Prevalence of Imaginary Companions in Children: A Meta-Analysis

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Abstract

Having an imaginary companion (IC) is a fascinating example of children's imaginative and pretend play. However, there are inconsistencies in the reported prevalence of children's ICs. This study examined how culture may affect this prevalence. We conducted a meta-analysis to assess whether the culture as well as age, assessment method, sex, and birth order may affect the prevalence of ICs in studies that included children under 12 years of age. The results revealed that culture as well as assessment method and sex/birth order may have a significant impact on the prevalence of ICs. Specifically, children in Western cultures were more likely to report invisible friends as compared to those in Japan, but the total prevalence of ICs did not differ across cultures. We illustrate several implications for future research on ICs.

Keywords: Imaginary companion, cultural differences, meta-analysis, pretend play

Prevalence of Imaginary Companions in Children: A Meta-Analysis

Imagination plays an important role in children's lives. Children begin to enter imaginary worlds after their first birthday, and they spend considerable time engaged in imaginative pretend play (Lillard, Pinkham, & Smith, 2011). The preschool period may be the "high season" of pretend play (Singer & Singer, 1990). Their pretend play becomes more elaborate over the course of the preschool years, and they start to engage in role play, where children adopt a role or identity for the self (Harris, 2000; Sachet & Mottweiler, 2013; Taylor, Sachet, Maring, & Mannering, 2013).

One fascinating example of children's imaginative and pretend play is the imaginary companion (IC) (Gleason, 2002; Piaget, 1962; Deniz Tahiroglu, Mannering, & Taylor, 2011). An IC was originally defined as "an invisible character named and referred to in conversation with other persons or played with directly for a period of time, at least several months, having an air of reality for the child, but no apparent objective basis. This excludes the type of imaginary play where an object is personified or in which the child takes on the role of a character" (p. 988) (Svendsen, 1934). Thus, only an invisible friend (IF) was regarded as an IC.

It had been assumed that stuffed animals or personified objects (POs) have a physical appearance, and therefore they are not purely imaginary. However, children may imagine more vividly if an object serves as a prop (Walton, 1990). Invisibility may not be a core feature of ICs, and POs can be included in this concept when children endow such objects with human qualities and treat them as a companion (Singer & Singer, 1990). Thus, several theorists included POs (Harris, 2000; Singer & Singer, 1990; Taylor, 1999). Nevertheless, there might be some differences between POs and IFs. Indeed, Gleason (2004a) examined the relationship between fantasy orientation and IC status, and found that children with POs showed the highest fantasy orientation, followed by children with IFs and children with no ICs. Moreover, children show

different behaviors to POs and IFs. Indeed, the relationship with IFs was more egalitarian like peer relationship whereas the relationship with POs was more hierarchical as parent-child relationship (Gleason, Sebanc, & Hartup, 2000). Thus, in this article, we regarded both IFs and POs as ICs, but treated them differently.

ICs were first reported in the nineteenth century (Vostrosky, 1895), and academic interest has grown enormously since then (Manosevttz, Fling, & Prentice, 1977). Although there was public interest in children's ICs, people often assumed that an IC was a symptom of personality deficits or emotional problems (Taylor, 1999). It was not until the 1960s that ICs began to be considered a positive sign of child development (Cohen, 1996).

Studies in the field of developmental psychology have shown that ICs may play an important role in children's social, emotional, and cognitive development (Bouldin & Pratt, 2002; Giménez-Dasí, Pons, & Bender, 2014; Gleason, 2004a; Gleason & Kalpidou, 2014; Hoff, 2005; Mottweiler & Taylor, 2014; Taylor, 1999; Taylor & Carlson, 1997). For example, research has shown that children with ICs may have more developed socio-cognitive skills (Roby & Kidd, 2008; Taylor & Carlson, 1997) or narrative skills (Trionfi & Reese, 2009) compared to those without ICs. Other studies examined the effects of ICs in children's coping competence (Benson & Pryor, 1973; Bouldin & Pratt, 2002; Gleason & Kalpidou, 2014; Hoff, 2005). Clinical studies have shown that ICs may help children to manage anxiety, stress, and social difficulties (Benson & Pryor, 1973; Hoff, 2005). Empirical studies also reported that adolescents having ICs used more positive coping strategies such as getting advice from someone, although they had low social preference with peers (Taylor, Hulette, & Dishion, 2010). In the younger population, Gleason and Kalpidou (2014) examined whether preschool children's IC status may be related to their coping competence, and found that children with and without ICs did not differ in terms of coping

competence. Rather, the researchers found that children with egalitarian child-IC relationships chose more constructive coping strategies than did those with hierarchical child-IC relationships.

There is accumulating evidence on children's ICs and its impacts on child development, but there remain several inconsistencies in the basic knowledge of this concept. The present article focuses on the prevalence of children's ICs and the factors that may affect the prevalence. Specifically, the main aim of this article is to focus on the effect of cultural factors on the prevalence of ICs. Most research about ICs is reported from Western cultures. In Western studies, about half of the children reported to have ICs. For example, a recent study by Taylor and colleagues showed that 65 out of the 100 participating children reported the presence of an IC (Taylor, Carlson, Maring, Gerow, & Charley, 2004). This may be an extreme case, but in most Western research, nearly half of the children appear to have ICs (Taylor, 1999). Moreover, in Western children, IFs are relatively more common than POs are. Indeed, Taylor and Mannering (2006) re-analyzed the data they collected, and reported that, out of the 592 descriptions of ICs, 356 (60.14%) pertained to IFs, whereas 236 (39.86%) pertained to special toys and objects that functioned as an IC (i.e., PO). This is not an unusual case, because several studies have showed a similar pattern in the prevalence of ICs (Davis, Meins, & Fernyhough, 2011; McInnis, Pierucci, & Gilpina, 2013; Trionfi & Reese, 2009).

There is little evidence for children's ICs in non-Western cultures. Nevertheless, some recent studies showed that there might be similarities as well as differences between the ICs of Western and Japanese children (Moriguchi & Shinohara, 2012; Motoshima, Shinohara, Todo, & Moriguchi, 2014). In terms of similarities, both Western and Japanese studies reported that about half of the children had ICs. In terms of differences, Japanese children are less likely to have IFs as compared to those in Western cultures. For example, Moriguchi and Shinohara (2012) reported

that 26 of 50 (52.00%) Japanese children reported the presence of ICs, which was consistent with the rate observed in Western children. However, out of the 26 descriptions of ICs, 5 (19.23%) were regarded as IFs whereas 21 (80.77%) pertained to POs, which was quite different from that observed in Western children. There are few direct cross-cultural studies of children's ICs, but given that children in Asian cultures are less likely to have IFs than those in the Western cultures are, cultural background may be an important factor in the prevalence of ICs.

The cultural effects on children's IC can contribute to our understanding of how cultural contexts can affect children's imaginative and pretend play. Imaginative and pretend play may be universal behaviors across cultures, with an evolutionary origin, but it is unclear how the play is constructed and shaped varies across cultures (Gaskins, 2013). Specifically, parenting, as well as children's playgroups and other cultural values can influence children's imaginative and pretend play. Nevertheless, the dominant interpretation of the imaginative and pretend play is usually based on Western studies. In addition, few empirical studies have examined the cultural differences in pretend play. Therefore, we aimed to examine whether and how socio-cultural contexts can affect children's ICs.

Other factors can also affect the prevalence of ICs, which may confound our interpretations of the cultural effects on ICs. We will discuss these factors, namely, children's age, assessment method, sex, and birth order below. The first factor that may affect the prevalence of ICs is age. In this regard, while some studies on ICs have included only preschool children, others have included both children and adolescents (Bouldin & Pratt, 1999; Gleason, et al., 2000; McInnis, et al., 2013; Pearson et al., 2001; Taylor & Carlson, 1997; Taylor, Cartwright, & Carlson, 1993). Moreover, while some researchers have proposed that the peak prevalence of children's ICs occurs at the age of 4 years (Manosevitz, Prentice, & Wilson, 1973), others have suggested it to occur between 2.5

to 3.5 years (Nagera, 1969; Somers & Yawkey, 1984), or older (Pearson, 1998). An additional complicating factor is whether the IC status includes current and/or past ICs. Several previous studies did not distinguish between current and past ICs.

The second factor, the assessment of ICs, may also affect findings regarding children's IC status. A traditional method is asking parents about their children's ICs (Bouldin & Pratt, 1999; Manosevitz, et al., 1973). Parents can be helpful in disambiguating what children report (Gleason, 2004b, 2005), but researchers have noted some problems in this assessment method. First, children's and parents' reports of ICs do not always match perfectly, and parents do not often know the details of children's ICs (e.g., age, sex, and personality of the IC) (Taylor, 1999). Second, parents who disapprove of their progeny's IC may know less about their companions as compared to parents who are happy for their child to have an IC (Gleason, 2004). The next assessment method—asking children about their IC (Pierucci, O'Brien, McInnis, Gilpin, & Barber, 2014)—is advantageous in that children may possess the most reliable information regarding their ICs; however, they may misunderstand an experimenter's questions and provide answers that pertain to their real friends or they may invent ICs during the interview (Taylor, 1999). Moreover, children below 3 years may be unable to provide sufficient information about their IC due to their limited verbal ability.

Given the problems noted above, most researchers have adopted a more rigorous assessment method, wherein children and parents are interviewed separately and their reports are compared (Davis, Meins, & Fernyhough, 2014; Moriguchi & Shinohara, 2012; Taylor & Carlson, 1997). Some variants of this method exist in the extant body of research. Some researchers regarded children to have an IC if the parents *or* the children indicated the presence of an IC (Trionfi & Reese, 2009), whereas other studies required both parents *and* children to indicate the

existence of ICs (Davis, et al., 2011). In the strictest form, children and parents were interviewed twice and their responses were required to be consistent at two different time points (Taylor & Carlson, 1997). This method may result in the lowest number of ICs as compared to reports from either parents or children.

Further, sex and birth order may strongly affect the prevalence of ICs. In terms of sex, it has been repeatedly reported that girls are more likely to have ICs than boys are (Carlson & Taylor, 2005; Mottweiler & Taylor, 2014). Additionally, the content of pretend play reflects sex differences. Specifically, girls are more likely to engage in IC play than boys are, whereas boys are more likely to impersonate characters such as Batman, than girls are (Carlson et al., 2005). Girls may achieve a feeling of mastery by caring about the IC, whereas boys may obtain the feeling through creating an ideal self (Harter & Chao, 1992). However, sex differences have not always been reported in the literature (Gleason & Hohmann, 2006). Moreover, sex differences may appear due to differences in the timing of appearance of ICs (e.g., a boy may have an IC at an older age; Taylor, 1999). Therefore, it is important to consider whether sex differences are observed through the developmental process. In terms of birth order, first-born children often engage in IC play more often as compared to other children (Gleason, et al., 2000; Trionfi & Reese, 2009). This may be because the creation of an IC may compensate for the lack of a real companion (Taylor, 1999).

In summary, previous studies have shown that the culture may affect the prevalence of ICs, but age, assessment method, sex, and birth order may confound the interpretations about the cultural differences in ICs. Therefore, it may be theoretically and practically significant to address the variations that may affect the prevalence of IC systematically. Therefore, we conducted a meta-analysis of studies examining children's IC status. Given the previous evidence, we hypothesized that culture, as well as children's age, assessment method, sex, and birth order would

affect the prevalence of ICs. More specifically, we hypothesized that children in Western cultures were more likely to report IFs compared to those in Japan, but the total prevalence of ICs may not differ across cultures.

Method

Data collection. First, we conducted a literature search using the keywords “imaginary companion,” “imaginary friend,” “imaginary playmate,” and “pretend friend” for participants under 12 years of age, on databases such as PsycINFO and Google Scholar, with an aim to identify the prevalence of IC during childhood. We excluded retrospective studies conducted with adults, that is, those wherein adults reported about the ICs they had during their childhood, because it is unclear whether they could have recalled their childhood ICs accurately. Second, we reviewed all relevant published and unpublished research to identify any relevant articles from the citations. In particular, we made efforts to locate unpublished dissertations to avoid publication biases (Sachet, 2013; Sugarman, 2013; D. Tahiroglu, 2012). Third, we also reviewed the citations of influential articles (Nagera, 1969; Swendsen, 1932; Taylor & Carlson, 1997) and books (Singer & Singer, 1990; Taylor, 1999) that are highly cited in the field. In addition, we reviewed abstracts from the meetings of child development organizations, such as the Society for Research in Child Development. If necessary, we contacted the authors of the IC research for clarifications regarding the study. We concluded our search efforts in January 2016, and therefore, we did not include any published or unpublished studies that were concluded after that date.

Inclusion criteria. Our criteria for including a study in the meta-analysis were as follows. First, we excluded early studies, that is, studies published before 1970 from the analyses. Such studies might have been biased in their estimates because of the then-prevailing assumption that ICs were a sign of personality defect or a symptom of psychiatric disorders (Cohen, 1996; Taylor,

1999). There were changes in social attitudes toward ICs between the 1930s and 1960s (Cohen, 1996). Specifically, before the 1960s, children were explicitly discouraged to have ICs, but after the 1960s, ICs began to be regarded as a sign of creativity. Second, because we were interested in the prevalence of ICs in typically developing children, we excluded several studies that examined atypical children, such as those with schizophrenia (Shapiro, Prince, Ireland, & Stein, 2006). Third, we excluded case studies because they did not include any information about the prevalence of ICs. Fourth, we excluded studies wherein the researchers explicitly predetermined the number of children with and without ICs (e.g., researchers recruited 22 children with ICs and 22 children without ICs; Roby & Kidd, 2008). We referred to these studies as predetermined studies. Fifth, we found that some studies may have shared the same population. We suspected this because the number of children, the ratio of boys to girls, the mean ages, and age range were identical across studies. In such cases, we included only the earliest of the applicable studies. Finally, we required that the included studies were written in English or Japanese. We included Japanese studies because studies on an Asian population that were published in English were mostly from our laboratory, and therefore, we wanted to include other researchers' studies (Kawato, 2001; Tomita & Yamazaki, 2002).

Coding of study attributes. Studies that met the criteria were coded on the variables described in the Introduction (i.e., culture, age, assessment, sex ratio, and birth order). We extracted most relevant information from the reports themselves, such as culture, mean age, sex ratio, and birth order. We classified culture as Japan, USA, Europe, and Oceania (Australia and New Zealand). We only included data from Japan in Asian countries. We classified the assessment of ICs into the following four categories: parent only, children only, parent *or* children (hereafter, either), and parents *and* children (hereafter, both). Moreover, we coded year of publication, which

could have been confounded by the independent variables. As mentioned before, as older studies might have been biased in their estimates of the prevalence of IC, we did not include them in this meta-analysis. However, it is still possible that the year of publication may affect the prevalence of ICs. Therefore, we controlled the variable.

Dependent variables. We chose a single study as the unit of analysis. If one study included multiple experiments, we analyzed the first experiment to avoid doubly entering participants. The main focus was the proportion of children with ICs. However, we needed to take care of the definition of ICs in some cases. First, as described above, some studies described whether children had ICs currently or in the past, but other studies did not explicitly note this difference. Therefore, we used the proportion or number of children who had an IC that the researchers reported in the articles. If the researchers separately reported the current and past proportions of ICs, we summed these proportions for the analysis. Though it is possible that the studies that did not include the distinction between the current and the past ICs may report the current ICs only, the inclusion of the past ICs may affect the prevalence of ICs. Therefore, we conducted an analysis (the sixth analysis) to assess whether the prevalence of the current ICs differed from that of the past ICs

Second, some studies only included IFs, whereas others included IFs and POs. Moreover, several studies did not state whether the ICs were IFs or POs, and instead simply reported the proportion of children who had ICs. The inconsistency was an issue for our analyses. Therefore, we calculated different variables, which were used for different purposes, as follows: the proportion of children who had IFs, the relative proportion of children who had IFs out of IFs and POs, and the proportion of all children who had any type of IC (total IC). In the first analysis, we used the proportion of children who had IFs to assess the effect of several independent variables,

including culture. Next, we focused on the research that explicitly reported both IF and PO, and analyzed the relative proportion of IFs out of the sum of IFs and POs to examine which factors affect the prevalence of IC types in the second analysis. Finally, we used the total IC data to examine the cultural effects in the third analysis, as well as sex and birth order effects on children's ICs in the fourth and fifth analyses. In the analyses of sex differences, we used the odds ratio representing the odds of girls having ICs among all the children who had ICs, compared to the odds of girls not having ICs among all the children without ICs. In the analyses of birth order differences, we used the odds ratio representing the odds of first-born children having ICs among children with ICs, compared to the odds of first-born children not having ICs among children without ICs.

Statistical analyses. We transformed raw data into logits using natural logs, to satisfy linearity constraints (Lipsey & Wilson, 2001). In the first, second, third, and sixth analyses, the effect size represents the logit transformed proportion of the children who had ICs. In the fourth and fifth analyses, the effect size represents the log odds ratio of the proportion of the children who had ICs in some group as compared to those in the other group. In each analysis, we used a random-effects model, because differences in the methods and sample characteristics may introduce heterogeneity among the true effects (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Results

First, we considered 108 studies for possible inclusion in the analysis. We then excluded clinical (N = 12), case (N = 5), and predetermined (N = 10) studies. Other studies with a shared population (N = 17), those which included adolescents (N = 1), and those which did not include detailed information (N = 3) were also excluded. Further, theoretical studies (N = 15) and studies that did not include ICs (i.e., they referred to ICs, but not examine ICs, N = 12) were excluded.

Thus, 33 studies met our inclusion criteria and were considered for inclusion in one of the meta-analyses, described below. Out of the 33 studies, 29 reported the proportion of IFs. These were included in the first analysis. Twenty-two studies explicitly reported the proportion of IFs *and* POs; therefore, they were included in the second analysis. In the third analysis, we used all 33 studies to assess the factors that may affect the prevalence of the total ICs. For the fourth analysis, we chose 24 studies that reported sex differences, and for the fifth analysis, we used 10 studies that reported birth order differences. The sixth analysis included 9 studies that reported the current and the past ICs irrespective of whether the studies included both types of IC (IF and PO). Table 1 lists all studies that were included in the present meta-analyses.

Analysis of IFs. The estimated average effect size for IFs was -1.23 (95% CI $[-1.50, -0.94]$), meaning that 22.71% (95% CI $[18.17, 28.01]$) of the children had an IF in the 29 studies that were examined. We first estimated heterogeneity using the Cochran's Q test, and confirmed heterogeneity in this sample, $Q(28) = 539.88, p < .001$. We also estimated I^2 , which is a reliable measure of heterogeneity as it is unaffected by the number of research studies included. According to Higgins et al. (2003), 25%, 50%, and 75% were regarded as low, moderate, and high levels of heterogeneity, respectively. Thus, heterogeneity was notably high in the present data ($I^2 = 92.94\%$).

To examine the factors that may have affected the heterogeneity, we conducted a multiple regression analysis including culture, assessment of ICs, and children's age when they had ICs, as well as year of publication (as a control variable). The model accounted for 51.28% of the variance in the proportion of IFs. Of the covariates tested, assessment of ICs and culture were significant. In the former case, assessments made by children only were significantly different from those made by "both," $\beta = -0.95, p = .001$, and that made by parents only, $\beta = -0.97, p = .001$. No other

significant differences were found. That is, assessments by children only were 2.6 times more likely to reveal the presence of IFs than assessments by “both” and parents only (Figure 1). In terms of culture, children in Japan were less likely to have IFs than were children in the USA, $\beta = 1.19$, $p = .004$, and Oceania, $\beta = 1.05$, $p = .012$, but the same was not observed with reference to children in Europe, $\beta = 0.77$, $p = .115$. Children in the USA and Oceania were 3.3 and 2.9 times more likely to report IFs than children in Japan were, respectively (Figure 2A). Year of publication showed a marginal effect, $\beta = -0.02$, $p = .089$, indicating that the proportion of IFs decreased at a rate of 1% per year, after adjusting for other factors. Children’s age did not significantly predict the proportion of IFs, $\beta = 0.05$, $p = .709$.

Analysis of IFs vs. POs. We analyzed the effect size of the proportion of IFs out of the sum of IFs and POs. The effect size was 0.10 (95% CI [-0.34, 0.54]), which indicates that 52.58% (95% CI [41.66 63.27]) of the total ICs were IFs. We estimated heterogeneity and confirmed considerable heterogeneity in this sample, $Q(21) = 185.20$, $p < .001$, $I^2 = 87.86\%$. To examine the factors that may have affected the heterogeneity, we conducted a multiple regression analysis including year of publication, culture, assessment of ICs, and children’s age. The model accounted for 78.65% of the variance in the proportion of IFs. Out of the covariates, the only significant predictor was culture. Thus, children in Japan were less likely to have IFs than were children in the USA, $\beta = 1.804$, $p < .001$, Oceania, $\beta = 2.38$, $p < .001$, and Europe, $\beta = 2.23$, $p < .001$; children in the USA, Oceania, and Europe were 6.1, 10.8, and 9.3 times more likely than children in Japan to report IFs, respectively (Figure 2B). Other variables did not significantly predict the proportion of IFs out of the total ICs (year of publication, $\beta = -0.01$, $p = .721$; assessment of ICs, $ps > .394$; children’s age, $\beta = 0.08$, $p = .576$).

Analysis of total IC. The estimated average effect size for the total ICs was -0.45 (95%

CI [-0.66, -0.24]), meaning that 38.94% (95% CI [34.14, 43.93]) of the children had an IC in the 33 studies examined. We first estimated heterogeneity using Cochrane's Q test, and confirmed heterogeneity in this sample, $Q(32) = 320.24, p < .001$. We also estimated I^2 , and heterogeneity was notably high ($I^2 = 91.20\%$). To examine the factors that may have affected the heterogeneity, we conducted a multiple regression analysis including culture, assessment of ICs, and children's ages as well as year of publication (as a control variable), but no factors significantly explained the results ($p > .10$). Thus, culture did not affect the prevalence of the total ICs (Figure 3).

Analysis of sex and birth order differences. The effect size for sex differences was 0.60 (95% CI [0.41, 0.80]), which was significantly different from zero ($p < .001$). After transforming the logits back into raw values, girls were found to be 1.7 times more likely to have ICs than boys were. Cochrane's Q test did not reach significance in this sample, $Q(23) = 35.01, p = .051$, and I^2 , a more reliable indicator, suggested small heterogeneity $I^2 = 35.72\%$. Therefore, we did not conduct further analyses.

We also assessed the effect of birth order on ICs. The effect size of birth order was 1.039 (95% CI [0.77, 1.31]), which differed significantly from zero ($p < .001$). This indicates that first-born children were 2.8 times more likely to have ICs than were children who were not first-born. As for the effect of sex differences, we did not find heterogeneity in terms of the Cochrane's Q test, $Q(9) = 6.74, p = .663$, or $I^2 = 0\%$. Thus, we did not conduct analyses including covariates.

Analysis of the current and past ICs. We analyzed the effect size of the current ICs out of the sum of the current and past ICs. The effect size was 0.93 (95% CI [0.19, 1.68]), which indicates that 71.77% (95% CI [54.69, 84.25]) of ICs were current ICs. The Cochrane's Q test confirmed considerable heterogeneity in this sample, $Q(8) = 50.71, p < .001, I^2 = 91.13\%$. To

examine the factors that may have affected the heterogeneity, we conducted a multiple regression analysis including year of publication, culture, assessment of ICs, and children's age. However, no factors significantly explained the heterogeneity ($p > .10$).

Publication bias. Finally, we assessed publication bias, because significant results are more likely to be published than nonsignificant results are (Easterbrook, Gopalan, Berlin, & Matthews, 1991). To assess the bias, we created funnel plots. Funnel plots tend to be asymmetrical in the presence of potential publication bias. We examined the issue formally by testing whether the effect size or residuals (from a model with moderators) were related to their corresponding standard errors using the regression test recommended by Egger, Smith, Schneider, and Minder (1997). There were no asymmetries in the first ($p = .889$), second ($p = .567$), third ($p = .144$), fourth ($p = .812$), and fifth ($p = .098$) analyses. However, the funnel was asymmetrical in the sixth analysis ($p = .006$), thus indicating a publication bias in the final analysis.

Discussion

The first analysis revealed that, on an average, 22.71% of the children reported IFs. We found that culture and assessment method had significant impacts on IF status. In the second analysis, we found that approximately half of the children's ICs were IFs, which is essentially consistent with earlier evidence that about 60.00% of children's ICs are IFs (Taylor & Mannering, 2006). Only culture had a significant impact on the proportion of IFs out of the total ICs. The third analysis showed that about 38.94% of the children reported to have ICs (either IFs or POs), but culture as well as other factors did not significantly affect the total ICs. The fourth and fifth analyses revealed that sex and birth order had a significant impact on the prevalence of ICs. Girls were more likely to have ICs than boys were, and the first-born children were more likely to create ICs than other children were. We found no cultural effects, and the results suggest that sex and

birth order affected the prevalence of IC across cultures. The final analyses revealed that children usually reported current ICs (71.77%), and that the inclusion of past ICs increased the prevalence of ICs.

Taken together, there are two main findings in terms of cultural differences in children's ICs. First, Japanese children reported a lower proportion of IFs as compared to children in Western cultures. Second, the total ICs may not have been affected by cultural backgrounds, at least in this sample. The second and the third analyses revealed that Japanese children tend to have POs instead of IFs, and therefore the total ICs may not differ across cultures.

Our meta-analysis generally supported the view that imaginative and pretend play may be a universal behavior across cultures, but there are variations in how the play is constructed and shaped. An imaginary entity during pretend play, such as ICs, can be a universal phenomenon, but socio-cultural contexts may strongly affect how children imagine the entity (either IFs or POs). It is unclear what socio-cultural factors affect the cultural differences, which should be addressed in future studies. One plausible factor is parenting attitudes toward ICs. In Western cultures, parents may not discourage children from having ICs, especially IFs, when children begin to play with them (Taylor, 1999). On the other hand, the concept of ICs is not prevalent in Japan (Moriguchi & Todo, 2017). Parents may be anxious when their children talk about and interact with IFs. In fact, Kawato (2001) reported that Japanese parents were anxious about children's IFs and needed someone's psychological help when their children had an IF compared to when their children had a PO.

Importantly, the Japanese parents are not negative about the pretend play in general. Tamis-LeMonda, Bornstein, Cyphers, Toda, and Ogino (1992) compared Japanese and American toddlers' and parents' play, and found that the Japanese mothers were more likely to demonstrate

and solicit pretend play from their child compared to American mothers. Thus, the Japanese parents may be positive about children's pretend play, and therefore the total ICs may not differ across cultures. However, the Japanese parents may be specifically negative about IFs, and therefore the proportion of IF in the Japanese children may be lower than the proportion in the Western children.

The other possible interpretation was, although this is our speculation, the cultural differences in sleeping style may affect the prevalence of IFs. In Japan, infants and young children co-sleep with their parents, mostly with mothers. On the other hand, in Western cultures, infants and young children sleep alone in their own room, away from parents. Children in the latter style may have more opportunity to spend a time alone than children in the co-sleeping style, which may provide children chance to deal with the time by creating an IF. This interpretation is consistent with the compensation hypothesis of ICs, where the creation of an IC may compensate for the lack of a real companion (Taylor, 1999). Moreover, children's playgroups, other cultural values, as well as religious backgrounds (e.g., Abrahamic monotheisms vs. a polytheistic God concept) may contribute to the cultural differences in ICs.

More generally, we should assess cultural similarity and differences observed in this meta-analysis can be extended to other countries. Indeed, we included Japan as well as Western countries, and therefore the proportion of IFs and POs in other Asian countries as well as those in other cultural backgrounds should be assessed. If we assess parental attitudes, sleeping styles, and religious backgrounds, how socio-cultural factors affect the prevalence of ICs may be clarified. Moreover, other types of ICs may exist in different cultures and different contexts. For example, Mills (2003) proposed that ICs in Western cultures and "remembering a previous life" in India can be cross-cultural comparative categories. Probably, there might be culturally adapted forms of ICs

or imaginary entities in each culture. Future studies should assess this issue cross-culturally.

We also found that the other factors may affect children's ICs. In terms of the assessment method, when we adjusted for other factors, the proportion of reported IFs was higher in assessments made by children only as compared to that in the other methods. There are two possible interpretations for the results. One possibility is that we may overestimate the proportion of IFs via children's reports. The criterion to include ICs in this method may be less stringent as compared to other methods. Moreover, children may name their real friends or misunderstand an experimenter's questions (Taylor, 1999). Alternatively, we may underestimate the proportion of IFs via the other methods. That is, there might be cases where only children know about their ICs (Taylor, 1999). Perhaps, both interpretations may be partly true, and we need to be careful about the differences in the assessment method.

We also showed that sex and birth order may affect the prevalence of ICs. These results refute the possibility that the sex differences may be due to differences in time of IC creation (e.g., boys may generally have ICs at older ages than girls would) (Taylor, 1999) because our analysis adjusted for the effect of children's age. The results support the view that girls are more likely to engage in IC play than boys are, perhaps due to differences in feelings of mastery (Harter and Chao, 1992).

The present analyses did not reveal an effect of age. One possible reason is that most previous studies did not clarify whether their children reported ICs currently or whether past ICs were included. This is a critical issue when estimating age-related changes in the prevalence of ICs. Indeed, Pearson et al. (2011) revealed that the prevalence of children with IFs was basically constant across ages if the researchers included current and past IFs. It is still unclear whether the same is true for children with POs. Future research should address this issue.

The present study showed that these factors may affect the prevalence of children's ICs. More generally, the results may contribute to research on ICs and its relation to child development. Several studies show that children's ICs play roles in their social, emotional, and cognitive development, but there remain inconsistencies in the results pertaining to the effects of ICs. Some studies supported the effect of ICs on social and communicative skills, coping competence, and creativity, whereas others failed to find the differences between children with and without ICs (Bouldin & Pratt, 2001; Davis, et al., 2011; Davis, et al., 2014; Giménez-Dasí, et al., 2014; Hoff, 2005; Lillard & Kavanaugh, 2014; Lillard et al., 2013; Manosevttz, et al., 1977; Mauro, 1991; Moriguchi et al., 2016; Moriguchi, Sakata, Ishibashi, & Ishikawa, 2015; Taylor, et al., 2004). These previous studies used different criteria to identify children's ICs, and this may be partly responsible for the inconsistent results. Researchers should therefore consider how each study identifies children's ICs (e.g., assessment method) to argue about the effects of IC on child development.

Finally, we would like to note some limitations of this study. First, we analyzed IC studies from the 1970s. We did this to avoid considerable heterogeneity among studies. Nevertheless, the method may have affected the reported children's ICs. Second, our search for articles to include in the meta-analyses was limited. The use of different inclusion criteria may have led to different results. Third, we aimed to discriminate IFs from POs in the meta-analysis, but we failed to find the data of whether ICs included IFs or POs in some studies. We should clearly discern ICs in the next studies. Relatedly, there is a publication bias in the analyses of the current/past ICs. Though the main focus in this study did not include this issue, we need to consider more unpublished data to assess the effect of the current/past IC status on the prevalence of ICs. Fourth, we only included the studies written in English or Japanese. This may have created a bias in the results of the

meta-analysis. We may have different results if we include studies written in other languages, such as Chinese and Korean. Moreover, we need to include non-Western and non-Asian studies in future.

Despite the limitations, the present study revealed that culture as well as assessment method and sex/birth order may have a significant impact on the prevalence of ICs. More specifically, children in Western cultures were more likely to report IFs as compared to those in Japan, but the total prevalence of ICs did not differ across cultures.

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Table 1

Children's IC Types within Each Reference

Author (sample size)	Year	IF	PO	IC	Culture	Analyses
Manosevitz, M., Prentice, N. M., & Wilson, F.* (N = 222)	1973	1		1	U	1, 3, 4, 5
Kalyan-Masih, V.* (N = 92)	1986	1		1	U	1, 3, 4, 5
Taylor, M., Cartwright, B. S., & Carlson, S. M. (N = 27)	1993	1	1	1	U	1, 2, 3, 4
Taylor, M. & Carlson (N = 152)	1997	1	1	1	U	1, 2, 3, 4
Bouldin, P., & Pratt, C.* (N = 478)	1999	1		1	O	1, 3, 5, 6
Gleason, T. R., Sebanc, A. M., & Hartup, W. W. (N = 78)	2000	1	1	1	U	1, 2, 3, 4, 5
Kawato, Y. (N = 609)	2001	1	1	1	J	1, 2, 3, 4
Pearson, D., et al.* (N = 1795)	2001	1		1	E	1, 3, 4, 6
Tomita, S. & Yamazaki, A. (N = 85)	2002	1	1	1	J	1, 2, 3, 4
Coetzee, H., & Shute, R. (N = 61)	2003	1		1	O	1, 3
Gleason, T. R. (N = 88)	2004	1	1	1	U	1, 2, 3, 4
Hoff, E. V. (N = 69)	2005			1	E	3, 4
Fernyhough, C., et al. ** (N = 32)	2007	1	1	1	E	1, 2, 3, 4, 6
Mathur, R., & Smith, M. C. (N = 43)	2008	1	1	1	U	1, 2, 3, 6
Trionfi, G., & Reese, E. (N = 48)	2009	1	1	1	O	1, 2, 3, 4, 5, 6
Taylor, M., Hulette, A. C., & Dishion, T. J. (N = 152)	2010			1	U	3, 4, 6

Davis, P. E., Meins, E., & Fernyhough, C. (N = 80)	2011	1	1	1	E	1, 2, 3, 4
Tahiroglu, D., Mannering, A. M., & Taylor, M. (N = 83)	2011	1	1	1	U	1, 2, 3
Honeycutt, J. M., et al. * (N = 39)	2011	1		1	U	1, 3
Tahiroglu, D. (N = 73)	2012	1	1	1	U	1, 2, 3, 4
Sugarman, S. (N = 259)	2012	1	1	1	E	1, 2, 3, 5
Moriguchi, Y., & Shinohara, I. (N = 50)	2012	1	1	1	J	1, 2, 3, 4, 5, 6
Taylor, M., et al. (N = 208)	2013	1	1	1	U	1, 2, 3, 4
McInnis, M. A., Pieruccib, J. M., & Gilpina, A. T. (N = 107)	2013	1	1	1	U	1, 2, 3, 4
Sachet, A. (N = 71)	2013	1	1	1	U	1, 2, 3, 4
Mottweiler, C. M., & Taylor, M. (N = 75)	2014	1	1	1	U	1, 2, 3, 4
Motoshima, Y., et al. (N = 37)	2014	1	1	1	J	1, 2, 3, 4, 5, 6
Davis, P. E., Meins, E., & Fernyhough, C. (N = 159)	2014	1	1	1	E	1, 2, 3
Gleason, T. R., & Kalpidou, M. (N = 72)	2014	1	1	1	U	1, 2, 3, 4, 5
Pierucci, J. M., et al. (N = 103)	2014	1		1	U	1, 3, 4
Lillard, A. S., & Kavanaugh, R. D. (N = 58)	2014			1	U	3
Giménez-Dasí, M., Pons, F., & Bender, P. K. (N = 116)	2014			1	E	3
Moriguchi, Y., Shinohara, I., & Ishibashi,	2015	1	1	1	J	1, 2, 3, 4, 5, 6

M. (N = 45)

Note.

In Culture sections, U represents USA, E represents Europe, O represents Oceania, and J represents Japan. Analyses indicated whether each study was included in each analysis. Here, 1 represents the analyses for IF alone, 2 represents the analyses for both IF and PO, 3 represents the analyses for the total ICs, 4 represents the analyses for sex, 5 represents the analyses for birth order, and 6 represents the analyses for the current/past ICs.

* This study only reported the total IC, but it clearly included IF alone, and not PO. Therefore, we treated the figures as indicative of IF in addition to the total IC.

** This study conducted in Australia (Study 1) and in northern England (Study 2). Our analyses only included Study 1, and therefore we regarded this study as the one conducted in Australia.

Figure Legends

Figure 1. The effect of assessment method on the prevalence of IFs. “Children” represents the assessment of ICs by children only, “both” represents the assessment by both parents and children, “either” represents the assessment by parents or children, and “parents” represents the assessment by parents only. We have plotted the proportion of children whose IFs were assessed by each method.

Figure 2. The effect of culture on the prevalence of (A) IFs and (B) IFs out of the sum of IFs and POs. “Japan” represents the research conducted in Japan, “Oceania” represents the research conducted in Australia or New Zealand, “Europe” represents the research conducted in European countries, and “USA” represents the research conducted in the USA. We have plotted the proportion of children who had (A) IFs and (B) IFs out of the sum of IFs and POs

Figure 3. The effect of culture on the prevalence of total ICs. “Japan” represents the research conducted in Japan, “Oceania” represents the research conducted in Australia or New Zealand, “Europe” represents the research conducted in European countries, and “USA” represents the research conducted in the USA. We have plotted the proportion of children who had ICs (either IFs or POs).

Figure 1

Figure 2

Figure 3