `Playout_1`, `Conversation_1`; for parental beliefs on *Culture*: `Museum_0`, `Theater_0`, `Instrument_0`, `Library_0`, `Museum_1`, `Theater_1`, `Instrument_1`, `Library_1`; for parental beliefs on *Conflict*: `Scolding_0 Scolding_1`, `Argument_0`, `Argument_1`.

[16]Estimated factor loadings are generally larger than 0.7, while uniqueness are reasonably small with the exception of the sub-scale *Conflict*. Cronbach α for the general beliefs scale and the sub-scales in the 2022 sample are: 0.94 (*General* parental beliefs), 0.89 (parental beliefs on *Autonomy*), 0.89 (parental beliefs on *Engagement*),0.92 (parental beliefs on *Culture*), 0.78 (parental beliefs on *Conflict*). The estimates of the factor loadings and of the correlation between factors using data from the 2021 sample and the 2022 sample are reported in Table C.5 and Table C.6, respectively, in the Appendix.

Table 1: Factors and activities mentioned in the items of the beliefs' survey

Factor	Activity	With parent	Without parent	Factor	Activity	With parent	Without parent
Autonomy	Paint	-	A	**Engagement**	Paint	X	-
	Sing	-	A		Sing	X	-
	Puzzle	-	A		Puzzle	X	-
	Rolegame	-	A		Rolegame	X	-
	Doll	-	A		Doll	X	-
	Reading	-	A		Reading	X	-
	Play outside	-	A		Play outside	X	-
	Conversation	-	A		Conversation	X	-
Culture	Museum	X	S	**Conflict**	Scolding	X	A
	Theater	X	S		Argument	X	A
	Instrument	X	S				
	Library	X	S				

Note: the letter *S* refers to activities carried out under the supervision of a caregiver who is not the parent loading on the factor; the letter *A* refers to activities carried out by the child alone or with peers loading on a factor; the letter `X` refers to activities carried out with the parent loading on a factor. The symbol "-" indicates that the activity mentioned in the corresponding item is not loading on the factor.

The *Autonomy*, *Engagement* and *Culture* factors are positively correlated, while the correlation between *Conflict* and the other factors is generally close to zero and not statistically significant at conventional levels.

In the next section we present beliefs' indicators and we show that they correlate in the expected direction with the scale proposed and validated by Hembacher and Frank (2020) on Early Parenting Attitude (EPAQ). At the same time, correlations are low suggesting that our indicators capture different latent factors.

2.3 Indicators of Parental Beliefs

We consider four indicators of parental beliefs based on the survey. We construct factor scores, i.e. predicted values of the latent parental beliefs after confirmatory factor analysis, and simple indicators taking averages of the selected items listed in the previous section for each of the four factors we have identified.[17] In this paper, we will refer to these indicators

[17]Similar linear transformations of survey item responses are used to construct psychometric scales and sub-scales, such as for instance the Parental Stress Index Abidin (1997) and the Comprehensive Early Childhood Parenting Questionnaire - CECPAQ- Verhoeven et al. (2017). The simple indicators proposed differ with respect to the factor score because they assign equal weight to each item loading on the factor. However, given parameter estimates (see Table C.5), we might expect the difference to be minimal. They also differ because they have a different scale. As factor scales are normalized for identification purpose in

as sub-scales (*Autonomy*, *Engagement*, *Culture* and *Conflict*) for brevity.

Based on factor analysis we have selected the relevant items and have established that they are aligned with the ones commonly used in the economic literature. We are not aware of other questionnaires that explicitly inquire about beliefs regarding the role of parental engagement in various activities. However, we draw on psychological evidence to further support the convergent validity of our instrument. The *Early Parenting Attitudes Questionnaire* (EPAQ) by Hembacher and Frank (2020) is closely related to our work, as it aims at measuring how parents conceptualize their own role in child development. To further validate our survey instrument, we check the association between our survey and EPAQ. Overall, most pairwise correlations between our indicators and the EPAQ sub-scales are positive, but small in size – around 0.3.[18] The overall positive association between our belief indicators and EPAQ dimension is reassuring and shows that we are measuring similar concepts. Yet, the weak association between our indicators and the EPAQ sub-scales suggests that the dimensions captured by the two instruments are not perfectly overlapping. This is not surprising though, since EPAQ focuses on parental practices but it is not specifically designed to capture the role of parental presence across different every-day activities.[19]

3 Results

A key aspect of our measure of beliefs is to capture parental perceptions regarding the significance of parental engagement with their child. Gaining this insight can enhance our understanding of how parents distribute their time among various activities, especially those involving the direct participation of the child. In this section, we examine whether belief indicators predict parental time investments. We use a large set of alternative measures of parental time investments: total time spent with the child, time spent doing the activities

the confirmatory factor analysis model, the choice of the scale in either approach is somewhat arbitrary. Using the simple indicators, scoring starting from raw data would be easier for researchers using the beliefs survey resulting scales and sub-scales.

[18]Descriptive statistics on the psychometric sub-scales, including Cronbach α, are reported in Table B.2 in the paper Appendix.

[19]Table C.7 in the Appendix C presents the pairwise correlations with the beliefs indicators –computed as simple averages and as factor scores – and the psychometric sub-scale available in the 2021 sample and 2022 sample, respectively. Pairwise correlations are stable between the two approaches in computing beliefs' indicators.

included in our beliefs survey, engaged time, and quality time, as detailed below. Next, we examine the association of beliefs with parenting behaviours.

We start estimating jointly the measurement model used to construct beliefs (see Section 2.2) and a linear regression model to assess partial associations between the different dimensions of parental beliefs and time investments.[20] We control for observable characteristics of parent-child dyads adding four dummies related to the respondent characteristics (employed full time, employed part time, holds a college degree, and is female) and controls for the age of the child and the presence of siblings. All results are based on our main sample (2021). The coefficients of the observed regressors will be used to benchmark the size of the association between parental beliefs and parental time-investments.

We first examine (Table 2, Panel A) the partial correlation between parental behaviour – time investments – and parental beliefs' sub-scales, keeping constant parental beliefs on other dimensions.[21] We report the outcomes of formal tests of hypotheses regarding the potentially differential association between parental beliefs on *Engagement* and *Autonomy* and parental behaviours. Specifically, we formally test whether parental beliefs on *Engagement* and *Autonomy* have similar association (in sign and magnitude) with behaviours (i.e. $H_0 : \beta_{eng} = \beta_{aut}$) or rather the association goes in opposite directions but at the same time it has similar magnitude (i.e. $H_0 : \beta_{eng} = -\beta_{aut}$). If the latter hypothesis is not rejected, one can consider the difference between *Engagement* and *Autonomy* as an indicator of the relative importance parent attribute to their engagement. We construct this difference indicator as d_i

$$d_{i.} = \frac{1}{\widetilde{J}} \sum_{j=1}^{\widetilde{J}} (b_{ij}^1 - b_{ij}^0) \equiv \frac{1}{\widetilde{J}} \sum_{j=1}^{\widetilde{J}} b_{ij}^1 - \frac{1}{\widetilde{J}} \sum_{j=1}^{\widetilde{J}} b_{ij}^0$$

with $\widetilde{J}$ denoting the (common) number of selected items across the *Engagement* $\frac{1}{\widetilde{J}} \sum_{j=1}^{\widetilde{J}} b_{ij}^1$ and *Autonomy* $\frac{1}{\widetilde{J}} \sum_{j=1}^{\widetilde{J}} b_{ij}^0$.[22] As illustrated before, items loading on these two distinct factors refer to the same activity but differ in the modality in which the activity is performed. The

[20] We can also assess partial associations between the different dimensions of parental beliefs and time investments using the simple belief indicators described in section 2.3 – instead of factor scores – and linear regression. These results are available upon request and are consistent with the more precise estimates obtained estimating all model parameters jointly.

[21] Corresponding estimates of the measurement model are available upon request. We also estimate multiple linear regressions using the simple beliefs' indicators as regressor and not estimating the regression and measurement model jointly: results – available upon request – are similar.

[22] We can construct an analogous indicator using estimated factor scores but standard errors of regression

indicator $d_{i\cdot}$ is an individual specific indicator that summarizes the importance a respondent attributes to parental engagement. While the parental beliefs on *Autonomy* and *Engagement* are positively correlated, since parents evaluate the same activities, one can argue that the correlation of each indicator with parental behaviours might differ, i.e. that parental beliefs on either dimension have different implications for parental behaviours. In addition, notably, the difference indicator $d_{i\cdot}$ can capture the differential role of parents given a set of conventionally considered activities net of individual specific effects, under the assumption that (parents') individual fixed effects influence beliefs in an additive way for each activity listed in $d_{i\cdot}$. Thus, under the assumption that unobserved determinants of parental beliefs are individual specific, the observed association between the $d_{i\cdot}$ indicator and parental beliefs should not be driven by unobserved factors. This would also be consistent with Del Bono et al. (2024) who consider a model that allows for the presence of a family factor that influences how parents respond to survey questions about their children skills but does not directly affect their behaviour.

3.1 Association with parental time investments

To consider parental beliefs internally valid, we explore whether they influence concrete actions relevant for child development. Among the latter ones, parental time investments stand out as the most crucial, arguably even more impactful than financial, material, or other forms of educational investments (Fiorini and Keane, 2014).

On this premise, we use data from an app-based time diary, which provides a rich and detailed account of parental time use (Bigoni et al., 2025). Respondents from our main sample were asked to complete two 24-hour diaries – one on a weekday and one on a weekend day. Users selected an activity from 11 macro-categories.[23] In total, there are 137 pre-coded activities available for selection. For each selected activity, respondents had to report its duration. Additionally, they were asked to provide contextual information regarding the

would have to be adjusted to take into account that factor loadings are estimated. Point estimates are similar to those obtained using the $d_{i\cdot}$ indicator illustrated in the text.

[23]The macro-categories are: Sleep, eat, personal care; Work/study activities; Household activities; Childcare; Activities of support for others, club membership and volunteering; Social life and entertainment; Sport and outdoor activities; Hobbies and pastimes; TV, reading, communications and mass media; Travel; Other.

child's presence and level of engagement during each activity.[24]

We consider four measures of parents' time with children:

1. **Total Time with Child:** the total time the parent spends in the presence of their child, regardless of the activity and the level of engagement;

2. **Parental Belief Survey Activities:** all the time spent by the parent in the presence of their child doing the activities included in our beliefs survey;

3. **Engaged Time:** the time spent on any activity, provided the child is actively engaged. This measure of parental time investment focuses on the quality of daily parent-child interactions. In this case as well, we remain ex-ante agnostic about which activities are the most productive, but acknowledge that the quality of interaction is a key driver of child development. In fact, even seemingly mundane activities can become valuable learning opportunities if the child is actively involved. For further details on this novel measure, see Bigoni et al. (2025);

4. **Quality Time:** includes the time devoted to specific activities comprised in the Quality Time definition of Price (2008). All the activities included here are expected to be the most beneficial for child development.[25]

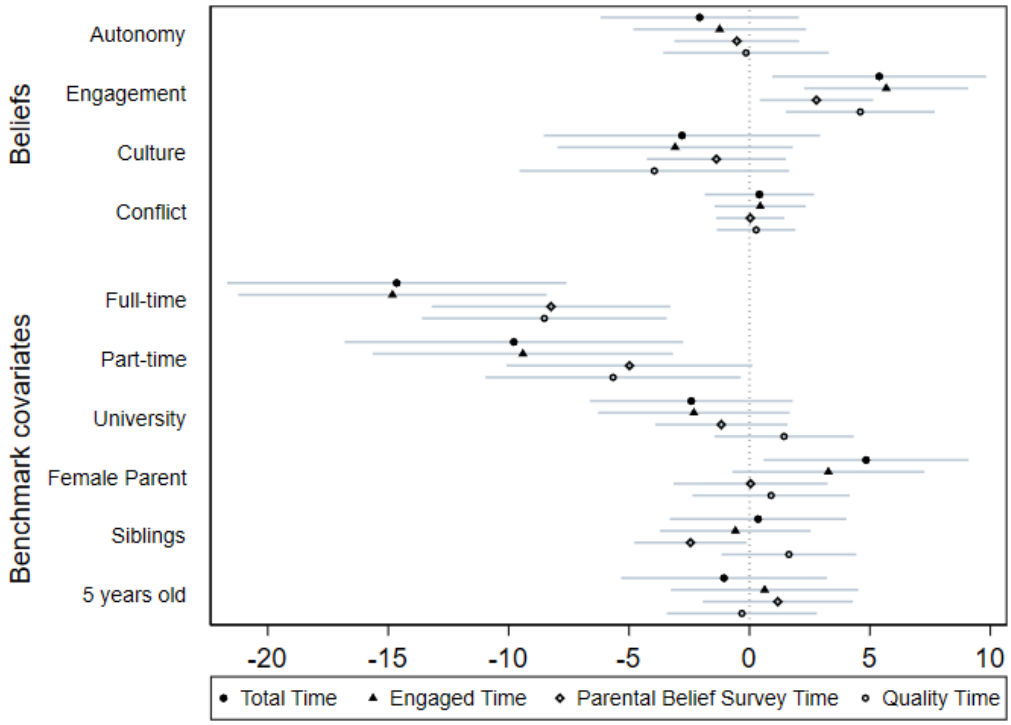
All time measures are obtained from the two time diaries using average hours per week as unit of measurement. Table B.3 in the Appendix presents summary statistics for the four measures. On average, respondents reported spending nearly 50 hours per week in the presence of their child, of which almost 43 hours are devoted to activities in which the child is actively involved. The discrepancy is due to activities such as household chores, grocery shopping, and working from home, when most likely the child is not directly involved. The total time spent in activities classified as quality time amounts to about 28 hours; finally, about 28 hours were devoted to activities included in our belief survey. These data are based on the 305 parents who completed the belief survey as well as both time use diaries (one on

[24]For further details on the structure of time diaries see Appendix D of this paper, and Bigoni et al. (2025).

[25]The activities included in Quality Time are: reading, playing, talking with/listening, arts and crafts, eating, playing sports, attending performing arts, visiting museums, participating in religious practices, looking after, physical care, and helping with homework for older children.

a weekday and one on a weekend day) on which the weekly time investments measures are constructed. The drop in responses is typical of this instrument, since time diaries are time-consuming, require undivided attention, and must be completed within a 3-day window. Importantly, we do not observe selective attrition. While the complexity of time diaries comes at the cost of attrition, they provide very granular information and are less prone to demand effect, which might bias other instruments such as retrospective questions about time use.[26]

Figure 2: Nexus between parental beliefs and parental time investments



Note: The plotted estimated coefficients are obtained from panel A of Table 2.

Table 2 and Figure 2 display the estimated coefficients of regressions associating beliefs and the four measures of parental time investments. Panel A shows that a 1sd increase in parental beliefs on engagement is associated with about 6 hours per week increase in engaged time. The associated increase in time spent on activities classified as *Quality time* according to Price (2008) is slightly lower (about 4.6 hours per week). These associations are large and correspond to about 30% of a standard deviation of the corresponding time investments

[26]Regression analysis using observed respondent characteristics used 301 observations, as for some respondents we have missing data on some control variables.

indicators.[27] The association with time spent on activities listed in the beliefs' survey (nearly 3 more hours per week) and with total time (around 5 additional hours per week) is less precisely estimated and positive. The latter outcome refers to the time parents spend with the child regardless of the activity performed and the level of engagement. In addition, the association of each measure of parental investment with beliefs on engagement is larger – in absolute value – than any obtained with socio-economic indicators, with only one exception: the employment status. As shown in Figure 2, working full-time or even part-time has a large negative association. Compared to a stay-at-home parent, one working full-time spends about 8.5 hour less of quality time and 15 hours less of total time with the child every week. For a part-time parent this gap is about 6 hours of quality time and close to 10 hours of total time per week. The association of beliefs on engagement is roughly equivalent to the difference in time-investments between being employed part-time and full-time, conditional on included controls.

Establishing the direction of causality between parental beliefs and investment decisions is often difficult. However, shifting the focus from beliefs about returns to investment toward beliefs about children's well-being may help mitigate these concerns. When parents are asked to assess the productivity of their time investments—for example, how much reading improves future cognitive outcomes—their responses may reflect not only prior beliefs but also an ex-post rationalization of their existing behavior. This raises the possibility that measured beliefs are endogenous to investment decisions, complicating causal interpretation. By contrast, eliciting beliefs about how various activities promote children's well-being may be less susceptible to this kind of reverse causality. These evaluations are likely to draw on more immediate, affective judgments rather than retrospective justifications, and may therefore offer a clearer window into the motivations that guide parenting choices. In addition, by refraining from focusing on a specific child skill, we limit the influence of the potential contamination highlighted by Del Bono et al. (2024), who provide evidence that parental assessment of children skills is influenced by own parental skills and traits.

We cannot reject the null that the association between time investments and parental beliefs on engagement has the same magnitude – but opposite sign – as the association

[27] See time use descriptive statistics in Table B.3 in the Appendix.

between time investments and parental beliefs on autonomy. On the contrary, we consistently reject the null that the two associations have the same sign and magnitude. We cannot reject the null that beliefs on culture and conflict are not jointly associated with parental time investments.

Table 2: Association between parental beliefs and parental time investments. Sample: 2021.

	(1) Total Time with the child	(2) Parental Beliefs' Survey activities	(3) Engaged time	(4) Quality time (Price, 2008)
Panel A: Association with Beliefs Indicators				
Belief: Autonomy	-2.069	-0.526	-1.237	-0.143
	(2.099)	(1.322)	(1.831)	(1.752)
Belief: Engagement	5.387*	2.783*	5.678**	4.602**
	(2.263)	(1.203)	(1.737)	(1.578)
Belief: Culture	-2.801	-1.374	-3.087	-3.950
	(2.927)	(1.473)	(2.493)	(2.857)
Belief: Conflict	0.412	0.0338	0.447	0.278
	(1.157)	(0.720)	(0.965)	(0.833)
Controls	Yes	Yes	Yes	Yes
Observations	301	301	301	301
$H_0 : \beta_{eng} = \beta_{aut}$	0.034	0.110	0.013	0.037
$H_0 : \beta_{eng} = -\beta_{aut}$	0.200	0.110	0.047	0.068
$H_0 : \beta_{cul} = 0, \beta_{confl} = 0$	0.630	0.640	0.450	0.380
Panel B: Association with Beliefs Difference Indicator d_i				
Relative Belief	1.711	0.772	1.468*	0.993
(Engagement-Autonomy)	(1.111)	(0.525)	(0.691)	(0.587)
Controls	Yes	Yes	Yes	Yes
Observations	301	301	301	301

Note: : * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Panel A coefficients' estimates are obtained via quasi maximum likelihood estimation with Satorra-Bentler error correction (Satorra and Bentler, 1994) using the `STATA` software and estimating jointly the measurement model deriving the beliefs indicator and the linear regression assessing the association between beliefs indicators (factor scores) and observed variables. For each null hypothesis listed H_0, we report corresponding p-values. Panel B estimates use the difference between the simple beliefs indicators on *Engagement* and *Autonomy* (d_i) – described in section 2.3 – as main regressor and, given the results of Panel A tests, omit the indicators of parental beliefs *Culture* and *Conflict*. The indicator d_i is constructed taking the simple average of the items loading on *Engagement* and *Autonomy*. Similar point estimates can be obtained by constructing the difference indicator as the difference of *Engagement* and *Autonomy* factor scores as resulting from CFA.

In Panel B of Table 2 we consider the association between the d_i indicator described in section 2.3 and parental time-use choices[28]: the estimated coefficients indicates that a 1 standard deviation increase in the relative importance parents attribute to their presence on child well-being relative to allowing the child to perform the same set of activities alone or with peers is positively associated to engaged time (leading to about 1.5 hours more of engaged time). Under the assumption that unobserved determinants of parental beliefs are individual specific, this figure should not be driven by unobserved factors.[29]

3.2 Association with parenting behaviours

Parenting styles reflect how parents handle disagreements with their children and have been shown to influence child development, correlating with parental time investments (Doepke and Zilibotti, 2017, 2019; Doepke et al., 2019). Economists have primarily focused on positive parenting and different parenting styles, such as authoritarian or authoritative parenting. These two different parenting styles have paralleled the rise in both parental time investments and socioeconomic inequality over recent decades (Doepke and Zilibotti, 2019), potentially driven by parents' efforts to prepare their children for increasingly competitive environments.

To capture the multidimensional nature of parental behaviours, we utilize the Comprehensive Early Childhood Parenting Questionnaire, developed by Verhoeven et al. (2017) for parents of preschool-aged children and validated for Italy by Sansavini et al. (2025). In psychological research, this instrument is recognized as a comprehensive and accurate measure of parenting behaviours, as it encompasses five key sub-scales central to early childhood development: (i) Support (sensitivity, responsiveness, affection); (ii) Stimulation (activities, exposure, toys); (iii) Structure (consistency, absence of laxness and over-reactivity); (iv) Harsh discipline (physical punishment, verbal punishment, and psychological control); and (v) Positive discipline (disciplinary techniques that promote positive child behavior, including induction and praising).[30]

[28]This regression omits indicators for parental beliefs on *Culture* and *Conflict* and is not directly comparable with the results in Panel A.

[29]Similar point estimates can be obtained constructing the difference indicator as the difference of *Engagement* and *Autonomy* factor scores as resulting from CFA: 1.691 (total time with child) 1.909 (parental beliefs' survey activities) 1.534 (engaged time) 1.119 (quality time). Standard errors would have to be adjusted to account the factor loadings are estimated.

[30]See Verhoeven et al. (2017) for more details on the development of the CECPAQ scale. The question-

Table 3 suggests that parental beliefs on the importance of handling conflict (*Conflict*) are positively associated with the sub-scales relating to *Structure* and *Harsh discipline* – as one may expect – but they are not associated with the *Stimulation* and *Positive discipline* sub-scales. A 1sd increase in parental beliefs on *Engagement* induces a 0.2sd increase in the CECPAQ sub-scales referring to *Stimulation* and *Positive discipline* and a 0.4sd in the CECPAQ sub-scale referring to *Support*, keeping constant parental beliefs on other dimensions. No association between parental beliefs on culture and parental behaviours as measured by CECPAQ can be detected.

Table 3: Association between parental beliefs and behaviours as measured by *CECPAQ* (Verhoeven et al., 2017), *CECPAQ-IT*(Sansavini et al., 2025). Sample: 2021.

	(1) Support	(2) Stimulation	(3) Structure	(4) Harsh discipline	(5) Positive discipline
Belief: Autonomy	-0.236**	0.148	0.0458	0.0734	0.0854
	(0.0892)	(0.0834)	(0.0890)	(0.0850)	(0.0993)
Belief: Engagement	0.416***	0.222**	0.0913	-0.0900	0.238**
	(0.0852)	(0.0785)	(0.0857)	(0.0823)	(0.0809)
Belief: Culture	-0.0541	-0.140	0.0513	-0.105	-0.0912
	(0.0658)	(0.0734)	(0.0725)	(0.0649)	(0.0724)
Belief: Conflict	0.0407	0.0205	0.109*	0.108*	0.00943
	(0.0418)	(0.0436)	(0.0480)	(0.0430)	(0.0440)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	581	581	581	581	581
$H_0 : \beta_{eng} = \beta_{aut}$	0.000	0.610	0.770	0.290	0.350
$H_0 : \beta_{eng} = -\beta_{aut}$	0.007	0.000	0.058	0.800	0.000
$H_0 : \beta_{cul} = 0, \beta_{confl} = 0$	0.400	0.130	0.070	0.008	0.440

Note: : * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Panel A estimates are obtained via quasi maximum likelihood estimation with Satorra-Bentler error correction (Satorra and Bentler, 1994) using the `STATA` software and estimating jointly the measurement model deriving the beliefs indicator and the linear regression assessing the association between beliefs indicators (factor scores) and observed variables. Panel B estimates would use the difference between the simple beliefs indicators on *Engagement* and *Autonomy* (d_i) – described in section 2.3 – as main regressor. This indicator is constructed taking the simple average of the items loading on *Engagement* and *Autonomy*. As the null $H_0 : \beta_{eng} = -\beta_{aut}$, against bilateral alternative, is rejected we do not report panel B estimates.

naire has attracted international interest and it has been translated – or is in the process of being translated- into different languages, including Chinese, Spanish (USA), Persian (Iran), Turkish, Hungarian, Italian, and Slovenian. See `https://cecpaq.sites.uu.nl/international-use-of-the-cecpaq/` for updated information.

We test whether the partial correlation between parental beliefs on autonomy and engagement and CECPAQ-IT are similar in magnitude but of opposite sign. With the exception of *Harsh discipline*, we find evidence that this hypothesis can be rejected while we tend not to reject the null that parental beliefs on autonomy and engagement are positively associated with parental behaviours as measured by CECPAQ-IT and their association is similar in magnitude. These results do not support the use of the beliefs difference indicator thus panel B estimates are not reported for this set of outcomes.

4 Conclusions

This paper introduces a new survey instrument designed to capture the beliefs of parents of preschoolers. Beliefs' scales have been proposed both in the psychological and economic literature and this study aims at bridging the two, adopting a cross-disciplinary approach and deviating from the literature in two ways. First, we design a survey instrument that explicitly focuses on the potential role of *parental engagement* in activities with preschoolers. Second, we do not restrict our attention to activities fostering specific skills of the child (such as language or cognitive skills). In addition, we can exploit rich and recent data on a developed country in two distinct samples of parents of preschoolers to show whether the beliefs' indicators based on our survey predict parental time-investments and parental behaviours.

Our study reveals that parental beliefs are multi-faceted. Using exploratory and confirmatory factor analysis, we identify four domains: *Autonomy*, *Engagement*, *Culture* and *Conflict*. We also find that belief indicators from our survey align with expected parental behaviours. On average, parents in our sample spend about 50 hours per week with their child, with around 43 hours in active engagement and 28 hours considered *quality time*. A one-standard-deviation increase in *Engagement* beliefs is associated with six additional hours spent with the child in active engagement and almost five hours of quality time, per week. These effects are large, amounting to roughly a third of a standard deviation of the corresponding time-use indicators.

A few considerations are in order. First, the strong association between *Engagement*

beliefs and time-use indicators suggests that policy interventions targeting this dimension of parental beliefs may be effective, provided these beliefs are indeed malleable.[31] Furthermore, our scale offers researchers a tool for examining how parents prioritize activities and the importance they place on being present during those activities, creating a synthetic indicator to capture the relative importance parents assign to their engagement. Additionally, the beliefs indicator we propose builds on previous research in the field without requiring assumptions about how parents balance investments across different skills, the measurement systems they use, or their perceptions of how children's skills are rewarded, although it does not measure the accuracy of these beliefs.

As parenting continues to gain attention in public policy, having a belief-based tool that is closely related to parents' daily lived experiences and that recognizes the value of both development and well-being, can enhance our understanding of how families invest in their children and how best to support them.

[31]Previous work has shown that parental beliefs about the productivity of early investments—such as language exposure—can be shaped by structured programs like LENA Start (Cunha et al., 2024). The beliefs we elicit differ in that they do not require parents to quantify returns or reason in explicitly developmental terms. Instead, they draw on parents' intuitive evaluations of everyday activities. It is possible that beliefs also framed in this way—closer to how parents naturally think and talk about caregiving—could be amenable to different forms of intervention, particularly lighter-touch or behaviorally informed ones. Future work could explore this potential complementarity more directly.

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Appendix for the paper

Parental beliefs, engagement, and time investments in preschoolers by

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A The parental beliefs' survey instrument

The parental beliefs' survey instrument was administered using a web-app developed within the MinUTo project (Guarini et al., 2022) by our technical partner Indici Opponibili. Table A.1 presents the list of activities included in the questionnaire and the wording of the items in English (participants could choose the app language among Italian, English and French). For each activity, the table includes a label where the suffix "_1" indicates that the activity is done with the presence of the parent, while the suffix "_0" indicates that the activity is done without the presence of the parent or with other children. Respondents could just see the text of the item (column "Activity" in Table A.1).

Table A.1: Survey activities list and items wording

Label	Activity
Eating_0	The child eats lunch or dinner alone or with other children.
Eating_1	The child has lunch or dinner with his parent.
Playout_0	The child plays outdoors alone or with other children.
Playout_1	The child plays outdoors with his parent.
Tablet_0	The child uses a tablet (or mobile phone or computer) alone or with other children.
Tablet_1	The child uses a tablet (or mobile phone or computer) together with his parent.
TV_0	The child watches a children's television programme alone or with other children.
TV_1	The child watches a children's television programme together with his parent.
Plant_Pet_care_0	The child takes care of the plants or pets alone or with other children.
Plant_Pet_care_1	The child takes care of the plants or pets with his parent.
Museum_0	The child visits a museum with the school.
Museum_1	The child visits a museum with his parent.
Reading_0	The child reads/looks through a book alone or with other children.
Reading_1	The child reads/looks through a book, together with his parent.
Storytell_0	The child listens to a story on the radio or other electronic media.
Storytell_1	The child listens to his parent reading a story.
Doll_0	The child plays with dolls or soft toys alone or with other children.
Doll_1	The child plays with dolls or soft toys together with his parent.
Rolegame_0	The child plays at acting out roles/dressing up alone or with other children.
Rolegame_1	The child plays at acting out roles/dressing up together with his parent.
Conversation_0	The child talks with other children about his day or other things that have happened.
Conversation_1	The child talks with his parent about his day or other things that have happened.
Scolding_0	Child is scolded by a teacher.
Scolding_1	The child is scolded by his parent.
Argument_0	The child argues with other children.
Argument_1	The child argues with his parent.
Puzzle_0	The child plays with building blocks and jigsaw puzzles alone or with other children.
Puzzle_1	The child plays with building blocks and jigsaw puzzles together with his parent.
Paint_0	The child draws, paints, cuts out, uses plasticine, or does manual activities alone or with other children.
Paint_1	The child draws, paints, cuts out, uses plasticine, or does manual activities together with his parent.
No_Feedback_0	The child speaks but is not heard by other children.
No_Feedback _1	The child speaks but is not heard by his parent.
Cry_0	The child cries alone or with other children.
Cry_1	The child cries with his parent
Theater_0	The child goes to the theater or a concert with the school.
Theater_1	The child goes to the theater or a concert with his parent.
Instrument_0	The child plays an instrument alone or with other children.
Instrument_1	The child plays an instrument with his parent.
Sing_0	The child sings alone or with other children.
Sing_1	The child sings with his parent.
Be_bored_0	The child is bored alone or with other children.
Be_bored_1	The child is bored with the parent.
Library_0	The child attends the library with the school.
Library_1	The child attends the library with his parent.

Note: List of activities included in the questionnaire and the wording of the items in English (participants could choose the app language among Italian, English and French). For each activity the suffix "_1" indicates that the activity is done with the presence of the parent, while the suffix "_0" indicates that the activity is done without the presence of the parent or with other children.

B Descriptive statistics

B.1 Sample

This section presents descriptive statistics. Table B.1 compares the samples used for the analysis with data from the Survey on Household Income and Wealth (SHIW) run by the Bank of Italy. Table B.2 provides the descriptive statistics for the psychometric scales and subscales, whereas Table B.3 presents the descriptives related to the time-use diaries.

Table B.1: Analysis sample vs. Northern Italy representative sample (*SHIW*): Mean (sd)

		Sample from MinUTo^{++}		SHIW Northern Italy sample
		2021	2022	4-5 years old parents
Child:	Age	4.3 (0.4)	4.3 (0.5)	4.6 (0.5)
	Female	0.5 (0.5)	0.5 (0.5)	0.5 (0.5)
	Single child	0.4 (0.5)	0.4 (0.5)	0.4 (0.5)
Mother:	Age	39.2 (4.5)	39.2 (4.7)	38.3 (5.6)
	Italian	0.92 (0.3)	1 (0)	0.8 (0.4)
	Years of education	16.4 (3.0)	16.6 (2.9)	13.1 (3.7)
	Employed	0.91 (0.3)	0.91 (0.3)	0.8 (0.4)
	Weekly hours of work^{+}	34.4 (9.0)	34.4 (8.9)	35.6 (8.83)
Father:	Age	41.5 (5.3)	41.8 (5.6)	42 (6.5)
	Italian	0.94 (0.2)	1 (0)	0.83 (0.4)
	Years of education	15.3 (3.4)	15.3 (3.5)	12.4 (3.64)
	Employed	0.99 (0.2)	0.98 (0.2)	0.97 (0.2)
	Weekly hours of work^{+}	41.1 (9.9)	41.4 (8.2)	41.1 (8.3)
Sample size		597*	951*	122**

Note: The table contrasts descriptives statistics from the population surveyed by MinUTo and a comparable sample of parents of pre-schoolers living in large Italian municipalities extracted from the nationally representative Survey on Household Income and Wealth run by the Bank of Italy (pooling data from several waves between 2002 and 2020). $^{++}$ MinUTo involves volunteers among parents of children 4 and 5 years old; one parent participates and reports information for both parents; * Number of observations with no missing data on the beliefs survey items. Item non response possible on other variables reported in the table, generally $\leq 2\%$. ** Number of observations with no missing data on preschool child/children in the household. Item non response possible on other variables reported in the table, generally $\leq 5\%$. $^{+}$ Hours of work statistics reported for employed respondents.

Table B.2: Descriptives on psychometric scales CECPAQ and EPAQ.

	Mean (sd) [Cronbach α]	
	Sample 2021	Sample 2022
CECPAQ		
Support	5.08 (0.44) [0.87]	5.06 (0.47) [0.88]
Stimulation	4.70 (0.51) [0.75]	4.77 (0.53) [0.79]
Structure	3.93 (0.57) [0.71]	3.97 (0.55) [0.70]
Harsh discipline	2.30 (0.70) [0.85]	2.30 (0.66) [0.84]
Positive discipline	5.50 (0.46) [0.68]	5.50 (0.52) [0.78]
N	590	947
EPAQ		
Affection and Attachment	6.09 (0.64) [0.69]	6.12 (0.65) [0.78]
Early Learning	6.26 (0.48) [0.49]	6.23 (0.53) [0.78]
Rules and Respect	5.54 (0.70) [0.65]	5.49 (0.70) [0.64]
N	585	943

Note: CECPAQ – *Comprehensive Early Childhood Parenting Questionnaire* (Verhoeven et al., 2017; Sansavini et al., 2025). EPAQ – *Early Parenting Attitudes Questionnaire* (Hembacher and Frank, 2020). The within-sample difference in N is due to difference in the completion of the questionnaire, as descriptives are reported using the largest available sample size for each scale (CEPAQ and EPAQ, respectively) and no missing data on the beliefs survey items. Samples: December 2021 and December 2022.

Table B.3: Descriptive statistics on parental time-use: average hours per week, based on parental time-use diaries.

	Mean (Sd)	Median
Total time with child	49.95 (17.91)	47.67
Total time with child engaged	42.84 (15.84)	40.83
Quality time (Price, 2008)	28.40 (13.06)	27.00
All activities listed in the beliefs' survey	28.16 (11.84)	27.17
N	305	

Note: Average hours per week, based on parental time-use diaries (one week-day and a weekend randomly assigned). All measures are collected using the time-use diaries of parents (Bigoni et al., 2025). Sample: December 2021 with no missing data on on the beliefs survey items (N=305). Time-use diaries data not available for December 2022 sample.

B.2 Beliefs survey

When answering the beliefs' survey, parents typically used the whole range of possible assessment values for almost all items, and the distribution of answers is remarkably similar between the two waves, both on average and–more importantly–when we use central tendency indicators that are more robust to the presence of outliers (such as median response).[1] As a preliminary step for our analysis on the factor structure emerging from the data, we explore the sources of variability in the answers among respondents, with particular attention to the role of between- and within-parents variability as well as to the variability induced by the two alternative scenarios parents are invited to consider.

Let b_{ij}^{k} indicate the single survey answer, where $i \in [1; n]$ denotes the individual respondent, $j \in [1; 22]$ denotes the activity, and $k \in [0, 1]$ denotes the scenario, and indicates whether the activity is performed with the parent ($k = 1$), or by the child alone, with peers or with other adults ($k = 0$).

[1] Table B.4 presents descriptive statistics on each of the 44 items in the survey. For each activity, it allows to compare the answer given in the two scenarios: that is, when the activity is performed with and without the parent.

Table B.4: Parental Belief Survey items: Descriptives. Data: 2021, 2022

	Sample 2021 ($N = 597$)		**Sample 2022** ($N = 951$)	
Item label	**Mean[Sd]**	**p25(p50)p75**	**Mean[Sd]**	**p25(p50)p75**
Eating_0	43.24 [50.11]	6 (52) 92	48.60 [50.48]	15 (59) 97
Eating_1	67.30 [35.62]	47 (74) 99	70.41 [34.13]	50 (81) 100
Playout_0	80.12 [27.75]	66 (94) 100	80.35 [31.47]	68 (97) 100
Playout_1	69.25 [33.97]	49 (78) 100	70.86 [34.40]	50 (83) 100
Tablet_0	-57.53 [47.11]	-99 (-70) -35	-60.77 [43.63]	-100 (-72) -36
Tablet_1	-30.80 [54.96]	-80 (-38) 12	-37.93 [53.88]	-84 (-49) 0
TV_0	32.32 [41.75]	9 (36) 56	33.65 [43.21]	7 (37) 60
TV_1	-2.75 [52.39]	-39 (0) 35	-3.13 [52.32]	-39 (0) 34
Plant_Pet_care_0	52.35 [43.42]	31 (58) 95	55.23 [45.10]	32 (61) 99
Plant_Pet_care_1	65.63 [35.87]	44 (71) 98	68.09 [37.58]	48 (75) 100
Museum_0	70.41 [34.84]	52 (79) 100	73.82 [33.24]	56 (87) 100
Museum_1	68.60 [36.03]	49 (78) 100	71.46 [34.76]	54 (79) 100
Reading_0	73.76 [31.32]	56 (83) 100	73.28 [33.93]	56 (85) 100
Reading_1	81.36 [23.73]	66 (94) 100	83.27 [23.34]	69 (97) 100
Storytell_0	6.95 [54.08]	-37 (16) 47	11.49 [55.98]	-32 (19) 53
Storytell_1	82.92 [24.04]	72 (96) 100	84.80 [23.68]	73 (98) 100
Doll_0	69.93 [32.89]	50 (79) 100	71.03 [34.26]	52 (82) 100
Doll_1	61.73 [37.13]	39 (67) 98	64.44 [36.13]	41 (69) 100
Rolegame_0	74.06 [30.01]	56 (81) 100	75.02 [30.76]	57 (85) 100
Rolegame_1	63.54 [35.98]	44 (68) 97	67.03 [34.95]	45 (73) 100
Conversation_0	61.53 [35.89]	40 (64) 97	65.95 [36.79]	47 (73) 100
Conversation_1	77.50 [29.85]	63 (91) 100	79.81 [29.04]	65 (95) 100
Scolding_0	1.62 [52.58]	-39 (7) 41	0.98 [54.82]	-40 (3) 41
Scolding_1	1.38 [53.06]	-37 (5) 40	0.76 [53.91]	-40 (1) 42
Argument_0	-24.18 [45.96]	-57 (-30) 6	-24.67 [48.00]	-58 (-30) 4
Argument_1	-37.86 [46.29]	-74 (-42) -14	-37.17 [46.58]	-71 (-42) -11
Puzzle_0	72.91 [29.14]	55 (81) 100	73.91 [29.37]	56 (82) 100
Puzzle_1	68.67 [30.79]	46 (72) 99	69.26 [31.63]	48 (74) 100
Paint_0	74.53 [28.72]	56 (84) 100	76.57 [28.53]	59 (87) 100
Paint_1	70.76 [31.18]	52 (77) 100	72.99 [29.71]	52 (81) 100
No_Feedback_0	-63.39 [38.76]	-99 (-71) -42	-65.13 [38.15]	-99 (-73) -43
No_Feedback_1	-79.32 [37.13]	-100 (-95) -73	-81.55 [33.17]	-100 (-97) -75
Cry_0	-40.71 [44.66]	-75 (-45) -13	-39.25 [48.99]	-77 (-49) -9
Cry_1	0.26 [55.43]	-44 (3) 43	-0.69 [55.62]	-44 (0) 43
Theater_0	71.68 [35.32]	52 (83) 100	75.36 [31.53]	58 (89) 100
Theater_1	73.71 [34.73]	58 (87) 100	76.85 [30.04]	61 (89) 100
Instrument_0	66.99 [36.47]	47 (76) 100	68.75 [36.85]	50 (78) 100
Instrument_1	66.95 [35.89]	47 (74) 100	69.85 [34.47]	51 (78) 100
Sing_0	75.46 [27.16]	58 (84) 100	76.04 [28.63]	58 (86) 100
Sing_1	74.95 [28.05]	57 (84) 100	76.74 [26.80]	60 (85) 100
Be_bored_0	-24.06 [51.88]	-62 (-31) 6	-19.16 [54.72]	-63 (-27) 24
Be_bored_1	-18.24 [50.79]	-55 (-21) 19	-12.36 [53.70]	-53 (-15) 27
Library_0	68.46 [38.00]	50 (79) 100	73.91 [33.09]	55 (87) 100
Library_1	69.97 [37.89]	55 (82) 100	74.21 [34.75]	57 (90) 100

Note: See Table A.1 for the list of items. For each of the 22 activities parents are invited to assess the role how the activity contributes to the general well–being of the child in two scenarios: with the parent (items with suffix "_1") and alone, with peers or with other adults (items with suffix "_0") – for activities that cannot be performed alone such as going to the library or to a museum. The range is (−100)–(100). The respondent moves a slider and cannot see the exact number she is answering.

Table B.5: Parental Survey Activities: Descriptives with Difference indicator (sorted)

Activity	**With Parent (1)**	**Without Parent (0)**	**Difference**
Storytell	82.92	6.95	75.97
Cry	0.26	-40.71	40.97
Tablet	-30.80	-57.53	26.73
Eating	67.30	43.24	24.06
Conversation	77.50	61.53	15.97
Plant_Pet_care	65.63	52.35	13.28
Reading	81.36	73.76	7.60
Be_bored	-18.24	-24.06	5.82
Theater	73.71	71.68	2.03
Library	69.97	68.46	1.51
Instrument	66.95	66.99	-0.04
Scolding	1.38	1.62	-0.24
Sing	74.95	75.46	-0.50
Museum	68.60	70.41	-1.81
Paint	70.76	74.53	-3.77
Puzzle	68.67	72.91	-4.23
Doll	61.73	69.93	-8.20
Rolegame	63.54	74.06	-10.52
Playout	69.25	80.12	-10.87
Argument	-37.86	-24.18	-13.68
No_Feedback	-79.32	-63.39	-15.93
TV	-2.75	32.32	-35.07

Note: For each of the 22 activities we present the average responses in two scenarios: *with the parent*, and *without the parent*, i.e. alone, with peers or with other adults – for activities that cannot be performed alone such as going to the library or to a museum. The activities are sorted by the difference reported in the last column. See Table A.1 for the list of items. This table relies on the data collected in 2021.

Let $b_{\cdot j} \equiv \frac{\sum_{i=1}^{n}\sum_{k=0}^{1} b_{ij}^{k}}{2n}$ denote the average rating of activity j across all parents and across both scenarios. Similarly, let $b_{ij} \equiv \frac{\sum_{k=0}^{1} b_{ij}^{k}}{2}$ denote the average rating of activity j given by respondent i, across the two scenarios. Finally, let $D_j = \sum_{i=1}^{n}\sum_{k=0}^{1}(b_{ij}^{k} - b_{\cdot j})^2$ denote the total deviance across the ratings assigned to activity j by all respondents, and in both scenarios.

Equation B.1 illustrates that the total deviance D_j can be expressed as the sum of two components. The "Between-parents" component captures the variability of the ratings of activity j across parents, which is due to their different opinions on the importance of the activity in general, and possibly also to their different response style. The "Within-parent" component instead captures the share of the variability that emerges from the different rating attributed by respondents to activity j, in the two scenarios.

$$D_j = \sum_{i=1}^{n}\sum_{k=0}^{1}(b_{ij}^{k} - b_{\cdot j}^{\cdot})^2 = \underbrace{\sum_{i=1}^{n} 2 \cdot (b_{ij}^{\cdot} - b_{\cdot j}^{\cdot})^2}_{Between-Parents} + \underbrace{\sum_{i=1}^{n}\sum_{k=0}^{1}(b_{ij}^{k} - b_{ij}^{\cdot})^2}_{Within-Parents} \tag{B.1}$$

Equation B.2 further expands the second term of Equation B.1, and decomposes it into a "Within-scenario" component, that captures the variability across respondents in the ratings of the same activity j under the same scenario k, and a "Between-scenarios" component, which captures the variability due to the fact that the rating of activity j performed with or without the parent is, on average, different.

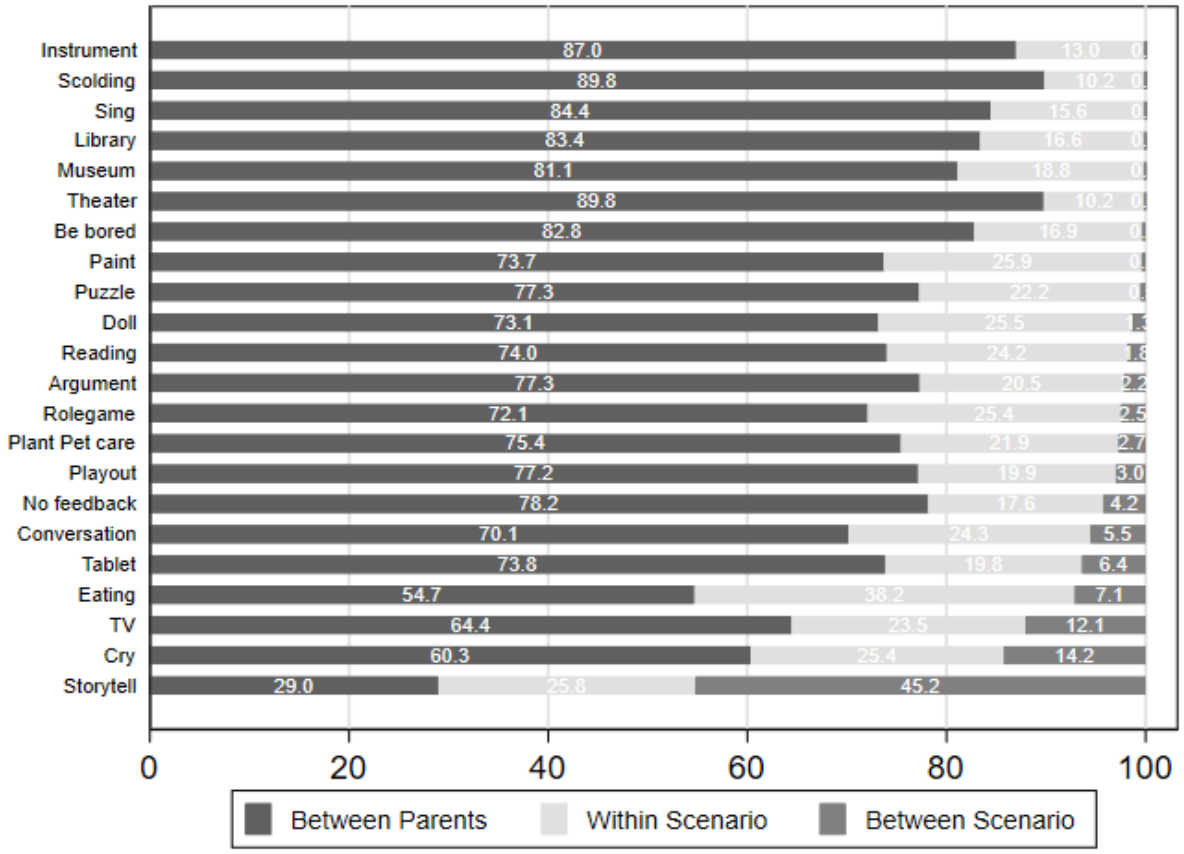
$$D_j = \sum_{i=1}^{n}\sum_{k=0}^{1}(b_{ij}^{k} - b_{\cdot j}^{\cdot})^2 = \underbrace{\sum_{i=1}^{n} 2 \cdot (b_{ij}^{\cdot} - b_{\cdot j}^{\cdot})^2}_{Between-Parents} + \underbrace{\sum_{i=1}^{n}\sum_{k=0}^{1}(b_{ij}^{k} - b_{\cdot j}^{k})^2}_{Within-scenario} + \underbrace{\sum_{k=0}^{1} n \cdot (b_{\cdot j}^{k} - b_{\cdot j}^{\cdot})^2}_{Between-scenarios} \tag{B.2}$$

Figure B.2 presents the results of a decomposition of the variability in the item-responses for each given activity j.[2] The graph reveals that, for most activities, the greatest part of the variability is due to the different opinions and possibly response styles across respondents (Between-parents component, represented by the dark-gray portion of the bar on the left). A non-negligible fraction of the variability (about 20-25% in most activities), however, is captured by the Within-scenario component (white part of the bars on the center), which implies that parents have different opinions on the importance of the same activity, within the same scenario. Finally, we observe that the third Between-scenarios component (light-gray portion of the bar on the right) varies substantially across activities. For some activities, it is very close to zero: this does not necessarily imply that respondents rate the activity the same, regardless of whether the parent is present or absent. This component can also be close to zero when some respondents consider the activity more important when performed with the parent while others rate the activity more when the parent is absent, and the impacts of these two opinions on average cancel out. When instead this component is more prominent, it implies that parents are more unanimous in rating the activity more under one than under the other scenario.

The third (light-gray) portion of the bars in the graph, thus, allows to assess the contribution of the differential rating respondents attribute to each activity under the two scenarios, and suggests this component is non-negligible and that there is scope for exploring the factor structure emerging from the answers. For activities such as watching *TV* or *Crying* - about 1/3 of the Within-parent variability can be attributed to differences in the answers

[2]The same decomposition using the second wave of data is available upon request.

Figure B.1: Parental beliefs survey: decomposition of the variability. Sample: 2021



Note: The chart shows a visual representation of the variance decomposition in Equation B.2. The decomposition B.2 further expands the second term of Equation B.1, and decomposes it into a "Within-scenario" component (white, middle), that captures the variability across respondents in the ratings of the same activity j under the same scenario k, and a "Between-scenarios" component (light gray, left), which captures the variability due to the fact that the rating of activity j performed with or without the parent is, on average, different. The "Between-parents" component (dark gray, left) captures the variability of the ratings of activity j across parents, which is due to their different opinions on the importance of the activity in general, and possibly also to their different response style.

between scenarios, that tend to be common across parents. For a few activities (*Storytell*), the contribution of this variance component is even larger.

In the next section, we present some descriptive statistics that can be useful to elaborate on the reliability and the potential problems of consistency, irrelevance, multi-dimensionality and redundancy, in light of the descriptive analysis presented above.

C Reliability, Exploratory Factor Analysis and Confirmatory Factor Analysis

In this section, before performing exploratory factor analysis, we examine the reliability of the answers of the respondents. We carry out a preliminary analysis of the Cronbach alpha of the full set of items, and subsets of either items related to parental engagement or those that relate to activities performed alone or with peers. Table C.1 explores reliability over a general scale considering all items, while Table C.2 illustrates what would happen if we simply group items based on the scenario they refer to (*with parent* vs *alone/with peers/with other relevant adult*). For each set of items, we present the overall Cronbach alpha and the one we would obtain by eliminating a given item (Column (1) in Tables C.1, C.2). This allows to identify potentially problematic items which are not answered consistently with the rest of the others. By comparing the reliability indicators in Table C.1 (using all items together) and the reliability indicators in Table C.2, we see that the reliability coefficients worsen when one considers separately items relating to parental engagement and items not-relating to parental engagement, hinting at some potential redundancy. Indeed, the Cronbach alpha is generally around 92% considering all items and decreases to around 87% (85%) considering only items referring to the scenario *with parent* (*without parent*) in Table C.2. Since Cronbach α's remain very high (above 0.8), we conclude that, while redundancy may inflate Cronbach α's in Table C.1, it is unlikely to reduce construct validity beyond acceptable levels.

Then, we consider the inter-item correlation (Column (2) in Tables C.1 and C.2). This index reflects the average correlation we would get between the response to the item under examination and all the others. The index allows detecting potential problems of either irrelevance (low values, i.e. below 0.15) or multi-dimensionality (high values, i.e. above 0.5). In the first case, the indication is that the items do not measure the same construct, in the second case the indication is that items might be repetitive. The average inter-item correlation is similar across Tables, and lies around 22%.[3] The tables also report the item-test correlation, which represents the correlation between the value of the single item and the total value in the scale and the item-rest correlation, in which to the total value of the scale is subtracted the value of the single item. Inter-item correlations are stable across items, while item-test correlations highlight some items who tend to perform poorly (specifically *Tablet*, *TV*, *No Feedback*, *Argument*, *Cry*, *Scolding*, *Be bored*, *Eating*, *Storytell*).[4]

[3]The literature suggests these indicators be between .20 and .40 for reasonably homogeneous items that at the same time contain sufficiently unique variance so as to not be isomorphic with each other. We will come back to this issue examining uniqueness in the exploratory factor analysis estimates table.

[4]For items related to *Eating* and *Storytell* in the two scenarios reliability indicators differ. Based on informal interactions with participants seeking support, this pattern may relate to different interpretations of the wording of the items in the scenario *without parent* (see Table A.1 for items' text).

Table C.1: Reliability. Data: 2021.

Item label	Cronbach α (1)	Inter-Item Correlation (2)	Item-Test Correlation (3)	Item-Rest Correlation (4)
Eating_0	0.92509	0.22312	0.19281	0.14701
Eating_1	0.92324	0.21858	0.38541	0.34434
Playout_0	0.92136	0.21412	0.57444	0.54167
Playout_1	0.92165	0.21480	0.54573	0.51146
Tablet_0	0.92407	0.22060	0.29977	0.25614
Tablet _1	0.92460	0.22189	0.24497	0.20009
TV_0	0.92648	0.22663	0.04362	-0.00336
TV_1	0.92643	0.22652	0.04852	0.00154
PlantPet_care_0	0.92086	0.21297	0.62309	0.59306
PlantPet_care_1	0.92178	0.21510	0.53274	0.49782
Reading_0	0.92048	0.21210	0.66022	0.63245
Reading_1	0.92012	0.21129	0.69455	0.66901
Storytell_0	0.92542	0.22395	0.15761	0.11134
Storytell_1	0.92052	0.21219	0.65628	0.62826
Doll_1	0.92094	0.21316	0.61513	0.58463
Doll_0	0.92066	0.21251	0.64283	0.61398
Rolegame_0	0.92052	0.21219	0.65630	0.62828
Rolegame_1	0.92092	0.21310	0.61784	0.58750
Conversation_0	0.92136	0.21412	0.57464	0.54188
Conversation_1	0.92128	0.21395	0.58179	0.54942
Instrument_0	0.92003	0.21108	0.70362	0.67869
Instrument_1	0.91946	0.20979	0.75815	0.73707
Sing_0	0.92008	0.21119	0.69879	0.67353
Sing_1	0.92005	0.21112	0.70165	0.67658
Puzzle_0	0.92028	0.21165	0.67904	0.65247
Puzzle_1	0.92030	0.21170	0.67712	0.65043
Paint_0	0.92088	0.21301	0.62161	0.59150
Paint_1	0.92053	0.21221	0.65545	0.62738
Argument_0	0.92410	0.22065	0.29728	0.25358
Argument_1	0.92426	0.22107	0.27976	0.23563
No Feedback_0	0.92235	0.21646	0.47525	0.43766
No Feedback_1	0.92247	0.21674	0.46347	0.42538
Cry_0	0.92435	0.22128	0.27086	0.22653
Cry_1	0.92591	0.22519	0.10496	0.05820
Scolding_0	0.92724	0.22861	-0.04009	-0.08681
Scolding_1	0.92604	0.22551	0.09144	0.04461
Theater_0	0.91960	0.21011	0.74474	0.72268
Theater_1	0.91958	0.21006	0.74659	0.72466
Museum_0	0.92012	0.21128	0.69476	0.66923
Museum_1	0.92053	0.21220	0.65578	0.62774
Library_0	0.92015	0.21135	0.69200	0.66629
Library_1	0.92022	0.21151	0.68525	0.65909
Be bored_0	0.92539	0.22387	0.16105	0.11482
Be bored_1	0.92577	0.22482	0.12070	0.07406
Total	0.92390	0.21626		

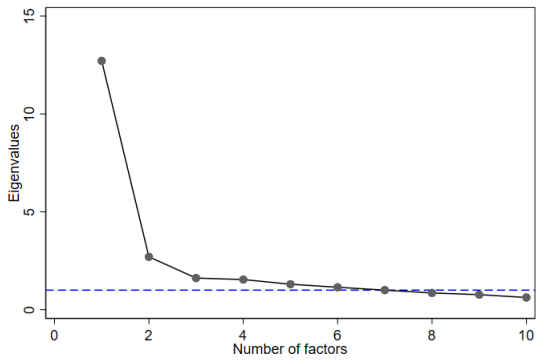
Note: Inter-Item Correlation represents the average correlation we would get between the response to the item under examination and all the relevant others. The item-test correlation represents the correlation between the value of the single item and the total value of the scale. The item-rest correlation represents the correlation between the value of the item and the total value of the scale when we remove the value of the single item considered.

Table C.2: Reliability: only items referring to the scenario *with parent* and *without parent* separately. Sample: 2021

Item label	Cronbach α (1)	Inter-Item Correlation (2)	Item-Test Correlation (3)	Item-Rest Correlation (4)
	Sample: 2021 - items *with parent* scenario			
Eating_1	0.86816	0.23872	0.44640	0.37221
Playout_1	0.86329	0.23119	0.58486	0.52269
Tablet_1	0.87363	0.24766	0.28198	0.19861
TV_1	0.87856	0.25623	0.12448	0.03719
PlantPet_care_1	0.86120	0.22807	0.64224	0.58626
Reading_1	0.85744	0.22264	0.74203	0.69858
Storytell_1	0.85913	0.22506	0.69752	0.64819
Doll_1	0.86009	0.22644	0.67214	0.61968
Rolegame_1	0.86103	0.22783	0.64665	0.59117
Conversation_1	0.86258	0.23011	0.60463	0.54451
Instrument_1	0.85770	0.22302	0.73513	0.69073
Sing_1	0.85863	0.22433	0.71092	0.66331
Puzzle_1	0.85803	0.22347	0.72672	0.68119
Paint_1	0.85964	0.22580	0.68404	0.63303
Argument_1	0.87221	0.24530	0.32551	0.24406
No Feedback_1	0.86801	0.23848	0.45089	0.37703
Cry_1	0.88157	0.26170	0.02391	-0.06353
Scolding_1	0.87739	0.25416	0.16253	0.07577
Be bored_1	0.87944	0.25780	0.09557	0.00805
Theater_1	0.85827	0.22382	0.72034	0.67396
Museum_1	0.86046	0.22698	0.66227	0.60862
Library_1	0.85975	0.22595	0.68116	0.62980
Total	0.87095	0.23476		
	Sample: 2021 - items *without parent* scenario			
Eating_0	0.85937	0.22540	0.25127	0.16314
Playout_0	0.84633	0.20778	0.58890	0.52434
Tablet_0	0.85798	0.22341	0.28936	0.20270
TV_0	0.86507	0.23390	0.08850	-0.00273
PlantPet_careg_0	0.84680	0.20836	0.57766	0.51192
Museum_0	0.84148	0.20177	0.70389	0.65314
Reading_0	0.84091	0.20108	0.71711	0.66815
Storytell_0	0.86140	0.22837	0.19435	0.10456
Doll_0	0.84286	0.20346	0.67166	0.61673
Rolegame_0	0.84240	0.20289	0.68251	0.62896
Conversation_0	0.84547	0.20668	0.60985	0.54758
Instrument_0	0.83908	0.19891	0.75868	0.71563
Sing_0	0.83919	0.19904	0.75618	0.71277
Puzzle_0	0.84004	0.20005	0.73693	0.69074
Paint_0	0.84273	0.20329	0.67485	0.62032
Argument_0	0.85976	0.22597	0.24032	0.15182
No Feedback_0	0.85100	0.21382	0.47315	0.39776
Cry_0	0.85909	0.22500	0.25896	0.17110
Scolding_0	0.86537	0.23435	0.07983	-0.01143
Theater_0	0.83944	0.19933	0.75067	0.70645
Libraryg_0	0.84157	0.20189	0.70168	0.65064
Be bored_0	0.86274	0.23036	0.15623	0.06568
Total	0.85584	0.21251		

Note: Inter-Item Correlation represents the average correlation we would get between the response to the item under examination and all the relevant others. The item-test correlation represents the correlation between the value of the single item and the total value of the scale. The item-rest correlation represents the correlation between the value of the item and the total value of the scale when we remove the value of the single item considered.

Figure C.1: Scree plot after Exploratory Factor Analysis. Sample: 2021 data.



Note: We perform our Exploratory Factor Analysis (EFA) using all 44 items, relying on the 2021 data and maximum likelihood estimation. This figure reports the scree plot after EFA. The scree plot after Principal Axis Factoring exhibits a similar pattern.

We start our exploratory factor analysis (EFA) using all items and the Kaiser criterion, the screeplot (Cattell, 1966), and parallel analysis to guide our choice on the number of factors to retain. EFA is performed using 2021 data.[5] The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) is 0.899 keeping all items and improves to 0.926 dropping problematic items, as resulting from the reliability indicators discussed before. These KMO levels are considered respectively *meritorious* and *excellent* and indicate that there is scope for performing factor analysis but are not decisive in selecting the items to retain. The scree plot – starting from the full set of items – is presented in Figure C.1 and the results of the parallel analysis can be found in Table C.3. Combining these criteria, we retain 4 factors and estimate factor loadings imposing orthogonal factors and normalization.[6] We perform item selection removing items that return high uniqueness and were performing poorly according to the reliability indicators, as previously discussed in detail.[7]

For most items, estimated factor loadings (Table C.4) tend to generally be higher than 0.7 on just one latent factor and to be of a significant smaller size on other factors, allowing us to detect meaningful patterns. However, for a limited subset of items, factor loadings

[5]We performed EFA estimation using maximum likelihood but we detect deviations from normality in the raw data. The results are robust relying on Principal Axis Factoring, robust to deviations from normality.

[6]The curve in the screeplot flattens after the fourth factor and the parallel analysis shows that for all the listed factors is never higher in the parallel analysis compared to the real data.

[7]We drop `Tablet_0`, `Tablet_1`,`TV_0`, `TV_1`, `Cry_0`, `Cry_1`, `Be_bored_0`, `Be_bored_1`, `Eating_0`, `Eating_1`, `No_Feedback_1`, `No_Feedback_0`, `Storytell_0`, `Plant_Pet_care_0`, as these had poor reliability indicators and return a high uniqueness. While we drop `Storytell_1` and `Plant_Pet_care_1` for symmetry, we retain `Scolding_0`, `Scolding_1`, `Argument_0`, `Argument_1`, despite their reliability is similar to the dropped items because uniqueness is generally much lower than customary thresholds.

Table C.3: Parallel analysis: Eigenvalues averaged over 500 replications. Sample: 2021 data.

	Factor Analysis	Parallel Analysis	Difference
1.	12.71157	.6374178	12.07415
2.	2.701397	.5776428	2.123754
3.	1.616707	.5345796	1.082128
4.	1.540926	.4942609	1.046666
5.	1.301857	.4591759	.8426811
6.	1.147301	.4271808	.7201207
7.	1.000036	.3969306	.6031055
8.	.8561757	.3682034	.4879723
9.	.7689419	.3409835	.4279584
10.	.6235949	.3152503	.3083445

Note: These are the results of parallel analysis after Exploratory Factor Analysis with 44 items included. We retain the first 10 eigenvalues, i.e., the number of eigenvalues estimated in the factor analysis. A parallel analysis with 500 replications after Principal Axis Factor with 44 items included leads to similar results.

tend to have similar magnitude across the first three factors.[8] The first factor that emerges pertains to parental beliefs about the role of cultural activities in child development, without emphasizing the role of parents. The items loading onto this factor involve cultural and artistic activities, such as visiting theaters, libraries, museums, and playing a musical instrument. We label this factor *Culture*. The second factor encompasses activities carried out with peers, alone, or with other adults. The common feature among these items – the absence of parents – suggests that such activities may promote self-determination. Thus, we label this factor *Autonomy*. In contrast, the third factor (labeled *Engagement*) reflects parental views that emphasize the importance of parental engagement, as it includes items that represent the opposite attribute — i.e., activities performed with parents. The activities included both in the second and in the third factor are notably diverse, ranging from playing outdoors to engaging in role-playing games. Finally, the fourth factor highlights the importance of managing disagreements. We label this factor *Conflict*, as it includes instances such as a child being scolded by a parent or another adult (e.g., a teacher), and a child arguing with a parent or peers. This factor suggests that learning to handle conflict equips children to navigate challenges, from minor squabbles to more significant issues.

[8]The items with similar factor loadings across the factors labeled *Autonomy*, *Engagement* and *Culture*, are: `Conversation_0`, `Conversation_1`, `Playout_0`.

Table C.4: Exploratory factor analysis (EFA): estimated factor loadings, after orthogonal rotation. Sample: 2021 data, n=597.

Item	Factor label				Uniqueness
	Culture	*Autonomy*	*Engagement*	*Conflicts*	
Theater_0	**0.8260**	0.2584	0.1218	-0.0286	0.2353
Theater_1	**0.8136**	0.1650	0.2441	-0.0188	0.2509
Library_1	**0.7422**	0.1080	0.2401	0.0213	0.3794
Library_0	**0.7295**	0.3002	0.0912	-0.0278	0.3686
Museum_0	**0.6787**	0.2346	0.2138	-0.0269	0.4379
Instrument_1	**0.6122**	0.3366	0.3603	-0.0259	0.3814
Instrument_0	**0.5959**	0.5212	0.1099	0.0538	0.3584
Museum_1	**0.5583**	0.2285	0.3145	0.0362	0.5358
Conversation_1	0.3756	0.3174	0.2980	0.0799	0.6630
Paint_0	0.2269	**0.6797**	0.2485	0.0491	0.4223
Sing_0	0.4102	**0.6469**	0.2313	0.0826	0.3530
Puzzle_0	0.3338	**0.6360**	0.2986	0.0747	0.3893
Rolegame_0	0.3321	**0.6185**	0.2461	0.0295	0.4456
Doll_0	0.2953	**0.5926**	0.2762	-0.0351	0.4842
Reading_0	0.4024	**0.4895**	0.2668	0.0293	0.5264
Conversation_0	0.3797	0.4111	0.2073	0.0545	0.6409
Puzzle_1	0.2599	0.2961	**0.7256**	-0.0613	0.3145
Paint_1	0.2604	0.3141	**0.6492**	-0.0842	0.4050
Doll_1	0.2738	0.2305	**0.5706**	-0.1650	0.5191
Playout_1	0.2186	0.1606	**0.5505**	-0.0316	0.6224
Rolegame_1	0.3222	0.2623	**0.5087**	-0.0545	0.5657
Reading_1	0.3832	0.3154	**0.4934**	-0.0212	0.5098
Sing_1	0.4058	0.4150	**0.4452**	-0.0206	0.4645
Playout_0	0.2761	0.3464	0.3481	-0.0100	0.6824
Scolding_1	-0.0188	0.0170	0.0038	**0.9249**	0.1439
Scolding_0	0.0549	0.0433	-0.0559	**0.8567**	0.2580
Argument_1	-0.1105	0.0521	-0.1879	**0.5139**	0.6857
Argument_0	-0.1312	0.0431	-0.2162	**0.4204**	0.7574

Note: The table reports the estimated factor loadings related to the items using data collected in December, 2021; $N = 597$. Model parameters are estimated via maximum likelihood using the `STATA` software. Similar results can be obtained relying on Principal Axis Factoring.

The general scale we obtain has a Cronbach α of approximately 0.94, while for the sub-scales: *Culture* $\alpha \approx 0.92$, *Autonomy* $\alpha \approx 0.88$ (including the items `Conversation_0`, `Playout_0` the index increases), *Engagement* $\alpha \approx 0.87$ (including the item `Conversation_1` the index increases) and *Conflict* $\alpha \approx 0.80$. The resulting structure exhibits non-zero factor loadings, with items generally loading on more than one factor (see Table C.4).

Table C.5 and C.6 present the estimated factor loadings from the confirmatory factor analysis on the 2021 sample and the 2022 sample, respectively.[9]

In these cases, we impose the normalization, the factor structure - i.e. namely we set some factor loadings to zero, imposing that some item load exclusively on some factors - and allow for correlation between factors.[10] Table C.7 supports the validity of the scale by examining the pairwise correlation between the beliefs indicators described in the paper and the sub-scales of EPAQ (Hembacher and Frank, 2020).

[9]The model parameters are estimated via quasi-maximum likelihood with Satorra-Bentler error correction (Satorra and Bentler, 1994) to accommodate deviations from normality of the raw data. Asymptotic distribution free estimation is not well suited to our setting as it has been proven to perform poorly when the set of items is above 20 and the sample size is below 5000, as in our setting.

[10]We also estimate models with orthogonal factor structure but fit improves with correlated factors.

Table C.5: Confirmatory factor analysis. Data: 2021

Dimension	Item	Loading	Std. Err.	Z	p-value	Uniqueness
Autonomy	Paint_0	0.73	0.03	23.75	0.00	0.47
Autonomy	Sing_0	0.78	0.02	41.22	0.00	0.40
Autonomy	Puzzle_0	0.79	0.02	45.25	0.00	0.38
Autonomy	Rolegame_0	0.73	0.02	30.87	0.00	0.46
Autonomy	Doll_0	0.71	0.02	29.90	0.00	0.49
Autonomy	Reading_0	0.71	0.03	25.97	0.00	0.50
Autonomy	Playout_0	0.56	0.03	16.30	0.00	0.68
Autonomy	Conversation_0	0.61	0.03	21.21	0.00	0.63
Engagement	Paint_1	0.76	0.02	33.35	0.00	0.43
Engagement	Sing_1	0.74	0.02	30.26	0.00	0.46
Engagement	Puzzle_1	0.78	0.02	41.96	0.00	0.39
Engagement	Rolegame_1	0.65	0.03	19.83	0.00	0.58
Engagement	Doll_1	0.68	0.02	32.97	0.00	0.53
Engagement	Reading_1	0.71	0.02	29.91	0.00	0.50
Engagement	Playout_1	0.58	0.03	19.96	0.00	0.67
Engagement	Conversation_1	0.56	0.04	15.30	0.00	0.68
Culture	Museum_0	0.75	0.03	27.43	0.00	0.44
Culture	Theater_0	0.85	0.02	55.55	0.00	0.28
Culture	Instrument_0	0.76	0.02	31.41	0.00	0.43
Culture	Library_0	0.78	0.03	26.35	0.00	0.39
Culture	Museum_1	0.67	0.03	20.12	0.00	0.55
Culture	Theater_1	0.84	0.02	42.13	0.00	0.29
Culture	Instrument_1	0.78	0.02	35.33	0.00	0.39
Culture	Library_1	0.76	0.03	27.53	0.00	0.42
Conflict	Scolding_0	0.88	0.03	30.82	0.00	0.23
Conflict	Scolding_1	0.90	0.02	48.49	0.00	0.19
Conflict	Argument_0	0.45	0.03	13.37	0.00	0.80
Conflict	Argument_1	0.53	0.03	16.99	0.00	0.72

Note: The table reports the estimated factor loadings related to the items using data collected in December, 2021; $N = 597$. Model parameters are estimated via quasi-maximum likelihood with Satorra-Bentler error correction (Satorra and Bentler, 1994) using the `STATA` software. Model specification with oblique factors and exclusion restrictions. Covariance estimates (and related std. err.) are: cov(Culture, Autonomy) = 0.78 (0.03); cov(Culture, Engagement)= 0.75 (0.04); cov(Culture, Conflict) = –0.02 (0.04); cov(Autonomy, Engagement) = 0.83 (0.03); cov(Autonomy, Conflict) = 0.06 (0.04); cov(Engagement, Conflict) = –0.10 (0.05).

Table C.6: Confirmatory factor analysis. Data: 2022

Dimension	Item	Loading	Std. Err.	Z	p-value	Uniqueness
Autonomy	Paint_0	0.79	0.02	36.38	0.00	0.38
Autonomy	Sing_0	0.75	0.02	33.52	0.00	0.43
Autonomy	Puzzle_0	0.81	0.02	51.75	0.00	0.34
Autonomy	Rolegame_0	0.73	0.02	31.91	0.00	0.47
Autonomy	Doll_0	0.71	0.02	30.29	0.00	0.50
Autonomy	Reading_0	0.73	0.02	34.23	0.00	0.46
Autonomy	Playout_0	0.48	0.03	14.23	0.00	0.77
Autonomy	Conversation_0	0.68	0.02	28.62	0.00	0.54
Engagement	Paint_1	0.77	0.02	44.08	0.00	0.40
Engagement	Sing_1	0.74	0.02	40.55	0.00	0.44
Engagement	Puzzle_1	0.77	0.02	41.67	0.00	0.41
Engagement	Rolegame_1	0.74	0.02	47.00	0.00	0.45
Engagement	Doll_1	0.71	0.02	36.28	0.00	0.50
Engagement	Reading_1	0.70	0.03	27.69	0.00	0.51
Engagement	Playout_1	0.49	0.03	18.32	0.00	0.76
Engagement	Conversation_1	0.69	0.02	29.44	0.00	0.52
Culture	Museum_0	0.68	0.03	26.16	0.00	0.53
Culture	Theater_0	0.79	0.02	39.55	0.00	0.37
Culture	Instrument_0	0.81	0.02	43.91	0.00	0.35
Culture	Library_0	0.77	0.02	31.96	0.00	0.40
Culture	Museum_1	0.67	0.03	22.71	0.00	0.56
Culture	Theater_1	0.79	0.02	38.53	0.00	0.38
Culture	Instrument_1	0.82	0.02	47.70	0.00	0.33
Culture	Library_1	0.78	0.02	40.92	0.00	0.39
Conflict	Scolding_0	0.87	0.02	37.85	0.00	0.25
Conflict	Scolding_1	0.89	0.02	42.88	0.00	0.21
Conflict	Argument_0	0.42	0.03	13.12	0.00	0.82
Conflict	Argument_1	0.49	0.03	17.19	0.00	0.76

Note: The table reports the estimated factor loadings using the data collected in December, 2022; $N = 951$. Model parameters are estimated via quasi-maximum likelihood with Satorra-Bentler error correction (Satorra and Bentler, 1994) using the `STATA` software. Model specification with oblique factors and exclusion restrictions. Covariance estimates (std. err.) are: cov(Culture, Autonomy) = 0.82 (0.03); cov(Culture, Engagement) = 0.79 (0.03); cov(Culture, Conflict) = 0.08 (0.04); cov(Autonomy, Engagement) = 0.81 (0.03); cov(Autonomy, Conflict) = 0.10 (0.03); cov(Engagement, Conflict) = 0.00 (0.03).

Table C.7: Beliefs indicators - pairwise correlations between simple beliefs indicators and factor scores (in squared parentheses) with EPAQ – *Early Parenting Attitudes Questionnaire*. Sample: 2021 and 2022.

	Engagement	**Autonomy**	**Culture**	**Conflict**	**N**
			Sample: 2021 data		
Affection and Attachment	0.303* [0.321*]	0.302* [0.316*]	0.287* [0.296*]	-0.075 [-0.073]	585
Early Learning	0.284* [0.301*]	0.256* [0.276*]	0.229* [0.246*]	-0.124* [-0.088*]	585
Rules and Respect	0.103* [0.108*]	0.124* [0.141*]	0.086* [0.092*]	0.122* [0.169*]	585
			Sample: 2022 data		
Affection and Attachment	0.339* [0.345*]	0.247* [0.270*]	0.284* [0.296*]	-0.126* [-0.122*]	943
Early Learning	0.269* [0.273*]	0.241* [0.246*]	0.205* [0.219*]	-0.108* [-0.065*]	943
Rules and Respect	0.081* [0.089*]	0.090* [0.098*]	0.077* [0.087*]	0.095* [0.176*]	943

Note: EPAQ – *Early Parenting Attitudes Questionnaire* (Hembacher and Frank, 2020). Figures in squared parentheses refer to the pairwise correlation between EPAQ and factor scores resulting from Confirmatory Factor Analysis (see Table C.5 and Table C.6 for the 2021 and 2022 sample, respectively), while figures not in parentheses refer to indicators constructed as simple averages. The symbol * is used in the table to denote pairwise correlations statistically significant at 5%.

D Time-use survey to measure parental investments

Here we summarize the main features of the time-use app and of data collection process, as well as the rational behind these measures. Further details can be found in Bigoni et al. (2025). The team, in partnership with a specialized digital agency, developed an app designed to administer the time diary survey along with other questionnaires.

Each respondent is randomly assigned two random days to report on time-use diaries survey. After the invitation to fill each time-use diary, a maximum of three days is allowed to fill the diary to minimize the risk of recall bias and at the same time allowing some flexibility to limit attrition issues, as parents may not be able to fill the diary immediately.

The time diary covers the whole 24-hours (starting from 4 a.m.) and allows users to flexibly define time slots/episodes for each performed activity with a pre-specified minimum duration of 10 minutes. For each episode, the respondents have to pick an activity from a pre-determined list following a hierarchical structure. They are asked first to choose among 11 macro-categories, and thereafter to to select a specific activity among a sublist within the macro-category. The macro-category Childcare is an exception and is organized in a three-level, rather than two-level structure, including 11 sub-categories, and 68 activities. The overall number of pre-coded activities is 137.

Our time use questionnaire also includes a novel feature to capture the quality of the daily parent-child interaction, and – in particular – the level of engagement of the child during each parent's activity.

Combining the two diaries available for each participating parent, we construct four different weekly measures of parental time with children: (i) total time they spend with their child; (ii) the time parents spend with their child doing the activities included in the beliefs' survey; (iii) the time spent in any activity, provided the child is actively engaged; (iv) the time spent in specific activities included in the *Quality time* definition of Price (2008), which are activities expected to be most beneficial for child development (see Section 3.1 for the full list). The second measure, (ii), is considered in this paper to investigate the direct link between activities on which parents are asked to report their beliefs and their actual time use choices; the measures in (i) and (iv) are time investments definitions commonly adopted in the child development literature. Instead, the measure in (iii) stems from the novel approach proposed in Bigoni et al. (2025), and takes into account all the activities that a parent can do with their child, over and above childcare, acknowledging that child development can be promoted by any kind of everyday parent-child interactions, including the unstructured and non necessarily educational ones. Descriptive statistics are reported in Table B.3.