Psychological Bulletin
2013, Vol. 139, No. 1, 1–34

0033-2909/12/$12.00 DOI: 10.1037/a0029321

The Impact of Pretend Play on Children's Development: A Review of the Evidence

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Pretend play has been claimed to be crucial to children's healthy development. Here we examine evidence for this position versus 2 alternatives: Pretend play is 1 of many routes to positive developments (equifinality), and pretend play is an epiphenomenon of other factors that drive development. Evidence from several domains is considered. For language, narrative, and emotion regulation, the research conducted to date is consistent with all 3 positions but insufficient to draw conclusions. For executive function and social skills, existing research leans against the crucial causal position but is insufficient to differentiate the other 2. For reasoning, equifinality is definitely supported, ruling out a crucially causal position but still leaving open the possibility that pretend play is epiphenomenal. For problem solving, there is no compelling evidence that pretend play helps or is even a correlate. For creativity, intelligence, conservation, and theory of mind, inconsistent correlational results from sound studies and nonreplication with masked experimenters are problematic for a causal position, and some good studies favor an epiphenomenon position in which child, adult, and environment characteristics that go along with play are the true causal agents. We end by considering epiphenomenalism more deeply and discussing implications for preschool settings and further research in this domain. Our take-away message is that existing evidence does not support strong causal claims about the unique importance of pretend play for development and that much more and better research is essential for clarifying its possible role.

Keywords: pretend play, preschool, cognitive development, social development

How does pretend play affect children's development? Claims for its positive impact are resounding. The National Association for the Education of Young Children, the major preschool accrediting body in the United States, stated in its recent position paper, "high-level dramatic play produces documented cognitive, social, and emotional benefits" (Copple & Bredekamp, 2009, p. 15). An article aimed at parents states that play "is a significant contributor to the child's cognitive, physical, emotional, and social development"[1] (Hurwitz, 2002, p. 101). Some even maintain that pretend play's impact is unique: A clinical report on the subject for the American Association of Pediatrics opened, "play is essential to development . . . so important . . . that it has been recognized by the United Nations High Commission for Human Rights as a right of every child"[2] (Ginsburg, the Committee on Communications, & the Committee on Psychosocial Aspects of Child and Family Health, 2007, p. 182). P. K. Smith (2010, pp. 28–29) gave many other examples of the important and wide-reaching benefits attributed to pretend play (see also Bredekamp, 2004; Brown & Vaughan, 2009; Elkind, 2007; Tullis, 2011). American parents concur (Roopnarine, 2011), and child development experts endorse pretend play even more strongly (K. R. Fisher, Hirsh-Pasek, Golinkoff, & Gryfe, 2008). Entire preschool curricula are designed around pretend play because of the "unequivocal evidence for [its] critical importance" to children's development (Zigler & Bishop-Josef, 2004, p. 9). Master teachers' discussions of why pretend play is so vital for children are convincing (e.g., Paley, 2005), and we agree: When we watch children in pretend play, it seems to us like a very important activity.

However, many non-Anglo cultures do not share this view of pretend play's importance, and perhaps as a result, children growing up in those cultures pretend much less (Gaskins & Goncu, 1992; Lancy, 2007). A recent survey found that in only five of 16

This article was published Online First August 20, 2012.

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Preparation of this article was supported by National Science Foundation (NSF) Grant 1024293, a Brady Education Foundation grant, and a University of Virginia Sesqui award to Angeline S. Lillard; the American Psychological Foundation's Elizabeth Munsterberg Koppitz Fellowship, the James H. and Elizabeth W. Wright Endowed Fellowship from the Jefferson Scholars Foundation, and grants from the American Psychological Association and the Association for Psychological Science to Matthew D. Lerner; and an NSF graduate fellowship to Eric D. Smith.

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[1] Elsewhere it is clear that pretend play is intended; for example, "in play, everything and anything can happen: a sheet over a table becomes a castle" (Hurwitz, 2002, p. 101).

[2] Pretend play is Ginsburg et al.'s (2007) focus; for example, "play allows children to create and explore a world they can master, conquering their fears while practicing adult roles" (p. 183).

countries surveyed (the United States, the United Kingdom, Ireland, Portugal, and Argentina) do the majority of mothers say their children (ages 1–12) often participate in imaginative play (D. G. Singer, Singer, D'Agostino, & Delong, 2009). Even within the United States, there is individual variation in how much children pretend (Fein, 1981). Should infrequent pretenders be pretending more? Would doing so help their development? Is the evidence strong enough to warrant designing curricula around pretend play and deriding preschools that do not encourage it? Here we examine evidence cited in support of pretend play's importance to determine whether there is a convincing case. The evidence concerns six domains of development, chosen because they are frequently claimed to be assisted by pretend play (e.g., see Ashiabi, 2007; Bergen, 2002; Ginsburg et al., 2007; Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009; Isenberg & Quisenberry, 1988; Lillard, 2001a) and because we found at least a half dozen studies concerning each: nonsocial cognitive aptitudes (with five subdomains), social cognition, social skills, language, narrative skills, and self-regulation (with the subdomains of executive function and emotion regulation).

First we define pretend play and review three theoretical positions on whether and how it affects development generally. Next, we describe patterns of evidence that would support each position, then review and discuss the evidence domain by domain. Finally we consider one position more deeply, address the implications of our review for educational settings, and make suggestions for future research on this topic.

Defining Pretend Play

A preliminary issue is to define pretend play. Play itself is a notoriously difficult concept to pin down (Burghardt, 2011). For our purposes the four criteria of Krasnor and Pepler (1980) will define play: flexibility, positive affect, nonliterality, and intrinsic motivation (cf. Sutton-Smith & Kelly-Byrne, 1984). Flexibility denotes that play behaviors vary from real ones in form (they might be exaggerated, or truncated) and/or content (one might play at eating with a stick instead of a spoon). Positive affect touches on the idea that people look like they are having fun when they play. Nonliterality refers to the fact that, in play, behaviors lack their usual meaning while paradoxically retaining it; Bateson (1972) famously pointed out that, "the playful nip denotes the bite, but it does not denote what would be denoted by the bite" (p. 317). Intrinsic motivation suggests voluntariness: One engages in the activity by choice for its own sake.

Pretend play activities are the subset of play activities characterized by an "as-if" stance (Garvey, 1990). Beyond being simply nonliteral, in pretend play a "pretense" is layered over reality (Austin, 1979); specifically, a pretender knowingly and intentionally projects some mentally represented alternative on to the present situation in the spirit of play (Lillard, 1993). Sometimes pretend play is social: A group of children share an alternative reality that they project, perhaps acting like they are different people in another place and time. Other times pretending is a solo activity. Pretend play can involve projecting imaginary objects and properties, or using one object as if it were another (Leslie, 1987). It is most prominent in early childhood, with ages 3 to 5 being declared its "high season" (D. G. Singer & Singer, 1992), although it does continue into middle childhood and beyond (E. D. Smith & Lillard, in press).

There are several other forms of play besides pretend (see Pellegrini, 2009; P. K. Smith, 2010); in particular there is a small but important literature on physical play (such as hopscotch and rough-and-tumble play), which has been well reviewed elsewhere (Pellegrini & Bohn, 2005; Pellis & Pellis, 2009). Such forms of play assist sustained attention in conventional school situations (Pellegrini & Bohn, 2005); they also (in the case of rough-and-tumble play fighting) assist emotion regulation, social coordination, and normal sexual behavior, at least in some rodents and nonhuman primates (Pellis & Pellis, 2009). Pretend play can overlap with these and other types of play. For example, physical play overlaps with pretend play when children pretend to be fighting warriors. Object play overlaps with pretending when a child animates those objects.

The literature is not always clear as to when pretend play specifically, versus play more generally, or some other specific type of play is at issue; this can be seen in the quotes with which we opened (but see footnotes 1–2), and probably arises because young children's play is so often infused with pretense. Our aim here is not to resolve this ambiguity but rather to consider studies used to support claims that play is crucial to positive developments, excluding the physical play literature just mentioned, and retaining focus on pretend play as much as possible. Our main exception to this is in two subdomains of nonsocial cognitive aptitudes, creativity and problem solving, because for those skills several studies concerning manipulative play with small objects (which might or might not involve pretending) are often cited as showing play's cognitive benefits. When a study contrasted pretend play with some other form of play (like construction play, as in building with blocks) we focused on the pretend condition. Many studies strain the voluntary aspect of play in that children were told to play or were instructed in acting out a story, but because those studies have been cited as showing play's benefits, they are reviewed here.

To locate studies, the first author began with references supporting claims of play's benefits in articles like those in the opening paragraph, then back referenced those studies in a snowball fashion. Through this process she arrived at the six main topics and six subdomains of nonsocial cognitive skills; the subdomain of mathematics was subsequently eliminated due to an insufficient number of studies. From there a search engine (Google Scholar) was employed, searching by keywords ("social skills, pretend play") and the "referenced by" and "related articles" features, as well as continuing to back reference from within articles. To avoid an unwieldy review, we passed over studies of atypical populations or cultural variation, and largely confined ourselves to published or in press peer-reviewed studies.[3]

Theoretical Background

P. K. Smith (2010) laid out three theoretically possible relationships between pretend play and positive developmental outcomes.

[3] Exceptions were made for particularly important unpublished studies reported in other published work by the author or thesis advisor, and for one article under review.

The first is that pretend play is *crucial* to optimal development. The second, which Smith supported, is *equifinality*: Pretending helps some developments, but it is only one possible route. Other activities can work as well or better. The third possibility is that pretending is an *epiphenomenon* or byproduct of some other selected-for capability, but in and of itself makes no contribution to development; rather, the other activity or condition to which it is sometimes attached is the actual contributor. Two major developmental theorists, Vygotsky and Piaget, align with the first and third views, respectively.

For Vygotsky (1978), pretense has a crucial developmental role, because it is the activity by which children learn to separate referent from object. In play, children first understand that actions (and objects on which one might act) can be separated from reality and can be based on the meaning of a given situation rather than on the physical properties of objects (Vygotsky, 1967). In this way, for example, a banana could become a phone in a pretense situation and the child could act on it as if it were a phone, inhibiting how he or she would act on it if it were a banana. The upshot of this is that children develop abstract thought through pretend play (Vygotsky, 1967). In addition, because reality must be inhibited, children also develop inhibitory control through pretending (Bodrova & Leong, 1996). Because of these features, "in play, it is as though [the child] were a head taller than himself" (Vygotsky, 1978, p. 102); play takes a child to the upper end of his or her "zone of proximal development" (p. 86).

In contrast, for Piaget (1962), pretend play is more an index than a promoter of development.[4] Its appearance around 18 months indicates the development of the semiotic function, which also allows for deferred imitation and language. The semiotic function separates an idea from its referent, a memory from its context, and an object from its label, allowing one to entertain and elaborate on mental content that is separate from the physical, present reality.

Here we consider which of these views is best supported by the evidence. Each view is compatible with a particular pattern of evidence from correlational and experimental (short-term and training) studies, shown in Table 1 (cf. P. K. Smith, 2010, Table 9.2, p. 187). These patterns assume methodologically sound studies including sufficient duration and sample sizes. First, if pretend play does crucially *cause* positive developments (Vygotsky's position), then strong positive correlations between pretend play and those developments should consistently be found; if a child pretends more, whether naturally (in a correlational study) or due to an experimental manipulation, the development should increase. If pretend play causes creativity, then children who pretend more will generally be more creative. Additional predictors, like intelligence, are also possible, but if pretending is truly the important causal factor, the unique and important relationship to pretend play should hold even when those other predictors are partialled out.

Conversely, if Smith's *equifinality* position is correct, then one would generally expect positive relationships between play and the outcome but also correlations with other predictors that engender the outcome. For example, if social pretend play develops theory of mind and so does adult talk about mental states, then correlations should be found for both variables. Interventions increasing mental state talk and pretend play might have an additive effect when combined, which could lead to even larger effects (but not if there was a ceiling on development for that age). There could be cases when although equifinality is the best model, pretend play fails to evince a significant effect. This might occur, for example, when there is substantial multicollinearity, or when an alternate predictor's effect is much larger, masking pretend play's effect. Thus equifinality does not insist on 100% consistent results, but it generally expects them.

The third, or *epiphenomenon*, position is supported if pretend play coincides with some other causal circumstance; in such cases pretend play might mistakenly be considered causal. For example, if social pretend play is related to theory of mind because adults who engage in a lot of mental state talk also happen to encourage pretend play, then perhaps what is actually leading to the increased theory of mind is not the pretend play, but the mental state talk; social pretend play is secondary or epiphenomenal to the mental state talk–theory of mind relationship. If pretend play is an epiphenomenon then one might find inconsistent correlations with outcomes (because pretend play does not always go along with the real predictors) but consistent correlations between real predictors and outcomes. Because different studies measure different possible predictors, the true predictors might not always be evident. Here we evaluate the patterns of evidence with an eye to each of these positions. Before beginning to do so, it is useful to note some recurring problems in this literature (see also Cheyne, 1982).

Common Methodological Problems

Several problems recur in the literature on whether pretend play helps development. Sometimes these problems occur because the

[4] Others have claimed Piaget gives pretense a stronger role in development; for example, Singer and colleagues, citing Piaget (1962), claimed he "concluded that play was a vital component to children's normal intellectual and social development" (D. G. Singer et al., 2009, p. 285). In our reading the closest Piaget (1962) comes to this is when he says it is undoubtedly "a preparation for imaginative aptitudes" (p. 155), where imagination (as in pretend play) is the assimilative pole of thought (in contrast to accommodation), and creative imagination arises only when one integrates the two. This is essentially the position taken by Harris (2000) and D. G. Singer and Singer (1992): Pretending assists imagination. But whereas for these modern authors this is a reason to centralize pretend play, our reading of Piaget's text on play suggests that this role in imaginative development was a minor concern; pretend play was primarily an offshoot of the symbolic function. Perhaps confusion has arisen because elsewhere Piaget assigns manipulative activities (Piaget, 1929) and peer interaction (Piaget, 1932) as important to development, and pretend play often involves these other activities. But in considering manipulative activity, Piaget refers more to what is now referred to as embodied cognition ("manual work is essential to the child's mental development"; Piaget, 1929, p. 383), and regarding peer involvement Piaget's own focus on pretend play was particularly as a solitary activity. Piaget (1962) did think pretending served an egoistic function in that it allowed the child to fulfill wishes that he or she could not fulfill in reality. A child who wants to be a mother can simply pretend to be one. But Piaget was concerned with cognitive development, not personality development, and pretend play was *pre*-operational because it indicated what the child lacked. For Piaget, children outgrow pretending as they develop the ability to accommodate reality. Here he followed some major figures of his time in child psychology, such as Freud (1955, as discussed by Harris, 2000) and Montessori (1989). Aligning with our own reading, Sutton-Smith (1966) colorfully summarized Piaget's view of pretending as "a buttress to an inadequate intelligence" (p. 108). For further discussion, see P. K. Smith (2010, pp. 31–37).

Table 1
Three Possible Relationships Between Pretend Play and Development

Expected pattern of results	Crucial (Vygotsky)	Equifinality (P. K. Smith)	Epiphenomenon (Piaget)
Correlational studies	Strong, unique, and consistent.	Generally consistent but not unique. Including other causal variables could mask pretend play's effects, so correlations *could* be inconsistent.	Inconsistent, but consistent with other variables that are causal. For example, if presence of certain toys increases pretending in children who are more creative, but other objects have no impact, then correlations between pretending and creativity will be seen only in environments with those toys.
Experimental (short-term and training) studies	Strong, unique, and consistent.	Strong and consistent but not unique, so other conditions could also affect development. For example, skills training and pretend play training could both increase the development.	Effects found only if the crucial underlying factor(s) is (are) influenced by the intervention. For example, suppose pretend play only assists development when intensive adult interaction is part of that training; when children pretend but there is no intensive adult interaction, the pretend play does not increase the development; in addition, another condition might show that intensive adult interaction alone increases the development, even in the absence of play.

research was conducted when experimental standards were not as high as they are today, pointing to the need to modernize the evidence base. In more recent studies, perhaps scholars did not apply more rigor because of a deep belief in the *power of play* (Elkind, 2007), what P. K. Smith (1988) dubbed the "play ethos" and Sutton-Smith (1995, p. 279) the rhetoric of "play as progress." Here we strive to overcome the tendency to favor pretend play by holding all studies to a high standard.

One common problem in discussions of the impact of play on development is that correlational findings are often discussed as if they were causal. When children who play more do better on some other measure, of course it does not mean that the play definitely caused the outcome. Positive correlations between pretend play and a development are only a necessary precondition to pretend play being causal. Likewise prominent authors have described elaborate pretend worlds they constructed as children, and one might see the earlier behavior as causing their subsequent literary genius (Root-Bernstein, in press), but it is as plausible that their creativity led to conjuring up elaborate imaginary worlds at both time points.

A second recurring problem is failure to replicate. For example, one study shows increases in empathy associated with pretense training (Saltz & Johnson, 1974) and another does not (Iannotti, 1978), and typically only the positive finding is cited. If other key experimental factors are essentially equal, either the reported positive result reflects a Type I error or the failure reflects a Type II error. Inconsistent findings in correlational studies contradict the causal view but would be expected with either the equifinality or epiphenomenalism. For equifinality, nonreplications would occur when the alternate route was stronger in one study, and including it masked the effect of pretend play; for the epiphenomenon position, nonreplications would occur because the underlying cause sometimes accompanied pretend play and sometimes did not. In the literature extolling play's benefits, failures to replicate are often ignored.

A third problem concerns experimenter bias. Every undergraduate research methods course should impart the importance of experimenters being "masked" insofar as possible: that is, unaware of (a) the hypotheses being tested and (b) participants' conditions. Yet cognitive development research rarely uses masked experimenters. This might usually be fine: Child development researchers and the kinds of tests they give might not be vulnerable to experimenter bias under the usual circumstances. For example, we know of no research suggesting that false belief or conservation errors occur at certain ages only when experimenters are unmasked. However, for research on the benefits of pretend play there are several cases where results obtained with knowledgeable experimenters went away when masked ones were employed (Christie, 1983; Guthrie & Hudson, 1979; Pepler & Ross, 1981; Simon & Smith, 1983, 1985; P. K. Smith, Simon, & Emberton, 1985; P. K. Smith & Whitney, 1987). Nonreplications with masked experimenters make a strong case for being cautious about pretend play results obtained with knowledgeable experimenters.

Besides correlational data, nonreplication, and unmasked experimenters, other recurrent problems are very small sample sizes, nonrandom assignment, confounding implementer with intervention (particularly concerning when there is only one implementer per condition and interventions last for several months), control conditions that differ beyond pretend play, confounding content with pretend play, and unsound statistical practices like using subsets of data and one-tailed tests without prior rationale.

Methodological problems are so prevalent in this literature that meta-analysis is precluded. E. P. Fisher (1992) did a meta-analysis of the impact of play (generally) on development, despite awareness of these limitations (see "Shortcomings of the Studies," pp. 164–168), but he also did not have a consistent even-handed approach to which statistics he included, and further, he used some wrong statistics that inflated his result. As a particularly egregious illustration of this, from Christie (1983) he used the statistic pertaining to a variable named variable ($F = 257.67$), reflecting the overall sample scores on five variables, when the far smaller Variable $\times$ Time $\times$ Condition statistic ($F = 0.49$) is what should

have been used. Careful reading reveals many more problems, yet this article is often cited (126 times, Google Scholar, as of May 28, 2012) as evidence that play helps development (e.g., Bergen, 2009; Ginsburg et al., 2007; Wyver & Spence, 1999).

Because so many studies in this area are methodologically unsound, the current literature base is best suited to a descriptive review, on which we now embark. In each section, we begin with theoretical and construct issues, then review studies. A series of 10 tables compiles the studies pertinent to each domain or subdomain of development.

After reviewing the studies, each section concludes by discussing the evidence with respect to the three views (summarized in Table 12). In these discussions, we sometimes rely on the absence of evidence to support a position. We do this with caution, since one can never prove that a relationship does not exist (Altman & Bland, 1995). However, inconsistent correlation patterns across studies with similar samples and methods and reliable coders are against a causal view. Likewise, when sound experimental methods yield null effects or even effects showing play is less positive than the alternative, this is also relevant. Finally, doubt is also cast on a causal view when masking experimenters or equalizing other aspects of interventions nullifies previous findings.

A final note before treading into the evidence concerns the "straw person" element of the crucial causal view. When put on the stand, perhaps few would endorse the position that pretend play is crucial (in the sense of essential or vital) for various aspects of development. Yet the quotes with which we opened and additional references throughout this review show that this stance is taken in the literature, so we consider it here.

Nonsocial Cognitive Aptitudes

As was seen in our opening paragraph, many scholars have asserted that pretend play produces cognitive benefits. One way pretend play could help cognition is by predisposing children to a generally playful attitude (Dansky & Silverman, 1973) that could lead to production of unusual ideas, creative problem solving (Vandenberg, 1980), and then to other cognitive aptitudes. This view is compatible with Fredrickson's (2001) broaden-and-build theory of positive emotions, with play eliciting joy, which in turn leads to a broadening of individuals' thought–action repertoires. Vygotsky's ideas on symbolic and abstract thought, just reviewed, also suggest how pretend play could assist cognitive abilities. Here we discuss evidence that pretend play assists development in five subdomains: creativity, problem solving, intelligence, conservation, and reasoning.

Creativity

Although creativity has been operationalized in a number of ways, in the studies on play it has typically been defined as the ability to produce original content relevant to a particular task (Wallach & Kogan, 1965). The most commonly used measure of creativity in this literature is the alternate uses task (R. C. Wilson, Guilford, & Christensen, 1953), in which participants give possible uses for common objects, like a paper towel or a paperclip (Dansky, 1980a). Task responses are typically coded for fluency (number of uses named) and originality (number of uses not given by any other participant). Another common task is the Torrance Thinking Creatively in Action and Movement Test or TCAM (Torrance, 1981), which includes several subtests, including having children move like trees in the wind, and also alternate uses.

Correlational studies. Several studies have addressed the claim that pretending makes children more creative (Ginsburg et al., 2007; J. L. Singer, 1973) by looking for correlations between naturalistic play and creativity, since they should exist if more frequent pretenders have become more creative via their pretend activity. Of course correlations are not evidence of causation, but if causation exists, correlations should be consistently found.

Naturalistic classroom play has been categorized differently in different studies, but a combination of Smilansky (1968) and Parten's (1932) schemes has been used most often (Rubin, 2001). Smilansky's scheme (derived from Piaget) divides play into cognitive categories (*functional play* when a child repeats motor actions on objects, *construction play* when a child builds things, *dramatic or symbolic play* when the child substitutes an imagined world for reality, and *games-with-rules* like Checkers). Parten's scheme is focused on the social aspect of children's play: *cooperative* when children are actively interacting in a common group endeavor; *associative* when they interact but not toward a single common endeavor; *parallel* when they play similarly but side by side, with little interaction; *solitary independent* when they play alone at their own games; *onlooker* when they watch others play; and *unoccupied*.

We found eight studies correlating pretend play and creativity (see Table 2). Seven concerned preschoolers. Typically children's play in preschool was coded for 1–5 min per day for a period of 20 days or more, and then alternate uses with two to four objects (or in some cases the TCAM or another test) was administered. Results were inconsistent.

Johnson (1976) found that, controlling for IQ, amount of social but not solitary fantasy play was related to fluency. This would suggest that something about the social element, rather than pretending in and of itself, was related to creativity. However, Johnson (1978) later failed to replicate this finding in a very similar study, showing no relationship between pretend play (social or solo) and alternate uses. A different study with the same age range also found no relationship between creativity and social pretend play (L. Dunn & Herwig, 1992) but found a negative relationship between originality of responses and solo pretend play that disappeared when IQ was partialled out. Pellegrini and Gustafson (2005) also did not find children's frequency of pretend play to be related to creativity ($r = -.18$) yet did find frequency of *construction* play was related. On the other hand, a different study found all pretend play was significantly related to creativity in a sample of 15 high-IQ preschoolers (Moran, Sawyers, Fu, & Milgram, 1984). Wyver and Spence (1999) found that particularly fantastical pretend play was related to semantic creativity (naming all the objects one could think of) but not figural creativity (making objects from shapes); two other categories of pretend play that they coded were not related to either. The remaining preschool study, Lloyd and Howe (2003), was not useful regarding pretend play because they combined it with functional play, which was twice as common as pretend play, but it is worth noting that in contrast to Pellegrini and Gustafson (2005) they found construction play (which was coded separately) was not related to creativity. In the eighth and final correlational study, looking at somewhat older children, Russ and

Table 2
Studies Examining the Effect of Play on Creativity

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Johnson (1976)	SPP	Solo				
C	Johnson (1978)		SPP/Solo				
C	L. Dunn & Herwig (1992)		SPP	Solo			Solo disappears when partial IQ
C	Pellegrini & Gustafson (2005)	Const.	PP				
C	Moran et al. (1984)	PP					Holds when partial IQ
C/T	Wyver & Spence (1999)	PP	PP/SPP		No	No	C: One type of pretense related to one task; T: effects work both ways; fantastical themes; finding for one of two measures for associative PP
C	Lloyd & Howe (2003)		Const.				
C	Russ & Grossman-McKee (1990)	Solo					Creativity/play measures are redundant
E	Dansky & Silverman (1973)	Play			No	No	
E	Dansky & Silverman (1975)	Play			No	No	Extended to different objects
E	Li (1978)	PP			No	No	Two of four objects only
E	Dansky (1980b)	Play			No	No	Pretenders only
E	P. K. Smith & Whitney (1987)		Play		No	Yes	
E	Pepler & Ross (1981)		Play		No	Yes	See footnote 5 in text
E	Pellegrini & Greene (1980)		Play		No	No	Structured questioning better
E	Pellegrini (1981)		Play		No	No	Structured questioning better
E	Russ & Kaugars (2001)		PP		No	No	Scorer but not administrator masked
E	Howard-Jones et al. (2002)	Play			Irrel.	Yes	Control task very dull
T	Dansky (1980a)	SPP			Yes	Yes	Adult contact not controlled; "natural" pretenders only
T	Feitelson & Ross (1973)	PP	PP		No	No	Only on one measure; adult contact not controlled
T	Christie (1983)		PP = Skills		No	Yes	Adult contact controlled
T	P. K. Smith & Syddall (1978)		PP = Skills		Yes	No	Adult contact controlled
T	P. K. Smith et al. (1981)		PP = Skills		No	Yes	Adult contact controlled
T	Moore & Russ (2008)		Solo		No	Yes	Adult contact controlled

Note. Type of study: C = correlational; E = experimental; T = training. Type of play: Play = pretense status unspecified; Const. = construction play (e.g., blocks); Solo = pretend play alone; SPP = social pretend play; PP = pretend play (social unspecified). +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). Irrel. = irrelevant.

Grossman-McKee (1990) examined play with Russ's Affect in Play Scale (APS), which uses 10 min of play with puppets and blocks coding generativity. Alternate uses also taps generativity, so it is not surprising that positive correlations were found, both concurrently and over time (Russ, Robins, & Christiano, 1999).

The eight correlational studies show an inconsistent pattern of relationships that does not support the causal model. The other models seek alternate routes or third variables that could underlie relationships when they are found. With this particular set of studies, no obvious other variable emerges. IQ is sometimes related to creativity (Johnson, 1976; Wyver & Spence, 1999) but sometimes not (L. Dunn & Herwig, 1992; Lloyd & Howe, 2003; Moran et al., 1984; Wyver & Spence, 1999); Johnson (1978) did not test IQ. Johnson worked with low-socioeconomic status children, whereas others involved middle-class ones, but this cannot explain the discrepant results across Johnson's own studies. Another third variable that fits either view is environment (i.e., types of toys supplied), which can drive the types of play children engage in (McLoyd, 1983). Because environment was not measured, we cannot evaluate if this could underlie the inconsistencies. Regardless, distinguishing the second and third views requires experimental studies.

Experimental studies. Four experimental studies found higher associative fluency when children first played with objects for which they later named uses (Dansky, 1980b; Dansky & Silverman, 1973, 1975; Li, 1978). This fit with Sutton-Smith's (1968) quasi-experimental study in which boys came up with more alternate uses for traditional boy toys than did girls (although for girl toys, they were equal). To check whether experience with the objects, rather than playing with them per se, was important, Dansky and Silverman (1973) included an imitation group, in which children gained experience by imitating the experimenter handling the objects. The imitators gave no more uses than the controls, suggesting that experience with the objects did not explain the first results (see also Hughes, 1981, as cited in Hutt, Tyler, Hutt, & Christopherson, 1989).

Pretend play's effect on creativity could be limited to the objects at hand. To test this, Dansky and Silverman (1975) used a different set of objects in the test phase, and here again the play group produced more uses, suggesting play's hypothesized effect on creativity generalizes.

In the Dansky studies just described, although the theoretical rationale concerned pretend play, it is unclear whether children pretended with the objects or just manipulated them. Li (1978) tested whether pretend play might improve creativity above and beyond play generally. In the pretend play condition, the experimenter told a short fantasy story, then showed children the stimulus objects and said, "Let's make-believe or imagine that these

objects could become anything you want them to be. Play with all of these things" (p. 33). Free play, imitation, and control conditions were similar to those used in Dansky's studies. After 10 min, the same experimenter administered the alternative uses test with the three objects used in the intervention and a new fourth object. Significant differences were found for one of three old objects (a paperclip), for the make-believe group and the free play group, and for the new object (a screwdriver) only for the make-believe group versus the control. Overall, Li's children came up with far fewer uses than children had in the previous studies, perhaps reflecting population variance.

Taking a different tack, Dansky (1980b) examined whether children who naturally engage in more pretend play would benefit more from a play intervention. Children were classified as pretenders if they engaged in pretense more than 25% of the time, or nonpretenders if they engaged in it less than 5%. They were then assigned to free play or control conditions. Suggesting the classroom classifications had validity, in the free play condition 88% of the pretenders but only 6% of the nonpretenders pretended with the objects. The alternate uses test was given with a different set of objects, and only the pretenders in the free play condition had higher fluency. Dansky concluded that play induces creativity only for those who are predisposed to pretend.

These experimental studies suggest that play might have a causal effect on creativity, at least for children who frequently pretend (see also Sutton-Smith, 1967). However, in these studies the experimenters administering the creativity test knew which condition each child was in, and perhaps their expectations influenced children's responses. With alternate uses, the experimenter elicits answers until they think a child has run out of possibilities. More coaxing might inadvertently occur when children are expected to produce more uses. In an attempted replication of Dansky and Silverman (1973), P. K. Smith and Whitney (1987) used different experimenters for the intervention phase and the posttest, with the latter masked to condition. Results showed no significant differences—in fact the control condition obtained the highest mean score. This finding is consistent with another study using a masked experimenter: The number of uses given was not significantly different for children in a play condition (Pepler & Ross, 1981, Study 2).[5] A less direct test of possible experimenter effects occurs when a different hypothesis is being tested. Two studies tested the hypothesis that focused questioning would elicit more uses than would playing with objects (Pellegrini, 1981; Pellegrini & Greene, 1980). The hypothesis was upheld: Focused questioning led to more uses, and free play was not different from the control. Another way to check for experimenter biasing is to videotape task delivery, which could encourage standardization; Russ and Kaugars (2001) did so, and children who engaged in pretend play generated no more uses than children who did puzzles. All this suggests that the alternate uses task might be particularly vulnerable to experimenter bias.

A solution is to use a different creativity task, like making a collage, the creativity of which is assessed by masked judges (Howard-Jones, Taylor, & Sutton, 2002). Unfortunately the study that did this did not use a good control condition. Six- and 7-year-olds played with salt dough for 25 min or copied words from the board (and if they finished early, were told to start over). Afterward, they made collages, and the play group's were more creative. However, perhaps forced copying had a deleterious effect on creativity, rather than play having a positive one. Further research with a more neutral control condition is needed.

Training studies. Experimental studies (as defined here) examine short-term change; perhaps play does influence creativity but requires longer incubation periods. We located seven longitudinal play training studies. The first three produced effects that were in the expected direction, but four others controlled for adult contact and found play training itself had no effect.

Dansky (1980a) compared 36 low-income preschoolers in sociodramatic play, free play, and object exploration interventions over 3 weeks, with three 30-min sessions per week. The sociodramatic play training involved enacting pretend play themes like going on a picnic. Children in the free play group could play as they wished, and they rarely engaged in pretend play. The exploration training group explored and discussed objects. All experimenters were masked. The sociodramatic play group outperformed both other groups on alternate uses.

In a similar study, Feitelson and Ross (1973) compared 24 kindergarteners in play tutoring, music tutoring, toy play without tutoring, and control groups, with ten 30-min interventions over 5 weeks. Creativity was measured with the picture completion subtest of Thinking Creatively With Pictures (Torrance, 1966), in which children complete up to 10 pictures in a way that "no one else will think of" and give each picture a title, and Dog and Bone (Banta, 1970), in which children make up different routes from a dog to a bone. The play tutoring group's scores increased the most on the number of unusual titles given (but not number of pictures or picture elements) and trended toward better performance on Dog and Bone.

Wyver and Spence (1999) trained 38 children in three types of play based on Parten's social categories and play type (associative fantastical, cooperative fantastical, or cooperative constructive/everyday sociodramatic) for 4 hr over 4 weeks, with pre- and posttests of figural and semantic creativity; they included a no-intervention control. The former two groups increased their fantastical pretend play, and the third did not increase in any type of pretend play. However, only the third group showed increases in both semantic and figural creativity. Associative fantastical play training improved semantic but not figural creativity, and cooperative fantastical play did not improve in either. These results are quite mild then for the hypothesis that pretend play increases creativity, since it did not reliably do so for the fantasy groups and the sociodramatic group also engaged in construction play. Other experiments in this study tested the reverse direction by training children in creativity and then observing play; results suggested complex and bidirectional relationships.

The results of these studies suggest that the play training can increase children's creativity. However, it is unclear whether ex-

[5] Their first experiment, using a knowledgeable experimenter, yielded some significant differences, although observing an experimenter play had as much of an effect on fluency as playing oneself. Their second experiment with a masked experimenter did not replicate the first one but did yield a near-significant difference in originality (not fluency) of responses ($p < .052$). Planned comparisons were done, using one-tailed tests, yielding positive results for free play. Pepler and Ross (1981) claimed to have presented evidence that free play promotes divergent thinking, but the inconsistent findings within the study and the use of less rigorous statistical methods make us view this as an unreliable result.

perimenter involvement was greater in the play training group. Christie (1983) controlled for adult contact (and used a blind experimenter, which Dansky did but the others did not) when comparing preschoolers in play tutoring with those in skills tutoring, using nine weekly 20-min sessions. With adult interaction controlled, both groups improved on the fluency factor of the TCAM, with no advantage for play over skills tutoring. There were no changes for either group on the originality or the imagination factors of the TCAM. On the other hand, in this study there was no increase in pretend play in the play training group. One could argue that this should not be necessary—that pretending within the intervention should be all that is needed; the sociodramatic/construction play children in the Wyver and Spence study improved in creativity without increasing their pretend play. Yet they had a 4-hr intervention over 4 weeks, whereas Christie's had 3 hr over 9 weeks. Perhaps pretend play has an effect but only after a more intensive play intervention schedule.

Yet P. K. Smith and Syddall (1978) and P. K. Smith, Dalgleish, and Herzmark (1981) did increase pretend play with their more lengthy intervention and also controlled for adult contact, comparing fantasy play and skills tutoring groups. Although the sample size was very small in the first study (14), 65 children participated in the second study. They again found no group differences in a creativity outcome, this time on the Dog and Bone task.

One final study involved slightly older children who participated in five 30-min training sessions over 3 to 5 weeks (Moore & Russ, 2008). Experimental children were asked to play out particular stories, emphasizing affect or fantasy and story coherence. A control group did puzzles, and experimenter contact was standardized to involve similar levels of encouragement in each group. Although the play groups did play more following the intervention, the control group actually increased significantly more in fluency on the alternate uses test. Thus although Christie (1983) is inconclusive because the intervention was perhaps insufficient, these other three studies suggest that increased adult interaction might drive increases in children's creativity, rather than pretend play itself.

Summary. The evidence that pretend play enhances creativity is not convincing. Correlational studies are inconsistent, with some showing relationships only to social pretend play, pretend play, or construction play, and other studies failing to show relationships to those same constructs. Inconsistent correlations are against a causal model and unfriendly but not fatal to equifinality. In the experimental studies with strong control conditions, evidence that play increases associative fluency disappeared when experimenters were masked. This shows that the play ethos is a considerable problem in this domain, and it is fatal to both the causal and equifinality views. Furthermore, effective training studies with controlled adult contact found that skills training increased creativity just as much as pretend play training. Although this could support equifinality and epiphenomenalism, equifinality was eliminated by the experimental studies with masked experimenters. Unless one argues that the length of the play interventions was insufficient (training ranged from 3 to about 26 hr, with no linear relationship to results) or that the creativity tests were invalid, the pattern of results from the methodologically sound studies (masked experimenters, control conditions that equalize important nonfocal factors, effective interventions) best supports that pretend play is an epiphenomenon of some other relationship to creativity, coincident with adult interaction.

If pretend play is epiphenomenal, one must explain why correlations are found between pretend play, or social pretend play, or construction play, in some studies but not others. Most of the correlational studies took place on school playgrounds, hence in different and unique settings. Perhaps some feature of the settings, like varying styles of adult interaction or different toys those adults provide, could explain the inconsistent patterns of correlations.

In closing, note that the studies here were limited in many ways. Ns were often very small, training schedules were often paltry, and the operationalization of creativity was limited. Just one study examined artistic creativity, and although it needs follow-up, it was promising. There is not a compelling case that pretend play improves creativity as it has been measured, and there is a strong need for more high quality research.

Intelligence

Vygotsky (1967, 1978) is the preeminent proponent of the position that pretend play increases intelligence. His claim was that repeated experiences separating object from referent develop abstract reasoning. The definition and measurement of intelligence are controversial (Neisser et al., 1996), but abstract reasoning is clearly central. In the literature concerning play, intelligence has been operationalized by a variety of measures, such as Raven's Progressive Matrices, the Stanford–Binet and the Peabody Picture Vocabulary Test (PPVT), which are correlated (Sattler, 1992), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). Below we review correlational and training studies.

Correlational studies. Several studies have examined relationships between naturally occurring play and intelligence in preschoolers, and results have been inconsistent (see Table 3). Three studies were previously discussed regarding creativity. In the first of these (Johnson, 1976), social pretend play was related to the PPVT and the Picture Completion subset of the WPPSI, but nonsocial pretend play bore no relation. This suggests that being able to incorporate others into one's play is related to intelligence, but failing to do so is unrelated.

The other two studies also discussed for creativity found negative relationships between intelligence and lower levels of play. Lloyd and Howe (2003) used the same intelligence tests as Johnson (1976) but did not code social play; a negative relationship was found with a variable combining Parten's lowest categories (onlooker and unoccupied). L. Dunn and Herwig (1992) coded social play but found no correlation with IQ; instead they found a negative correlation to solitary play, such that children who engaged in more solitary play had lower IQ scores.

An earlier study also found a negative relationship ($r = -.19$) between IQ and solitary functional play for a sample of 122 older 4-year-olds in preschool settings (Rubin, 1982); it also found a negative relationship for onlooker play and a positive one for construction play, but no relationship to pretend play. Parten (1932), using a much larger age range (1–4 years) and smaller sample ($n = 42$), also found a negative relationship between IQ and solitary play ($r = -.20$, an equal effect size that was nonsignificant with the sample size) and found larger positive relationships with both cooperative and parallel play. Taking these studies together, a consistent picture that emerges is that in preschool

Table 3
Studies Examining the Effect of Pretend Play on Intelligence

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Johnson (1976)	SPP					Did not control for age, wide span
C	Lloyd & Howe (2003)		Solo	No play			Social not coded
C	L. Dunn & Herwig (1992)		SPP	Solo			
C	Rubin (1982)	Const.		F			
C	Parten (1932)	SPP		Solo			
C	Peisach & Hardeman (1985)		PP				
C	Cole and Lavoie (1985)		SPP, PP				
C	Johnson et al. (1982)	Const.	Solo, SPP	F			
T	Saltz et al. (1977)	SPP, D			No	No	Did not control for pretest
T	Christie (1983)		PP = Skills		No	Yes	Adult contact controlled
T	Saltz & Johnson (1974)		PP = Classify		No	No	Dimension training slightly more effective than PP training alone
T	Schellenberg (2004)			D		Yes	Music > Drama = No lessons
T	P. K. Smith & Syddall (1978)		PP = Skills		Yes	No	Adult contact controlled
T	P. K. Smith et al. (1981)		PP = Skills		No	Yes	Found for one test, at one site

Note. Type of study: C = correlational; T = training. Type of play: Const. = construction play (e.g., blocks); Solo = pretend play alone; SPP = social pretend play; F = functional play; PP = pretend play (social unspecified); D = enacting stories with dolls or other children. +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example).

settings, where other children are available to play with, choosing to play alone or not play at all might be indicative of lower intelligence.

Three other studies could be seen as going against this picture, but methodical variations can explain the difference. Peisach and Hardeman (1985) scored fantasy play either via observation (4-year-olds) or interview (5- to 7-year-olds) and administered a test similar to the Raven's; they did not obtain significant positive correlations. However, the small number of 4-year-olds (10) and the fact that older children were interviewed rather than observed in school settings could be why. Cole and Lavoie (1985) found no relationship between solitary or social pretend play and PPVT scores in children ages 2 to 6, but in this study dyads were randomly paired, which might have affected the nature of their play. Johnson, Ershler, and Lawton (1982) found that 4-year-olds who engaged in more functional play at preschool scored lower on the PPVT and the Raven's, and those who engaged in more construction play scored higher. Although this is consistent with the picture painted thus far, its third finding is not: Contra Johnson (1976), sociodramatic play frequency was not related to intelligence (cf. Henniger, 1991). Perhaps the preschool setting was influential here: It was a cognitive-based program, and almost three times as much construction as pretend play was coded. Whereas in some settings pretend play is most frequent (Parten, 1933), here it was the least common type of play. It might be the case that the program offered abundant construction materials and few toys inspiring sociodramatic play, restricting its range and preventing stronger correlation.

The picture that emerges is that less intelligent children engage in lower levels of play in most of the preschool settings studied. By the Vygotskian model, these children failed to become more intelligent because they did not engage in higher levels of pretend play. Although the consistent correlations observed support this possibility, level of intelligence might induce level of play, rather than the reverse. Training studies can resolve this.

Training studies. We found six training studies that examined intelligence. Just one reported a solid and unique pretend play training effect (Saltz, Dixon, & Johnson, 1977). Three cohorts of children were given, over 6 months, a 15-min intervention 3 times per week enacting thematic fantasies (like *The Three Billy Goats Gruff*), discussing those same stories, or acting out typical experiences like going to the doctor. A control group engaged in other preschool activities. The sociodramatic and thematic fantasy groups had higher posttraining intelligence scores than the other groups. However, the researchers who did the training also administered the posttests, which could be problematic for studies of pretend play. Among the other five studies, three of which used masked posttesters, pretend play tutoring showed no more benefit than skills/classification tutoring (Christie, 1983; Saltz & Johnson, 1974; P. K. Smith et al., 1981; P. K. Smith & Syddall, 1978) and less benefit than music (especially voice) training (Schellenberg, 2004); the only hint of a difference favoring play was in one study (P. K. Smith et al., 1981), on one of eight tests (geometric design), in one of two schools, which is not better than would be expected by chance. Thus when more sound methods were used, pretend play training did not increase intelligence more than the comparison condition. Regarding Schellenberg (2004), however, we have two concerns: differential dropout (17% in the keyboard condition) and combining the keyboard and voice groups for analysis when the IQ gain of the drama group was only one point less than the gain of the keyboard group.

Summary. Relationships are found in natural settings between levels of play and intelligence, but the direction of effects is uncertain. Training studies with solid methods suggest that pretend play is no better than other adult interventions in raising intelligence scores, and music interventions raised them more (cf.

Wenner, 2009). Perhaps some feature of adult interaction or some aspect of music training drives group differences, which is more consistent with epiphenomenalism. Ideally in future research one could remove these key features, or isolate them for singular presentation in a third condition.

Problem Solving

Problem solving involves inventing strategies to overcome an obstacle and reach a goal. Theorists have speculated that playing with objects enables children to think about them in myriad ways and thus employ them in new ways to solve problems. Studies of problem solving and play have typically used Kohler's lure-retrieval paradigm, in which one must join two sticks together with a clamp or block in order to reach something. With this paradigm, it is not always clear if children are pretending: mapping an alternate reality on to the objects. But in discussions of the studies, pretend play is often considered key (Garvey, 1990). See Table 4.

Correlational studies. Four correlational studies of play and problem solving found that engaging in *construction* but not pretend play in preschool was positively related to performance on the lure-retrieval problem (Cheyne & Rubin, 1983; Pellegrini & Gustafson, 2005; Rubin, 1982), although for one study that relationship held only for boys (Gredlein & Bjorklund, 2005). Construction play could be related to performance on the lure-retrieval problem due to a third variable. For example, if some children are particularly drawn to constructing things, this could lead to high scores on both measures. Experimental studies are needed to examine causality and to more specifically address the issue of pretend play.

Experimental studies. In the original study to use the lure-retrieval paradigm with children, Sylva (1974, summary published in Sylva, Bruner, & Genova, 1976) gave preschoolers a 1-min demonstration of how to put a clamp on a single stick. Then one group was given 10 sticks and seven clamps and allowed to play for 9 more min, an observe group was given an additional 1-min demonstration in which the adult joined two sticks with a clamp, and a control group went straight to the lure-retrieval problem. The problem involved removing a chalk from a plexiglass box by clamping two sticks together, using them to dislodge the chalk, and then raking it toward oneself. When children did not engage with the tools during the problem time they received up to five hints, culminating in direct instruction.

The play and observe groups both outperformed the controls, with about 40% of each obtaining the chalk with no hints, and there were also no differences between these groups in latency to solve the problem. Although overall children in the play group solved the problem with fewer hints by a McNemar's test, examination of Table 6 in Sylva's thesis shows the play group received 74 hints, the observe group 77, and the control group 120, so the difference between the first two groups was utterly trivial. We conclude that playing with a set of objects for 9 min, having had a 1-min demonstration of how an object works, is as good as a 2-min demonstration of how that object works. Another study removed demonstration altogether and found the effects of 10 min

Table 4
Studies Examining the Effect of Play on Problem Solving

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Cheyne & Rubin (1983)	Const.	PP				
C	Pellegrini & Gustafson (2005)	Const.	PP				
C	Rubin (1982)	Const.	PP				Time to solution, so *r* was negative
C	Gredlein & Bjorklund (2005)	Const.	PP				Boys only; category also included using objects as tools
E	Sylva (1974)/Sylva et al. (1976)		Play = Obs.		No	No	Pattern of hints slightly different for play but overall number appears to be the same
E	Vandenberg (1981)	Play	Play		No	No	One of two problems
E	P. K. Smith & Dutton (1979)	Play			No	No	On new task only; did not replicate Sylva on hints
E	Simon & Smith (1983)		Play = Obs.		No	Yes	Suggests hint delivery biased in prior study
E	P. K. Smith et al. (1985)		Play = Obs.		Irrel.	No	Videotaped procedure, blind scoring; matched delivery of hints; minimized interaction
E	Vandenberg (1990)			Wide focus > Play	No	Yes	Concerns whether children observe environment better in play, thus can use information to solve problems
E	Bonawitz et al. (2011)	Play			No	Irrel.	Could be task specific
E	Buchsbaum et al. (2011)	Play			No	Irrel.	Could be task specific

Note. Type of study: C = correlational; E = experimental. Type of play: Play = pretense status unspecified; Const. = construction play (e.g., blocks); PP = pretend play (social unspecified); Obs = observe. +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. > = did better than. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). Irrel. = irrelevant.

of play versus a control were task dependent, appearing for a lure-retrieval but not a dislodging problem (Vandenberg, 1981).

A further study using the lure-retrieval paradigm addressed the differential exposure time across Sylva et al.'s conditions by extending the observe condition so it would also take 10 min (P. K. Smith & Dutton, 1979). To further test problem solving, they added a second test, in which the child had to put three sticks together to reach the reward. Performance across the observe and play groups was equal on the first problem by all three measures—percentage solving, solution latency, and number of hints. However, the play group solved the second problem more quickly than the observe group, thus they obtained a play-favored result for one of six measures. Yet Smith and his colleagues were leery that experimenters might have introduced bias into the procedure, so they reran the study with a masked experimenter, and condition differences were eliminated (Simon & Smith, 1983). They concluded that experimenter bias in delivering hints in the prior study led to its positive results, a hypothesis confirmed by a later study (P. K. Smith et al., 1985; see also Simon & Smith, 1985). Null results for play in a further study led to the conclusion that there should be "serious questions about the merits of play for enhancing problem solving" (Vandenberg, 1990, p. 271).

Finally, there is also controversy regarding the fantasy versus construction play element in all of these studies. Sylva (1977) reexamined her results and found children who pretended with the sticks were most apt to solve the problem, yet in an explicit study of this (Hughes, 1981, 1983, as described in Hutt et al., 1989), children who pretended with the sticks needed more hints to reach a solution than children who had engaged in exploratory/constructive play (see DeLoache, 2000, for another case in which play impedes cognition). From this focused study, construction but not pretend play appears to be the important factor.

Some recent experiments have shown that being allowed to freely interact ("play" in the sense of explore, an action with which play is often contrasted; see Berlyne, 1960; Hutt et al., 1989, p. 11) with specially designed puzzle toys known to do interesting things can lead to discovering solutions that are more efficient than a single inefficient solution that was taught (Bonawitz et al., 2011; Buchsbaum, Gopnik, Griffiths, & Shafto, 2011). In these cases, the specific problem—getting a specially constructed toy to make music—is probably important; there is no indication that exploration improved problem solving generally, although such a study would be welcome. Reviews and meta-analyses of the "discovery learning" literature have concluded that children tend not to learn what was intended in open discovery learning paradigms (Alfieri, Brooks, Aldrich, & Tenenbaum, 2011; Mayer, 2004). Rather, children tend to learn best when problems are structured such that children are likely to find the solution (Klahr & Nigam, 2004) as they are in Montessori education. This is in line with a "playful learning" (Hirsh-Pasek et al., 2009) but not an open free play approach (see Vandenberg, 1990).

Summary. Correlational studies show that construction but not pretend play is correlated with solving problems that involve construction. Does the construction play cause the problem solving, or does a common trait like a propensity toward constructing underlie both (see Pellegrini, 2009)? Experimental studies could shed light on this, but they have had inconsistent and mild results that have not replicated with more tightly controlled procedures or masked experimenters; in those cases performance has been equal across play and observe conditions. This pattern of results could support epiphenomenalism or equifinality as regards construction play. But the fact that construction and not pretend play is the consistent correlate to solving the lure-retrieval problem, and that pretend play even interferes with using objects as tools, suggests that pretend play does not help problem solving, at least not the types used in research thus far. Research does show that exploring specially constructed puzzle toys leads to figuring out their solutions, and further research should examine if such "play" helps problem solving generally.

Reasoning

Another cognitive skill sometimes discussed with reference to the purported benefits of pretend play (D. G. Singer & Singer, 1992, p. 237) is solving logical syllogisms, in which one must reason from false premises like, "Dogs live in trees. Rex is a dog. Does Rex live in a tree?" The logically correct answer is that he does, but the problem is difficult since one must set aside one's real knowledge. Several studies (see Table 5) have found children do better on such problems when they are embedded in fantasy (Dias & Harris, 1988, 1990; Hawkins, Pea, Glick, & Scribner, 1984; Kuczaj, 1981; Richards & Sanderson, 1999), for example by using exaggerated pretend intonation, or saying, "Let's pretend that everything in the stories is true" (Dias & Harris, 1988, p. 210). However, Harris and Leevers (2000) thought this might be because fantasy manipulations got children to consider the premises more carefully. A series of experiments showed that using any cue that "clarified the experimenter's intention that the children should accept the premises as a basis for reasoning" (p. 77) helped. This supports the equifinality view: Pretend play, as operationalized in these studies, is one of many means to enhance children's ability to solve logical syllogisms.[6] It makes sense that pretend play might help children reason about false premises, since they are definitional to pretend play: One acts as if something false were true. Further research should use correlational and training paradigms to explore whether pretending affects logical reasoning more generally. We note that this reasoning research is also consistent with epiphenomenalism; research separating pretend play from the cue to consider the premises is needed to show whether pretend play alone is effective.

Conservation

Conservation, or understanding that objects retain certain core properties after superficial transformations, is structurally like pretending: In both cases children must keep one reality in mind while simultaneously focusing on a represented alternative (Fink, 1976). One must think about the water in a short glass while looking at that same water in a tall glass, or about the telephone while holding the banana. However, studies do not support a natural relationship between pretend play and conservation (see Table 6), since three correlational studies failed to detect one (Aisenson, 1978; Doyle, Ceschin, Tessier, & Doehring, 1991;

[6] Similarly, for philosophers, Twin Earth (Putnam, 1975/1996), an imaginary place that is just like real Earth but removed from it, has provided fertile grounds for reasoning from hypothetical premises. Lillard (2001a) discussed at length how pretend play is like a child's Twin Earth.

Table 5
Studies Examining the Effect of Pretend Play on Reasoning

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
E	Dias & Harris (1988)	PP			No	No	Syllogistic reasoning; pretend context
E	Dias & Harris (1990)	PP			No	No	Syllogistic reasoning; pretend context
E	Hawkins et al. (1984)	PP			No	No	Syllogistic reasoning; pretend context
E	Kuczaj (1981)	PP			No	No	Syllogistic reasoning; pretend context
E	Richards & Sanderson (1999)	PP			No	No	Syllogistic reasoning; pretend context
E	Harris & Leevers (2000)		PP		No	No	Series of studies, overrode Harris's view that pretending itself was the key factor in Dias's studies: rather, considered stance drove the effect

Note. Type of study: E = experimental. Type of play: PP = pretend play (social unspecified). +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example).

Johnson et al., 1982). These are not discussed, but they are problematic for a causal account. Training studies have had mixed results, with positive ones eventually explained by other factors.

The first training study had partially positive results. Fink (1976) encouraged one group of 12 to pretend, gave another group extra free play time but did not interact, and also had a no-intervention control group. Interventions lasted 25 min, twice a week for 4 weeks; masked experimenters administered the posttests. The pretend play group showed a trend toward improvement in quantity and number conservation and significant improvement in social role conservation (understanding that a father was also a doctor). However, adult involvement was very different across the conditions and might be the source of the effects.

In the next training study on play and conservation, Golomb and Cornelius (1977) assigned 4-year-olds to symbolic play training or a construction play control condition. The play training involved engaging children in pretense and then asking how the play objects could have both a real and a pretend identity. The play children subsequently did better on standard conservation tasks. Two methodological problems hold for this and two further studies from Golomb's laboratory (Golomb & Bonen, 1981; Golomb, Gowing, & Friedman, 1982). First, the trainers were the posttesters; Guthrie and Hudson (1979) failed to replicate the result with masked experimenters. Second, better performance might have been due to the extensive and pointed questioning about how play objects could simultaneously have two identities. Golomb et al. (1982) in fact cited an unpublished study (Golomb & Adams, 1978) as showing that verbal inquiry was key (see also Hughes, 1981, as cited in Hutt et al., 1989). Further, these later Golomb studies showed that conservation training was as or more effective than pretend play training.

In sum, there is no compelling evidence that pretend play leads to conservation. The crucial causal view requires consistent correlations that do not exist. Equifinality suffers from this lack of

Table 6
Studies Examining the Effect of Pretend Play on Conservation

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Aisenson (1978)		PP				Fantasy interview—second grade
C	Doyle et al. (1991)		SPP				
C	Johnson et al. (1982)		PP				Negative relationship to parallel play
T	Fink (1976)	PP			No	Yes	Positive for social role; trend for physical types of conservation
T	Golomb & Cornelius (1977)	PP			No	No	Explaining pretense could be causal factor
T	Golomb & Bonen (1981)		PP		No	No	PP training = conservation training
T	Golomb et al. (1982)	PP + ConT.			No	No	Combined PP and conservation training > conservation training > PP > control; self-initiated PP > adult-initiated PP
T	Guthrie & Hudson (1979)		PP		No	Yes	Delayed posttest trends to favoring control
T	Golomb & Adams (1978 [unpublished])		PP		No	No	Suggested structured questioning was the promoting factor in other three Golomb studies

Note. Type of study: C = correlational; T = training. Type of play: SPP = social pretend play; PP = pretend play (social unspecified); ConT. = conservation training. +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example).

consistency but is supported by Golomb's studies showing conservation training was as effective. However, the results were attributed by the lead author to adult questioning in the play condition, not pretend play alone.

Conclusion: Cognitive Aptitudes

The literature reviewed here does not support the view that pretend play is crucial for children's cognitive development (cf. Isenberg & Quisenberry, 1988). Correlations have been examined for all domains here except reasoning and are inconsistent for creativity, null for conservation, and for problem solving are to construction play, not pretend play. For intelligence, the direction of effects could be the reverse, thus from intelligence to level of play.

Equifinality is supported only for reasoning, for which epiphenomenalism is also possible. For creativity, intelligence, and conservation, epiphenomenalism is best supported, because of the combination of inconsistent/null findings from correlational studies and the elimination of training results when experimenters were masked or interactions made more equal. For problem solving, again, the relationship appears to concern construction and exploration but not pretend play. Taken together and examined closely, these studies present a dim view for the oft-made claim that pretend play importantly enhances cognitive development. Perhaps further and better research will show otherwise, but existing evidence is not supportive.

Theory of Mind

Next we examine studies addressing whether pretend play might assist social cognition or a theory of mind (Premack & Woodruff, 1978). Theory of Mind (ToM) refers to the coherent network of interrelated concepts people use to explain and predict behavior (Wellman, 1990). Theorists have long speculated that ToM could be promoted through pretend play (see chapters by Flavell, Leslie, and others in Astington, Harris, & Olson, 1988). Leslie (1987) claimed that the cognitive architecture that supports understanding that someone can have a false belief is the same architecture needed to understand pretense, so pretending facilitates use of those cognitive structures (Flavell, 1988; Forguson & Gopnik, 1988; Moses & Chandler, 1992). By this view all pretending should be related to ToM. Simulation theory suggests that children come to perceive others' mental states by analogy to the self, imagining oneself in another's shoes (Harris, 1995). Role play provides children with practice at such simulations, so for simulation theorists sociodramatic play should particularly assist ToM. We focus first on solitary and then social pretend play (see Table 7).

Since the early 1980s, ToM has been tested with a well-known set of tasks, including the false belief task, in which someone thinks something that is not true, and children are asked to contrast the belief with reality (Wimmer & Perner, 1983); the appearance–reality task (Flavell, Flavell, & Green, 1983), in which children state the real and apparent identities of a fake object (like a candle that looks like an apple); and perspective taking tasks, in which children contrast points of view (Flavell, 1978). Earlier studies used tasks like Borke's (1971) affective and Piaget's "3 Mountains" spatial perspective taking tasks.

Solitary Pretense

We found seven studies examining correlations between ToM and different measures of solitary pretend play. These measures concerned the sophistication and frequency of children's object substitutions. Four studies used the imaginary object task (Overton & Jackson, 1973), which asks children to pretend various actions, like to brush their teeth (self-directed) or cut paper (object-directed). Using an imaginary object (shaping one's hand as if holding a toothbrush) receives a higher score than using a body part (like one's finger) to perform the act, because older children tend to use imaginary objects more (Taylor & Carlson, 1997). Two studies found a positive relationship between ToM and this task (Nielsen & Dissanayake, 2000; Suddendorf, Fletcher-Flinn, & Johnston, 1999), one found it for self- but not object-directed acts (Taylor & Carlson, 1997), and the fourth (which used only self-directed acts) did not find it (Lillard, 2001b). Thus using an imaginary object as opposed to a body part—considered a higher level of pretending—is inconsistently related to ToM scores. The methods used in these studies were very similar, although Lillard and Taylor and Carlson had test session gaps of at least 1 week. In contrast, for the others much of the testing occurred in the same session, so masking status of the experimenter could be a concern here.

Object substitution with external objects has also been used as a measure of solitary pretend play. It has been coded by having children play freely with blocks for 3 min and then describe what they built; higher scores reflect more elaborate descriptions. Taylor and Carlson (1997) found a significant correlation ($r = .23$) between ToM and free block scores; Lillard (2001b), using a much smaller sample, found a trend ($r = .27$, thus a similar effect size). However, the free block variance—like that of the false belief task—is partially accounted for by verbal skills—Lillard (2001b) found free block correlated .21 with PPVT—so language could account for much of the ToM relationship. Another study coded object substitution only from observation and found no significant relationship to ToM (Schwebel, Rosen, & Singer, 1999). On the other hand, teacher endorsement of the descriptor "engages in simple make-believe play alone" (which plausibly stems from observing object substitutions) was related ($r = .37$) to ToM score (Lalonde & Chandler, 1995). Thus object substitution in free play is also inconsistently related to ToM, with three positive results—some of which could be carried by language—and a null one.

We found only one experimental study of solitary pretend play and ToM, and it is unsatisfactory (Matthews, Beebe, & Bopp, 1980): Prior play might have influenced performance on one of three spatial perspective taking tasks, but no statistical analyses were done, and results are inconsistent regardless. The inconsistent relationships between solitary pretending and ToM could support equifinality or epiphenomenalism; they do not suggest a crucial causal role.

Social Pretense

Correlational studies. Four studies correlating social pretend play with early measures of ToM had inconsistent results. For spatial perspective taking, one study showed a positive relationship

Table 7
Studies Examining the Effect of Play on Theory of Mind

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Nielsen & Dissanayake (2000)	Solo, SPP					
C	Suddendorf et al. (1999)	Solo					
C	Taylor & Carlson (1997)	Solo, SPP					Self-directed acts only; age not controlled
C	Lillard (2001b)		Solo				Self-directed acts
C	Schwebel et al. (1999)	SPP	Solo				SPP only with AR
C	Lalonde & Chandler (1995)	Solo, SPP					
E	Matthews et al. (1980)		Solo		No	Yes	No stats; perhaps for one of three spatial PT tasks
C	Rubin & Maioni (1975)	SPP					Spatial not affective PT
C	Cole & LaVoie (1985)			SPP			Affective PT negative
C	Peisach & Hardeman (1985)	PP					
C	Connolly & Doyle (1984)	SPP					Affective not cognitive PT
C	Doyle & Connolly (1989)		SPP				Controlled for age
C	Astington & Jenkins (1995)	SPP	SPP				Joint proposals & roles, not SPP generally
C	J. Dunn & Cutting (1999)	SPP					Maternal education not controlled
C/T	Goldstein & Winner (2010)		D		No	No	Effect found with unorthodox statistics
C	Hughes & Dunn (1997)		SPP				Controlled for age
C	Lindsey & Colwell (2003)						
C	Taylor et al. (2004)	SPP					IC—Empathy
CL	Youngblade & Dunn (1995)	SPP					Unidirectional test
CL	Jenkins & Astington (2000)		SPP				Bidirectional tests; ToM predicts SPP
T	Saltz & Johnson (1974)	D			No	No	Affective PT
T	Saltz et al. (1977)		D		No	No	Effect found only with unorthodox statistical practices
T	Burns & Brainerd (1979)	SPP	Const.		No	No	Summed varied tasks with different ranges
T	Scheffmann (1981, in Brainerd, 1982)		SPP/Const.		No	No	Unpublished failure to replicate
T	Goldstein & Winner (2012)	D			No	No	Inconsistent effects across experiments
T	Dockett (1998)	SPP			No	No	Inadequate control group
T	Fink (1976)	SPP			Yes	Yes	Social not spatial PT
T	Rosen (1974)	SPP			No	Yes	Training might teach to test
T	P. K. Smith & Syddall (1978)	SPP			Yes	No	Teach to test
T	Chandler (1973)	D			No	Yes	Egocentrism, teach to test
T	Chandler et al. (1974)	D			No	Yes	Role taking, not referential communication; teach to test
T	Iannotti (1978)	PP			No	Yes	Only for hiding, but teach to test
T	P. K. Smith et al. (1981)		SPP		No	Yes	

Note. Type of study: C = correlational; CL = cross-lag correlation; E = experimental; T = training. Type of play: Const. = construction play (e.g., blocks); Solo = pretend play alone; SPP = social pretend play (including imaginary companion play in Taylor studies); PP = pretend play (social unspecified); D = enacting stories with dolls or other children. +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). AR = appearance–reality; PT = perspective taking; IC = imaginary companion; ToM = theory of mind.

(Rubin & Maioni, 1975),[7] but two did not (Cole & LaVoie, 1985; Peisach & Hardeman, 1985); yet the latter found a positive relationship to moral perspective taking. For affective perspective taking, one had a positive relationship to social pretend play complexity but not amount (Connolly & Doyle, 1984), but two found no relationship (Cole & LaVoie, 1985; Rubin & Maioni, 1975). Connolly and Doyle (1984) found no relationship to cognitive perspective taking (matching gifts to recipients, from Flavell, Botkin, Fry, Wright, & Jarvis, 1968). Thus earlier studies of this issue were inconsistent, with three positive relationships and six null ones. One possible reason for some inconsistency is that Borke's affective perspective-taking task could rely on vocabulary more than deep understanding, reflecting a language–pretend play relationship. Spatial perspective taking is influenced by familiarity with task materials (Borke, 1975), and perhaps this led to inconsistent results for it. Studies relating social cognition tasks of this earlier era to those of today would be useful.

More recent studies have operationalized social pretend play in two ways, broadly speaking: (a) impersonation, including role enactment and having an imaginary companion, and (b) joint proposals and role assignments, in which a child states what they are pretending. We located 12 studies relating these behaviors to ToM (Astington & Jenkins, 1995; Doyle & Connolly, 1989; J. Dunn & Cutting, 1999; Goldstein & Winner, 2010; Hughes &

[7] This article itself is ambiguous as to whether the "dramatic play" category was social, but elsewhere Rubin discussed this study as revealing relationships to "symbolic or dramatic play with peers" (Rubin & Pepler, 1980, p. 224).

Dunn, 1997; Lalonde & Chandler, 1995; Lindsey & Colwell, 2003; Nielsen & Dissanayake, 2000; Schwebel et al., 1999; Taylor & Carlson, 1997; Taylor, Carlson, Maring, Gerow, & Charley, 2004; Youngblade & Dunn, 1995), and findings were inconsistent. For example, some studies found relationships only with specific tasks, like with appearance reality but not false belief (Schwebel et al., 1999), or with role enactment but not explicit role assignment (Youngblade & Dunn, 1995), or with joint proposals and role assignments but not social pretend play generally (Astington & Jenkins, 1995). Several studies used a large age range but did not partial out age, when both social pretend play and ToM scores increase with age (Taylor & Carlson, 1997). With age partialled out, in some studies the association became a trend (Doyle & Connolly, 1989) or disappeared entirely (Hughes & Dunn, 1997). Other studies seem less solid because maternal education was very strongly related to both social pretense and ToM, and socialization practices could undergird both outcomes independently (J. Dunn & Cutting, 1999).

However, Youngblade and Dunn (1995) used a limited age range and partialled out verbal ability, and Astington and Jenkins (1995) partialled out both age and verbal ability; both studies still found relationships between aspects of social pretense and ToM; Schwebel et al. (1999) partialled both factors and still found a relationship but only to appearance–reality. Although it is inconsistent, the relationship appears often enough that it is frequently remarked upon in the literature (Harris, 2000; Kavanaugh, 2006; Lillard, 2001a). It is important to consider direction of effects.

Longitudinal studies, of which we found two, can shed light here. Youngblade and Dunn (1995) assessed pretending at 33 months and ToM at 40 months and found that role enactment (but not total amount of social pretending, diversity of pretend themes, or explicit verbal role assignment) predicted later ToM. The role enactment finding is consistent with simulation theory and a pretend-to-ToM causal view. In a study cited far less often (Google Scholar, March 19, 2012), Jenkins and Astington (2000) tested children ages 34–45 months three times—at an initial point, then 3.5 and 7 months later—for ToM, language, and the proportion of their social pretend play turns dedicated to making joint proposals in pretense and explicitly assigning roles. Here, earlier ToM predicted later social pretend play, but not the reverse. The different directions of effects seen in these two studies can be explained in at least four ways: (a) The first study did not allow for finding the ToM-to-pretend direction, since it did not include ToM tests at earlier time points; (b) the first study used verbal and behavioral indicators of pretending, whereas the second used only verbal ones; (c) only role enactment is related, and the second study did not measure it; (d) the first study used younger children. More longitudinal studies examining a range of variables are needed to more definitively determine the direction of effects between social pretend play and ToM. Yet still a third variable could underlie results found with correlational methods; training studies provide the best test.

Training studies. Many pretend play–social cognition training studies were conducted in the 1970s (see summary in Rubin, 1980), inspired by Smilansky (1968). Noting that middle-class children play more than lower class ones and show many of the advantages pretense might be expected to confer, Smilansky trained children of lower class immigrants to Israel to engage in sociodramatic play for 90 min/day. Nine weeks of training increased their pretending. As an afterthought she also looked at their verbal skills. She did not test for any of the social cognitive outcomes that she theorized pretense might influence (cf. Burns & Brainerd, 1979), but many others have done so, making social cognition the most studied potential outcome of pretend play training. Yet all but one study had a serious methodological shortcoming preventing clear conclusions: The experimenters were not masked, or the level of adult contact across conditions was very different, or the training explicitly "taught to the test." Some studies have additional problems as well. The most solid study had null results.

The first six studies we discuss lacked masked experimenters, which we now know is problematic in studies of the effects of play. Saltz and Johnson (1974) found improvement in affective perspective taking following thematic fantasy training (acting out stories) but not following training in identifying object dimensions or no training at all. However, Saltz's second study (Saltz et al., 1977) showed no main effect of thematic fantasy or sociodramatic play, yet they went on to compare thematic fantasy only with the other three groups combined (sociodramatic play, fantasy discussion, and control), and only for the first two years of the 3-year study—not accepted statistical practice.

Burns and Brainerd (1979) engaged children in sociodramatic play or construction play, preceded and followed by a variety of perspective taking tasks. A summed perspective taking score revealed a significant effect of sociodramatic relative to construction play, and each improved more than the no treatment group. However, effects were inconsistent across tasks. A doctoral student in Brainerd's laboratory went on to do a more rigorous and larger replication and extension of this study (Scheffman, 1981, described in Brainerd, 1982). As summarized by Brainerd, "when it comes to the question of how powerful dramatic (and constructive) play is as an enhancer of conceptual knowledge, the results were extremely disappointing. For all intents and purposes, there were no learning effects" (p. 125).

Two more recent studies (Goldstein & Winner, 2010, 2012) examined whether acting classes (compared to other arts classes) improve ToM and empathy; they lacked random assignment as well. Children who want to take acting classes might differ from other children in ways that influence ToM development, and there were in fact group differences in some key measures prior to training. In addition, although positive results were found on some tests, results were inconcordant across the experiments.

A sixth unmasked training study also had unequal adult contact across conditions (Dockett, 1998). The experimental group visited a pizza restaurant and then a pizza play area was set up in their classroom. Over the next month, an experimenter encouraged their play toward more complex levels. Teachers added props and resources to promote pizza play, posted a photographic record of the play on the walls, and devoted large blocks of time to it. From pre- to post- and even on a delayed posttest, the play group improved more on ToM.

Some 1970s-era training studies also had unequal adult contact across experimental and control groups but did use masked experimenters. Fink (1976) found that sociodramatic play led to increases in social role but not spatial perspective taking, and Rosen's (1974) sociodramatic play group improved significantly more on perceptual and semantic role taking. In this latter study the trained group had four times more adult contact.

P. K. Smith and Syddall (1978) explicitly equalized experimenter contact for two tutoring groups—skills (jigsaw puzzles, games) and sociodramatic play—although experimenters were not masked. Cognitive perspective taking improved significantly more in the play group. Smith and Syddall then questioned the tasks they (and Rosen, 1974) had used. One was the gift assignment task and the other was putting objects with the appropriate person, for example a stethoscope with a doctor. Such tasks require simple matching paralleled in the sociodramatic play training, when props are assigned to roles. Three other early studies examining the influence of role play training on social cognition, although quite sound in most ways, also seem to "teach to the test" (Chandler, 1973; Chandler, Greenspan, & Barenboim, 1974; Iannotti, 1978).

Because of his concern about this issue, Smith conducted a follow-up study with a more diverse array of social cognitive tasks and this time also employed a masked posttester and equalized contact (P. K. Smith, et al., 1981). Using these very sound methods, they found no improvement in role taking in the play tutoring group or the skills training group. The authors concluded that some aspect of adult contact, rather than pretense, was responsible for prior findings. One might fault this study in that one of two settings showed no posttraining increase in fantasy play, but it still ought to have obtained results at the setting where fantasy play did increase. Thus the one study in the group without a significant methodological problem showed no significant increases on ToM measures for either pretend or skills tutoring.

Summary

Logically, it seems like pretend play could well assist ToM, but solid evidence that it does so is lacking. Correlational results have been inconsistent, and one study has suggested a reverse direction of effects: A more developed ToM enables sociodramatic play. Many training studies have been conducted, but most had at least one serious methodological shortcoming, and there are also important failures to replicate. The most solid study showed no improvement in ToM from either skills or pretend play training. The inconsistent correlational results and hints of a reverse direction of effects lead us to see the body of evidence as being more supportive of epiphenomenalism than equifinality. Children who have more advanced ToM skills often also engage in more advanced pretend play, but possibly because of some third variable, like having parents (or experimenters) who interact with them in ways that encourage mental state reasoning and pretend play.

Social Skills

Next we examine evidence that pretend play improves children's social skills. Social skills are distinguished from ToM in that they involve enactment but not necessarily knowledge. Although social competence is empirically associated with ToM (Bosacki & Astington, 1999; Watson, Nixon, Wilson, & Capage, 1999), knowledge can be inert; alternatively, one could conceivably act in a socially skilled manner without underlying ToM knowledge. Two theories guide research in this area. Both suggest that pretend play causes social skills; one claims that even solitary pretending does so (Stagnitti & Unsworth, 2000) because children often pretend about emotional and difficult issues; working through such issues in pretense would enhance social skills generally (Bretherton, 1989; Fein, 1989; Fein & Kinney, 1994). The second theory highlights social pretend play because it requires negotiation (Harris, 2000; Lillard, Pinkham, & Smith, 2011). Studies concerned with social skills tend to measure children's behavior in real-life settings with peer sociometric ratings and teacher or parent reports.

Solitary Pretense

Addressing the first theory are five studies correlating social skills and solitary pretense (see Table 8). The first two were playground studies using peer sociometric ratings; one found no relationship (Rubin, 1982), and the other found a negative one (Rubin & Daniels-Beirness, 1983). However, as has been noted, on a school playground the norm is social pretend play, and children who instead play alone might already have poor social skills. Thus, these results do not really speak to whether solitary pretend play might develop social skills.

The other three studies provide a better test. Two found a positive correlation between children's solitary pretend play in a laboratory setting and a teacher measure of social competence (McAloney & Stagnitti, 2009; Uren & Stagnitti, 2009), but the third (Swindells & Stagnitti, 2006) found no relationship using a parent measure. Close examination of the measures used in the first two experiments reveals that social compliance, tapped by both the teacher report and pretend play measures, might undergird the relationships. Further research should examine this possibility.

Social Pretense

If social pretend play helps develop social skills, one would expect that (a) one would see more socially competent behavior within social pretend play than outside of it, (b) more advanced social pretend play, whether occurring naturally or after training, would predict more advanced social skills, and (c) training in social pretend play would improve social skills.

Does social pretend play entail more advanced social behavior? We found five studies examining this. Two found that social pretend play involved greater social skills than social nonpretend play. In a study comparing social pretend and literal activities, pretense interactions lasted longer, involved larger groups of children, and had more positive and less negative affect (Connolly & Doyle, 1984). The second study replicated this and also found more reciprocity/complexity in social pretend play (Connolly, Doyle, & Reznik, 1988).

The third study occurred in the laboratory and only involved girl dyads; it had mixed results. Social pretend play involved more verbal exchanges and shared focus than social literal play, but it also involved longer, less often resolved conflicts (de Lorimier, Doyle, & Tessier, 1995). The fact that girl dyads were more able to solve their conflicts outside of the pretense setting might suggest that they were more socially skilled in literal settings.

Against the idea that social pretend play entails more social skills, Howes and Matheson (1992) found preschoolers' level of social competence was equal across social and nonsocial pretense contexts, and Doyle, Doehring, Tessier, de Lorimier, and Shapiro (1992) found the complexity and positive affect (which could index prosocial interaction) of peer exchanges to be equal in pretense and nonpretense contexts, although the latency to com-

Table 8
Studies Examining the Effect of Play on Social Skills

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Rubin (1982)		Solo				Sociometric
C	Rubin & Daniels-Beirness (1983)		SPP	Solo			Sociometric
C	McAloney & Stagnitti (2009)	PP					Teacher report—compliance?
C	Uren & Stagnitti (2009)	PP					Teacher report—compliance?
C	Swindells & Stagnitti (2006)		PP				Parent report
O	Connolly & Doyle (1984)	SPP			No	No	Person variables not controlled
O	Connolly et al. (1988)	SPP			No	No	Person variables not controlled
O	de Lorimier et al. (1995)		SPP		No	No	Mixed findings
O	Howes & Matheson (1992)		SPP		No	No	No different from solo pretense
O	Doyle et al. (1992)		PP		No	No	No difference: pretense and nonpretense
C	Rubin & Maioni (1975)	SPP			No	No	Sociometric
C	Connolly & Doyle (1984)	SPP			No	No	Two of three measures of social competence
E	Galyer & Evans (2001)		PP		Yes	Yes	
C	Lindsey & Colwell (2003)	SPP			No	No	Girls only
C	Colwell & Lindsey (2005)	SPP		SPP	No	No	Always for girls; negative for boys who engage in other-sex social pretend play
T	Schellenberg et al. (2004)	SPP			Yes	Yes	Drama lessons; social interaction?

Note. Type of study: C = correlational; O = observational studies comparing means rather than correlating; E = experimental; T = training. Type of play: Solo = pretend play alone; SPP = social pretend play; PP = pretend play (social unspecified). +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example).

plex interaction was shorter in pretense (Doyle et al., 1992). A strength of this latter study is that it controlled for whether children were frequent or infrequent pretenders. Dyads in which both children were classified in another setting as frequent pretenders engaged in more complex social interaction than dyads in which both children were classified as infrequent pretenders, which could explain the results of studies that found more complex interactions in pretend play: It could be that more socially competent children are more apt to engage peers in social pretend play, in which case the direction of effects is opposite to that speculated. This leads to the next issue.

Does more advanced social pretend play predict greater social skills? The findings on this are also mixed, with two studies finding it to be the case, two finding it not to be, and two revealing different results by gender. Rubin and Maioni (1975) found a positive correlation between sociometric ratings and social pretend play in 3- and 4-year-olds. Connolly and Doyle (1984) replicated this and also found a positive relationship with teacher reports of social competence with peers, but not with the social skill of following teachers' rules. In contrast, Rubin and Daniels-Beirness (1983) did not find a positive relationship between sociometric status and social pretend play, and Galyer and Evans (2001) failed to find a positive relationship to teacher-reported social skills. Finally, Lindsey and Colwell (2003) and Colwell and Lindsey (2005) had gender-specific findings, with more mixed-sex play predicting higher same-sex sociometric and teacher-reported social competence ratings for girls but lower ones for boys. This result is also against the view that pretense leads to better social skills, since boys who pretend with girls should gain social skills just as well as boys who pretend with boys.

Does social pretend play training improve social skills? We located only one study that trained children in social pretend play (drama lessons) and then examined social skills (Schellenberg, 2004). The purpose of the study (mentioned earlier) was actually to see if music lessons enhance IQ, and parent assessments of children's social competence (adaptability, social skills, and leadership) were administered for exploratory reasons. Six-year-olds were randomly assigned to 36 weeks of keyboard lessons, voice lessons, drama lessons, or no lessons. Consistent with the hypothesis, children who received keyboard and voice lessons increased most in IQ. However, the drama group unexpectedly increased most in social competence. It is not clear whether this result stems from playing out roles or from the social interaction inherent in doing so versus doing keyboard or voice lessons. Still the findings are very interesting, and future research should clearly explore them with control conditions matched for social contact.

Summary

Results from studies examining correlations between social skills and pretend play are inconsistent, which is against the crucial causal position. The serendipitous finding in a training study suggests a potential causal relationship from drama training to social skills, which would (along with inconsistent correlations) be in keeping with equifinality, but alternate epiphenomenal explanations must be ruled out (e.g., perhaps level of interaction was different in the drama training). Pretending is perhaps a route to social skills, but without more convincing evidence it is equally feasible that social pretending and social skills emerge from a latent factor like sociability or some aspect of interaction.

Symbolic Understanding: Early Language

In pretend play children use one object to stand for another, hence, a symbol. Language is also symbolic (Piaget, 1962; Werner & Kaplan, 1963). Aligning with the causal position, some theorists

have claimed that repeated practice using symbols in pretend play "contributes greatly to language development" (Miller & Almon, 2009, p. 63; see also Ervin-Tripp, 1991). Yet perhaps pretend play is just one of many behaviors that can improve children's language or is epiphenomenal to some other factors that give rise to language. In this section we examine evidence for these views with regard to early language, namely, acquiring first words and syntax. We end with a brief note about the research on how pretend play affects written language or literacy. Findings are summarized in Table 9.

Correlational Concurrent Studies

Many studies have revealed concurrent associations between language development and pretend play (Bates, 1979; Bates, Bretherton, Snyder, Shore, & Volterra, 1980; Casby & Corte, 1987; Corrigan, 1982; Elias & Berk, 2002; Jurkovic, 1978; Lewis, Boucher, Lupton, & Watson, 2000; Lyytinen, Poikkeus, & Laakso, 1997; McCune, 1995; Shore, 1986), with particularly strong correlations for children under 4 years of age (Doswell, Lewis, Sylva, & Boucher, 1994).[8] They have looked at different aspects of language (vocabulary size in comprehension and/or production, syntax) measured in different ways (checklist, free speech, elicited speech), and different aspects of pretend play (object substitutions, doll-directed acts, length of play sequences) measured in both free and elicited play situations. The evidence that pretend play and language are related early in development is compelling. Is there evidence for causality?

Longitudinal Studies

Longitudinal studies have attempted to determine whether pretend play predicts symbolic understanding. One study of 10 children tested monthly, from 8 to 24 months,[9] was conducted alongside a cross-sectional study of 102 children, six of each age from 8 to 24 months (McCune, 1995). The sample size restricted analytic techniques, but McNemar's tests indicated that new levels of pretend play emerged roughly 2 months prior to what was considered the analogous level of language skill.[10] A similar longitudinal study was carried out with four Japanese children, with similar results (Ogura, 1991). McCune (1995), like most authors in this domain, did not assume a causal relationship from play to language, but instead believed an underlying third mechanism was responsible for the relationship (thus taking the epiphenomenon view). McCune posited that language emerges later than play because it relies on later-maturing vocal control.

Larger longitudinal samples have permitted cross-lagged correlational and regression analyses. Four studies tested children at the beginning and end of the second year; only one (Bornstein, Vibbert, Tal, & O'Donnell, 1992) did not find cross-lagged correlations, and it used more limited measures. Two found relationships between other-directed play early in the second year and measures of comprehension, production, and syntax later in that year (Lyytinen, Laakso, Poikkeus, & Rita, 1999; Ungerer & Sigman, 1984). Ungerer and Sigman (1984) suggested that other-directed play indicated an interest in others and communication that is then transferred to language. The fourth study found no association from play to productive vocabulary or mean length of utterance (MLU) but did find a relationship to semantic diversity, or the number of categories of speech represented (Tamis-LeMonda & Bornstein, 1994). Two studies also found the reverse direction of effects, from language to play (Tamis-LeMonda & Bornstein, 1994; Ungerer & Sigman, 1984), although for the former the finding disappeared when mother behaviors were partialled out. Note that there is some methodological bias against finding relationships from language to play: One study did not test play at the older ages (Lyytinen et al., 1999), and Ungerer and Sigman used just one language measure at the earlier age versus five later (although they did find a positive relationship for that one measure). Finally, a fifth longitudinal study tested slightly older children—20 and 28 months—and did not find that play predicted language (Shore, O'Connell, & Bates, 1984).

In sum, most research shows that children who are more advanced in their play around 1 year of age are more advanced in one or more aspects of their language around 2. Cross-lagged studies across the second (but not into the third) year are mostly consistent with the possibility that play could be crucially important to language, but the reverse direction of effects is also possible, as is a third underlying variable. Thus the correlational evidence cannot distinguish the three accounts; intervention studies are needed.

Play–Language Interventions

We found four studies that increased play and monitored language, three with preschool-aged children. The best control condition was in Smilansky's (1968) study training children of immigrants to Israel in pretend play or exposing them to other "meaningful experiences." Although the play group increased impressively in some aspects of language, statistical analyses were not conducted.

For the other three studies, language increases were seen, but it is not clear what aspect of the intervention contributed. Lovinger (1974) engaged 20 low-income 4-year-olds in a daily hour of pretend play for 25 weeks; a control group had no intervention. The experimental group's language increased, but possibly simply due to increased adult contact and conversation. Levy, Schaefer, and Phelps (1986) used a pre–posttest design with no control group. They expanded a university preschool classroom's pretend play area and trained the children in pretend play; in addition, these children were exposed to more songs, stories, field trips, and classroom visitors. Boys' but not girls' PPVT scores increased.

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[8] These studies are not listed in the table because the list is long and they are not discussed in any detail.

[9] This is an approximation: For each child, testing was stopped when the highest levels were achieved.

[10] Determining what is analogous across the domains of language and pretense is a challenge. McCune (1995) sequenced play into five levels and matched them with verbal ability. Level 1, presymbolic schemes (putting a cup to one's lips), had no lexical match, but Level 2, self-directed pretense (carrying out the full drinking behavior, perhaps with sound effects or exaggeration) and Level 3, other-directed pretense (having a doll drink), were equated with lexical onset (5+ words). Level 4, pretend combinations (pouring before having the doll drink), was equated with multiword onset (producing 3+ word combinations), and Level 5, hierarchical pretense (pretend acts in the absence of perceptual support, e.g., finding a cup for the doll to drink from), was equated with rule-governed combinations or syntax.

Table 9
Studies Examining the Effect of Play on Language

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Casby & Corte (1987)	PP[a]					
CL	McCune (1995)	PP					
CL	Ogura (1991)	PP					
CL	Bornstein et al. (1992)	PP	PP				13 months only; limited measures
CL	Lyytinen et al. (1999)	PP					Bidirectional
CL	Ungerer & Sigman (1984)	PP					Bidirectional
CL	Tamis-LeMonda & Bornstein (1994)	PP					Semantic diversity, not MLU
CL	Shore et al. (1984)		PP				
T	Smilansky (1968)	SPP			No	No	
T	Lovinger (1974)	SPP			No	No	No control for adult interaction
T	Levy et al. (1986)	SPP			No	No	No control group
E	Christakis et al. (2007)	Blocks			Yes	Yes	Not clear what did with blocks

Note. Type of study: C = correlational; CL = cross-lag correlation; E = experimental; T = training. Type of play: SPP = social pretend play; PP = pretend play (social unspecified). +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). MLU = mean length of utterance.
[a] Numerous other studies show this; 10 are cited but not described in the section.

The most recent study distributed sets of blocks with instructions about how to play with them to parents of toddlers (Christakis, Zimmerman, & Garrison, 2007). Low-income children whose families received this block set, compared with controls who did not, had more advanced language postintervention, but (a) we do not know if children pretended with the blocks, and (b) the intervention might have increased parent interaction, which then improved language. More controlled intervention studies are needed to show whether pretend play specifically might cause language development.

Literacy

Ample research has shown that exposure to literacy play materials (like plastic letters or a model post office) increases literacy (Neuman & Roskos, 1992; Roskos & Neuman, 1998). This is similar to findings with board games and math (Ramani & Siegler, 2008). Although it is useful to know that one can influence what children play with, and through those play materials can influence their skills, it is particular to specific pretend play content and not pretend play generally. Increased exposure to that same content outside of pretend contexts might be equally effective. What could be important here with regard to pretend play is motivation. If pretend play is a context that especially motivates engagement with literacy materials, this is significant.

Summary

Children's levels of pretend play and their early language development do appear to be related, with pretending preceding language. Researchers in this area tend to think that the domains are related due to an underlying symbolic function—an epiphenomenal reason. A causal account is possible, although a reverse direction of effects is as well, and better intervention studies are needed to determine which of the three models is best supported in this domain.

Narrative

Another development that pretend play is claimed to assist is narrative, the ability to tell and comprehend stories. Some have claimed that pretend play and narrative are different ends of a continuum: "Play . . .[is] story in action, just as storytelling is play put into narrative form" (Paley, 1990, p. 4). If this is the case, then practice or training with either skill should improve the other. Other theories focus on specific pretense skills that might benefit narrative skills. For example, pretending could foster metalinguistic skills necessary for storytelling, because during social pretend play communication often occurs at the meta level (Garvey & Kramer, 1989; Giffin, 1984). In addition, pretense role play requires a child to imagine and track the perspective of another character, a skill also used when following and telling a story (O'Neill & Shultis, 2007; Ziegler, Mitchell, & Currie, 2005). Finally, embodied cognition (Lillard, 2005, Chapter 2; Scott, Harris, & Rothe, 2001) would predict children would remember stories better after acting them out. We located 14 studies of whether pretend play leads to better narrative skills, operationalized as storytelling, memory, and comprehension (see Table 10).

Correlational Studies

Three studies examined whether children who naturally engage in more pretend play have better narrative skills. In the initial one, Johnson (1976) coded the free play of 3- to 5-year-olds as nonfantasy, social fantasy, or nonsocial fantasy and later gave children a story completion task. Scores were significantly correlated with social but not solitary pretend play. Trionfi and Reese (2009) compared 5-year-olds with and without imaginary companions (ICs), and children with ICs scored higher on narrative quality (but not memory) when retelling a story and telling personal narratives. Both of these studies suggest a possible causal relationship from pretend play to narrative. A longitudinal correlational study would provide better evidence.

Table 10
Studies Examining the Effect of Play on Narrative Skills

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	Johnson (1976)	SPP	Solo				
C	Trionfi & Reese (2009)	IC					Possible bias in delivery of procedures
CL	Tenenbaum et al. (2005)		SPP				SPP with mothers not peers
E	Ilgaz & Aksu-Koç (2005)		D		No	No	Props; + if handle data in unorthodox way
E	Benson (1993)			D	No	No	Props; perhaps + if look at data differently
E	Kim (1999)	D			No	No	Props
T	Pellegrini & Galda (1982)	D			No	No	
T	Pellegrini (1984)	D			No	No	
E	Marbach & Yawkey (1980)	D	D		No	No	Self +, puppets −
T	Saltz & Johnson (1974)	D			No	No	Teaches to the test, other problems
T	Saltz et al. (1977)		D		No	No	Higher IQ subset +
T	Baumer et al. (2005)	D			Yes	Yes	Could be teacher effect: Different teachers implemented each intervention
T	Silvern (1986)	D			No	No	Could be teacher effect: They were likely interested in their own classes doing well
T	Dansky (1980a)	SPP			Yes	Yes	Adult involvement not controlled

Note. Type of study: C = correlational; CL = cross-lag correlation; E = experimental; T = training. Type of play: Solo = pretend play alone; SPP = social pretend play; D = enacting stories with dolls or other children; IC = imaginary companion. +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). Tr = teacher.

In the third correlational study researchers coded the social pretend play talk of 48 Head Start children and their mothers during a free play session in both kindergarten and fourth grade (Tenenbaum, Snow, Roach, & Kurland, 2005), and when the children were in sixth grade, told them a novel story and then tested for comprehension. Controlling for maternal education and age 3 verbal ability, neither child's nor mother's pretend play talk in kindergarten or fourth grade predicted sixth grade story comprehension. Thus narrative production but not comprehension or memory might be associated with pretend play. One possibility here is that having a high fantasy predisposition results in (a) pretending a lot with one's peers, (b) having an IC, and (c) telling elaborate stories; this is an epiphenomenal explanation. However, experimental studies are the best source of evidence for whether and how pretend play affects narrative skills.

Experimental Studies

Three studies have addressed whether children tell better stories when they are pretending, with pretending operationalized as being provided with small model toys. Ilgaz and Aksu-Koç (2005) and Benson (1993) contrasted the stories children told with and without toys. The former study had no external supports for the control condition, whereas Benson provided the control group with drawings of characters. Ilgaz and Aksu-Koç found no condition differences on a first pass. They then excluded the youngest few children in each age group (3-, 4-, and 5-year-olds, original $n = 10$ per age, within-subject design) and conducted another analysis of variance with 20 children. With this approach, they obtained a near-significant result ($p = .05$) of more complex stories with toy props for the older 4-year-olds only. Especially with the decision to exclude certain subjects being post hoc, this is properly considered a null result. Benson found that children in the control condition actually told more complex stories. The third study involved retelling a story that had been read to them rather than generating an original story (Kim, 1999), as well as answering questions about it (considered below). Children given toy animals produced more complex and complete narrative retellings than children who were given pictures of the same animals. Results are thus inconsistent as to whether pretense-supporting props lead children to tell better stories; perhaps pictures (as in Benson's control condition) help children more with making up new stories, and props are more helpful when the task is to retell a previously heard story. Props might assist story retellings via embodied cognition.

Supporting this possibility are three other studies looking at the impact of pretense reenactment on story memory. Pellegrini and Galda (1982) compared three groups of 5- to 7-year-olds, each of which had two training sessions followed by a test session. In all three sessions a story was read, and then a pretend play group reenacted the story, a discussion group answered questions about it, and a drawing group drew pictures about it. Children in the reenactment group scored better both at retelling the story and answering questions about it. Pellegrini (1984) also found that peer-directed play was as effective for story memory as adult-directed play.

At issue is whether the pretend play was the source of this effect versus embodied cognition (moving one's body in ways that represent the story). Testing this, Marbach and Yawkey (1980) compared 5-year-olds' recall of a story in two pretend conditions: reenactment with one's whole body or with a puppet, thus only with one's hands. Although both experimental conditions could be considered pretend play, children who reenacted the story with their whole body showed significantly better recall than children who did so with a puppet. Kim (1999) also supported this: Chil-

dren who retold the story with toy props were no better at answering *memory questions* about the story than were children who had pictures of the animals.

In sum, research suggests that pretend role play, but not toy props/puppets, leads to better memory for stories, due to embodied cognition; also when retelling but not when making up new stories, having toy props leads to more elaborate narratives. Thus certain types of pretend play influence certain aspects of narrative development, but the effects are limited.

Training Studies

We located six studies that trained children in pretend play and then examined narrative skills. Saltz and Johnson (1974) had preschoolers act out stories (thematic fantasy play) or label and classify objects. A narrative memory test involved arranging six pictures in proper sequence while retelling a story, and a story generation task involved making up new stories with sets of five pictures. Thematic fantasy play led to significantly higher scores on the story memory task and longer stories with more inferences and connectives in the story generation task. Although initially compelling, this study has several problems, such as lack of masked experimenters and teaching to the test. On the latter point, fantasy training involved going over stories repeatedly including answering questions about them ("Why did the billy goats cross over the bridge?"), so one cannot know if it was the acting out or simply the deeper consideration of stories that helped.

Saltz et al. (1977) addressed teaching to the test by including a fantasy story discussion group along with fantasy play training; the other two groups were sociodramatic play training and an arts and crafts control. On two narrative tasks similar to the ones used earlier, all children did poorly, and there were no condition differences. However, for the story generation task and the high IQ subset of children, a significant difference was found between the two pretend play and two nonpretend play conditions. Yet even for this subset, scores were between 0 (naming pictures but with no relation to others) and 1 (minimal story, no elaboration). Thus an unplanned analysis led to a small result on one of several measures with unmasked experimenters for a subset of children.

In a more tightly controlled study that took the precaution of using masked experimenters, Baumer, Ferholt, and Lecusay (2005) tested the effects of a kindergarten pretend play intervention implemented for 2 hr/week for 14 weeks. In one experimental and one control classroom, the intervention began with hearing and discussing *The Lion, the Witch, and the Wardrobe*. Then in the pretend play classroom, four experimenters reenacted passages from the book, and eventually the teacher and then the children joined in. In the control classroom, the teacher continued to read and discuss the story, and the same experimenters drew pictures and wrote stories with the children. Results showed that children in the pretend play classroom had significantly higher posttest scores for story comprehension and story length and coherence (but not complexity). Three concerns with this study are small samples (12 control, 17 experimental), classrooms with very different ethnic compositions that could influence narrative trajectories, and the use of one full-time classroom teacher per condition—the teachers might have differed in narrative skill teaching effectiveness outside the intervention. Although the results are intriguing, replication is needed.

Another study used many more teachers—13 in all (Silvern, 1986). Children from kindergarten to third grade ($n = 505$) acted out or were simply read stories, preceded and followed by 10 multiple-choice questions. Teachers administered all aspects of the procedure and served as their own controls by administering the experimental condition to their own class and the control condition to another one. Although on face this seems like a good idea, teachers have a personal stake in their own class (the experimental one) doing well; having multiple disinterested outsiders as experimenters would be better. Pretend training did result in significantly more gain for teachers' own classrooms. Further analysis showed this was only for children with poor narrative skills (Williamson & Silvern, 1990). Although narrative skill and IQ might be orthogonal, the contrast with the Saltz et al. (1977) finding that only higher IQ children were affected by training is worth noting.

Except for the sociodramatic play condition in Saltz et al. (1977), the intervention studies reviewed so far have involved reenacting stories. Dansky (1980a) used more everyday pretend play, with low-income preschoolers in three 30-min sessions per week for 3 weeks. In the sociodramatic play group, 12 children were encouraged to play out everyday themes. A free play group received no direction in their play, and an exploration training group discussed objects in a manner that appeared to equalize adult contact. The intervention increased the amount of pretend play in the first group, whereas the other groups—like the first group preintervention—showed little pretend play. Masked experimenters administered three narrative posttests of story memory and quality, and children in the sociodramatic training group scored higher on nine of 10 measures. This study is promising for the hypothesis that pretend play causes narrative skills, especially because the methods were sound (the free play group had less adult contact, but contact appears similar for the exploration group) and children were not acting out stories but rather were merely encouraged to engage in the types of everyday pretend they might engage in on their own. Replication with a larger sample size would be helpful.

Summary

The research reviewed here suggests that providing toys does not enhance new stories but does help with story retelling. Story memory is helped by role play, probably due to embodied cognition. Children who pretend more also appear to tell more elaborate stories, although when older they were not better at story comprehension. Thus experimental and correlational studies had qualified results for the hypothesis that pretend play causes narrative development. Although most of the training studies have methodological shortcomings, the strongest one suggests that social pretend play positively influences narrative development. This would make sense, since social pretend play does involve creating and acting out narrative. Still, this evidence does not make a solid case that pretend play is *crucial* for narrative development. Further research should examine additional alternate routes, like story reading without enactment. Although Baumer et al. did this, the confounding of intervention and classroom teacher is problematic. In addition, researchers in this area should be careful to distinguish the different aspects of narrative development under consideration: telling stories, story memory, and story comprehension.

Pretend Play and Self-Regulation

Pretend play is sometimes claimed to improve children's self-regulation (Bergen, 2002; Bredekamp, 2004), which involves the top-down cognitive processes called the executive functions, and (possibly overlapping) processes that regulate one's level of emotional arousal (Blair & Raver, 2012). We focus on each in turn.

Executive Function

Executive function (EF) is an umbrella term for a suite of related skills including inhibitory control, working memory, and attention (Blair & Razza, 2007; Garon, Bryson, & Smith, 2008; Miyake, Friedman, Emerson, Witzki, & Howerter, 2000; Rueda, Posner, & Rothbart, 2005). Vygotsky (1978) claimed pretending helps such skills based on two aspects of pretend play. First, it involves behaviors that are internally guided as opposed to stimulus bound. Pretending involves operating at two levels, the real and the pretend (Lillard, 1993); the pretend level is largely internally guided, while the real (external world) level must in many ways be inhibited. In this interpretation all pretending should be related to EF. Second, Vygotsky noted that pretend role play involves behaving according to norms that often differ from one's own everyday behaviors. Studies of pretend play and EF (see Table 11) have used teacher or parent ratings of self-regulation and direct tests of EF. Some have coded naturalistic pretend play, and others have used laboratory measures.

Correlational and experimental studies. Several studies have reported that children with better self-regulation are more likely to engage in positive peer play generally (Fantuzzo, Sekino, & Cohen, 2004; Mendez & Fogle, 2002; Mikami, 2010). When it comes to pretend play specifically, however, results concerning the relationship to EF are inconsistent.

Two older studies used the ability to stand still as an index of EF. J. L. Singer (1961) rated 6- to 9-year-olds as high or low in fantasy, based on fantastical toy and game preferences and having an imaginary companion, then asked them to remain as still as possible for up to 15 min. The cover story justifying this request was that the researchers were conducting "a study of persons suitable for space flight with its long periods of solitary confinement in a narrow space [to find] space men of the future'" (p. 404). High fantasy children remained still twice as long as low fantasy children. Children's high imagination appeared to help: Some of the children who waited the longest told the experimenter, in posttest interviews, that they had been engaged in fantasy while waiting (e.g., "playing a rocket game," p. 408).

Manuilenko (1975) examined conditions under which 3- to 6-year-olds could stand still the longest. Two conditions embedded the instruction in a pretense game, Factory and Guards, in which the guards were to stand motionless while other children did the factory work (packing boxes). Four-year-olds appeared to be most successful (no statistical analyses were done) when standing guard over two to four children packing boxes. They were less successful when standing guard outside the classroom, out of sight of the other players or for other, nonpretense reasons. Younger and older children were not as affected by the pretend scenario.

Taken together, these two older studies suggest that specific pretend play content can motivate and strengthen voluntary behavior for some children. The limitations (high fantasy children, one of four age groups, social context) are problematic for the idea that pretending causes EF generally. This position would be better

Table 11
Studies Examining the Effect of Play on Self-Regulation (Executive Function and Emotion Regulation)

Type	Citation	+	~	−	Masked Int	Masked Exp	Notes
C	J. L. Singer (1961)	PP					Cover story taps EF
E	Manuilenko (1948/75)	PP	PP		No	No	Limited conditions only; no statistics
C	Cemore & Herwig (2005)	PP	PP				Child interview +; play observation ~; teacher interview ~; parent interview ~
C	Albertson & Shore (2009)	PP					Lab measure +; did not examine own naturalistic pretense
C	Carlson et al. (2012)	PP	PP				Lab measure +; own naturalistic pretense ~
C	Kelly et al. (2011)	PP	PP				Lab measure +; own naturalistic pretense ~
C	Elias & Berk (2002)	PP	PP				Limitations: only clean up measure, and only in high-impulsive children
C	Harris & Berk (2003)			PP			Head Start children
T	Saltz et al. (1977)	PP	PP		No	No	Failed to replicate from one year to next
T	Diamond et al. (2007)	PP			No	No	Unclear if play or other aspects of intervention
C/E	Galyer & Evans (2001)	PP	PP		Yes	Yes	Mixed results in experiment; also found correlation
E	L. A. Barnett & Storm (1981)	PP			No	No	Unclear if play or time
E	L. A. Barnett (1984)	PP			No	No	Unclear if due to negative impact of control condition or positive impact of play
T	Moore & Russ (2008)		PP		No	No	

Note. Type of study: C = correlational; E = experimental; T = training. Type of play: PP = pretend play (social unspecified). +: positive relationship to play; ~: no correlation or play = nonplay condition; − = negative relationship to play. Masking: Intervention (Int) or posttest experimenters (Exp). If masking status was not specified, we assume experimenters were not masked, since that is the unmarked case. Masking for correlational studies is omitted because it is rarely mentioned, even when it is likely (because play observations occurred several years earlier than testing, for example). EF = executive function.

supported if children who pretend a lot show higher EF outside of the play situation.

Cemore and Herwig (2005) tested this with a standard delay of gratification test (with no cover story) and by assessing play in three interviews (mother, teacher, child) as well as via direct preschool observation. Only the child interview was related to delay time, but this interview occurred just after the delay task with the same experimenter, leaving open the possibility of experimenter biasing. None of the other measures of play was significantly related to EF.

Three other studies found a relationship to laboratory tests of knowledge about pretend play (Albertson & Shore, 2009; Carlson, White, & Davis-Unger, 2012; Kelly, Hammond, Dissanayake, & Ihsen, 2011); however, the knowledge tests themselves appear to require EF. What would be most telling is if engaging in pretend play were itself related to EF. The latter two studies measured spontaneous pretend play and found no relationship to it.

Perhaps one can see a relationship from pretend play to EF only over time. In a cross-lagged correlational study, Elias and Berk (2002) examined fifty-one 3- to 4-year-olds in four classrooms at two times points 4 months apart, recording play behaviors at the first time point and self-regulatory behaviors (attentiveness at circle time and behavior at cleanup time) at both time points. Pretend play was coded as solitary, social, and complex (e.g., adopting a role, talking in that role, and using substitute objects). Partialing out age, verbal ability, and Time 1 cleanup or circle time attention, complex social pretend play predicted Time 2 cleanup, but not Time 2 circle time attention. Further analyses showed the cleanup relationship existed only for children rated high in impulsivity; pretend play made no difference for low-impulsive children. The authors' explanation for the lack of relationship to the circle time measure is that the teacher more closely supervised circle time. However, children were not at ceiling on this measure at Time 2—they scored an average of 104 out of a possible 120, with a standard deviation of 16.8—so it is not clear that closer teacher supervision explains the lack of association.

Most concerning about this study, however, is failure to replicate the result with low-income children (Harris & Berk, 2003, as cited in Berk, Mann, & Ogan, 2006). In a similarly designed study, Head Start children's Time 1 sociodramatic pretend play was actually negatively related to their Time 2 cleanup behavior ($r = -.25$). If social pretend play helps self-regulation, one would expect it to do so for low-income children as well—indeed the Fantuzzo et al. (2004) positive correlation with social play was found for Head Start children. Berk and colleagues explained the discrepant results as being due to the themes of children's pretending, which they said were often aggressive in the Head Start group. If that is the case, then one cannot say that pretend play helps self-regulation generally (and as the Elias & Berk, 2002, study is often cited as showing, e.g., Bredekamp, 2004; Whitebread, Bingham, Grau, Pino Pasternak, & Sangster, 2007); rather, complex social pretend play with particular content (Elias & Berk stated the main play theme was "housekeeping") might help more impulsive children's self-regulation as assessed by a cleanup measure but not an attention measure.

In sum, strong evidence that pretend play helps EF is lacking. Two older studies showed that when pretending a role where standing still is important, pretend play helps some children under some circumstances. Relationships to spontaneous pretend play have rarely been shown, and even then appeared only for one of two measures, and only with high-impulsive middle-class children, not low impulsive or lower class ones. This pattern of results does not support that pretense is key to developing EF. But as in other domains, training studies provide the best test.

Training studies. We found three studies examining the effect of training pretend play on EF. In a study discussed in several earlier sections, Saltz et al. (1977) used thematic fantasy play, sociodramatic play, fantasy discussion, and controls. Recall that this study used unmasked experimenters and subsets of data without prior rationale. Here there is rationale, because although the study involved three cohorts, EF tasks were given only to the first and third. First year children were "guardians of the toy": They had to sit by an attractive toy and if they did not touch it during the waiting period, they were later rewarded with another toy. Two thirds of the children were also given instructions about how to make waiting easier (Mischel, Shoda, & Rodriguez, 1989): "think about your favorite story" or "read this book" (p. 371). Children in the play training conditions (combined) waited longer than children in the other two conditions; although an interaction with instructions was not significant, the authors stated that "the data clearly display an interaction" (p. 376), limiting the result to the subset of children instructed in how to make waiting easier. This result did not replicate in the third year, however, when the task was sitting in a chair for 5 min pretending to be in a spaceship.

Two other studies are cited as showing that pretend play assists EF (Hirsh-Pasek et al., 2009; Nisbett, 2009), although we question whether pretend play is the source of the effect. Tools of the Mind is a Vygotsky-inspired preschool program with many "tools" to assist self-regulation. For example, one tool is a freeze game, in which children run around to music, and when the music stops all children must freeze until it starts again, directly challenging their self-regulation. Another is "reading buddies," in which one child holds a symbol of an ear while another holds a symbol of a mouth, to help them remember if it is their turn to listen or to speak. Regarding pretending, the program has an unusual requirement: Before they begin play, children must draw or dictate to the teacher a play plan; once play commences, they are not allowed to deviate from that plan (Diamond & Lee, 2011). Of five studies that have looked at the EF outcomes of this program, one had strong results (Diamond, Barnett, Thomas, & Munro, 2007), one had milder ones (W. Barnett et al., 2008), and three others saw no impact (Clements, Sarama, Unlu, & Layzer, 2012; Lonigan & Phillips, 2012; S. J. Wilson & Farran, 2012). Even were results consistently positive, one cannot separate pretend play from other aspects of the program, preventing a clear conclusion that pretend play influences EF. Other aspects of this multifaceted program might be the engines.

In sum, training studies of pretending and EF are entirely inconclusive, with failures to replicate and uncertain causes. Coupled with very limited correlational findings, evidence that pretend play assists EF is sparse at best.

Emotion Regulation

Others have focused on pretense assisting emotion regulation. Freud (1955) saw all play as releasing tension, and Erikson (1950) believed children could master disturbing events through play. Fein (1989) and Bretherton (1989) went so far as to claim emotion

regulation is the primary function of pretend play. This possible function of play relates closely to pretend play therapy. For reasons of space we do not review this literature here but note that a current review from within the field, which considered two recent meta-analyses, concluded that evidence for play therapy's efficacy is "largely inadequate" (p. 13) and that the strongest effects are seen in studies of children who play out theme-specific issues concerning medical treatment (Phillips, 2010). Thus, pretending about specific content might help children cope with that content in real life, but in general we lack good evidence for the efficacy of pretend play therapy.

We found four studies focused on pretend play and emotion regulation. In a correlational study, parents of 4-year-olds filled out a measure of emotion regulation (Shields & Cicchetti, 1997) and reported on their child's play at home (Galyer & Evans, 2001), and they found that children who were rated as higher in emotion regulation were also reported to pretend more at home. Then a laboratory measure was given to determine if children who have higher emotion regulation are better pretenders. Children were engaged in disrupted pretend play: In the middle of a nice episode, a toy crocodile suddenly threatened to eat all the other toys. The parent emotion regulation scores were not significantly related to how long the children spent in pretend play with the researcher or how effectively the disruption was handled, but they were more likely to continue the play. This reflected only a 2-point difference in emotion regulation score (26 vs. 28 of 60) for children who did and did not continue the play; further, the emotion regulation measure was not validated on 4-year-olds. The small difference might not be of practical importance, although the naturalistic correlational result is interesting.

In a study in which specific pretense content appears to be key, L. A. Barnett and Storm (1981) showed forty 3- to 5-year-old children a traumatic episode of the television show *Lassie*, and half the children (the "unresolved" group) did not see the episode's happy resolution. Afterward, those in the unresolved group chose to play significantly more with a toy Lassie, and their play more frequently involved themes from the episode (although they did not reenact it). Their anxiety (Palmar Sweat Index) also was significantly reduced after the play, and their self-reported happiness was increased. Since there was no control that saw the unresolved episode but did not play, it is not clear how much the passage of time versus the play itself is responsible, but the finding that children chose to play with Lassie and then their anxiety was reduced is interesting.

A later experimental study examined pretending's impact on stress following mother's departure on the first day of preschool (L. A. Barnett, 1984). Seventy-four children (mean age 3.3 years) were divided into eight conditions. Roughly half of the children in each group were not very anxious at their mother's departure and half were (Palmar Sweat Index). Within each of these groups, half were told to sit at a table and to hear a story about local vegetation, and half were brought to a room full of toys to play freely. Within each of these two conditions, half of the children were alone, and half were with five other children. Thus the conditions were social/alone nested in story/play nested in high/low anxious. For the high anxious children, playing with toys alleviated anxiety more than listening to the story. In addition, playing alone alleviated anxiety more than social play. Low anxious children showed little effect of condition.

These two studies suggest that solitary pretend play might reduce anxiety. But in the first study, the passage of time could be the crucial factor, and in the second study, the reduction could be only relative to a rather restrictive control activity. Further research is needed to examine these possibilities.

A training study, mentioned earlier regarding creativity, found no immediate nor long-term effect of pretend play on teacher-rated emotion regulation (Moore & Russ, 2008). Forty-five first and second grade children were trained in pretend play and 2 to 8 months later were tested. Although their pretending had increased relative to that of controls, and so had their positive affect expression, the trained children did not improve in emotion regulation as measured by the teacher. Perhaps positive affect expression reflected an improvement in underlying emotion regulation that the teachers had as yet failed to detect, a speculation that requires further research.

Taken together these four studies leave open the case as to whether pretend play assists emotion regulation. Although parents rate children similarly on both, experimental paradigms have important alternate explanations that need to be ruled out, and the single training study we found failed to find that pretend play training increased emotion regulation as measured by the teacher.

Summary

Some scholars have claimed that pretend play improves, and even is crucial to the development of, self-regulation (Bergen, 2002; Bredekamp, 2004; Hirsh-Pasek et al., 2009; Tomlinson, 2009). This review shows little support for such claims. The inconsistency in correlational studies is against a general causal account. Without further research, there is no basis to determine if equifinality is supported; the direct path might not exist, and no other paths have been examined. Epiphenomenalism arises when there are inconsistent correlations, but in this literature correlations are so sparse there might be nothing to explain.

Summary and Conclusions

This review has examined evidence cited to support claims that pretend play is a crucial engine of child development. In addition to the causal Vygotskian model inherent in such claims, we considered two alternative possibilities: that pretending is one of several possible routes to development, or that pretending is merely an epiphenomenon, something that often goes along with important developments, but does not cause them. The overriding conclusion from this review is that there is currently not evidence to support the first position and that more and better research is needed to clarify pretend play's possible role in children's development. Table 12 summarizes findings from this review as regards the three possible models, which will now be discussed in turn.

The causal position is that pretend play has a unique and important role in promoting healthy development. This might seem like a straw-person view, but the claim is repeatedly made in the literature, as we have shown throughout this article. If this position were supported, then for any development pretend play causes, strong, consistent, and unique correlations should be seen between pretend play and the development. We concluded that the causal account is possible, based on existing research, for four of 11 developments reviewed here: reasoning, language, narrative, and

Table 12
Summary of Evidence for Each Position

Domain or subdomain	Causal	Equifinal	Epiphenomenal
Creativity	No: Inconsistent correlations.	No: When experimenters are masked or filmed or have other hypotheses, null results.	Best supported, but not clear what of. Adult interaction, materials, social mix?
Intelligence	No: Although correlations, direction of effects is uncertain; skills training suggests adult interaction could be underlying third variable.	No: Music training is more effective.	Best supported: Adult interaction or other features of intervention.
Problem solving	No: Construction but not pretend play.	No: Construction but not pretend play.	No: Construction but not pretend play. Associations might result from propensity to construct.
Reasoning	No: Getting children to focus on premises is as effective.	Yes.	Possible: If pretend as operationalized is also a cue to pay attention to premises, and this is true reason for results.
Conservation	No: Correlational studies find no relationship; training results ride on adult questioning.	No: When experimenters are masked and other aspects of intervention equalized, null results.	Best supported: Adult interaction (structured questioning).
Theory of mind	No: Inconsistent. Some correlations to social pretend play with more recent tasks, but direction of effects is unclear.	Possible, yet sounder methods fail to show.	Best supported, considering inconsistent findings and hints of reverse direction of effects. Adult interaction.
Social skills	No: Correlations inconsistent with both solitary and social pretend play. Direction of effects is an issue.	Possible: Other routes unexamined.	Possible: Crucial variable could be practice.
Language	Possible: Consistent relationships to different aspects of language. Effects could be bidirectional.	Possible: Other routes unexamined.	Possible: Adult interaction could explain training study results.
Narrative	Possible: Correlations inconsistent and to different aspects of narrative development but one solid but small training study needs replication.	Possible.	Less likely but one solid but small training study needs replication.
Executive function	Not likely: If so, limited to subsets of children and tests.	Not clear that pretend play leads to.	Not clear that pretend play is reliably associated.
Emotion regulation	Possible: Parent rating consistent in single study; other results have other interpretations.	Not clear that pretend play leads to.	Too few studies.

emotion regulation. Of these developments, the causal account is most plausible for language, as pretend play is quite consistently related to it. However, correlation is not causation, and reverse causality (from language to play) is shown in some studies. An underlying variable like adult interaction could also be important, with pretend play possibly being epiphenomenal to intensive developmentally oriented adult interaction, explaining results from training studies. For narrative development, conclusions were similar, although the database is not as dense and the domain is complicated by the different aspects of narrative showing somewhat different results (unlike language, where results were fairly consistent regardless of aspect of language measured). Emotion regulation and reasoning are more difficult to evaluate given the scarcity of solid research. For all other areas, the causal account is not supported by available research: Correlations to pretend play were inconsistent for no clear reason (creativity, theory of mind, social skills) or did not exist (conservation, problem solving), or pretend play had no unique role since other training worked as well (intelligence), or results were limited to subsets of children or measures (executive function).

Equifinality was supported for the domain of reasoning, since studies have clearly shown that pretend play is one way to get children to focus on the premises and perform better on logical syllogism tasks. However, one might also argue that this supports epiphenomenalism: The pretend play aspect of the experimental condition was epiphenomenal to the true underlying cause of focusing on the premises.

Equifinality is also possible for some other domains, although few other routes have been explicitly compared—this is a topic for further research on the development of social skills (music training was not as good), language, and narrative (free play was not as good, story discussion route requires further study). For theory of mind, in the most solid study neither pretend play training nor skills training led to significant improvements; other studies had at least one serious methodological problem. For creativity and conservation, equifinality was not supported because masked experi-

menters eliminated the causal result. For intelligence, equifinality was not supported because music lessons led to greater gains than drama lessons. For the two aspects of self-regulation, there are not clear findings showing that pretend play is a possible route; existing findings are too sparse, limited, or attributable to other factors.

Epiphenomenalism is less likely for narrative because of the one small but solid training study (Dansky, 1980a), but it could explain some findings. For example, high fantasy children might produce more complex narratives and also be apt to pretend more and have ICs. For self-regulation, there are too few findings showing a relationship. Epiphenomenalism seemed possible for language, social skills, reasoning, and problem solving; and for creativity, intelligence, conservation, and theory of mind, we believe it is the best supported position.

Two truths are abundantly clear from this review. One is that we do not have a good basis of evidence from which to claim that pretend play is *crucial* to development. The second is that much of the evidence on pretend play suffers from serious methodological problems that must be addressed in further research to allow for a solid assessment of whether pretend play causes any important development. But as a thought experiment, we next take seriously the third position, asking of what pretend play might at least sometimes be an epiphenomenon.

Three Epiphenomenal Reasons for Some Findings

If pretend play is at least in some domains epiphenomenal, then of what might it be an epiphenomenon? It is not likely to be just one thing, but we hypothesized in several cases that correlations between pretend play and positive developmental outcomes could be due to the same adults influencing children's development in both domains. Adults who hear the child development rhetoric noted at the beginning of this article and have time and interest to devote to their children's psychological development would encourage pretending, along with other development-enhancing activities. When adults encourage pretending, children pretend more (Lillard, 2011). But where pretending is not considered so important, children learn from adults in other contexts (Berk et al., 2006), and then correlations between pretend play and the outcome do not exist. To examine this hypothesis will require more careful study of the relation between pretense and other developments in the context of adult–child interactions.

A second possible epiphenomenal reason for positive results concerns features of children that would also go along with higher pretend play scores in the studies. In some cases, we noted that children who are more socially compliant and/or intelligent would do better on pretend play and the other tasks, since the researcher was asking them to pretend and asking them to engage in some other task. For language, a plausible alternative child factor is a "symbolic function" supporting both language and pretend play. Indeed, research has shown that children's performance on symbolic tasks that are not primarily concerned with language or pretend play (DeLoache, 2000) is associated with both (Kavanaugh & Lillard, 2012; Walker & Murachver, 2012).

A third underlying factor that could explain some positive experimental results is the content about which children are asked to pretend. In studies of problem solving, theory of mind, executive function, and narrative, teaching to the test, or using content in the pretend training or manipulation that directly involves elements that would then help on the outcome test, could plausibly cause results. If children's pretending involves assigning props to roles, they do better on ToM tasks that involve assigning objects to people, and if they pretend by focusing on the narrative structures of stories, their own stories come to have better narrative structure. This is important in that children are naturally motivated to play, and if we can embed learning in play materials such that we positively influence development, this could be good. It is the same rationale underlying many technology toys, and even *Sesame Street*. But just as watching television generally does not help development even though watching particular content can, the evidence reviewed here suggests that pretend play might not generally help development *on its own* but that playing with particular content can. It is notable that in one study, the more that "hard to manage" children pretended, the worse off they were developmentally—but their pretend content was often violent (J. Dunn & Hughes, 2001). In sum, features of the adults with whom children interact, features of the children themselves, and the content with which children pretend are potential epiphenomenal reasons for some findings relating pretend play to positive developmental outcomes.

Implications for Educational Settings

Despite the poor state of the evidence on pretend play's benefits, research does *not* advocate what is often offered as the only alternative to a playful approach in educational settings: adult-centered instruction. Research in U.S. schools has clearly shown that adult-centered learning environments are less positive for young children than more active, child-centered approaches (Stipek, Feiler, Daniels, & Milburn, 1995) dubbed "playful learning" (D. G. Singer, Golinkoff, & Hirsh-Pasek, 2006), like Reggio Emilia, Montessori, and Tools of the Mind. Developmental science does not support young children sitting in desks while teachers lecture at them.

What else about child-centered classrooms leads to more positive developmental outcomes if it turns out not to be the pretend play? Child-centered classrooms differ from teacher-centered ones in several qualities. Like pretend play, child-centered classrooms often provide free choice, interesting hands-on activities for which the child is intrinsically motivated, and peer interactions. Unlike pretend play, these elements have been shown in independent research to be consistently associated with more positive outcomes (see summaries of the literatures in Lillard, 2005). Compared with free play programs, more structured classrooms with carefully designed, challenging, hands-on activities that confer learning appear to help children's development the most (Chien et al., 2010; Lillard, 2012; Lillard & Else-Quest, 2006).

Do these findings regarding pretend play mean children need no time to play (pretend or otherwise)? First, there is good research showing that recess restores attention in conventional school settings where the basic instructional method involves children sitting at desks and listening to teachers (Pellegrini & Smith, 1993). In addition, exercise, be it from athletics or recess, improves cognitive function (Lillard & Erisir, 2011; Ratey, 2008). A perfectly sufficient reason for play time might simply be that it is fun (Power, 2000). Pretend play is also relaxing, associated with more heart rate variability (Hutt et al., 1989, p. 12). Finally, the research reviewed here often suggested that adult interaction might be the real underlying cause of positive effects from various interven-

tions. Pretend play might be useful because it is a setting that can facilitate positive adult–child interaction (Paley, 2005; P. K. Smith et al., 1981).

Implications for Methods

The literature on the possible benefits of pretend play for development showcases an array of methodological problems. Further research in this area must avoid these problems to elucidate if and how pretend play might help development. Here we highlight a few major problems that must be addressed (see also Cheyne, 1982; Christie & Johnsen, 1983).

Experimenters. In the literature on pretend play, experimenters have rarely been masked, but when they were, results often went away, suggesting experimenter bias created the original result. It is possible that masked experimenters sometimes result in null effects because children are not familiar with the second experimenter. If this is the case, then the positive influence of pretending is so tenuous that being tested by an unfamiliar posttest experimenter dwarfs it. We think this unlikely (Lillard & Peterson, 2011). More likely it seems that experimenters who are swayed by the cultural view of play and knowledgeable about condition subtly and probably unconsciously influence the children's performance. The biasing does not always happen, perhaps because of stricter experimenters, procedures that are less vulnerable to bias, or experimenters with less of the play ethos, but it happens enough to taint the picture. Masked experimenters are rare in cognitive development research, but in this domain, not using them has been shown to be a problem. Thus, a clear recommendation from this review is that in pretend play research, masked experimenters should be used unless measures are absolutely impervious to bias. Those who administer outcome measures should not know how much children have pretended in observations or whether children were in the pretend play condition. Ideally intervention administrators are masked to hypotheses, alternate conditions, and what tests will be given.

Samples and conditions. In experimental research, random assignment to condition is necessary. If children choose their condition (acting classes) then unmeasured preexisting differences could account for results. Further, care must be taken to develop control conditions that are equal except for the pretend element: The degree of adult interaction, the content, and the context must be the same save the pretend play. Finally, researchers must avoid potential confounds with other stable variables that might influence children's development, for example, by providing several implementers per condition, or using implementers as their own control but without them having a personal stake in the performance of children in one condition but not another.

Measures. Researchers should use uniform measures to facilitate comparisons across studies. For younger children, McCune's hierarchy (derived from Piaget; see footnote 10) is a useful standard. For examining natural play in the classroom, a serviceable and widely used scoring system nests Parten's (1932) in Smilansky's (1968) scheme, as described in the Creativity section (Rubin, 2001). We would also add to this combined scheme a tally of the number of transformations children make. If pretending assists children because it gets them thinking in unusual ways, then tracking the extent to which children do so is important. When not coding naturally occurring play, using a standard measure is important. The Test of Pretend Play (Lewis & Boucher, 1997) addresses levels of play derived from observational studies.

Analyses. A recurrent problem with the existing research is how results were analyzed and reported. Brainerd (1982) pointed out that even when positive effects of pretend play were obtained, they were tiny. Experimenters in this area have not always been rigorous in their analyses, perhaps because of the play ethos (P. K. Smith, 1988). In some instances, no result was found on an omnibus test but follow-up tests were done. One-tailed tests were used without strong rationale. Only subsamples were included, for no compelling reason. Unfavorable results were ignored. The existing meta-analysis (E. P. Fisher, 1992) used erroneous and cherry-picked statistics. Solid truths stand up to rigorous analyses, and unrigorous techniques only muddy the waters.

Other recommendations. Although our own preference is experimental methods, other researchers favor correlational designs with natural settings. Modern statistical techniques allow causal inferences from such designs with sufficiently large samples and numerous measures. Since pretend play might have effects only over a long time course, longitudinal efforts should be encouraged.

Finally, we would recommend that experimenters open themselves to other potential benefits of pretend play. Well-being and a sense of personal agency are two possibilities. When children are pretending they appear to feel in control. This might be mitigated in many experiments, when children are instructed to pretend, but experimental conditions might be designed that minimize the sense of external control. Another issue to consider is the reverse of what was investigated here: whether absence of play is harmful, as has been shown in some animals (Pellis & Pellis, 2009).

With more experiments incorporating rigorous methodology, one day researchers will have a more solid answer regarding whether pretending helps specific aspects of children's development, is just one route among many, or simply often goes along with other circumstances that lead to positive developments.

Conclusion

Despite over 40 years of research examining how pretend play might help development, there is little evidence that it has a crucial role; equifinality and epiphenomenalism have as much if not more support. With equifinality, pretend play would be just one of many routes to a positive developmental outcome. With epiphenomenalism, pretend play would often go along with a positive developmental outcome, but for extraneous reasons; it would not itself serve any causal role in that outcome.

Because the literature is riddled with weak methods (correlational studies, lack of masked experimenters, poor control conditions) and unrigorous statistical approaches, we cannot definitively state which of these models is most supported. In many areas the current research base is clearly inconsistent with the causal model, but leaves open the other two. The methodological problems must be remedied with sound experiments and longitudinal studies before we can know whether and how pretend play helps development. Meanwhile, the lack of existing evidence that pretend play helps development should not be taken as an allowance for school programs to employ traditional teacher-centered instructional approaches that research has clearly shown are inferior for young children. The hands-on, child-driven educational methods sometimes referred to as "playful learn-

ing" (Hirsh-Pasek et al., 2009) are the most positive means yet known to help young children's development.

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Received December 9, 2011
Revision received June 4, 2012
Accepted June 6, 2012 ■