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Playful activities mitigate relations between parental mental health difficulties and child verbal outcomes

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Abstract

This study examined the role of parental involvement in the home learning environment in the association between parental mental health and child cognitive performance. In a sample of 174 three- to five-year-old children (52% female, 97% White, 7% Hispanic, 2019-2022), playful activities moderated the relation between parental general depression and child verbal reasoning and acquired verbal knowledge. However, there was no evidence that parental involvement moderated the association between parental mental health and child spatial reasoning. These results improve our understanding of the pathways by which parental mental health, even in a non-clinical community sample, relate to child outcomes and raise the possibility of leveraging playful activities as one mechanism to alleviate the potential role of parental mental health difficulties.

Up to 12.8 million parents—about 20% of parents—in the United States have experienced mental health difficulties during the previous year (Stambaugh et al., 2017). Importantly, parent mental health difficulties not only have consequences for parents themselves (e.g., reduced quality of life), but also for their children. For example, increases in parent mental health difficulties are associated with decreases in child verbal, spatial, socio-emotional, motor, and behavioral skills (Liu et al., 2017; Slomian et al., 2019). As early cognitive abilities are predictive of later outcomes, including academic, socioemotional, and behavioral outcomes (Bleses et al., 2016; Girard et al., 2016; Loi et al., 2017; Marchman et al., 2018), it is imperative to better understand the association between parent mental health and child cognitive abilities.

In previous studies, researchers have proposed theoretical models in which the characteristics associated with common mental health difficulties (e.g., low mood, lethargy) may compromise the features of parent-child interactions that support child development (Goodman & Gotlib, 2002). Indeed, increases in parent mental health difficulties have

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been linked to lower sensitivity and warmth (Lovejoy et al., 2000), less parent-child communication (Scheiber et al., 2022), and less parent-child play (Rao, 2021), which are all aspects of parent-child interactions that support child development. Parent-child interactions play an influential role in the relation between parental mental health difficulties and child outcomes, such as socioemotional and behavioral outcomes (Mäntymaa et al., 2004). Despite support for the relation between parent mental health and child outcomes, parent mental health and parent-child interactions, and parent-child interactions and child outcomes, the extant literature on the role of parent-child interactions in the relation between parent mental health and child outcomes is surprisingly narrow. Most research to date has focused on narrow aspects of parent mental health, has been limited to the perinatal period, and primarily focused on aspects of parenting that relate to children's socio-emotional and behavioral development. Thus, in the current study, we investigated the role of parent involvement in the home learning environment—a key factor in children's cognitive development (Sénéchal et al., 1998; Sénéchal & LeFevre, 2002; Skwarchuk et al., 2014)—in the association between parent mental health and child cognitive abilities. More specifically, we asked whether different types of parental involvement mitigated or exacerbated the relation between parental mental health and children's cognitive performance in a non-clinical community sample.

Parental Mental Health.

The literature to date broadly suggests that increases in parental depression and anxiety are associated with decreases in child outcomes, including child cognitive abilities. For example, in a recent meta-analysis, authors suggested that children who were exposed to higher levels of maternal depression scored significantly lower on a composite measure of early cognitive abilities compared to children who were exposed to lower levels of maternal depression (Liu et al., 2017). Notably, the extant literature has primarily focused on parental mental health difficulties, with most studies focusing on parental depression and anxiety (Dennis et al., 2017); that is, parental mental health has largely been operationalized as ill-being (Kinderman et al., 2015). Whether parental well-being plays a role in parent-child interactions and child cognitive abilities has yet to be explored. Indeed, a recent review paper called for the inclusion of positive dimensions of parent mental health, as there is preliminary evidence for associations between positive mood and child socioemotional development (Phua et al., 2020).

Importantly, mental health has often been characterized as the absence of pathology; accordingly, research has focused on its presence versus absence. However, well-being, the presence of positive mood (Diener, 2009), may be structurally distinct from simply the absence of negative mood (Busseri & Sadava, 2011; Craske et al., 2016). Keyes's (2005) two-continua model delineates mental ill-being and mental well-being as separate yet interconnected dimensions. Indeed, mental ill-being and well-being exhibit different trajectories across the lifespan; interventions targeting each dimension yield complementary yet distinguishable outcomes, and the determinants and mechanisms underlying ill-being are different from those underlying well-being (Iasiello & Van Agreten, 2020; Westerhof & Keyes, 2010; Kinderman et al., 2015). For example, negative life events and rumination

are strong predictors of ill-being, while material resources strongly predicts well-being (Kinderman et al., 2015).

Preschool Years.

Most studies examining the association between parental mental health and parent-child interactions have focused on the perinatal period. However, while such difficulties are certainly prevalent during the perinatal period, there is evidence that they extend beyond the perinatal period and well into the preschool years (Ibanez et al., 2015; Van der Waerden et al., 2015). It is important to expand the current literature by investigating parent mental health beyond the perinatal period because during these years, children build upon the earlier skills they developed and acquire more complex verbal and spatial reasoning skills (Frausel et al., 2020; Halpern et al., 2007; Rowe et al., 2020; Verdine et al., 2017). In turn, differences among children in their verbal and spatial skills during preschool predict later academic achievement as well as broader facets of development, like self-regulation and attentional skills (Bleses et al., 2016; Gunderson et al., 2012; Petersen & LeBeau, 2021). Parents tend to spend more time with their children, especially in interactive play and teaching activities, during preschool years compared to the later years (Kalil et al., 2012). Moreover, implementing interventions during the preschool years may produce better outcomes than implementing them later in childhood (Campbell et al., 1995; 2014). Thus, better understanding the role of parent mental health beyond the perinatal period, during the preschool years, would inform targeted early intervention strategies.

Parental Involvement in the Home Learning Environment.

The home environment has often been characterized based on the emotional and learning support that parents provide to their children (e.g., Neel et al., 2018; Rosen et al., 2019; 2020; Soto-Ramírez et al., 2022). The literature surrounding emotional support has highlighted parenting styles and behaviors, of which sensitivity and warmth are important components (Laucht et al., 2001; Mäntymaa et al., 2004; Neel et al., 2018). Research on learning support, also known as early cognitive stimulation (Rosen et al., 2019) and/or the cognitive home environment (Mendelsohn et al., 1999) has highlighted parent involvement in learning activities, the quantity and quality of linguistic stimulation, the availability of enriching learning resources and toys, and opportunities for independent exploration and varied experiences (Bradley et al., 2001; Bradley & Caldwell, 1977; Knauer et al., 2019; Parker et al., 1999; Rodriguez & Tamis-LeMonda, 2011). Although a substantial body of literature focuses on the relation between parent mental health and emotional support, especially as it relates to child socio-emotional and behavioral outcomes (Mäntymaa et al., 2004), the relation to child cognitive abilities requires further investigation.

Parent involvement in the home learning environment—a component of the overall home learning environment—also referred to as parent engagement in learning (Sénéchal & LeFevre, 2022), parent cognitive stimulation (Mendelsohn et al., 1999), and parent stimulating activities (Knauer et al., 2019), refers to parent's active involvement with their children. Involvement encompasses a spectrum, ranging from more instructional and direct approaches to more playful and open-ended interactions (Ma et al., 2016; Sénéchal &

LeFevre, 2002). Importantly, parent involvement predicts child outcomes beyond parenting styles, and it uniquely predicts child cognitive abilities, including visual and spatial outcomes (Brito, 2017; Mermelshtine, 2017; Rosen et al., 2019; Weisleder & Fernald, 2013). Moreover, active parent involvement is more crucial than children merely having access to enriching materials or opportunities (Rosen et al., 2019).

Structured didactic activities (e.g., instructional, direct) are most often parent-led and have a specific goal (e.g., reading a storybook, teaching new words and their definitions, reciting numbers, labeling shapes) (Sénéchal & LeFevre, 2002; Skwarchuk et al., 2014). These types of activities support distinct cognitive abilities. For example, parent involvement in verbal activities, like literacy instruction and parent-child book reading, predict child language and literacy skills (e.g., Rowe et al., 2012; Sénéchal & LeFevre, 2002; Skwarchuk et al., 2014). Parent involvement in spatial activities, like puzzles, predict child spatial outcomes (e.g., Clingan-Siverly et al., 2021; Levine et al., 2012).

More recently, studies have highlighted the importance of playful, non-didactic, and open-ended parental involvement for children's cognitive development. Typically, play is characterized as a child-only activity, marked by absence of a specific goal or purpose (Weisberg et al., 2013a; 2013b) and includes various forms, including physical play, object play, pretend play, or structured games (e.g., Rao et al., 2021). More recently, play has been conceptualized along a spectrum or continuum of playful experiences (Hassinger-Das et al., 2017; Zosh et al., 2018). The activities within this spectrum of play are characterized by flexibility and voluntariness, differing from the more structured didactic and instructional activities (Hassinger-Das et al., 2017; Weisberg et al., 2013a; 2013b; Zosh et al., 2018). For example, free play does not have an explicit goal, is child-directed, and involves little to no adult guidance or involvement (Brown, 2014; Garvey, 1990; Pellegrini, 2009; Zosh et al., 2018). Within this spectrum lies a variety of playful learning experiences with different levels of adult support, including guided play, games, and co-opted play (Zosh et al., 2018). Guided play involves child-directed, spontaneous activities with parents scaffolding the experience (Weisberg et al., 2013a; 2015; 2016). Games are adult-initiated with purposeful adult support and retain playful elements. Co-opted play involves instances where parents direct the play to introduce various concepts, similar to direct instruction but retaining a playful nature.

The functions of play have been long debated, with Vygotsky and Piaget proposing that play benefits problem-solving skills, self-regulation, divergent thinking, and language development (Piaget, 1962; Vygotsky, 1967). Empirical work confirms play as a beneficial aspect of parent involvement for socio-emotional, cultural, cognitive, and communicative outcomes, and the specific strength and nature of relations between play and outcomes varies by type of play (Lillard et al., 2013; Tamis-LeMonda et al., 2002). For example, guided play has repeatedly been shown to be important for academic-related learning, in both literacy and STEM domains (e.g., Fisher et al., 2011; Hirsh-Pasek et al., 2009; Klahr et al., 2011). Additionally, games are predictive of important outcomes, like spatial skills (Jirout & Newcombe, 2015). Notably, children learn more effectively during guided play compared to free play, and they learn as well as, if not better, during guided play compared to direct instruction (Fisher et al., 2011). The qualities of the interaction that make play

particularly effective include being active, engaged, social, iterative, and joyful (Hirsh-Pasek et al., 2009).

The literature on parent involvement in the home learning environment highlights two models aimed at explaining the observed associations. According to skill development models, parent involvement improves child outcomes by providing the child with skill-related resources, like cognitive skills and opportunities to practice skills (Pomerantz & Moorman, 2010; Sénéchal & LeFevre, 2002). From this perspective, parental involvement might also enhance child outcomes by giving parents an opportunity to gain information on their child's abilities. On the other hand, according to motivational models, parent involvement improves child outcomes by providing motivational-related resources, like intrinsic motivation and enjoyment (Hirsh-Pasek et al., 2004; Lillard et al., 2013; Rao et al., 2021; Yogman et al., 2018). From this perspective, parental involvement might also enhance child outcomes by providing children with a sense of control and positive perceptions of their own performance. For example, enjoyable literacy interactions at home are predictive of increased child interest in reading and higher reading frequency (Baker et al., 1997).

Parent Mental Health, Parent Involvement, and Child Cognitive Outcomes.

Increased interaction with a caregiver who has mental health difficulties might mitigate the potentially negative role of the mental health difficulties. This aligns with the rich literature highlighting parent involvement as an important aspect of the home learning environment (e.g., Napoli & Purpura, 2018; Rowe, 2012; Sénéchal and LeFevre, 2002; Skwarchuk et al., 2014). Proximal parent-child interactions could provide a safe context for parents with mental health difficulties, who might otherwise have difficulty noticing their child's signals. In other words, parent involvement, such as instruction and play, might create a context in which parents can communicate and interact with their children (Scheiber et al., 2022). This buffering role might be particularly pronounced for play interactions that are active, iterative, and joyful.

Contrarily, increased interaction with a caregiver who has mental health difficulties might exacerbate the negative role of the mental health difficulties. Not all parent involvement is beneficial (e.g., Park et al., 2023; Pomerantz et al., 2005); its impact depends on its affective quality (Pomerantz et al., 2005). Negative affect during interactions might dampen child motivation and, in turn, achievement. Moreover, even in contexts typically characterized by playfulness, parents with mental health difficulties may be more distracted and show reduced interest and responsiveness (Tingley, 1994). For example, maternal depression has been linked to technology interference during parenting, especially during playtime (McDaniel & Coyne, 2016; Newsham et al., 2020).

Present Study.

In the current paper, we aimed to pinpoint the role of parent involvement in the home learning environment—an environmental factor widely shown to contribute to child cognitive development (Sénéchal et al., 1998; Sénéchal & LeFevre, 2002; Skwarchuk et al., 2014). Specifically, we investigated whether different aspects of parent involvement

mitigated or exacerbated the association between parent mental health and child cognitive outcomes by examining if parent involvement moderated the impact of parent mental health on child cognitive abilities in a non-clinical community sample.

Given the overall positive impact of parent involvement on child outcomes (e.g., Demir-Lira et al., 2019; Napoli & Purpura, 2018; Rowe, 2012; Sénéchal and LeFevre, 2002; Skwarchuk et al., 2014), we hypothesized that parent involvement could buffer the negative impact of parent mental health difficulties and low well-being on child cognitive outcomes. Specifically, we expected the negative relation between parent mental health and child cognitive outcomes to vary based on parent-reported quantity of home learning activities. We anticipated that the relation between parent mental health and child cognitive outcomes would be weaker with higher levels of home learning activities. Additionally, mental health symptoms and low well-being might be mitigated to a greater extent during open-ended and flexible interactions, like playful activities.

However, as previously discussed, it is also possible that home learning activities might intensify the negative implications of parental mental health symptoms. Didactic activities are sometimes associated with negative affect in parents (Pomerantz et al., 2005), and thus, engaging in didactic activities with a parent experiencing mental health difficulties or low well-being might exacerbate the potential negative consequences for child outcomes. Additionally, following the two-continua model for mental health (Keyes, 2005; Kinderman et al., 2015), we expected patterns to differ based on specific mental health constructs. We expected parent mental health difficulties, or ill-being, to be more strongly related to home learning activities than parent well-being, as ill-being dimensions are more closely tied to the caregiver's psychological resources, whereas well-being is more related to material resources provided to the child. Overall, better delineating the specific role that parent involvement in the home learning environment plays in the relations between parent mental health and child cognitive outcomes will inform targeted prevention and intervention strategies for children at risk.

Methods

Participants

Participants included 174 children, three- to five-years of age, who participated in an ongoing longitudinal study on the relations between preterm birth and neurodevelopment. Parent-child dyads, all of which were from a Midwestern city in the United States, were recruited from electronic health records, mass emailing systems, research registry, social media, and word of mouth. Parent-child dyads were eligible for this study if the child was between the ages of three- and five- years old, was a native speaker of English, had normal or corrected-to-normal vision and hearing, had no history of a genetic syndrome or birth defect, and had no limitations (based on parental report) that would prevent them from completing paper and/or pencil tasks. Again, we chose to focus our attention on the preschool period, as findings suggest that family involvement in these early years establish the foundation for later academic success (e.g., Ma et al., 2016). Enrollment for the study began in June 2019. Due to the COVID-19 pandemic, data collection was paused in March 2020 and resumed online, via Zoom video conferencing, in October 2020. For those who

completed the study in an online format, it was also preferred that they had an electronic device (computer, laptop, tablet, smart phone) with reliable internet. Parent-child dyads without an electronic device were mailed an Amazon Fire tablet that they could use to participate in the online sessions. Three parent-child dyads who completed the study online were excluded because the parents did not identify as the child's primary caregiver; this exclusion did not affect the findings. This study was approved by the local Institutional Review Board.

Participant demographic characteristics for consenting parent-child dyads are presented in Table 1. Parental income was measured as part of the parent-reported questionnaires, where parents were asked to report household income by adding together the incomes of all the adults currently living in the home the child resides in. For parental education, parents were asked to report the highest level of education they have received using a 7-point Likert scale ranging from 1 (8th grade or less) to 7 (professional degree). The sample included children born between 22 and 42 weeks of age, and thus included both preterm (30%) and full-term (70%) children. Preterm birth was defined as birth before 37 postmenstrual weeks and full-term birth was defined as birth after 37 postmenstrual weeks. Although not central to the aims of the paper, we examined if parental mental health scores and reported quantities of home learning activities differ between parents of preterm-born children and parents of term-born children, and found no significant differences (Table S1). Multigroup path analysis also explored if the patterns of associations we observed were indeed different across preterm-born and term-born children, and we did not find any significant differences (Section S1). Thus, for the purposes of the current paper, the groups were combined. Additionally, to check that we acquired a sample size sufficient to reject false models overall, we computed a post-hoc power analysis for structural equation models in the R (Version 4.2.2; R Core Team, 2022) package *semPower* (Moshagen & Erdfelder, 2016). Power to reject a wrong model using absolute fit indices (RMSEA), $\alpha=.05$, $df=19$, was greater than .80, with $N=174$, indicating sufficient power.

Procedures

Parent-child dyads were invited to participate in one three-hour study. The cognitive assessments administered face-to-face were conducted in three blocks, and children were given 15-minute breaks in between each block. Parent-child dyads who participated via Zoom video conferencing attended four 30- to 45-minute sessions. During the study, children completed batteries of cognitive testing with members of the research team and parents completed several online behavioral and cognitive related questionnaires on their child. As part of the study, consenting parents were administered two questionnaires—one assessing parental mental health difficulties and one assessing quantities of proximal parent-child activities. As part of the standardized cognitive assessments, children were administered subtests from the Wechsler Preschool & Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012). The order of the standardized cognitive assessments was the same in both the face-to-face and online sessions, and the tasks were administered by the same research assistants.

Measures

Parental Mental Health—Parents were administered the Inventory of Depression and Anxiety Symptoms, Expanded Version (IDAS-II) (Watson et al., 2007; 2008; 2012), during which they were asked to report on the extent to which they experienced various depression and anxiety symptoms during the previous two weeks, using a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). Three subscales from the IDAS-II were used to reflect parental mental health: 1) General Depression (e.g., I had little interest in my usual hobbies and activities; I had troubles concentrating), 2) Social Anxiety (e.g., I found it difficult to make eye contact with people; I felt self-conscious knowing that others were watching me), and 3) Well-Being (e.g., I felt hopeful about the future; I felt like I had a lot of interesting things to do). Higher values indicated greater levels, or feelings, of each mental health construct. Subscale scores were not calculated if parents did not complete every question associated with the subscale. The IDAS-II has good psychometric properties, including good internal consistency (.86 to .92) and good convergent, discriminant, and criterion validity (Watson et al., 2007; 2008; 2012).

Home Activities Questionnaire—To assess parental involvement in the home learning environment, parents were asked to answer questions about how often they engage in various activities with their children, using a 7-point Likert scale ranging from 1 (never) to 7 (multiple times per day). Specifically, parents were asked “How often do you engage in the following activities with your child?”. The responses were then averaged across each participant. These activities were adapted and modified from prior questionnaires examining the role of parental-focused activities in the home learning environment in children’s cognitive development, and these questionnaires are widely used in the literature (LeFevre et al. 2009; Sénéchal, 2006; Sénéchal et al., 1998; Sénéchal and LeFevre, 2002; Skwarchuk et al., 2014). Verbal activities were defined as those in which the parents provided direct instruction, often focusing on spoken or written language. For example, parents were asked to report on how often they read stories, identify sounds of written alphabet letters, and introduce new words and definitions to their children. Spatial activities were defined as those that involved learning concepts about space, practicing mental visualization (e.g., imagining spatial layouts and objects from different angles) or reasoning about qualities of space (e.g., measuring distance). For example, parents were asked to report on how often they label shapes or arrange or order objects by shape or size (e.g., smallest to biggest). Playful activities were defined as those that involved creativity, spontaneity, or creating original ideas, often open-ended. For example, parents were asked to report on how often they play board and card games, color or paint, or engage in pretend play (e.g., with small action figures or dolls) with their children. Please see Table S2 for a detailed list of home learning activities. Didactic verbal activities consisted of 10 items ($\alpha = .86$), didactic spatial activities consisted of 6 items ($\alpha = .80$), and playful activities consisted of 8 items ($\alpha = .83$); thus, all exhibiting high internal consistency.

Child Outcome Measures—Children were administered the WPPSI-IV Information and Similarities subtests, which comprise the Verbal Comprehension Index (VCI). The VCI measures a child’s acquired knowledge, verbal reasoning, and comprehension skills. The Information subtest assesses children’s acquired knowledge (e.g., “what do people use to

stay dry in the rain?”). The Similarities subtest asks children to describe how two words that share a common characteristic are related to one another (e.g., “red and yellow are both...”) to measure verbal reasoning abilities. Lastly, children were administered the WPPSI-IV Matrix Reasoning subtest, part of the Fluid Reasoning Index (FRI), which measures children’s nonverbal visual processing and spatial perception skills. The Matrix Reasoning subtest asks children to select a missing portion from a matrix (Wechsler, 2012). Standard scores were utilized in the analyses. The WPPSI-IV demonstrates excellent psychometric properties, including good internal consistency (.75 to $\geq .90$), test-retest reliability (.75 to .87), interrater reliability (.96 to .99), and content validity (Syeda & Climie, 2014).

Results

Descriptive Statistics

Table 2 presents the means, standard deviations, and possible range of scores for the primary measures of interest. Parents reported, on average, that they engage in didactic verbal, didactic spatial, and playful activities with their children multiple times per week. It also should be noted that our sample was not a clinical sample (Stasik-O’Brien et al., 2019). However, using the screening cut-offs from Stasik-O’Brien et al. (2019), 11% of parents scored above the screening cut-off for Major Depressive Disorder on the IDAS-II General Depression Scale and 26% of parents scored above the screening cut-off for Social Phobia on the IDAS-II Social Anxiety Scale.¹ Lastly, compared to same-aged peers, children in the current study performed in the average range on subtests relating to acquired verbal knowledge (63rd–75th percentiles), verbal reasoning (75th percentile), and spatial reasoning skills (50th percentile).

Figure 1 presents bivariate correlations between parent education, parental mental health, child cognitive outcomes, and home learning activities. While parental general depression and social anxiety were significantly and positively correlated with one another, they were negatively correlated with parental well-being and child acquired verbal knowledge. Parental well-being was positively correlated with child acquired verbal knowledge. Didactic verbal, didactic spatial, and playful activities were positively correlated with one another, and didactic verbal and playful activities were positively correlated with child acquired verbal knowledge and verbal reasoning. Child acquired verbal knowledge, verbal reasoning, and spatial reasoning were positively correlated with one another as well. Lastly, parent education was negatively correlated with parental general depression and positively correlated with parental well-being, didactic verbal activities, playful activities, and child acquired verbal knowledge and verbal reasoning skills.

¹As part of the current study, we had access to electronic medical records for a subset of the participants—those who were born at the local hospital. We gathered data from the Edinburgh Postnatal Depression Scale (EPDS), which is a standardized questionnaire of parental depression around the time of birth. Findings revealed, utilizing multiple linear regression, that parental depression around birth served as a robust predictor of the IDAS-II General Depression measure collected when children were three- to five-years of age, $\beta = .238$, $SE = .084$, $p = .006$, while controlling for gestational age, child age, and parental education. This finding provides support for the relative stability of mental health profiles.

Confirmatory Factor Analysis

Based on prior literature focusing on proximal home learning activities, we posited a three-factor model (didactic verbal, didactic spatial, and playful activities) a priori. Specifically, we created three factors for each group of activity using confirmatory factor analyses with robust maximum likelihood estimation (MLR) in the R (Version 4.2.2; R Core Team, 2022) package *lavaan* (Rosseel, 2012). We examined standardized factor loadings and model fit statistics to adjust models that initially failed to demonstrate good fit. We improved models by including covariances based on similarly worded items. Model fit statistics include the obtained model χ^2 , its scaling factor (in which values different than 1.000 indicate deviations from multivariate normality), its degrees of freedom, and its p -value (in which non-significance is desirable for good fit), CFI (the Comparative Fit Index, in which values higher than .95 are desirable for good fit and values higher than .90 are indicative of adequate fit), TLI (Tucker-Lewis Index, in which values higher than .95 are desirable for good fit and values higher than .90 are indicative of adequate fit), the RMSEA (the Root Mean Square Error of Approximation point estimate and 90% confidence interval, in which values lower than .06 are desirable for good fit and values between .05 and .08 are indicative of adequate fit), and SRMR (Standardized Root Mean Square Residual, in which values lower than .08 are desirable for good fit) (Hu & Bentler, 1999; Schreiber et al., 2006).

The initial three-factor model showed acceptable fit ($X^2(216) = 365.39$; $p < .001$; RMSEA = .064, 90% CI = .053–.076; CFI = .914; TLI = .900; SRMR = .067), and standardized factor loadings were moderate to strong for didactic verbal activities (ranging from .474 to .739), didactic spatial activities (ranging from .466 to .772), and playful activities (ranging from .438 to .804). Although we, a priori, planned to split the home learning activities into the three categories based on theoretical interest, we explored whether the three-factor model was indeed better fit for our data compared to alternative models. First, we tested a two-factor model where we divided all activities into didactic, or instructional activities, versus playful activities. The two-factor model had a poorer fit ($X^2(219) = 416.81$; $p < .001$; RMSEA = .074, 90% CI = .063–.085; CFI = .886; TLI = .868; SRMR = .072) compared to the three-factor model. We then tested a one-factor model where we combined all activities. The one-factor model similarly performed worse ($X^2(267) = 543.86$; $p < .001$; RMSEA = .080, 90% CI = .070–.089; CFI = .857; TLI = .839; SRMR = .075). Further examination of sources of local fit via normalized residual covariances and modification indices yielded no interpretable remaining relations, and thus the three-factor model was retained. We then retained the factor scores to be utilized in the moderation analyses, as described below.²

Moderation Analyses

To address our main question, we asked whether the three types of home learning activities moderate the association between parental mental health constructs and child cognitive performance. We ran three parallel moderation models, while leveraging bootstrap to determine CIs, in the R (Version 4.2.2; R Core Team, 2022) package *lavaan* (Rosseel, 2012)

²Initially, our primary objective also encompassed investigating which didactic verbal, didactic spatial, and playful activities mediated the relation between parental mental health and child cognitive outcomes. However, given the concerns regarding mediation analysis using cross-sectional data, particularly concerning the assumption of directionally and the lack of time precedence in such designs (Kline, 2015), we decided to concentrate the study on the moderation argument and analyses.

—one for each child outcome (child acquired verbal knowledge, verbal reasoning, spatial reasoning). The mental health constructs, as measured by the IDAS-II, were mean-centered and then paired with each latent variable created for each of the three types of home learning activities (e.g., parental general depression x didactic verbal activities, parental well-being x didactic spatial activities, and parental social anxiety x playful activities). The following covariates were included in each of model: gestational age, parental education, time of data collection (pre-pandemic versus pandemic), and level of schooling. The findings remained the same after removing outliers (i.e., data points that were three standard deviations above the mean).

In Model 1, the interaction component between parental general depression and playful activities was significant in predicting child acquired verbal knowledge ($\beta = .185$, $SE = .090$, $p = .040$). The overall R^2 for Model 2 is 0.375. Figure 2 depicts the difference in the slopes for the relation between parental mental health and child performance on acquired verbal knowledge at different levels of depressive symptoms (grouped for visualization purposes only). The higher the playful activities, the more attenuated was the negative relation between parental depressive symptoms and child outcomes on acquire verbal knowledge. Stated differently, the negative relation between parental depressive symptoms and child acquired verbal knowledge was stronger for parents who engaged in lower levels of playful activities with their children.

In Model 2, the interaction component between parental general depression and playful activities was significant in predicting child verbal reasoning scores ($\beta = .335$, $SE = .124$, $p = .007$), as depicted in Figure 3. The overall R^2 for Model 2 is 0.384. This moderation displayed an identical pattern to Model 1, whereas in Model 2, playful activities moderated the relation between general depressive symptoms and child verbal reasoning skills. In other words, the negative relation between general depressive symptoms reported by the parents and child verbal reasoning skills was attenuated at higher levels of playful activities. In Model 3, no direct pathways or interaction components ceased to reach conventional significance in relation to child WPPSI-IV MR scaled scores.

Discussion

The purpose of the current study was to elucidate the role parental involvement in the home learning environment plays in the relation between specific parental mental health constructs, in a non-clinical community sample, and child cognitive outcomes. Previous literature has shown that parental mental health difficulties—specifically, parental depression—predicts variability in parents' interactions with their children (e.g., maternal supportiveness and responsivity) and general cognitive outcomes (e.g., Glasheen et al., 2010; Rao et al., 2021). However, the nature of the relations between parental mental health, specific child cognitive outcomes, and specific home learning activities have not been examined thoroughly. Pinpointing specific relations is significant for the development of targeted interventions for children at-risk. Our approach is also consistent with theoretical frameworks highlighting the importance of moving beyond composite measures of parenting that are generally beneficial to identifying specific aspects of parental involvement that might be valuable under certain circumstances, i.e. specificity principle (Bornstein, et

al. 2019). In the current study, we aimed to fill existing gaps in the literature by pinpointing which aspects of parental mental health (depression, anxiety, well-being) beyond the perinatal period relate to specific aspects of child cognitive development (acquired verbal knowledge, verbal reasoning, spatial reasoning) via specific types of parental involvement (parental didactic verbal, didactic spatial, playful activities). Overall, our results indeed supported relations between parental depression, playful activities, and child verbal outcomes.

Moderating Role of Playful Activities.

Data from the current study showed that playful activities have a significant moderating role in the relation between parental general depression and child acquired verbal knowledge and verbal reasoning skills, but not spatial reasoning skills. Further, playful activities had stronger relations to child performance, as compared to verbal and spatial activities. The results remained even after controlling for parental education, child gestational age, and level of schooling. Our findings are consistent with the recent literature emphasizing the importance of playful activities in children's verbal and academic environment (Milteer et al., 2012). Why might parental *playful* activities play a specific role in relating to child cognitive outcomes—especially acquired verbal knowledge and verbal reasoning outcomes? Playful activities might exhibit certain attributions that differentiate it from didactic activities, such as verbal and spatial teaching activities—particularly with respect to the child cognitive outcomes we focused on in the current study. Prior work suggest that specific features of play may increase children's agency in their own learning (Hirsh-Pasek et al., 2004; 2015), creativity (Ginsburg, 2007), problem solving, and collaboration (Yogman et al., 2018), and in turn, stimulate cognitive development (Christakis et al., 2007; Ginsburg, 2007). Intervention studies also highlighted the causal role of play on positive child outcomes (e.g., Kochanska et al., 2013). The cognitive outcomes we focused on, especially acquired verbal knowledge and verbal reasoning skills, might more strongly relate to the open-ended, child-led nature of playful activities. It is also possible that the role of different cognitive stimulation types varies as a function of child's developmental stage – for example verbal didactic activities might play more of a significant role in verbal skills in elementary school years. Overall, future studies could compare contributions of playful activities across a wider range of child outcomes and ages.

Specific Links to Depressive Symptoms.

In terms of the specific role of parental involvement, our results supported a moderation model for the role of playful activities specifically for depressive symptoms. Findings demonstrated that playful activities might possibly serve as a resiliency factor, where children whose parents experience depressive symptoms might be protected from adverse consequences if parents engage in playful interactions to a greater extent. Specifically, we showed that the negative association between parents' report of general depressive symptoms and both children's acquired knowledge and verbal reasoning was attenuated at higher levels of playful activities. Taken together, our results suggest that playful activities in the home learning environment has the potential to act as a buffer against the adverse effects parental depressive symptoms have on child outcomes (Yogman et al., 2018). Parents with higher levels of depression might suffer from symptoms commonly associated with

parental mental difficulties, such as disengagement, withdrawal, and lethargy (Goodman & Gotlib, 2002). Partaking in open-ended, interactive, low structure interactions with their children (Hassinger-Das et al., 2017; Zosh et al. 2018), as it is the case for play, might buffer children and parents against these symptoms. Overall, for parents who do engage in playful activities, their children might be protected from the potentially adverse role of the depressive symptoms. Indeed, although parents with depressive symptoms do engage in playful activities to a lower extent, positive parenting activities, including playful activities, have been shown to decrease parental depressive symptoms and parental stress (Berkule et al., 2014). Future work should examine why some parents with depressive symptoms engage in playful activities (e.g., neurological divergences, social support, access to resources) more than others and how to best support play behavior (Zhang et al., 2019). Overall, our findings contribute to the literature on the moderators of the relation between parental depressive symptoms and child cognitive outcomes, and they highlight playful activities as a potential target for prevention and intervention efforts aimed at facilitating the cognitive development of children exposed to parental depression (Rao et al., 2021).

Unlike parental general depression, we did not find significant relations with parental well-being and social anxiety. Although null results are difficult to delineate, one possibility as to why parental well-being and social anxiety did not emerge as significant moderators is that these mental health constructs may play a greater role in domains outside of cognitive functioning, such as socioemotional and behavioral outcomes. For instance, a small body of research has demonstrated that that parental well-being, as measured by life satisfaction, significantly and negatively influences children's internalizing problems (e.g., Kaiser et al., 2017). Or consistent with the two-continua model, well-being might relate to child outcomes via a distinct path. Specifically, well-being might be more strongly related to material resources, which is also a significant but distinct path predicting child outcomes than parental interactions (Kinderman et al., 2015). Likewise, the parental social anxiety has been shown to be a robust predictor for social anxiety in children and socioemotional outcomes (Poole et al., 2018). Parental anxiety might also predict child outcomes via pathways we did not probe in the current study, such as maternal warmth (Feldman et al., 2009). Stated differently, our specific measures of parental well-being and social anxiety may be more closely related to that of children's socioemotional and behavioral outcomes or more closely related to other aspects of parenting, and future studies could compare the contributions across a wider range of child outcomes.

Specific Links to Verbal Outcomes.

Why might be the pattern of relations be stronger for verbal outcomes than spatial outcomes? Empirical studies have demonstrated that the frequency of engaging children in play is associated with language development (e.g., Tamis-LeMonda & Bornstein, 1994). Similarly, intervention studies have shown that children learn new words better during playful activities—the kind of activities we focused on in the current study—compared to free play children engage in on their own (Toub et al., 2018). This may be because playful activities encompass features such as flexibility, creativity, and intrinsic motivation (Hirsh-Pasek et al., 2004; Lillard et al., 2013; Rao et al., 2021; Yogman et al., 2018). These unique features might deem playful activities especially conducive to creating rich

linguistic interactions between parents and children (Ginsburg, 2007). For instance, parents tend to facilitate children's engagement and follow children's lead during playful activities, which in turn might give children the opportunities to practice their language skills by using language freely and creatively about their own interests and ideas (Weisberg et al., 2013b). Our findings highlighting specific susceptibility of child verbal skills to depressive symptoms are consistent with the recent literature suggesting that verbal skills might be more sensitive to environmental influences, over and above nonverbal skills (Farah et al., 2006).

Strengths and Limitations.

The current study encompasses a myriad of strengths, including the ability to assess wide-ranging features of proximal parental involvement in the home learning environment, along with a range of parental mental health constructs. However, the study also has limitations. First, our results are based on correlational data and thus, we cannot claim causality. Second, while our sample was unique that it included both urban and rural families, our sample was predominantly white and of higher socioeconomic status, which could limit the generalizability of our findings. Parental mental health difficulties are more common in parents from lower socioeconomic status backgrounds, underscoring the importance of examining this topic in a more socioeconomically diverse sample. Third, our sample was not a clinical sample. For example, it is possible that our findings would have been different if we examined clinical ranges of depression and anxiety. Perhaps the relation to anxiety would emerge only in clinical populations. However, this sub-clinical sample still exhibited significant variability in all symptoms assessed. The fact that we discovered an association between parental depression, parental interactions, and child verbal outcomes in this non-clinical community sample highlights the widespread effect of parental depressive symptoms and the importance of examining this topic also in a clinical sample.

Fourth, the current study was limited to examining quantitative features of parental involvement in the home learning environment via questionnaires, by asking "How often do you engage in the following activities with your child?". Existing studies measure parental involvement frequency through various methods, including parental questionnaires and observational studies (Sénéchal & LeFevre, 2002). Observational studies, such as home or lab observations, offer valuable insights into the quality of children's naturalistic experiences and parent-child interactions. This is important to capture since the quality of parental involvement, the nature or the complexity of the interaction, or activity, such as linguistic complexity and interactive features or specific strategies that promote child learning (Anderson et al., 2021; Rowe & Snow, 2020). However, parental questionnaires capture parental involvement in less frequent but academically relevant interactions, such as discussions about numbers or letter teaching (Levine et al., 2010). Stated differently, questionnaires may better capture these less frequent parent-child interactions that observational studies might miss or show low variability in (Mutaf Yildiz et al., 2018). Indeed, parental questionnaires provide valid and reliable data regarding children's cognitive environments (Dreyer et al. 1996) and sometimes predict child outcomes even when observational measures do not (Mutaf Yildiz et al., 2018). Our focus on frequency was motivated by the rich prior literature highlighting the strong contribution of quantity of

enriching home learning activities for child outcomes (Sénéchal & LeFevre, 2002). Future studies would greatly benefit by thoroughly examine both the qualitative and quantitative features of home learning activities. Taken together, our study provides useful information for future longitudinal studies aimed to elucidate the mechanistic role of home learning activities in the relation between parental mental health constructs and child cognitive outcomes using longitudinal data.

Conclusion

Taken together, the current study examined role of proximal parental involvement in the home learning environment—specifically, parental verbal, spatial, and playful activities—in the relation between specific parental mental health constructs, in a non-clinical community sample, and child cognitive outcomes. We demonstrated that playful activities moderate the association between parental general depression and both children’s acquired knowledge and verbal reasoning skills. Our results raise the possibility of leveraging playful home learning activities as one possible mechanism to alleviate the potential negative relations of parental mental health difficulties to children’s neurodevelopment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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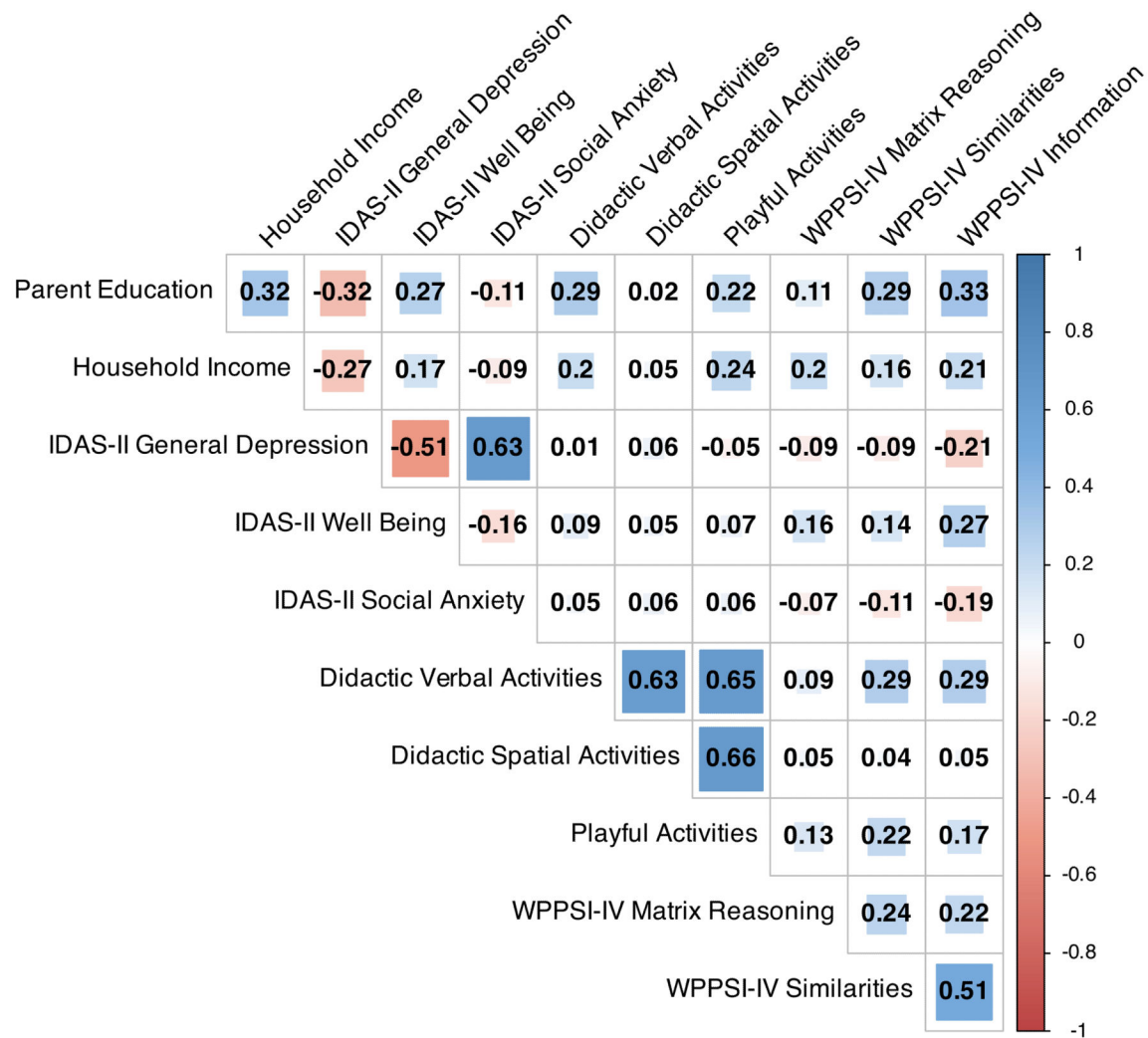


Figure 1.

Bivariate correlations between parent education, household income, parent mental health as measured by Inventory of Depression and Anxiety Symptoms, Expanded Version (IDAS-II; Watson et al., 2012), home learning activities, and child cognitive outcomes as measured by Wechsler Preschool & Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012). *Note.* Colored squares indicate correlations that reach conventional significance, where small squares coincides with $p < .05$, medium-sized squares with $p < .01$, and large squares with $p < .001$. From Wei T, Simko V (2021). *R package 'corrplot': Visualization of a Correlation Matrix.* (Version 0.92), <https://github.com/taiyun/corrplot>.

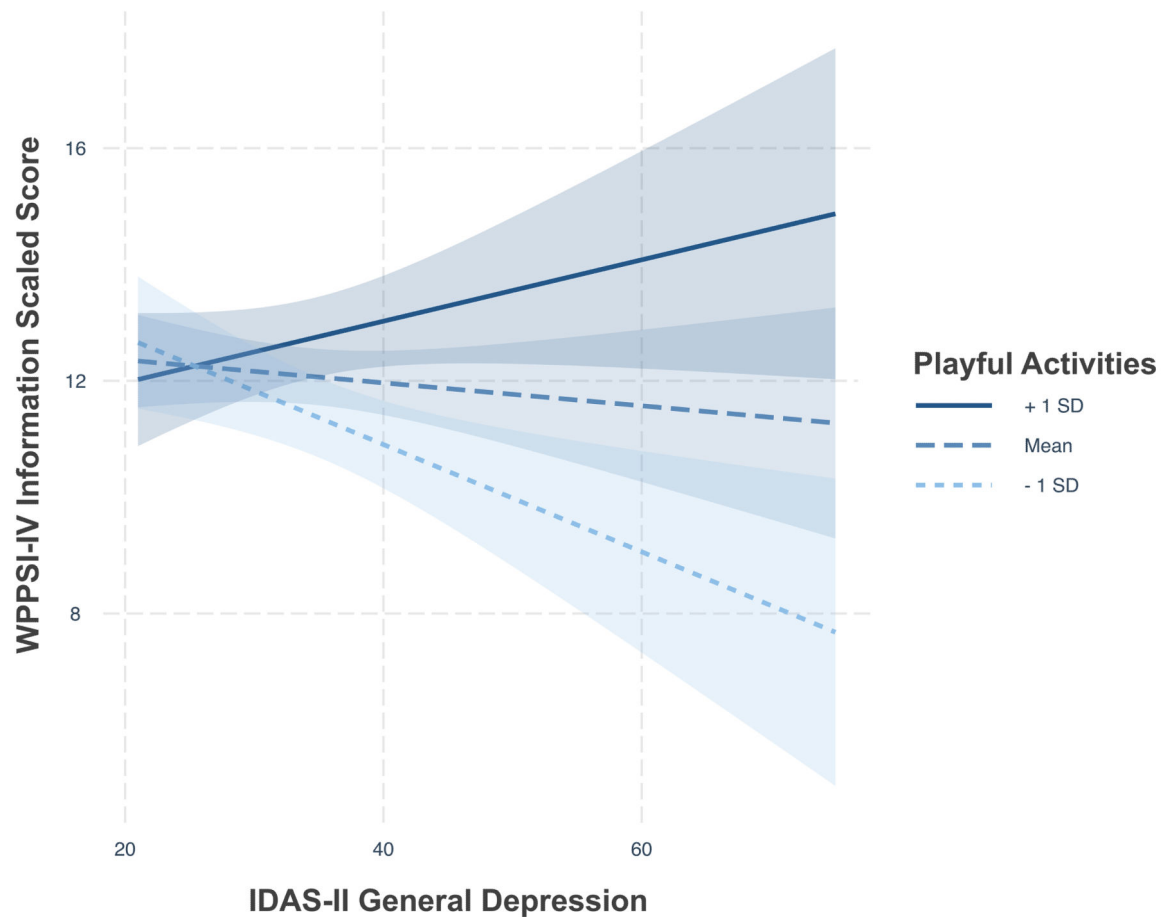


Figure 2.

Plot depicting the interaction between parental general depression and playful activities on child acquired verbal knowledge, as measured by Wechsler Preschool & Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012) Information subtest. Parental general depression, as measured by Inventory of Depression and Anxiety Symptoms, Expanded Version (IDAS-II; Watson et al., 2012), is divided into 3 categories for visualization purposes only (+1 SD, mean, -1 SD). Shaded confidence intervals reflect 95% CI. *Note.* From Long, J. A. (2019). *interactions: Comprehensive, User-Friendly Toolkit for Probing Interactions*. R package version 1.1.0, <https://cran.r-project.org/package=interactions>.

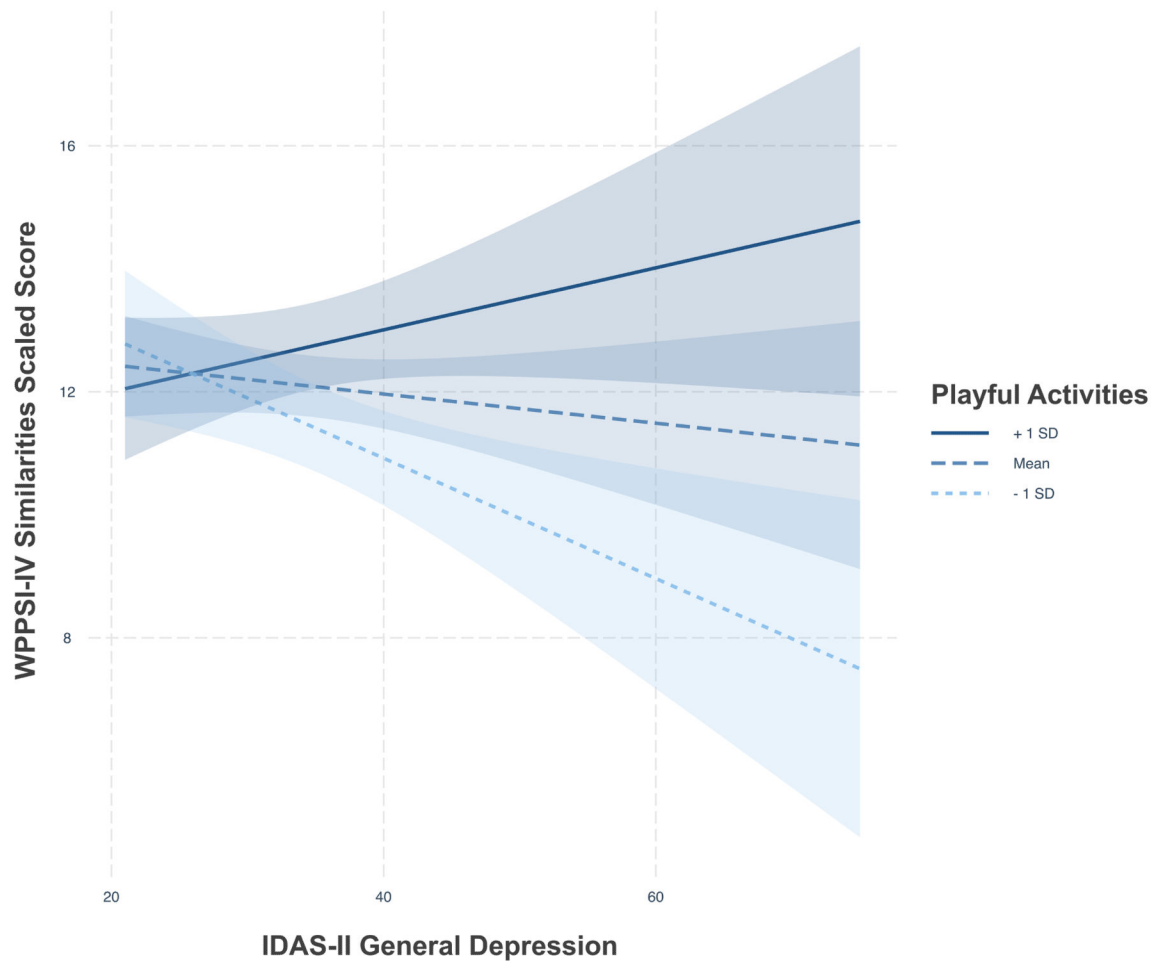


Figure 3.

Plot depicting the interaction between parental general depression and playful activities on child verbal reasoning skills, as measured by Wechsler Preschool & Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012) Similarities subtest. Parental general depression, as measured by Inventory of Depression and Anxiety Symptoms, Expanded Version (IDAS-II; Watson et al., 2012), is divided into 3 categories for visualization purposes only (+1 SD, mean, -1 SD). Shaded confidence intervals reflect 95% CI. *Note.* From Long, J. A. (2019). *interactions: Comprehensive, User-Friendly Toolkit for Probing Interactions*. R package version 1.1.0, <https://cran.r-project.org/package=interactions>.

Table 1.

Demographic Information for all Participants (N = 174)

Variable	<i>M (SD) or n (%)</i>
Child Age, years	4.83 (0.64)
<i>Child Gender</i>	
Female	89 (52%)
Child Hispanic	13 (7%)
Child White	168 (97%)
Gestational Age, weeks	36.91 (4.65)
Birth weight, lbs,oz	6.47 (2.26)
Household Income (USD)	\$121,176 (\$79,641)
<i>Parent Education</i>	
High school	5 (3%)
Some college credit	16 (9%)
Associate's Degree	19 (11%)
Bachelor's Degree	60 (34%)
Professional Degree	74 (43%)
Parent Age, years	36.20 (6.07)
<i>Parent Gender</i>	
Female	160 (93%)
Parent Hispanic	4 (2%)
Parent White	165 (95%)

Table 2.

Descriptive Statistics for Parental Mental Health, Home Learning Activities, and Child Cognitive Outcomes (N = 174)

Variable	M (SD)	Range
IDAS-II General Depression	33.93 (9.84)	20–100
IDAS-II Well Being	24.54 (5.51)	16–32
IDAS-II Social Anxiety	7.93 (2.74)	6–30
Didactic Verbal Activities	5.06 (0.97)	1–7
Didactic Spatial Activities	4.84 (1.10)	1–7
Playful Activities	4.43 (0.97)	1–7
WPPSI-IV Information	11.51 (2.80)	1–19
WPPSI-IV Similarities	12.02 (3.01)	1–19
WPPSI-IV Matrix Reasoning	10.18 (3.93)	1–19

Note. Parental mental health was measured by the Inventory of Depression and Anxiety Symptoms, Expanded Version (IDAS-II; Watson et al., 2012) and child cognitive outcomes were measured by the Wechsler Preschool & Primary Scale of Intelligence, Fourth Edition (WPPSI-IV; Wechsler, 2012).