Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods

Classical Twin Design

We searched databases for results from classical twin studies. The classical twin design is based on the comparison of phenotypic similarity within monozygotic (MZ) twins and dizygotic (DZ) twins. As MZ twins share 100% of their segregating genome and DZ twins share on average 50%, a higher degree of phenotypic similarity within MZ than DZ twins indicates genetic influence. When DZ twins show within-pair similarity greater than half of that of MZ twins, this suggests shared environmental influences (defined as environmental influences that make children growing up in the same family similar). Differences between MZ twins are attributed to nonshared environmental influences, which are influences of aspects of the environment that children growing up in the same family do not share.

Quality Assessment

Publications were quality assessed using a modified version of the checklist for assessing the quality of quantitative studies[1], which rates studies on a scale from 0 to 2 (2 = Yes; 1 = Partial; 0 = No; NA = Not Applicable) on the following 14 items:

1. Question/objective sufficiently described?
2. Study design evident and appropriate?
3. Method of subject/comparison group selection or source of information/input variables described and appropriate?
4. Subject (and comparison group, if applicable) characteristics sufficiently described?
5. If interventional and random allocation was possible, was it described?
6. If interventional and blinding of investigators was possible, was it reported?
7. If interventional blinding of subjects was possible, was it reported?
8. Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?
9. Sample size appropriate?
10. Analytic methods described/justified and appropriate?
11. Some estimate of variance is reported for the main results?
12. Controlled for confounding?
13. Results reported in sufficient detail?
14. Conclusion supported by the results?

The modifications we made to make the tool suitable for assessing the quality of twin studies were: (1) removal of items 5 and 7, because classical twin studies do not include interventional and random allocation or interventional blinding of subjects; (2) removal of item 12 from the assessment, as the confounds that we were most interested in are controlled for by the twin design itself (e.g. age, genetic influences, shared rearing environment); (3) adaption of item 6 (rewording it to: “If possible, were investigators blind to zygosity or task outcome?”); (4) introduction of an additional item (“Sample included only same-sex twins, or same-sex and opposite-sex twins were separated in the analyses?”), because, if opposite-sex twins are treated more differently than same-sex twins, inclusion of data from opposite-sex twins introduces an additional source of difference between MZ and DZ twins and can lead to inflated heritability estimates.

Duplicate Information

It is common for univariate twin results from a single study to be reported in more than one publication because multivariate twin studies often report univariate estimates for all included phenotypes. Consequently, when one phenotype from a twin sample is analyzed in relation to different phenotypes across more than one publication, each publication will typically report univariate estimates for the focal phenotype. As a result, we searched extracted data for overlapping/duplicate information (e.g., publication reporting estimates relating to the same phenotype, measure, age, and cohort) and excluded duplicates from the meta-analysis (prioritizing inclusion of estimates with larger and more recently published estimates).

Three-Level Multilevel Random Effects Meta-Analysis

Before running the meta-analyses, we prepared the extracted data. If studies reported only heritability, shared and nonshared environment (ACE) estimates or both ACE estimates and concordances (not correlations), we used Falconer’s formulas to convert the ACE estimates into correlations.[2] Variances were then calculated using the within-twin correlations (rMZ and rDZ) and sample sizes. The correlations and variances were then used in the three-level multilevel random effects meta-analyses. We conducted three-level multilevel random effects models to facilitate the simultaneous estimation of multiple dependent effect sizes within a single cohort. This

allowed us to include all data published in studies that reported estimates from same-sex and opposite-sex twins separately (and sometimes same-sex male and same-sex female, separately) as well as those that reported multiple assessments (e.g., repeated measures) or multiple different measures of the same or similar phenotypes—all of which are common occurrences in large twin studies and registries. Although ideally we would have incorporated the correlations among dependent effect sizes, this was not possible as this information was not usually reported. Evidence suggest that the hierarchical approach estimates effects well even without such information [3]. Combining same-sex and opposite-sex DZ twins in analyses has the potential to inflate heritability estimates if opposite-sex twins DZ twins are systematically less similar (because of sex effects) than same-sex DZ twins, as sex limited genetic effects will end up in a lower DZ correlation and thus an inflated genetic estimate. However, as many of the synthesized studies combined data from same-sex and opposite-sex DZ twins, we were not able to run sufficiently powered analyses using only estimates from same-sex twins or modelling same sex and opposite sex twins separately. We included the following types of estimate in our analyses: estimates from combined samples of same-sex and opposite-sex DZ twins (labelled DZ in eFigures 4–13 and 20–35), DZ estimates from samples that did not specify whether twins were same-sex, opposite-sex or combined (labelled DZ in eFigures 4–13 and 20–35); estimates from same-sex DZ twins (labelled DZSS, DZF [if same-sex and female only], or DZM [if same-sex and male only] in eFigures 4–13 and 20–35) and estimates from opposite-sex DZ twins (DZOS). For example, if a study only reported one estimate per phenotype from DZ twins we included only that one estimate, whereas if a study separately reported twin correlations for a phenotype from DZOS, DZM and DZF, we extracted and separately included all three of the estimates from that study. Dependency between estimates from the same study was taken into account in the multilevel models, which accounted for within- and between-cohort variance. The script for the meta-analyses is available on the Open Science Framework (https://osf.io/4y7z8/?view_only=8d98cb5ce4224e15a401fa5dd658e878).

Meta-Analytic SEM Models

After running the multilevel random effects meta-analyses, we calculated ACE estimates by running meta-analytic SEM models. These models were estimated using the correlations and squared standard errors (variances) from each of the two the multilevel meta-analyses (one to estimate MZ and one to estimate DZ), for each phenotype category, thus allowing parameters and their confidence intervals to be estimated taking account of between-study heterogeneity. Confidence intervals for the ACE parameter estimates were obtained using likelihood-based confidence interval estimation in OpenMx. The script for the meta-analytic twin modelling and confidence interval estimation is available on the Open Science Framework (https://osf.io/4y7z8/?view_only=8d98cb5ce4224e15a401fa5dd658e878).

Forest Plots

The script used to create the Forest plots displayed in (eFigures 4–13, 20–35) is available on the Open Science Framework (https://osf.io/4y7z8/?view_only=8d98cb5ce4224e15a401fa5dd658e878). There are small discrepancies between the main results (presented in Table 1 and eTables 8 and 9) and the pooled estimates in the forest plots because the main results were estimated based on all the pooled data whereas the forest plots were created using MZ and DZ subsets, separately. The main results, based on all the pooled data, provide the most precise estimates. The phenotype category with the greatest discrepancy between the two methods was ‘family relationships’.

eResults

Breakdown by Geographical Location

More than half (52.55%) of the twin pairs were from European samples, around a quarter (24.09%) were from North American samples, 15.72% were based in Asia, 7.38% in Oceania and less than 1% were from African or South American samples (0.24% and 0.02%, respectively). For a breakdown of twin pairs by country, see eFigure 2, and by continent, see eFigure 3.

Exclusions From Meta-Analysis

Of the 33 publications excluded from the meta-analysis, 22 were excluded because they contained no novel data—i.e., they only contained relevant findings that were reported in one or more of the other included publications. Eighteen of the 377 phenotypes (4.8%) were excluded from the meta-analysis because they did not fit into a category of the ICF-CY (see final row of eTable 6), resulting in the exclusion of two publications. Fifty-nine phenotypes (15.6%) were excluded from the meta-analysis because they fell into a category of the ICF-CY that contained phenotypes gathered from fewer than five independent twin samples, resulting in the exclusion of nine publications. Extracted data, including the data excluded from the meta-analysis, is available on the Open Science Framework (https://osf.io/4y7z8/?view_only=8d98cb5ce4224e15a401fa5dd658e878).

Sub-category Analysis

The ten sub-categories of the ICF-CY containing data from five or more independent samples were meta-analyzed. Definitions for each sub-category can be found in the ICF-CY[4]. Lists of all phenotypes included in each are displayed in eTable 6. Results from the meta-analyses of sub-categories are reported in eTable 8. Forest plots for these analyses are reported in eFigures 20–29.

Heritability: 'Psychomotor control' (h^2_{pooled} = .61; 95% CI [.26–.75] $p < .001$), and 'regulating behaviors within interactions' (h^2_{pooled} = .58; 95% CI [.18–.87] p = .004) had the highest heritability estimates. 'Sustaining attention', 'organization of psychomotor functions', 'range of emotion', 'regulation of emotion', and 'social cues in relationships' also had high heritability estimates (h^2_{pooled} range: .41–.50). Heritability estimates for 'respect and warmth in relationships', 'acting in accordance with social rules' and 'expression of language' were small-to-moderate and had confidence intervals that overlapped with zero (h^2_{pooled} range: .20–.31).

Shared Environment: 'Expression of language' had the highest shared environmental estimate (c^2_{pooled} = .59; 95% CI [.34–.85] $p < .001$). 'Respect and warmth in relationships', 'acting in accordance with social rules', and 'organization of psychomotor functions' also had moderate-to-high shared environmental estimates (c^2_{pooled} range: .29–.42) with 95% confidence intervals that did not overlap with zero. Shared environmental estimates for 'psychomotor control', 'sustaining attention', 'regulation of emotion', 'regulating behaviors', 'range of emotion', and 'social cues in relationships' were small and had 95% confidence intervals that overlapped with zero (c^2_{pooled} range: .00–.18).

Nonshared Environment: Each of the ten phenotypic sub-categories had nonshared environmental estimates with 95% confidence intervals that did not overlap with zero (e^2_{pooled} range: .14–.47). The category with the highest nonshared environmental estimate was 'regulation of emotion' (e^2_{pooled} = .47; 95% CI [.35–.59] $p <$ .001).

Heterogeneity: As displayed in eTable 8, sampling variance contributed a proportionally small amount to the total variance of each of the ten phenotypic sub-categories ($I^2_{Level\ 1}$ range: 0.21%–16.31%). Within-cohort heterogeneity contributed a substantial amount to the total variance in 'respect and warmth in relationships', 'range of emotion' and 'expression of language' ($I^2_{Level\ 2}$ range: 58.26%–81.71%) and between-cohort heterogeneity contributed a low or moderate amount to these outcomes ($I^2_{Level\ 3}$ range: 17.78%–41.53%). The remaining seven sub-categories each had substantial between-cohort heterogeneity ($I^2_{Level\ 3}$ = 51.30%–98.07%) and low or moderate within-cohort heterogeneity ($I^2_{Level\ 2}$ range: 0.00%–43.00%).

Analysis of Phenotypes by Category and Rater

Each estimate included in the meta-analysis was coded as: 'parent-rated', 'observer-rated', or 'other'. 'Other' included estimates where the rater was not specified, as well as objective measurement such as neuroimaging, measurement of birth weight/length, cortisol sampling and actigraphy. Twenty-seven independent cohorts contained estimates coded as 'other'. However, this was largely driven by the 'Growth maintenance functions' category, which contained data on anthropometric characteristics, the measurements for which were all coded as 'other'. Overall, there were more independent cohorts with parent-reported data (k_{cohort} = 22) than observer-rated data (k_{cohort} = 12). Examining the ICF-CY categories individually, in 7 out of the 10 categories there were more

independent cohorts containing parent-report data than observer-rated data. It was only in the 'Basic cognitive functions' category that there were more cohorts reporting observer ratings than parent ratings. In 'Family relationships' there were an equal number of cohorts containing parent and observer reports. For a breakdown of the phenotypic categories by rater subgroup, see eTable 7. There is evidence that heritability estimates can differ by rater, thus we also conducted analyses of ICF-CY categories split by informant (parent or observer). Three of the ICF-CY categories contained data from five or more independent samples for both subgroups: (1) parent-reported and (2) observer-rated phenotypes. Data from each of these six subgroups (three parent-report and three observer-report) were meta-analyzed. Results from these analyses are reported in eTable 9. Forest plots for the analyses are reported in eFigures 30–35.

Heritability. The heritability point estimates for parent reports of 'psychomotor functions', 'basic interpersonal interactions' and 'emotional functions' were all high and had 95% confidence intervals that did not overlap with zero (h^2_{pooled} range: .49–.67). Conversely, heritability estimates for observer ratings of the same three phenotypic categories were smaller and had confidence intervals that overlapped with zero (h^2_{pooled} range: .20–.35).

Shared Environment. The shared environmental estimate for parent-reports of 'emotional functions' was small but had a confidence interval that overlapped with zero (c^2_{pooled} = .17; 95% CI [.01–.35] p = .033). The remaining two parent-report subgroups ('psychomotor functions' and 'basic interpersonal interactions') both had small shared environmental estimates with 95% confidence intervals overlapping with zero (c^2_{pooled}: .00 and .15, respectively) as did the three observer-reported subgroups c^2_{pooled} range: .12–.21). Comparable shared environment estimates in parent and observer ratings might be interpreted as indicating limited rater bias linked to shared environment. However, this comparison is likely confounded by other influences and is complicated by the fact that, in theory, studies may have had the same observer rating both twins (although, generally speaking, this is unusual, and it is hard to estimate in our specific sample as this information was typically not provided by the included studies).

Nonshared Environment. Nonshared environmental estimates for parent and observer reports of 'psychomotor functions', 'basic interpersonal interactions' and 'emotional functions' were all statistically significant. The observer-report subgroups each had higher nonshared environmental estimates (e^2_{pooled} range: .45.47) than the parent-report subgroups (e^2_{pooled} range: .30.33).

Heterogeneity. As displayed in eTable 9, a proportionally small amount of the total variance was attributed to sampling variance in each of the six observer- or parent-report subgroups ($I^2_{Level\ 1}$ range = 0.88%–18.76%). Observer ratings of 'psychomotor functions' and 'emotional functions', and parent ratings of 'emotional functions', each had moderate to substantial within-cohort heterogeneity ($I^2_{Level\ 2}$ range = 43.14%–94.31%). Conversely, parent reports of 'psychomotor functions' and 'basic interpersonal interactions', and observer reports of 'basic interpersonal interactions', each had low within-cohort heterogeneity ($I^2_{Level\ 2}$ range = 2.92%–32.18%). Parent reported 'emotional functions' had between-cohort heterogeneity of 0% and the remaining five observer- and parent-reported categories all had moderate to substantial between cohort heterogeneity ($I^2_{Level\ 3}$ = 40.38%–96.20%).

Publication Bias

Publication bias is present when the likelihood of a finding being published is influenced by the finding itself. For example, if statistically significant findings are more likely to be published than findings that are not statistically significant. We examined publication bias via two methods. First, we created funnel plots, plotting effect sizes against standard errors. These plots are reported in eFigures 14–18. As larger studies typically have lower standard errors than smaller studies, larger studies should appear towards the top of the plot and smaller ones towards the bottom. It is assumed that, in the absence of publication bias, smaller studies with higher standard errors will be scattered symmetrically across the bottom of the plot. In the presence of publication bias it is assumed that plots will be skewed, displaying asymmetry, e.g., there will be more studies with small sample sizes reporting positive than negative results. Based on visual inspection of the funnel plots of rMZ and rDZ in eFigures 14 and 15, there appears to be some asymmetry. Specifically, larger studies tended to publish findings with stronger correlations and smaller studies tended to publish findings with weaker correlations. As displayed in eFigure 15, estimates of h^2 largely displayed no patterns of asymmetry, although for 'psychomotor functions' and 'growth maintenance functions' the smaller studies tended to report lower h^2 estimates. As shown in eFigures 17 and 18, for most of the phenotypic domains, estimates of c^2 and e^2 echoed the same patterns of asymmetry seen in correlations—with smaller studies tending to publish smaller effects. As the interpretation of funnel plots depends on visual examination and is thus somewhat subjective, we also ran the Egger's regression test of publication bias. The Egger's test regresses effect sizes on their standard errors, weighted by their inverse variances. In the absence of publication bias, the regression intercept is expected to be zero and in the presence

of publication bias, it is expected to be significantly different from zero ($p < .05$). Results of Egger's regression test are presented in eTables 10 and 11. Echoing the patterns of skewness in the funnel plots, there was evidence of publication bias for all correlations by category ($p < .001$), apart from *r*DZ in 'attention functions' and 'family relationships' ($p = .061$ and .062). Results suggested potential publication bias in heritability estimates for 'psychomotor' and 'emotional' functions, 'basic interpersonal interactions' and 'complex interpersonal interactions' (p range: .013 to < .001) but not 'sleep', 'attention' or 'growth maintenance' functions (p range: .072–.385). Findings indicated publication bias for all shared environment estimates ('emotional functions', $p = 0.08$ and all others $p < .001$), apart from 'attention functions' ($p = .402$). Results suggested publication bias in nonshared environment estimates of 'attention functions' and 'basic interpersonal interactions' ($p = .036$, .027, respectively) but not 'sleep', 'psychomotor', 'emotional' or 'growth maintenance' functions or 'complex interpersonal interactions' (p range: .099–.494). The possible publication bias observed in the funnel plots and Egger's test results was in the opposite direction to the publication bias that is typically hypothesized in research. Usually, it is expected that publication bias will result in more smaller studies publishing large effect sizes due to a bias to publish positive or favorable findings. However, in this case, smaller studies tended to publish findings with smaller effect sizes. These unusual results may reflect that fact that statically significant within-twin correlations and estimates of heritability, shared and non-shared environmental influence do not represent "favorable" results in the same way that statistically significant results might in, for example, intervention research. For example, it is not the statistical significance of a within-twin correlation but, rather, the relationship between within-twin MZ correlations and within-twin DZ correlations that is drawn upon to estimate the sizes of the three variance components. The three variance components each represent the proportion of variation linked to individual differences in a trait. Individually, none of them can be below 0 or above 100 and collectively they must sum to 100. Consequently, these estimates represent something quite different to effect sizes in other research contexts. Additionally, while funnel plot asymmetry and significant Egger's test results indicate possible publication bias, they could be driven by alternative explanations. One particularly plausible possibility, given our highly heterogeneous findings, is that the asymmetry was influenced by between-study heterogeneity, which can also induce skewness in funnel plots.[5]

eTable 1. Database and Reference List Searches

Date	Database	Search terms	N [a] publications	N publications (no duplicates)	Includes (T&A [b])	Includes (FT [c])
30/11/18	PubMed	(twin*[Title/Abstract] AND (gene[Title/Abstract] OR genome[Title/Abstract] OR genetic* [Title/Abstract] OR herita* [Title/Abstract] OR environment* [Title/Abstract]) AND (infan*[Title/Abstract] OR early [Title/Abstract]))	2735	2727	199	105
30/11/18	PsycINFO	(twin* and (gene or genome or genetic* or herita* or environment*) and (infan* or early)).ab.	1291	504	47	13
05/02/20	PubMed (from 1/10/18 onwards)	(twin*[Title/Abstract] AND (gene[Title/Abstract] OR genome[Title/Abstract] OR genetic* [Title/Abstract] OR herita* [Title/Abstract] OR environment*[Title/Abstract]) AND (infan*[Title/Abstract] OR early[Title/Abstract]))	315	230	5	1
05/02/20	PsycINFO (From 2018 onwards)	(twin* and (gene or genome or genetic* or herita* or environment*) and (infan* or early)).ab.	120	28	0	0
11/02/21	PubMed (from 1/2/20 onwards)	(twin*[Title/Abstract] AND (gene[Title/Abstract] OR genome[Title/Abstract] OR genetic* [Title/Abstract] OR herita* [Title/Abstract] OR environment*[Title/Abstract]) AND (infan*[Title/Abstract] OR early[Title/Abstract]))	190	179	4	2
11/02/21	PsycINFO (From 2020 onwards)	(twin* and (gene or genome or genetic* or herita* or environment*) and (infan* or early)).ab.	24	7	2	0
n/a	Reference list searching	n/a	372	98	98	18
			5047	3773	355	139

[a] N = Number of.
[b] T&A = After screening by title and abstract.
[c] FT = After screening by full text.

eTable 2. Inclusion and Exclusion Criteria

	Inclusion criteria	Exclusion criteria
Publication type	➢ Peer-reviewed journals ➢ In English	➢ Not subject to peer review ➢ Not published in English
Study type	➢ Twin studies	➢ Not reporting twin data ➢ Syntheses of previously published twin data (e.g., reviews/meta-analyses)
Population	➢ MZ[a] and DZ[b] twins ➢ Infants with mean age ≤ 2	➢ Mean age > 2 years ➢ MZ twins only ➢ Case studies
Outcome	➢ Psychological and developmental traits and milestones ➢ MZ/DZ correlations ➢ ACE estimates based only on data from MZ/DZ twins	➢ Not on psychological and developmental traits and milestones ➢ No heritability estimates, twin correlations, or concordances available ➢ Twin data not possible to separate from non-twin data ➢ Multivariate or gene-environment interaction analyses where univariate estimates not possible to extract

[a] MZ = monozygotic
[b] DZ = dizygotic

eTable 3. Information Extracted From Included Publications

Extracted data	Description
Study	Overarching twin study/sample/cohort
Country	Country in which twin population was based
Sex	Whether the sample included male and/or female twins
Phenotype	The examined trait as labelled in the publication
Age	In months, at which data was collected
Rater	Who rated the reported data (e.g., parent, observer)
Measure	How the phenotype was measured
MZ/DZ correlations	Within-twin monozygotic twin correlations and dizygotic twin correlations (based on samples of same-sex DZ twins, opposite-sex DZ twins and combined samples)
ACE estimates	Estimates of heritability (A, or h^2) and shared (C, or c^2) and nonshared (E, or e^2) environmental influence
Number of twin pairs	Entered for each extracted correlation/variance component
Method for estimating variance components	Method used to calculate ACE estimates
Continuous or dichotomous data	Was the measure used to capture the trait continuous or dichotomous
Concordant/discordant pairs	If a dichotomous measure, rates of concordance/discordance for the trait
Prevalence	If a dichotomous measure, trait prevalence rates in the twin sample being examined

eTable 4. Publications Identified in Systematic Literature Search, Presented Alphabetically by First Author

Publication	Status	Study	Country	Category (using codes from the ICF-CY[a])	Phenotypes Extracted from Publication
Akerman & Fischbein (1992)[6]	Included in meta-analysis	Project Metropolitan	Sweden	b560 Growth maintenance functions[b]	Height Weight
Ando et al. (2006)[7]	Included in meta-analysis	Tokyo Twin Cohort Project	Japan	b134 Sleep functions b560 Growth maintenance functions d550 Eating[c] d710 Basic interpersonal interactions	Chest circumference Head circumference Height Milk consumption Mimic, point gazing, joint attention Rhythmicity Time to fall asleep Weight
Bakermans-Kranenburg et al. (2004)[8]	Included in meta-analysis	Netherlands Twin Register	The Netherlands	d760 Family relationships	Dependency (to father) Infant-father attachment security
Beaver et al. (2014)[9]	Included in meta-analysis	Early Childhood Longitudinal Study-Birth Cohort	United States	b167 Mental functions of language	Expressive vocabulary
Bishop et al. (2003b)[10]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	b163 Basic cognitive functions	General cognitive ability

[a] ICF-CY = International Classification of Functioning, Disability and Health, Children and Youth Version.[4] Definitions for each of the categories and subcategories can be found in the cited ICF-CY manual: https://apps.who.int/iris/handle/10665/43737.
[b] The prefix *b* is given to coded items within the ICF-CY component of Body Functions.
[c] The prefix *d* is given to items in the component of Activities and Participation.

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Bokhorst et al. (2003)[11]	Included in meta-analysis	Netherlands Twin Register and Multiple Births Foundation of Queen Charlotte's and Chelsea Hospital in London	The Netherlands; UK	b152 Emotional functions d760 Family relationships	Attachment disorganization Attachment security Temperamental reactivity
Boomsma et al. (1992)[12]	Excluded from meta-analysis (duplicate data)	Netherlands Twin Register	The Netherlands	b560 Growth maintenance functions	Height Weight
Brant et al. (2009)[13]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b163 Basic cognitive functions	General cognitive ability
Brescianini et al. (2011)[14]	Included in meta-analysis	Italian Twin Register	Italy	b134 Sleep functions	Cosleeping Diurnal sleep duration Night awakenings Nocturnal sleep duration
Brescianini et al. (2012)[15]	Included in meta-analysis	Italian Twin Register	Italy	b560 Growth maintenance functions	Weight gain
Caramaschi et al. (2012)[16]	Excluded from meta-analysis (phenotype[s] could not be categorized)	Quebec Newborn Twin Study	Canada	N/A	Testosterone

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Chen et al. (1990a)[17]	Included in meta-analysis	Taipei City Teaching Hospitals Twin Study	Taiwan	b125 Dispositions and intra-personal functions b140 Attention functions b147 Psychomotor functions b152 Emotional functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Activity level Adaptability Approach/withdrawal Attention/persistence Distractibility Intensity of reaction Quality of mood Rhythmicity Threshold of responsiveness
Chen et al. (1990b)[18]	Included in meta-analysis	Taipei City Teaching Hospitals Twin Study	Taiwan	b560 Growth maintenance functions	Arm circumference Chest circumference Head circumference Height Weight
Cherny et al. (1992)[19]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	b163 Basic cognitive functions	Cognitive ability
Cherny et al. (1994a)[20]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Shyness
Cherny et al. (1994b)[21]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	b163 Basic cognitive functions	Cognitive ability
Custodio et al. (2007)[22]	Included in meta-analysis	University of Sao Paulo - Longitudinal Twin Study	Brazil	b134 Sleep functions	Emergence of the cortisol circadian rhythm
Dale et al. (2000)[23]	Included in meta-analysis	Twins Early Development Study	UK	b167 Mental functions of language	Grammar Vocabulary

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Davis et al. (2015)[24]	Included in meta-analysis	Louisville Twin Study	United States	b140 Attention functions b147 Psychomotor functions d710 Basic interpersonal interactions	Activity level Affect-extraversion Task orientation
DiLalla & Bishop (1996)[25]	Included in meta-analysis	Colorado Twin Registry: Twin Infant Project	United States	b140 Attention functions b152 Emotional functions b310 Voice functions d710 Basic interpersonal interactions	Affection for mother Enthusiasm for interaction with mother Negative affect Task orientation Vocalize Watch mother
Dilalla et al. (1994)[26]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Behavioral Inhibition
Dionne et al (2003a)[27]	Excluded from meta-analysis (duplicate data)	Twins Early Development Study	UK	b167 Mental functions of language	Grammar Vocabulary
Dionne et al. (2003b)[28]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b167 Mental functions of language d720 Complex interpersonal interactions	Expressive vocabulary Physical aggression
Dionne et al. (2011)[29]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b134 Sleep functions b167 Mental functions of language	Ratio of day/night sleep duration Vocabulary
Dubois et al. (2007)[30]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b560 Growth maintenance functions	Height Weight

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Dubois et al. (2012)[31]	Included in meta-analysis	Quebec Newborn Twin Study, Child and Adolescent Twin Study in Sweden, Twin Study of Child and Adolescent Development, Danish Twin Registry, and Brisbane Longitudinal Twin Study	Canada, Sweden, Denmark, Australia	b560 Growth maintenance functions	BMI Height Weight
Emde et al. (1992)[32]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b140 Attention functions b144 Memory functions b147 Psychomotor functions b152 Emotional functions b164 Higher-level cognitive functions b167 Mental functions of language d710 Basic interpersonal interactions	Activity Affect Attention/persistence Behavioral Inhibition Categorization Emotionality Empathy Expressive language Frustration Memory for location Negative affect Negative hedonic tone Overall mood Positive affect Positive hedonic tone Receptive language Shyness Sociability Task orientation Word comprehension

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Finkel et al. (2000)[33]	Included in meta-analysis	Louisville Twin Study	United States	d760 Family relationships	Attachment
Fisher et al. (2012)[34]	Included in meta-analysis	Gemini Study	UK	b134 Sleep functions	Daytime nap duration Night awakenings Nighttime sleep duration Wake time
Flom & Saudino (2017)[35]	Excluded from meta-analysis (duplicate data)	Boston University Twin Project	United States	d710 Basic interpersonal interactions	Callous Unemotional Behavior
Flom & Saudino (2018)[36]	Included in meta-analysis	Boston University Twin Project	United States	b140 Attention functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	ADHD Callous Unemotional Behavior ODD
Flom et al. (2019)[37]	Included in meta-analysis	Boston University Twin Project	United States	d710 Basic interpersonal interactions	Callous unemotional traits
Forget-Dubois et al. (2007)[38]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	d720 Complex interpersonal interactions	Difficult temperament Disruptive behavior
Friedman et al. (2011)[39]	Excluded from meta-analysis (phenotype in category containing < 5 independent samples)	Colorado Twin Registry: Longitudinal Twin Sample	United States	b164 Higher-level cognitive functions	Self-restraint
Fujisawa et al. (2012)[40]	Included in meta-analysis	Tokyo Twin Cohort Project	Japan	b560 Growth maintenance functions d710 Basic interpersonal interactions	Head circumference Head circumference growth Sociocognitive abilities
Gagne & Goldsmith (2011)[41]	Included in meta-analysis	Wisconsin Twin Panel	United States	b152 Emotional functions	Anger Distress to limitations

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Gagne & Saudino (2010)[42]	Included in meta-analysis	Boston University Twin Project	United States	b164 Higher-level cognitive functions	Inhibitory control
Gagne et al. (2011)[43]	Included in meta-analysis	Boston University Twin Project	United States	b140 Attention functions b164 Higher-level cognitive functions d720 Complex interpersonal interactions	ADHD Externalizing Inhibitory control
Gagne & Saudino (2016)[44]	Excluded from meta-analysis (duplicate data)	Boston University Twin Project	United States	b164 Higher-level cognitive functions	Inhibitory control
Gagne et al. (2020)[45]	Excluded from meta-analysis (duplicate data and phenotype in category containing < 5 independent samples)	Boston University Twin Project	United States	b140 Attention functions b164 Higher-level cognitive functions	ADHD Inhibitory control
Galsworthy et al. (2000)[46]	Excluded from meta-analysis (duplicate data)	Twins Early Development Study	UK	b163 Basic cognitive functions b167 Mental functions of language	Non-verbal cognitive development Verbal ability
German et al. (2015)[47]	Included in meta-analysis	Childcare Centers of Tel Aviv and Haifa	Israel	b560 Growth maintenance functions	Age at transition to childhood

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Gilmore et al. (2010)[48]	Excluded from meta-analysis (phenotypes in category containing < 5 independent samples)	UNC Early Brain Development Study	United States	s110 Structure of brain[d]	Cerebellum Corpus Callosum Cortical grey matter Cortical unmyelinated white matter Frontal grey matter Frontal unmyelinated white matter Intracranial volume Lateral Ventricles Left hemisphere grey matter Left hemisphere total Left hemisphere unmyelinated white matter Occipital grey matter Occipital unmyelinated white matter Parietal grey matter Parietal unmyelinated white matter Prefrontal grey matter Prefrontal unmyelinated white matter Right hemisphere grey matter Right hemisphere total Right hemisphere unmyelinated white matter Subcortical grey matter Total cerebrospinal fluid Total early myelinated white matter Total Frontal Total grey matter Total Occipital Total Parietal Total Prefrontal Total unmyelinated white matter

[d] The prefix *s* is given to items in the ICF-CY component of Body Structures.

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Goetghebuer et al. (2003)[49]	Included in meta-analysis	Twin study in The Gambia	The Gambia	b147 Psychomotor functions b560 Growth maintenance functions	Crawl Length Maintain head Roll over Sitting Sitting without support Stand holding on something Take two steps Walk holding on something Weight
Goldsmith & Gottesman (1981)[50]	Included in meta-analysis	Collaborative Perinatal Project	United States	b125 Dispositions and intra-personal functions b140 Attention functions b147 Psychomotor functions b560 Growth maintenance functions d710 Basic interpersonal interactions	Active manipulation Activity level Degree of social acceptance of examiner Degree of social contact with mother Interest in persons Interest in/responsiveness to people Physical development Pursuit persistence Response duration Speed of response Vigorous activity vs. psychomotor passivity
Goldsmith et al. (1999)[51]	Included in meta-analysis	Pooled Sample of twins from Oregon, Washington, Colorado, Texas, and Wisconsin	United States	b140 Attention functions b147 Psychomotor functions b152 Emotional functions	Activity level Distress to limitations Distress to novelty Duration of orienting Negative affect Positive affect Resistance to soothing Smiling and laughter

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Hawks & Marrus (2018)[52]	Included in meta-analysis	Early Reciprocal Social Behavior Study	United States	d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Behavior problems Competence Reciprocal social behavior
Herle et al. (2018)[53]	Excluded from meta-analysis (phenotype in category containing < 5 independent samples)	Gemini Study	UK	d550 Eating	Emotional overeating
Hur (2005)[54]	Excluded from meta-analysis (duplicate data)	The South Korean Twin Registry (Previously the Seoul Twin Family Study)	South Korea	b560 Growth maintenance functions	Weight

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Hur et al. (2005)[55]	Included in meta-analysis	Brisbane Adolescent Twin Study Japanese pooled sample: (1) Registry of twins recruited in Japan from associations for parents of multiples; (2) Registry of twins who applied for the secondary school attached to the Faculty of Education at the University of Tokyo between 1981 and 2003. Minnesota Twin Family Study South Korean pooled sample: (1) Twins born in two South Korean hospitals (1998–2003); (2) Seoul Twin Family Study Netherlands Twin Register	Australia, Japan, United States, South Korea, The Netherlands	b560 Growth maintenance functions	Weight
Ilott et al. (2010a)[56]	Included in meta-analysis	Boston University Twin Project	United States	b140 Attention functions b147 Psychomotor functions	Activity Level ADHD

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Ilott et al. (2010b)[57]	Excluded from meta-analysis (duplicate data)	Boston University Twin Project	United States	b140 Attention functions	ADHD
Jackson (2016)[58]	Included in meta-analysis	Early Childhood Longitudinal Study-Birth Cohort	United States	b152 Emotional functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Attachment security Avoids others/not sociable Comfortable cuddly Cooperative Demanding/angry Dependency Enjoys company Independent Moody/unusual Seeks attention Upset by separation
Jha et al. (2018)[59]	Excluded from meta-analysis (phenotypes in category containing < 5 independent samples)	UNC Early Brain Development Study	United States	s110 Structure of brain	Cortical surface area Cortical thickness Intracranial volume
Johnson et al. (2011)[60]	Included in meta-analysis	Gemini Study	UK	b560 Growth maintenance functions	Size (weight) Tempo (weight) Weight Weight change Weight velocity
Knafo & Plomin (2006)[61]	Included in meta-analysis	Twins Early Development Study	UK	d710 Basic interpersonal interactions	Prosocial behavior

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Koeppen-Schomerus et al. (2003)[62]	Included in meta-analysis	Twins Early Development Study	UK	b163 Basic cognitive functions b167 Mental functions of language d720 Complex interpersonal interactions	Behavior problems General cognitive ability Nonverbal cognitive ability Verbal ability
Kuntsi et al. (2005)[63]	Included in meta-analysis	Twins Early Development Study	UK	b147 Psychomotor functions	Hyperactivity
Lacourse et al. 2014[64]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	d720 Complex interpersonal interactions	Physical aggression
Levine et al. (1987)[65]	Included in meta-analysis	Jackson Memorial Hospital/University of Miami Medical Center	United States	b560 Growth maintenance functions	Length Weight
Liu et al. (2015)[66]	Included in meta-analysis	Chinese National Twin Registry	China	b560 Growth maintenance functions	BMI Height Weight
Livshits et al. (2000)[67]	Included in meta-analysis	Childcare Centers of Tel Aviv and Haifa	Israel	b560 Growth maintenance functions	Head circumference Head circumference (growth curve A) Head circumference (growth curve B) Head circumference (growth curve C) Height Height (growth curve A) Height (growth curve B) Height (growth curve C) Weight Weight (growth curve A) Weight (growth curve B) Weight (growth curve C)

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Llewellyn et al. (2010)[68]	Excluded from meta-analysis (phenotypes in category containing < 5 independent samples)	Gemini Study	UK	d550 Eating	Enjoyment of food Food responsiveness Satiety responsiveness Slowness in eating
Marrus et al. (2015)[69]	Included in meta-analysis	Early Reciprocal Social Behavior Study	United States	d710 Basic interpersonal interactions	Reciprocal social behavior Restrictive repetitive behavior
Marrus et al. (2018)[70]	Included in meta-analysis	Early Reciprocal Social Behavior Study	United States	d710 Basic interpersonal interactions	Reciprocal social behavior
Marrus et al. (2020)[71]	Included in meta-analysis	Early Reciprocal Social Behavior Study	United States	d710 Basic interpersonal interactions	Functional communication Restrictive repetitive behavior Social avoidance Social motivation Social orienting
Matheny (1980)[72]	Included in meta-analysis	Louisville Twin Study	United States	b140 Attention functions b147 Psychomotor functions b279 Additional sensory functions, other specified and unspecified d710 Basic interpersonal interactions	Activity level Activity Level Affect-extraversion Auditory-visual Motor development Task orientation
Matheny (1983)[73]	Included in meta-analysis	Louisville Twin Study	United States	b140 Attention functions b147 Psychomotor functions	Activity level Task orientation

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Matheny (1984)[74]	Excluded from meta-analysis (phenotype[s] could not be categorized)	Louisville Twin Study	United States	N/A	General temperament
Matheny (1989)[75]	Included in meta-analysis	Louisville Twin Study	United States	b152 Emotional functions d710 Basic interpersonal interactions	Approach/withdrawal Behavioral inhibition Emotional tone Fearfulness
Matheny et al. (1976)[76]	Included in meta-analysis	Louisville Twin Study	United States	b140 Attention functions b147 Psychomotor functions b152 Emotional functions b163 Basic cognitive functions b310 Voice functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Attention Banging Cooperative Emotional tone Endurance Energy Extraversion Fearfulness Fine motor Goal directedness Gross motor Listening Looking Manipulating Mouthing: pacifier Mouthing: thumb Mouthing: toys Object orientation Primary cognition Reactivity Tension Vocalize
Micalizzi et al. (2016)[77]	Included in meta-analysis	Boston University Twin Project	United States	b152 Emotional functions	Affective problems Autistic-like traits

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Micalizzi et al. (2017)[78]	Included in meta-analysis	Boston University Twin Project	United States	d720 Complex interpersonal interactions	Difficult temperament
Mook-Kanamori et al. (2012)[79]	Included in meta-analysis	Netherlands Twin Register	The Netherlands	b560 Growth maintenance functions	Height Length Weight
Nguyen et al. (2008)[80]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b134 Sleep functions	Sleep terrors
Nichols et al. (1974)[81]	Included in meta-analysis	Collaborative Perinatal Project	United States	b163 Basic cognitive functions	Mental development

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Orekhova et al. (2003)[82]	Included in meta-analysis	Moscow City Twin Sample	Russia	b140 Attention functions	Alpha frequency during darkness EEG mu gravity frequency during visual attention EEG spectral amplitude during visual attention: Alpha AF3 EEG spectral amplitude during visual attention: Alpha AF4 EEG spectral amplitude during visual attention: Alpha F7 EEG spectral amplitude during visual attention: Alpha F8 EEG spectral amplitude during visual attention: Alpha FC3 EEG spectral amplitude during visual attention: Alpha FC4 EEG spectral amplitude during visual attention: Alpha O1 EEG spectral amplitude during visual attention: Alpha O2 EEG spectral amplitude during visual attention: Alpha PO3 EEG spectral amplitude during visual attention: Alpha PO4 EEG spectral amplitude during visual attention: Alpha T5 EEG spectral amplitude during visual attention: Alpha T6 EEG spectral amplitude during visual attention: Delta AF3 EEG spectral amplitude during visual attention: Delta AF4 EEG spectral amplitude during visual attention: Delta F7 EEG spectral amplitude during visual attention: Delta F8 EEG spectral amplitude during visual attention: Delta FC3 EEG spectral amplitude during visual attention: Delta FC4 EEG spectral amplitude during visual attention: Delta O1 EEG spectral amplitude during visual attention: Delta O2 EEG spectral amplitude during visual attention: Delta PO3 EEG spectral amplitude during visual attention: Delta PO4 EEG spectral amplitude during visual attention: Delta T5 EEG spectral amplitude during visual attention: Delta T6 EEG spectral amplitude during visual attention: Theta AF3 EEG spectral amplitude during visual attention: Theta AF4 EEG spectral amplitude during visual attention: Theta F7 EEG spectral amplitude during visual attention: Theta F8 EEG spectral amplitude during visual attention: Theta FC3 EEG spectral amplitude during visual attention: Theta FC4 EEG spectral amplitude during visual attention: Theta O1 EEG spectral amplitude during visual attention: Theta O2 EEG spectral amplitude during visual attention: Theta PO3 EEG spectral amplitude during visual attention: Theta PO4 EEG spectral amplitude during visual attention: Theta T5 EEG spectral amplitude during visual attention: Theta T6 Spectral amplitude during darkness

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Ouellet-Morin et al. (2008)[83]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b152 Emotional functions	Cortisol reactivity
Ouellet-Morin et al. (2009)[84]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b134 Sleep functions	Cortisol secretion in morning Cortisol secretion on awakening
Peter et al. (1999)[85]	Included in meta-analysis	Childcare Centers of Tel Aviv and Haifa	Israel	b147 Psychomotor functions	Pulling up to a standing position Sitting up Turning over Walking five steps
Petitclerc et al. (2011)[86]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	d720 Complex interpersonal interactions	Disregard for rules
Pimpin et al. (2013)[87]	Excluded from meta-analysis (phenotypes in category containing < 5 independent samples)	Gemini Study	UK	d550 Eating	Carbohydrate intake Energy intake Fat intake Food weight Protein intake
Planalp et al. (2017)[88]	Included in meta-analysis	Waisman Center Birth to 3 year project	United States	b152 Emotional functions	Positive affect Smiling and laughter

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Plomin & Rowe (1979)[89]	Included in meta-analysis	Denver Twin Sample	United States	d710 Basic interpersonal interactions d760 Family relationships	Approaching mother Approaching stranger Cuddliness with mother Cuddliness with stranger Difference of response between mother and stranger: approach Difference of response between mother and stranger: cuddliness Difference of response between mother and stranger: looking Difference of response between mother and stranger: positive vocalizations Difference of response between mother and stranger: proximity Difference of response between mother and stranger: quality of play Difference of response between mother and stranger: smiling Difference of response between mother and stranger: touches Latency to approach stranger Looking at mother Looking at stranger Positive vocalization to mother Positive vocalization to stranger Proximity to mother Proximity to stranger Quality of play with mother Quality of play with stranger Separation distress Smiling at mother Smiling at stranger Touching mother Touching stranger

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Plomin et al. (1993)[90]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b140 Attention functions b144 Memory functions b147 Psychomotor functions b152 Emotional functions b163 Basic cognitive functions b164 Higher-level cognitive functions b167 Mental functions of language d710 Basic interpersonal interactions	Activity level Affect Attention/persistence Behavioral Inhibition Behavioral inhibition Categorization Emotionality Empathy Expressive language General cognitive ability Memory for Location Negative affect Overall mood Positive affect Positive hedonic tone Reactivity Receptive language Shyness Sociability Task orientation Word comprehension
Price et al. (2000)[91]	Excluded from meta-analysis (duplicate data)	Twins Early Development Study	UK	b163 Basic cognitive functions b167 Mental functions of language	Nonverbal cognitive development Verbal ability
Price et al. (2005)[92]	Included in meta-analysis	Twins Early Development Study	UK	b140 Attention functions	ADHD

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Pushina et al. (2005)[93]	Excluded from meta-analysis (phenotype in category containing < 5 independent samples)	Moscow City twin sample	Russia	b144 Memory functions	Working memory
Reznick et al (1997)[94]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b140 Attention functions b144 Memory functions b163 Basic cognitive functions b167 Mental functions of language	Expressive language Memory for Location Nonverbal Receptive language Verbal expressive Verbal receptive Visual attentiveness Word comprehension
Rhee et al. (2007)[95]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	b152 Emotional functions	Emotionality
Rhee et al. (2012)[96]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b152 Emotional functions	Negative affect
Rhee et al. (2013)[97]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Observed Disregard
Rhee et al. (2016)[98]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Disregard for others

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Rice et al. (2014)[99]	Included in meta-analysis	Western Australian Twin Registry	Australia	b167 Mental functions of language	Combining words Late language acquisition Use of finiteness grammatical markers Words Produced
Riese (1990a)[100]	Included in meta-analysis	Louisville Twin Study	United States	b147 Psychomotor functions b152 Emotional functions b560 Growth maintenance functions d710 Basic interpersonal interactions	Activity-awake Activity-sleep Irritability Reactivity Reinforcement Value Resistance to soothing Weight
Riese (1990b)[101]	Included in meta-analysis	Louisville Twin Study	United States	b147 Psychomotor functions b152 Emotional functions	Activity-awake Activity-sleep Irritability Reactivity Resistance to soothing
Robinson et al. (1992)[102]	Excluded from meta-analysis (duplicate data)	The Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Behavioral Inhibition
Roisman & Fraley (2006)[103]	Included in meta-analysis	Early Childhood Longitudinal Study-Birth Cohort	United States	b152 Emotional functions	Fussiness and demanding behavior Positive and negative affect
Roisman & Fraley (2008)[104]	Excluded from meta-analysis (duplicate data)	Early Childhood Longitudinal Study-Birth Cohort	United States	d760 Family relationships	Attachment security Temperamental dependency
Ronald et al. (2010)[105]	Included in meta-analysis	Boston University Twin Project	United States	b140 Attention functions d710 Basic interpersonal interactions	ADHD Autistic-like traits Non-social autistic-like traits Social autistic-like traits
Saudino (2012)[106]	Included in meta-analysis	Boston University Twin Project	United States	b147 Psychomotor functions	Activity level

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Saudino & Zapfe (2008)[107]	Excluded from meta-analysis (duplicate data)	Boston University Twin Project	United States	b147 Psychomotor functions	Activity Level Home Activity Level Lab Activity Level Play
Saudino & Eaton (1991)[108]	Included in meta-analysis	Manitoba Twin Study	Canada	b147 Psychomotor functions b560 Growth maintenance functions	Activity level Head circumference Length Motor development Ponderal index Weight
Saudino et al. (1996)[109]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b140 Attention functions b147 Psychomotor functions d710 Basic interpersonal interactions	Activity level Affect-extraversion Task orientation

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Saudino et al. (2008)[110]	Included in meta-analysis	Jumeaux et plus	France	b134 Sleep functions b140 Attention functions b147 Psychomotor functions b152 Emotional functions b279 Additional sensory functions, other specified and unspecified d550 Eating d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Activity/Impulsivity Aggression/Defiance Attention Atypical Index Competence Compliance Depression withdrawal Dysregulation Eating problems Empathy Externalizing General anxiety Imitation/Play Inhibition to novelty Internalizing Maladaptive behaviors Mastery Motivation Negative affect Peer aggression Prosocial peer relations Sensory Sensitivity Separation distress Sleep problems Social relatedness
Saudino et al. (2018)[111]	Included in meta-analysis	Boston University Twin Project	United States	b140 Attention functions b147 Psychomotor functions	Activity level Attention problems
Schmitz et al. (1999)[112]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	b152 Emotional functions d710 Basic interpersonal interactions	Emotionality Shyness
Schumann et al. (2017)[113]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b152 Emotional functions	Negative affect

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Silberg et al. (2005)[114]	Included in meta-analysis	Puerto Rican Infant Twin Study	United States	d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Difficult temperament Unadaptability Unsociability
Silberg et al. (2015)[115]	Included in meta-analysis	Puerto Rican Infant Twin Study	United States	d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Difficultness Inhibition Resistance to control Sociability
Silventoinen et al. (2007)[116]	Included in meta-analysis	Swedish Young Male Twins Study	Sweden	b560 Growth maintenance functions	BMI
Silventoinen et al. (2008)[117]	Included in meta-analysis	Swedish Young Male Twins Study	Sweden	b560 Growth maintenance functions	Height
Silventoinen et al. (2011a)[118]	Included in meta-analysis	West Japan Twins and Higher Order Multiple Births Registry	Japan	b560 Growth maintenance functions	Head circumference
Silventoinen et al. (2011b)[119]	Included in meta-analysis	West Japan Twins and Higher Order Multiple Births Registry	Japan	b560 Growth maintenance functions	Height
Silventoinen et al. (2012)[120]	Included in meta-analysis	West Japan Twins and Higher Order Multiple Births Registry	Japan	b560 Growth maintenance functions	Chest Circumference Chest circumference increase

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Silventoinen et al. (2016)[121]	Included in meta-analysis	The CODATwins Project: Boston University Twin Project; Gemini Study; Guinea-Bissau Twin Study; Hungarian Twin Registry; Italian Twin Registry; Japanese Twin Cohort; Michigan State University Twin Registry; Mongolian Twin Registry; Netherlands Twin Registry; Peri/Postnatal Epigenetic Twins Study; Quebec Newborn Twin Study; Swedish Young Male Twins Study; Twins Early Development Study; West Japan Twins and Higher Order Multiple Births Registry	Canada, Guinea-Bissau, Hungary, Italy, Japan, Mongolia, Sweden, The Netherlands, United Kingdom, United States	b560 Growth maintenance functions	BMI
Smit et al. (2010)[122]	Included in meta-analysis	Netherlands Twin Register	The Netherlands	b560 Growth maintenance functions	Head circumference

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Smith et al. (2012)[123]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample	United States	d710 Basic interpersonal interactions	Behavioral inhibition
Smith et al. (2017a)[124]	Excluded from meta-analysis (phenotypes in category containing < 5 independent samples)	Gemini Study	UK	d550 Eating	Food fussiness Food neophobia
Smith et al. (2017b)[125]	Included in meta-analysis	Gemini Study	UK	b147 Psychomotor functions	Activity level First Crawl First Sit First Steps
Soussignan et al. (2009)[126]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	d710 Basic interpersonal interactions	Emotional response to social stimuli Gaze aversion Motor activity during social stimuli Self-contact during social stimuli Social gaze
Spinath et al. (2003)[127]	Included in meta-analysis	Twins Early Development Study	UK	b163 Basic cognitive functions	General cognitive ability
Stevenson & Fielding (1985)[128]	Included in meta-analysis	Department of Psychology, University of Surrey	UK	b147 Psychomotor functions b152 Emotional functions b164 Higher-level cognitive functions d710 Basic interpersonal interactions	Activity level Emotionality Impulsivity Sociability

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Stroganova et al. (2000)[129]	Included in meta-analysis	Moscow City Twin Sample	Russia	b140 Attention functions b152 Emotional functions b164 Higher-level cognitive functions b279 Additional sensory functions, other specified and unspecified d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Aggression towards father Aggression towards mother Autonomy Control Defensive reactions Dependence on mother Fear High tension Imitation of father Imitation of mother Love for father Love for mother Low tension Moderate tension Nonoriented discharges Obedience to mother Obedience to father Object orientation Orientation to humans Passiveness Reaction to father Reaction to mother Reaction to mother's punishment Unpleasant sensations
Touchette et al. (2013)[130]	Included in meta-analysis	Quebec Newborn Twin Study	Canada	b134 Sleep functions	Daytime continuous sleep duration Night-time continuous sleep duration
Touwslager et al. (2011a)[131]	Excluded from meta-analysis (duplicate data)	East Flanders Prospective Twin Survey	Belgium	b560 Growth maintenance functions	Growth in weight
Touwslager et al. (2011b)[132]	Included in meta-analysis	East Flanders Prospective Twin Survey	Belgium	b560 Growth maintenance functions	Weight gain

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Tucker-Drob et al. (2011)[133]	Included in meta-analysis	Early Childhood Longitudinal Study-Birth Cohort	United States	b163 Basic cognitive functions	Mental ability
van Dommelen et al. (2004)[134]	Included in meta-analysis	Netherlands Twin Register	Netherlands	b560 Growth maintenance functions	Height Height deceleration Height jerk Height snap Height velocity Weight Weight deceleration Weight jerk Weight snap Weight velocity
Wang & Saudino (2012)[135]	Included in meta-analysis	Boston University Twin Project	United States	b134 Sleep functions	Sleep problems
Whitfield et al. (2001)[136]	Included in meta-analysis	Australian Twin Registry	Australia	b560 Growth maintenance functions	Weight
Wilson (1972)[137]	Excluded from meta-analysis (duplicate data)	Louisville Twin Study	United States	b163 Basic cognitive functions	Cognitive ability
Wilson (1974)[138]	Excluded from meta-analysis (duplicate data)	Louisville Twin Study	United States	b163 Basic cognitive functions	Cognitive ability
Wilson (1978)[139]	Excluded from meta-analysis (duplicate data)	Louisville Twin Study	United States	b163 Basic cognitive functions	Cognitive ability

eTable 4 (Continued)

Publication	Status	Study	Country	Category (using codes from the ICF-CY)	Phenotypes Extracted from Publication
Wilson (1983)[140]	Excluded from meta-analysis (duplicate data)	Louisville Twin Study	United States	b163 Basic cognitive functions	Cognitive ability
Wilson (1984)[141]	Included in meta-analysis	Louisville Twin Study	United States	b163 Basic cognitive functions b560 Growth maintenance functions	Cognitive ability Height
Wilson et al. (1972)[142]	Included in meta-analysis	Louisville Twin Study	United States	b147 Psychomotor functions b163 Basic cognitive functions	Cognitive ability Motor development
Wilson & Matheny (1976)[143]	Included in meta-analysis	Louisville Twin Study	United States	b163 Basic cognitive functions	Cognitive ability
Woodward et al. (2018)[144]	Included in meta-analysis	Colorado Twin Registry: Longitudinal Twin Sample; Twin Infant Project	United States	d710 Basic interpersonal interactions	Child affection

eTable 5. Twin Studies Identified in Systematic Literature Search, Presented Alphabetically by Study Name

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY[a])	Phenotypes (as labeled in included publications)	Publications
Australian Twin Registry	Australia	24	3808 (1799 MZ, 2009 DZ)	b560 Growth maintenance functions[b]	Weight	Whitfield et al. (2001)[136]
Boston University Twin Project	United States	24	314 (145 MZ, 169 DZ)	b134 Sleep functions b140 Attention functions b147 Psychomotor functions b152 Emotional functions b164 Higher-level cognitive functions b560 Growth maintenance functions d710 Basic interpersonal interactions[c] d720 Complex interpersonal interactions	Activity Level (Home/Lab/Play), ADHD, Affective problems, Attention problems, Autistic-like traits, BMI, Callous Unemotional Traits, Difficult temperament, Externalizing, Inhibitory control, Non-social autistic-like traits, ODD, Sleep problems, Social autistic-like traits,	Flom & Saudino (2017)[35] Flom & Saudino (2018)[36] Flom et al. (2019)[37] Gagne & Saudino (2010)[42] Gagne et al. (2011)[43] Gagne & Saudino (2016)[44] Gagne et al. (2020)[45] Ilott et al. (2010a)[56] Ilott et al. (2010b)[57] Micalizzi et al. (2016)[77] Micalizzi et al. (2017)[78] Ronald et al. (2010)[105] Saudino (2012)[106] Saudino & Zapfe (2008)[107] Saudino et al. (2018)[111] Silventoinen et al. (2016)[121] Wang & Saudino (2012)[135]
Brisbane Adolescent Twin Study	Australia	0	1330 (501 MZ, 829 DZ)	b560 Growth maintenance functions	BMI, Height, Weight,	Dubois et al. (2012)[31] Hur et al. (2005)[55]

[a] ICF-CY = International Classification of Functioning, Disability and Health, Children and Youth Version.[4] Definitions for each of the categories and subcategories can be found in the cited ICF-CY manual: https://apps.who.int/iris/handle/10665/43737.
[b] The prefix *b* is given to coded items within the ICF-CY component of Body Functions.
[c] The prefix *d* is given to items in the component of Activities and Participation.

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Child and Adolescent Twin Study in Sweden	Sweden	0	512 (172 MZ, 340 DZ)	b560 Growth maintenance functions	BMI, Height, Weight,	Dubois et al. (2012)[31]
Childcare Centers of Tel Aviv and Haifa	Israel	0–12	163 (51 MZ, 112 DZ)	b147 Psychomotor functions b560 Growth maintenance functions	Age at transition to childhood Head circumference Head circumference growth Height Height growth Pulling up to a standing position Sitting up Turning over Walking five steps Weight Weight growth	German et al. (2015)[47] Livshits et al. (2000)[67] Peter et al. (1999)[85]
Chinese National Twin Registry	China	0–36	3091 (1448 MZ, 1643 DZ)	b560 Growth maintenance functions	BMI Height Weight	Liu et al. (2015)[66]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Collaborative Perinatal Project	United States	8	504 (189 MZ, 315 DZ)	b125 Dispositions and intra-personal functions b140 Attention functions b147 Psychomotor functions b163 Basic cognitive functions b560 Growth maintenance functions d710 Basic interpersonal interactions	Active manipulation Activity level Degree of social acceptance of examiner Degree of social contact with mother Interest in persons Interest in/responsiveness to people Mental development Physical development Pursuit persistence Response duration Speed of response Vigorous activity vs. psychomotor passivity	Goldsmith & Gottesman (1981)[50] Nichols et al. (1974)[81]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Colorado Twin Registry: Longitudinal Twin Sample	United States	14, 20, 24, 7–36	887 (494 MZ, 393 DZ)	b140 Attention functions b144 Memory functions b147 Psychomotor functions b152 Emotional functions b163 Basic cognitive functions b164 Higher-level cognitive functions b167 Mental functions of language d710 Basic interpersonal interactions	Activity level Affect Affect-extraversion Attention/persistence Behavioral inhibition Categorization Affection Disregard for others Emotionality Empathy Expressive language Frustration General cognitive ability Memory for Location Negative affect Negative hedonic tone Nonverbal Observed Disregard Overall mood Positive affect Positive hedonic tone Reactivity Receptive language Self-restraint Shyness Sociability Task orientation Verbal expressive Verbal receptive Visual attentiveness Word comprehension	Bishop et al. (2003b)[10] Brant et al. (2009)[13] Cherny et al. (1992)[19] Cherny et al. (1994a)[20] Cherny et al. (1994b)[21] Dilalla et al. (1994)[26] Emde et al. (1992)[32] Friedman et al. (2011)[39] Plomin et al. (1993)[90] Reznick et al (1997)[94] Rhee et al. (2007)[95] Rhee et al. (2012)[96] Rhee et al. (2013)[97] Rhee et al. (2016)[98] Robinson et al. (1992)[102] Saudino et al. (1996)[109] Schmitz et al. (1999)[112] Smith et al. (2012)[123] Woodward et al. (2018)[144]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Colorado Twin Registry: Twin Infant Project	United States	7, 9, 7–36	168 (76 MZ, 92 DZ)	b140 Attention functions b152 Emotional functions b310 Voice functions d710 Basic interpersonal interactions	Affection for mother Child affection Enthusiasm for interaction with mother Negative affect Task orientation Watch mother Vocalize	DiLalla & Bishop (1996)[25] Woodward et al. (2018)[144]
Danish Twin Registry	Denmark	0	793 (141 MZ, 652 DZ)	b560 Growth maintenance functions	BMI Height Weight	Dubois et al. (2012)[31]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Denver Twin Temperament Study	United States	3–16, 22	70 (35 MZ, 35 DZ)	b140 Attention functions b147 Psychomotor functions b152 Emotional functions d710 Basic interpersonal interactions d760 Family relationships	Activity level Approaching mother Approaching stranger Cuddliness with mother Cuddliness with stranger Difference of response between mother and stranger: approach Difference of response between mother and stranger: cuddliness Difference of response between mother and stranger: looking Difference of response between mother and stranger: positive vocalizations Difference of response between mother and stranger: proximity Difference of response between mother and stranger: quality of play Difference of response between mother and stranger: smiling Difference of response between mother and stranger: touches Distress to limitations Distress to novelty Duration of orienting Latency to approach stranger Looking at mother Looking at stranger Negative affect Positive affect Positive vocalization to mother Positive vocalization to stranger Proximity to mother Proximity to stranger Quality of play with mother Quality of play with stranger Resistance to soothing Separation distress Smiling and laughter Smiling at mother Smiling at stranger Touching mother Touching stranger	Goldsmith et al. (1999)[51] Plomin & Rowe (1979)[89]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Department of Psychology, University of Surrey	United Kingdom	0–24, 12–24	118 (41 MZ, 77 DZ)	b147 Psychomotor functions b152 Emotional functions b164 Higher-level cognitive functions d710 Basic interpersonal interactions	Activity level Emotionality Impulsivity Sociability	Stevenson & Fielding (1985)[128]
Early Childhood Longitudinal Study-Birth Cohort	United States	9, 24	976 (238 MZ, 738 DZ)	b152 Emotional functions b163 Basic cognitive functions b167 Mental functions of language d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Attachment security Avoids others/not sociable Comfortable cuddly Cooperative Demanding/angry Dependency Enjoys company Expressive vocabulary Fussiness and demanding behavior Independent Mental ability Moody/unusual Positive and negative affect Seeks attention Upset by separation	Beaver et al. (2014)[9] Jackson (2016)[58] Roisman & Fraley (2006)[103] Roisman & Fraley (2008)[104] Tucker-Drob et al. (2011)[133]
Early Reciprocal Social Behavior Study	United States	18, 24	317 (126 MZ, 191 DZ)	d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Behavior problems Competence Functional communication Reciprocal social behavior Social avoidance Social motivation Social orienting	Hawks & Marrus (2018)[52] Marrus et al. (2015)[69] Marrus et al. (2018)[70] Marrus et al. (2020)[71]
East Flanders Prospective Twin Survey	Belgium	0–1, 1–6, 6–12, 12–24	280 (190 MZ, 90 DZ)	b560 Growth maintenance functions	Weight gain	Touwslager et al. (2011a)[131] Touwslager et al. (2011b)[132]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Gemini Study	United Kingdom	0, 3, 6, 16	2757 (1174 MZ, 1583 DZ)	b134 Sleep functions b147 Psychomotor functions b560 Growth maintenance functions d550 Eating	Activity level BMI Carbohydrate intake Daytime nap duration Emotional overeating Energy intake Enjoyment of food Fat intake First Crawl First Sit First Steps Food fussiness Food neophobia Food responsiveness Food weight Night awakenings Night-time sleep duration Protein intake Satiety responsiveness Size (weight) Slowness in eating Tempo (weight) Wake time Weight Weight change Weight velocity	Fisher et al. (2012)[34] Herle et al. (2018)[53] Johnson et al. (2011)[60] Llewellyn et al. (2010)[68] Pimpin et al. (2013)[87] Silventoinen et al. (2016)[121] Smith et al. (2017a)[124] Smith et al. (2017b)[125]
Guinea-Bissau Twin Study	Guinea-Bissau	0–2	108 (16 MZ, 92 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]
Hungarian Twin Registry	Hungary	2	389 (230 MZ, 159 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Italian Twin Registry (previously the Mercurio project)	Italy	12–24, 18, 24	7432 (3270 MZ, 4162 DZ)	b134 Sleep functions b560 Growth maintenance functions	BMI Cosleeping Diurnal sleep duration Night awakenings Nocturnal sleep duration Weight gain	Brescianini et al. (2011)[14] Silventoinen et al. (2016)[121]
Jackson Memorial Hospital/University of Miami Medical Center	United States	.5, 1, 3, 6, 9, 12	166 (67 MZ, 99 DZ)	b560 Growth maintenance functions	Length Weight	Levine et al. (1987)[65]
Japanese Twin Cohort	Japan	1–2	2169 (1345 MZ, 824 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Jumeaux et Plus ("Twins and more")	France	24	1950 (393 MZ, 1557 DZ)	b134 Sleep functions b140 Attention functions b147 Psychomotor functions b152 Emotional functions b279 Additional sensory functions d550 Eating d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Activity/Impulsivity Aggression/Defiance Attention Atypical Index Competence Compliance Depression withdrawal Dysregulation Eating problems Empathy Externalizing General anxiety Imitation/Play Inhibition to novelty Internalizing Maladaptive behaviors Mastery Motivation Negative affect Peer aggression Prosocial peer relations Sensory Sensitivity Separation distress Sleep problems Social relatedness	Saudino et al. (2008)[110]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Louisville Twin Study	United States	0, 3, 6, 9, 12, 18, 24	615 (289 MZ, 326 DZ)	b140 Attention functions b147 Psychomotor functions b152 Emotional functions b163 Basic cognitive functions b279 Additional sensory functions b310 Voice functions b560 Growth maintenance functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Activity level Activity-awake Activity-sleep Affect-extraversion Approach/withdrawal Attachment Attention Auditory-visual Banging Behavioral inhibition Cognitive ability Cooperative Emotional tone Endurance Energy Extraversion Fearfulness Fine motor General temperament Goal directedness Gross motor Height Irritability Listening Looking Manipulating Motor development Mouthing: pacifier Mouthing: thumb Mouthing: toys Object orientation Primary cognition Reactivity Resistance to soothing Task orientation Tension Vocalize Weight	Davis et al. (2015)[24] Finkel et al. (2000)[33] Matheny (1980)[72] Matheny (1983)[73] Matheny (1984)[74] Matheny (1989)[75] Matheny et al. (1976)[76] Riese (1990a)[100] Riese (1990b)[101] Wilson (1972)[137] Wilson (1974)[138] Wilson (1978)[139] Wilson (1983)[140] Wilson (1984)[141] Wilson & Harpring (1972)[142] Wilson & Matheny (1976)[143]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Manitoba Twin Study	Canada	7	60 twin pairs (39 MZ, 21 DZ)	b 147 Psychomotor functions b 560 Growth maintenance functions	Activity level Head circumference Length Motor development Ponderal index Weight	Saudino & Eaton (1991)[108]
Michigan State University Twin Registry	United States	24	10253 (3076 MZ, 7177 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]
Minnesota Twin Family Study	United States	0	1068 (682 MZ, 386 DZ)	b560 Growth maintenance functions	Weight	Hur et al. (2005)[55]
Mongolian Twin Registry	Mongolia	0–24	83 (36 MZ, 47 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Moscow City twin sample	Russia	7–12	94 (49 MZ, 45 DZ)	b140 Attention functions b144 Memory functions b152 Emotional functions b164 Higher-level cognitive functions b279 Additional sensory functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions d760 Family relationships	Aggression towards father Aggression towards mother Autonomy Control Defensive reactions Dependence on mother EEG alpha frequency during darkness EEG mu gravity frequency during visual attention EEG spectral amplitude during darkness EEG spectral amplitude during visual attention Fear High tension Imitation of father Imitation of mother Love for father Love for mother Low tension Moderate tension Nonoriented discharges Obedience to mother Obedience to father Object orientation Orientation to humans Passiveness Reaction to father Reaction to mother Reaction to mother's punishment Unpleasant sensations Working memory	Orekhova et al. (2003)[82] Pushina et al. (2005)[93] Stroganova et al. (2000)[129]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Multiple Births Foundation of Queen Charlotte's and Chelsea Hospital in London	United Kingdom	12–14	62 (30 MZ, 32 DZ)	b152 Emotional functions d760 Family relationships	Attachment disorganization Attachment security Temperamental reactivity	Bokhorst et al. (2003)[11]
Netherlands Twin Register	The Netherlands	0, 1, 2, 3, 4, 6, 8, 9, 13, 14, 15.5, 24	16848 (5259 MZ, 11589 DZ)	b152 Emotional functions b560 Growth maintenance functions d760 Family relationships	Attachment disorganization Attachment security BMI Dependency (to father) Head circumference Height Height deceleration Height jerk Height snap Height velocity Infant-father attachment security Length Temperamental reactivity Weight Weight deceleration Weight jerk Weight snap Weight velocity	Bakermans-Kranenburg et al. (2004)[8] Bokhorst et al. (2003)[11] Boomsma et al. (1992)[12] Mook-Kanamori et al. (2012)[79] Silventoinen et al. (2016)[121] Smit et al. (2010)[122] van Dommelen et al. (2004)[134]
Peri/Postnatal Epigenetic Twins Study	Australia	0–24	221 (91 MZ, 130 DZ)	b560 Growth maintenance functions	BMI	Silventoinen et al. (2016)[121]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Pooled Sample of twins from Oregon, Washington, Colorado, Texas, and Wisconsin	United States	3–16	302 (121 MZ, 181 DZ)	b140 Attention functions b147 Psychomotor functions b152 Emotional functions	Activity level Distress to limitations Distress to novelty Duration of orienting Negative affect Positive affect Resistance to soothing Smiling and laughter	Goldsmith et al. (1999)[51]
Project Metropolitan	Sweden	0	131 (28 MZ, 103 DZ)	b560 Growth maintenance functions	Height Weight	Akerman & Fischbein (1992)[6]
Puerto Rican Infant Twin Study	United States	12, 0–32	865 (377 MZ, 488 DZ)	d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Difficult temperament Difficultness Inhibition Resistance to control Sociability Unadaptability Unsociability	Silberg et al. (2005)[114]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Quebec Newborn Twin Study	Canada	0, 5, 6, 18, 19, 20, 18–24	1029 (419 MZ, 610 DZ)	b134 Sleep functions b152 Emotional functions b167 Mental functions of language b560 Growth maintenance functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	BMI Cortisol reactivity Cortisol secretion in morning Cortisol secretion on awakening Daytime continuous sleep duration Difficult temperament Disregard for rules Disruptive behavior Emotional response to social stimuli Gaze aversion Height Motor activity during social stimuli Negative affect Nighttime continuous sleep duration Physical aggression Ratio of day/night sleep duration Self-contact during social stimuli Sleep terrors Social gaze Testosterone Vocabulary Weight	Caramaschi et al. (2012)[16] Dionne et al. (2003b)[28] Dionne et al. (2011)[29] Dubois et al. (2007)[30] Dubois et al. (2012)[31] Forget-Dubois et al. (2007)[38] Lacourse et al. 2014[64] Nguyen et al. (2008)[80] Ouellet-Morin et al. (2008)[83] Ouellet-Morin et al. (2009)[84] Petitclerc et al. (2011)[86] Schumann et al. (2017)[113] Silventoinen et al. (2016)[121] Soussignan et al. (2009)[126] Touchette et al. (2013)[130]
Registry of twins recruited in Japan from associations for parents of multiples.	Japan	0	1045 (775 MZ, 270 DZ)	b560 Growth maintenance functions	Weight	Hur et al. (2005)[55]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Registry of twins who applied for the secondary school attached to the Faculty of Education at the University of Tokyo between 1981 and 2003.	Japan	0	1045 (775 MZ, 270 DZ)	b560 Growth maintenance functions	Weight	Hur et al. (2005)[55]
Childcare Centers of Tel Aviv and Haifa	Israel	0–12	93 (64 DZ, 29 MZ)	b147 Psychomotor functions	Pulling up to a standing position Sitting up Turning over Walking five steps	Peter et al. (1999)[85]
Seoul Twin Family Study	South Korea	0	686 (384 MZ, 302 DZ)	b560 Growth maintenance functions	Weight	Hur et al. (2005)[55]
South Korea Twin Registry	South Korea	0	433 (255 MZ,178 DZ)	b560 Growth maintenance functions	Weight	Hur (2005)[54]
Swedish Young Male Twins Study	Sweden	0, 12, 24	375 (231 MZ, 144 DZ)	b560 Growth maintenance functions	BMI Height	Silventoinen et al. (2007)[116] Silventoinen et al. (2008)[117] Silventoinen et al. (2016)[121]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Taipei City Teaching Hospitals Twin Study	Taiwan	1, 2, 4, 6, 9, 12	521 (428 MZ, 93 DZ)	b125 Dispositions and intra-personal functions b140 Attention functions b147 Psychomotor functions b152 Emotional functions b560 Growth maintenance functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	Activity level Adaptability Approach/withdrawal Arm circumference Attention/persistence Chest circumference Distractibility Head circumference Height Intensity of reaction Quality of mood Rhythmicity Threshold of responsiveness Weight	Chen et al. (1990a)[17] Chen et al. (1990b)[18]
Tokyo Twin Cohort Project	Japan	0, 4, 10, 19	1728 (669 MZ, 1059 DZ)	b134 Sleep functions b560 Growth maintenance functions d550 Eating d710 Basic interpersonal interactions	Chest circumference Head circumference Head circumference growth Height Milk consumption Mimic, point gazing, joint attention Rhythmicity Sociocognitive abilities Time to fall asleep Weight	Ando et al. (2006)[7] Fujisawa et al. (2012)[40]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
Twin study in The Gambia	The Gambia	0, 5–18	84 (22 MZ, 62 DZ)	b147 Psychomotor functions b560 Growth maintenance functions	Crawl Length Maintain head Roll over Sitting Sitting without support Stand holding on something Take two steps Walk holding on something Weight	Goetghebuer et al. (2003)[49]
Twin Study of Child and Adolescent Development	Sweden	0	823 (376 MZ, 447 DZ)	b560 Growth maintenance functions	BMI Height Weight	Dubois et al. (2012)[31]
Twins born in two South Korean hospitals (1998–2003)	South Korea	0	603 (338 MZ, 265 DZ)	b560 Growth maintenance functions	Weight	Hur et al. (2005)[55]
Twins Early Development Study	United Kingdom	24	9065 (3082 MZ, 5983 DZ)	b140 Attention functions b147 Psychomotor functions b163 Basic cognitive functions b167 Mental functions of language b560 Growth maintenance functions d710 Basic interpersonal interactions d720 Complex interpersonal interactions	ADHD Behavior problems BMI General cognitive ability Grammar Hyperactivity Nonverbal cognitive ability Prosocial behavior Verbal ability	Dale et al. (2000)[23] Dionne et al. (2003a)[27] Galsworthy et al. (2000)[46] Knafo & Plomin (2006)[61] Koeppen-Schomerus et al. (2003)[62] Kuntsi et al. (2005)[63] Price et al. (2000)[91] Price et al. (2005)[92] Silventoinen et al. (2016)[121] Spinath et al. (2003)[127]

eTable 5 (Continued)

Study name	Country	Age (months)	n twin pairs	Category (using codes from the ICF-CY)	Phenotypes (as labeled in included publications)	Publications
UNC Early Brain Development Study	United States	0, 0–3	180 (63 MZ, 117 DZ)	s110 Structure of brain[d]	Cerebellum Corpus callosum Cortical grey matter Cortical surface area Cortical thickness Cortical unmyelinated white matter Frontal grey matter Frontal unmyelinated white matter Intracranial volume Lateral ventricles Left hemisphere grey matter Left hemisphere total Left hemisphere unmyelinated white matter Occipital grey matter Occipital unmyelinated white matter Parietal grey matter Parietal unmyelinated white matter Prefrontal grey matter Prefrontal unmyelinated white matter Right hemisphere grey matter Right hemisphere total Right hemisphere unmyelinated white matter Subcortical grey matter Total cerebrospinal fluid Total early myelinated white matter Total frontal Total grey matter Total occipital Total parietal Total prefrontal Total unmyelinated white matter	Gilmore et al. (2010)[48] Jha et al. (2018)[59]

[d] The prefix *s* is given to items in the component of Body Structures.

eTable 5 (Continued)

University of Sao Paulo Longitudinal Twin Study	Brazil	0–6	17 (10 MZ, 7 DZ)	b134 Sleep functions	Emergence of cortisol circadian rhythm	Custodio et al. (2007)[22]
Waisman Center Birth to 3 year project	United States	6, 12	531 (180 MZ, 351 DZ)	b152 Emotional functions	Positive affect Smiling and laughter	Planalp et al. (2017)[88]
West Japan Twins and Higher Order Multiple Births Registry	Japan	0, 1–3, 3–5, 5–7, 7–9, 9–11, 11–13, 12, 24	767 (407 MZ, 360 DZ)	b560 Growth maintenance functions	BMI Chest circumference Chest circumference increase Head circumference Height	Silventoinen et al. (2011a)[118] Silventoinen et al. (2011b)[119] Silventoinen et al. (2012)[120] Silventoinen et al. (2016)[121]
Western Australian Twin Registry	Australia	24	473 (160 MZ, 313 DZ)	b167 Mental functions of language	Combining words Late language acquisition Use of finiteness grammatical markers Words Produced	Rice et al. (2014)[99]
Wisconsin Twin Panel	United States	12	735 (261 MZ, 474 DZ)	b152 Emotional functions	Anger Distress to limitations	Gagne & Goldsmith (2011)[41]

eTable 6. Phenotypes Identified in Systematic Literature Search Coded Using Classification System

ICF-CY[a] component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Global mental functions	b125 Dispositions and intra-personal functions	b1251 Responsivity	• Response duration • Speed of response • Threshold of responsiveness
Body functions	Mental functions	Global mental functions	b134 Sleep functions	b1340 Amount of sleep	• Cortisol secretion in morning • Cortisol secretion on awakening • Daytime continuous sleep duration • Daytime nap duration • Diurnal sleep duration • Emergence of the cortisol circadian rhythm • Night-time continuous sleep duration • Night-time sleep duration • Nocturnal sleep duration • Rhythmicity • Wake time
Body functions	Mental functions	Global mental functions	b134 Sleep functions	b1341 Onset of sleep	• Time to fall asleep
Body functions	Mental functions	Global mental functions	b134 Sleep functions	b1342 Maintenance of sleep	• Night awakenings •
Body functions	Mental functions	Global mental functions	b134 Sleep functions	b1343 Quality of sleep	• Sleep problems • Sleep terrors
Body functions	Mental functions	Global mental functions	b134 Sleep functions	b1348 Sleep functions, other specified	• Ratio of day/night sleep duration

[a] ICF-CY = International Classification of Functioning, Disability and Health, Children and Youth Version.[4] Definitions for each of the categories and subcategories can be found in the cited ICF-CY manual: https://apps.who.int/iris/handle/10665/43737.

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b140 Attention functions	b1400 Sustaining attention	• ADHD • Attention • Attention problems • Attention/persistence • Distractibility • Duration of orienting • Endurance • Goal directedness • Listening • Looking • Mastery motivation • Object orientation • Pursuit persistence • Task orientation • Visual attentiveness
Body functions	Mental functions	Specific mental functions	b140 Attention functions	b1408 Attention functions, other specified	• Mu frequency during visual attention • Spectral amplitude during visual attention
Body functions	Mental functions	Specific mental functions	b144 Memory functions	b1440 Short-term memory	• Memory for location • Working memory

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b147 Psychomotor functions	b1470 Psychomotor control	• Activity • Activity level • Activity level: Home • Activity level: Lab • Activity level: Play • Activity-awake • Activity-sleep • Activity/impulsivity • Energy • Hyperactivity • Vigorous activity vs. psychomotor passivity

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b147 Psychomotor functions	b1472 Organization of psychomotor functions	• Active manipulation • Banging • Crawl • Fine motor • First crawl • First sit • First steps • Gross motor • Maintain head • Manipulating • Motor development • Mouthing: pacifier • Mouthing: thumb • Mouthing: toys • Pulling up to standing position • Roll over • Sitting • Sitting up • Sitting without support • Stand holding on something • Take two steps • Turning over • Walk holding on something • Walking five steps

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b152 Emotional functions	b1521 Regulation of emotion	• Affective problems • Cortisol reactivity • Distress to limitations • Emotionality • Moody/unusual • Quality of mood • Reactivity • Resistance to soothing • Temperamental reactivity
Body functions	Mental functions	Specific mental functions	b152 Emotional functions	b1522 Range of emotion	• Affect • Anger • Demanding/angry • Depression withdrawal • Emotional tone • Fear • Fearfulness • Frustration • Fussiness and demanding behavior • General anxiety • High tension • Intensity of reaction • Internalizing • Irritability • Low tension • Moderate tension • Negative affect • Negative hedonic tone • Nonoriented discharges • Overall mood • Positive Affect • Positive and negative affect • Positive hedonic tone • Smiling and laughter • Tension

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b163 Basic cognitive functions	N/A	• Cognitive ability • General cognitive ability • Mental ability • Mental development • Nonverbal • Nonverbal cognitive ability • Nonverbal cognitive development • Primary cognition
Body functions	Mental functions	Specific mental functions	b164 Higher-level cognitive functions	b1641 Higher-level cognitive functions, other specified	• Categorization • Control • Impulsivity • Inhibitory control • Self-restraint

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Mental functions	Specific mental functions	b167 Mental functions of language	b1670 Reception of language	• Reception of language • Verbal receptive • Word comprehension
Body functions	Mental functions	Specific mental functions	b167 Mental functions of language	b1671 Expression of language	• Combining words • Expressive language • Expressive vocabulary • Grammar • Late language acquisition • Use of finiteness grammatical markers • Verbal ability • Verbal expressive • Vocabulary • Words Produced
Body functions	Sensory functions and pain	Additional sensory functions	b279 Additional sensory functions, other specified and unspecified	N/A	• Auditory-visual • Sensory Sensitivity • Unpleasant sensations
Body functions	Voice and speech functions	N/A	b310 Voice functions	b3100 Production of voice	• Vocalize

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body functions	Functions of the digestive, metabolic and endocrine systems	Functions related to the metabolism and endocrine system	b560 Growth maintenance functions	N/A	• Age at transition to childhood • Arm circumference • BMI • Chest circumference • Chest circumference increase • Head circumference • Head circumference growth • Head circumference growth curve parameters • Height • Height growth curve parameters • Height deceleration • Height jerk • Height snap • Height velocity • Length • Physical development • Ponderal index • Weight • Weight growth • Weight growth curve parameters • Weight deceleration • Weight gain • Weight jerk • Weight size • Weight snap • Weight tempo • Weight velocity

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Activities and participation	Self-care	N/A	d550 Eating	N/A	• Carbohydrate intake • Eating problems • Emotional overeating • Energy intake • Enjoyment of food • Fat intake • Food fussiness • Food neophobia • Food responsiveness • Food weight • Milk consumption • Protein intake • Satiety responsiveness • Slowness in eating
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d710 Basic interpersonal interactions	d7100 Respect and warmth in relationships	• Affection for mother • Callous unemotional behavior • Callous unemotional traits • Child affection • Disregard for others • Empathy • Observed Disregard • Prosocial behavior • Prosocial Peer Relations

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d710 Basic interpersonal interactions	d7104 Social cues in relationships	• Affect-extraversion • Approach/withdrawal • Approaching mother • Approaching stranger • Avoids others/not sociable • Behavioral inhibition • Competence • Degree of social acceptance of examiner • Degree of social contact with mother • Emotional response to social stimuli • Enjoys company • Enthusiasm for interaction with mother • Extraversion • Gaze aversion • Imitation/Play • Imitation of father • Imitation of mother • Inhibition • Inhibition to novelty • Interest in persons • Interest in/responsiveness to people • Latency to approach stranger • Looking at mother • Looking at stranger • Mimic, point gazing, joint attention • Orientation to humans • Positive vocalization to mother • Positive vocalization to stranger • Proximity to stranger • Quality of play with mother • Quality of play with stranger • Reaction to father • Reaction to mother • Reaction to mother's punishment • Reciprocal social behavior • Seeks attention • Shyness • Smiling at mother • Smiling at stranger • Sociability • Social autistic-like traits • Social gaze • Social relatedness • Sociocognitive abilities • Unsociability • Watch Mother

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d710 Basic interpersonal interactions	d7105 Physical contact in relationships	• Comfortable cuddly • Cuddliness with mother • Cuddliness with stranger • Touching mother • Touching stranger
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d710 Basic interpersonal interactions	d7106 Differentiation of familiar persons	• Difference of response between mother and stranger: approach • Difference of response between mother and stranger: cuddliness • Difference of response between mother and stranger: looking • Difference of response between mother and stranger: positive vocalizations • Difference of response between mother and stranger: proximity • Difference of response between mother and stranger: quality of play • Difference of response between mother and stranger: smiling • Difference of response between mother and stranger: touches

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d720 Complex interpersonal interactions	d7202 Regulating behaviors within interactions	• Adaptability • Aggression towards father • Aggression towards mother • Aggression/defiance • Defensive reactions • Difficult temperament • Difficultness • Disruptive behavior • Externalizing • Peer aggression • Physical aggression • Unadaptability
Activities and participation	Interpersonal interactions and relationships	General interpersonal interactions	d720 Complex interpersonal interactions	d7203 Interacting according to social rules	• Behavior problems • Compliance • Cooperative • Disregard for rules • Maladaptive behavior • Obedience to mother • Obedience to father • ODD • Resistance to control

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Activities and participation	Interpersonal interactions and relationships	Particular interpersonal relationships	d760 Family relationships	d7601 Child-parent relationships	• Attachment • Attachment disorganization • Attachment security • Dependence on mother • Dependency • Dependency to father • Independent • Infant-father attachment security • Proximity to mother • Separation distress • Temperamental dependency • Upset by separation
Body structures	Structures of the nervous system	N/A	s110 Structure of brain	s1100 Structure of cortical lobes	• Frontal grey matter • Occipital grey matter • Parietal grey matter • Prefrontal grey matter • Total Frontal • Total Occipital • Total Parietal • Total Prefrontal
Body structures	Structures of the nervous system	N/A	s110 Structure of brain	s1104 Structure of cerebellum	• Cerebellum

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Body structures	Structures of the nervous system	N/A	s110 Structure of brain	s1107 Structure of white matter	• Total unmyelinated white matter • Total early myelinated white matter • Cortical unmyelinated white matter • Prefrontal unmyelinated white matter • Frontal unmyelinated white matter • Parietal unmyelinated white matter • Occipital unmyelinated white matter • Right hemisphere unmyelinated white matter • Left hemisphere unmyelinated white matter • Corpus Callosum
Body structures	Structures of the nervous system	N/A	s110 Structure of brain	s1108 Structure of brain, other specified	• Cortical grey matter • Cortical surface area • Cortical thickness • Intracranial volume • Lateral Ventricles • Left hemisphere grey matter • Left hemisphere total • Right hemisphere grey matter • Right hemisphere total • Subcortical grey matter • Total cerebrospinal fluid • Total grey matter

eTable 6 (Continued)

ICF-CY component	ICF-CY domain	ICF-CY first level item	ICF-CY second level item (category)	ICF-CY third-level item (sub-category)	Phenotypes (as labeled in included publications)
Uncategorized	N/A	N/A	N/A	N/A	• Autistic-like traits • Alpha frequency during darkness • Atypical index • Autonomy • Cosleeping • Distress to novelty • Dysregulation • General temperament • Love for father • Love for mother • Motor activity during social stimuli • Non-social autistic-like traits • Passiveness • Restrictive repetitive behavior • Rhythmicity • Self-contact/comfort during social stimuli • Spectral amplitude during darkness • Testosterone

eTable 7. Estimates and Cohorts in Phenotypic Categories by Rater

ICF-CY category	Rater	k_{cohort} [a]	$k_{estimate}$ [b]	$\%_{estimate}$
b134 Sleep	Parent	6	43	87.76
	Observer	0	0	0.00
	Other	2	6	12.24
b140 Attention	Parent	6	33	18.86
	Observer	4	66	37.71
	Other	1	76	43.43
b147 Psychomotor	Parent	10	45	29.80
	Observer	5	84	55.63
	Other	3	22	14.57
b152 Emotional	Parent	11	90	41.67
	Observer	6	114	52.78
	Other	2	12	5.56
b163 Basic cognitive	Parent	1	7	14.89
	Observer	4	40	85.11
	Other	0	0	0.00
b167 Language	Parent	5	38	39.58
	Observer	1	58	60.42
	Other	0	0	0.00
b560 Growth	Parent	0	0	0.00
	Observer	0	0	0.00
	Other	24	465	100.00
d710 Basic interpersonal	Parent	11	136	38.20
	Observer	7	202	56.74
	Other	2	18	5.06
d720 Complex interpersonal	Parent	8	59	80.82
	Observer	1	4	5.48
	Other	1	10	13.70
d760 Family relationships	Parent	3	17	58.62
	Observer	3	10	34.48
	Other	1	2	6.90
Total	Parent	22	468	28.24
	Observer	12	578	34.88
	Other	27	611	36.87

[a] k_{cohort} = number of independent twin cohorts.

[b] $k_{estimate}$ = number of estimates (twin correlations).

eTable 8. Multilevel Random Effects Models of Phenotypic Subcategories

ICF-CY sub-category	k_{cohort} [a]	$k_{estimate}$ [b]	n_{MZ} [c]	n_{DZ} [d]	r_{MZ} [e] pooled	r_{MZ} 95% CI [f]	r_{DZ} [g] pooled	r_{DZ} 95% CI	h^2 [h] pooled	h^2 95% CI	$h^2 p$ [i]	c^2 [j] pooled	c^2 95% CI	$c^2 p$	e^2 [k] pooled	e^2 95% CI	$e^2 p$	I^2 [l] Level 1 [m]	I^2 Level 2 [n]	I^2 Level 3 [o]
Sustaining attention	10	101	3007	6135	.62	.49–.75	.37	.24–.50	.50	.14–.75	.007	.12	0–.41	.424	.38	.25–.51	<.001	6.53	42.17	51.30
Psychomotor control	11	83	3059	6287	.62	.48–.76	.29	.15–.43	.61	.26–.75	.001	.00	0–.27	1.000	.39	.26–.51	<.001	3.93	18.92	77.15
Organization of psychomotor	6	68	1022	1620	.79	.70–.88	.54	.45–.64	.49	.22–.76	<.001	.29	.08–.51	.006	.21	.12–.30	<.001	1.77	43.00	55.23
Regulation of emotion	10	48	980	1692	.53	.41–.65	.33	.20–.45	.41	.07–.66	.016	.12	0–.39	.379	.47	.35–.59	<.001	16.31	13.02	70.67
Range of emotion	11	168	1514	3271	.59	.49–70	.38	.28–.49	.42	.13–.69	.005	.17	0–.41	.153	.41	.30–.51	<.001	5.19	71.82	23.00
Expression of language	5	46	2244	2864	.86	.75–.98	.73	.61–.84	.27	0–.59	.099	.59	.34–.85	<.001	.14	.03–.25	<.001	0.21	58.26	41.53
Respect and warmth	7	39	3078	6131	.63	.45–.80	.53	.35–.70	.20	0–.69	.405	.42	.04–.69	.028	.37	.20–.53	.015	0.52	81.71	17.78
Social cues	15	285	1983	4030	.58	.46–.70	.38	.26–.50	.41	.06–.70	.021	.18	0–.46	.207	.42	.30–.54	<.001	2.20	20.69	77.10
Regulating behaviors	6	43	1056	2385	.72	.58–.87	.43	.28–.58	.58	.18–.87	.004	.14	0–.47	.393	.28	.14–.42	<.001	2.47	36.86	60.67
Social rules	9	30	3173	5070	.72	.60–.83	.56	.45–.68	.31	0–.63	.052	.41	.16–.66	.001	.28	.18–.39	<.001	1.93	0.00	98.07

[a] k_{cohort} = number of independent twin cohorts.
[b] $k_{estimate}$ = number of estimates (twin correlations).
[c] n_{MZ} = number of monozygotic (MZ) twin pairs.
[d] n_{DZ} = number of dizygotic (DZ) twin pairs.
[e] r_{MZ} = MZ twin correlation.
[f] $_{95\% CI}$ = 95% confidence interval.
[g] r_{DZ} = DZ twin correlation.
[h] h^2 = heritability.
[i] p = p-value
[j] c^2 = shared environment.
[k] e^2 = nonshared environment.
[l] I^2 = heterogeneity.
[m] $_{Level\ 1}$ = sampling variance.
[n] $_{Level\ 2}$ = within-cohort variance in outcome measurement.
[o] $_{Level\ 3}$ = between-cohort variance.

eTable 9. Multilevel Random Effects Models of Parent and Observer Ratings of 3 Phenotypic Categories

ICF-CY category and rater	k_{cohort} [a]	$k_{estimate}$ [b]	n_{MZ} [c]	n_{DZ} [d]	r_{MZ} [e] pooled	r_{MZ} 95% CI [f]	r_{DZ} [g] pooled	r_{DZ} 95% CI	h^2 [h] pooled	h^2 95% CI	h^2p [i]	c^2 [j] pooled	c^2 95% CI	c^2p	e^2 [k] pooled	e^2 95% CI	e^2p	I^2 [l] Level 1 [m]	I^2 Level 2 [n]	I^2 Level 3 [o]
Psychomotor (obs [p])	5	84	503	588	0.55	.37–.74	0.38	.20–.56	0.35	0–.74	.182	0.21	0–.57	.313	0.45	.27–.63	<.001	7.84	45.02	47.14
Psychomotor (par [q])	10	45	2862	5732	0.69	.52–.85	0.30	.13–.47	0.67	.30–.82	.001	0.00	0–.29	1.000	0.33	.19–.47	<.001	0.88	2.92	96.20
Emotional (obs)	6	114	793	1261	0.40	.27–.53	0.26	.13–.39	0.28	0–.53	.129	0.12	0–.40	.391	0.60	.47–.73	<.001	16.49	43.14	40.38
Emotional (par)	11	90	1579	3492	0.67	.60–.74	0.42	.35–.49	0.49	.28–.71	<.001	0.17	.01–.35	.033	0.33	.26–.40	<.001	5.69	94.31	0.00
Basic interpersonal (obs)	7	202	839	945	0.37	.25–.49	0.27	.15–.39	0.20	0–.50	.254	0.17	0–.40	.221	0.63	.51–.75	<.001	18.76	32.15	49.09
Basic interpersonal (par)	11	136	3518	7229	0.70	.57–.82	0.42	.29–.55	0.55	.19–.83	.002	0.15	0–.44	.307	0.30	.18–.43	<.001	1.21	32.18	66.61

[a] k_{cohort} = number of independent twin cohorts.
[b] $k_{estimate}$ = number of estimates (twin correlations).
[c] n_{MZ} = number of monozygotic (MZ) twin pairs.
[d] n_{DZ} = number of dizygotic (DZ) twin pairs.
[e] r_{MZ} = MZ twin correlation.
[f] $_{95\%\ CI}$ = 95% confidence interval.
[g] r_{DZ} = DZ twin correlation.
[h] h^2 = heritability.
[i] p = p-value
[j] c^2 = shared environment.
[k] e^2 = nonshared environment.
[l] I^2 = heterogeneity.
[m] $_{Level\ 1}$ = sampling variance.
[n] $_{Level\ 2}$ = within-cohort variance in outcome measurement.
[o] $_{Level\ 3}$ = between-cohort variance.
[p] obs = observer rated.
[q] par = parent rated.

eTable 10. Tests for Publication Bias on Twin Correlations by Phenotype Category

	Egger's r_{MZ}[a]			Egger's r_{DZ}[b]		
ICF-CY category	$k_{estimate}$[c]	*z*	*p*	$k_{estimate}$	*z*	*p*
b134 Sleep	24	-10.38	< .001	25	-3.55	< .001
b140 Attention	86	-8.51	< .001	89	-1.88	.061
b147 Psychomotor	75	-11.20	< .001	76	-4.17	< .001
b152 Emotional	105	-10.68	< .001	111	-4.76	< .001
b163 Basic cognitive	23	-6.26	< .001	24	-7.24	< .001
b167 Language	48	-22.50	< .001	48	-15.36	< .001
b560 Growth	216	-7.77	< .001	249	-4.78	< .001
d710 Basic interpersonal	174	-11.55	< .001	182	-10.05	< .001
d720 Complex interpersonal	34	-7.07	< .001	39	-3.40	< .001
d760 Family relationships	14	-4.84	< .001	15	-1.86	.062

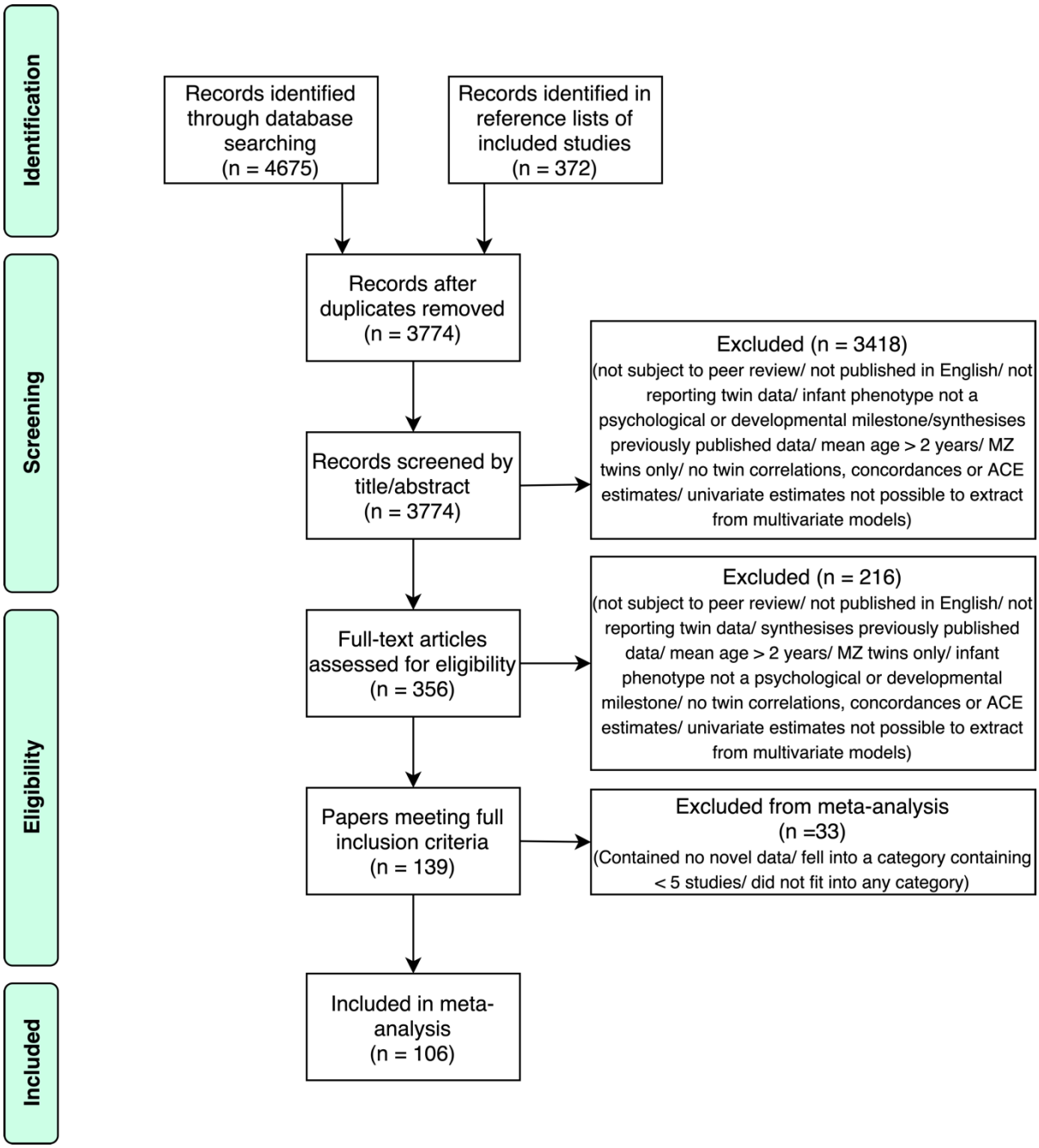
[a] Egger's rMZ = Egger's test on monozygotic twin correlations.
[b] Egger's rMZ = Egger's test on dizygotic twin correlations.
[c] $k_{estimate}$ = number of estimates (twin correlations).

eTable 11. Tests for Publication Bias on Phenotype Categories by Variance Component in Phenotype Categories With ≥10 Estimates[a]

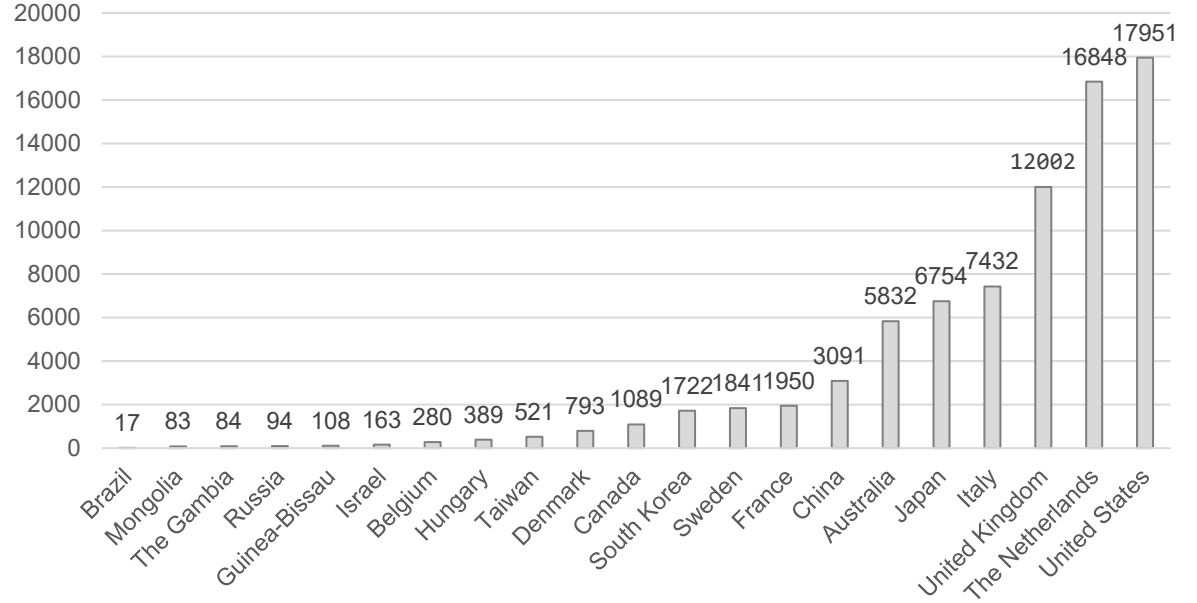
ICF-CY category	$k_{estimate}$[e]	Egger's h^{2}[b]		Egger's c^{2}[c]		Egger's e^{2}[d]	
		z	*p*	*z*	*p*	*z*	*p*
b134 Sleep	20	-1.80	.072	-3.62	< .001	-0.78	.438
b140 Attention	12	-1.12	.264	-0.84	.402	-2.10	.036
b147 Psychomotor	15	-5.26	< .001	-3.73	< .001	0.68	.494
b152 Emotional	20	-3.07	.002	-2.67	.008	-1.04	.297
b560 Growth	90	-0.87	.385	-5.64	< .001	-1.07	.285
d710 Basic interpersonal	41	-2.47	.013	-8.40	< .001	-2.21	.027
d720 Complex interpersonal	15	-3.07	.002	-5.52	< .001	-1.65	.099

[a] Because many studies only reported twin correlations, and not h^2, c^2 and e^2 estimates, the number of estimates included in the Egger's tests of h^2, c^2 and e^2 was smaller for all phenotypic categories than the number of estimates included in Egger's tests of twin correlations. There were too few estimates (< 10 estimates) to meet our criteria to create funnel plots or run Egger's tests on estimates of h^2, c^2 and e^2 for 'basic cognitive functions', 'mental functions of language' and 'family relationships'.
[b] Egger's h^2 = Egger's test on heritability estimates.
[c] Egger's c^2 = Egger's test on shared environment estimates.
[d] Egger's e^2 = Egger's test on nonshared environment estimates.
[e] $k_{estimate}$ = number of estimates (twin correlations).

eFigure 1. Prisma Flow Diagram

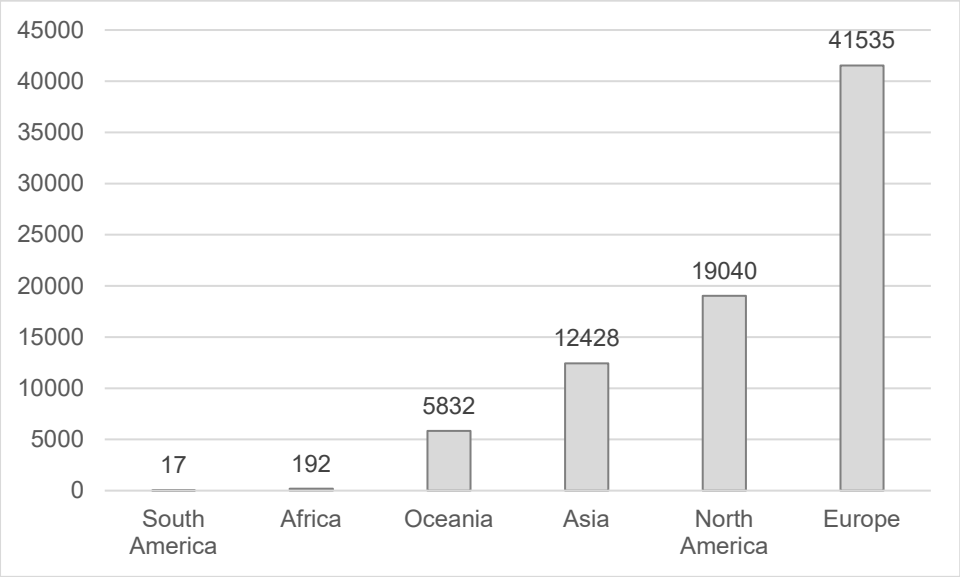


eFigure 2. Bar Chart of Number of Twin[a] Pairs by Country



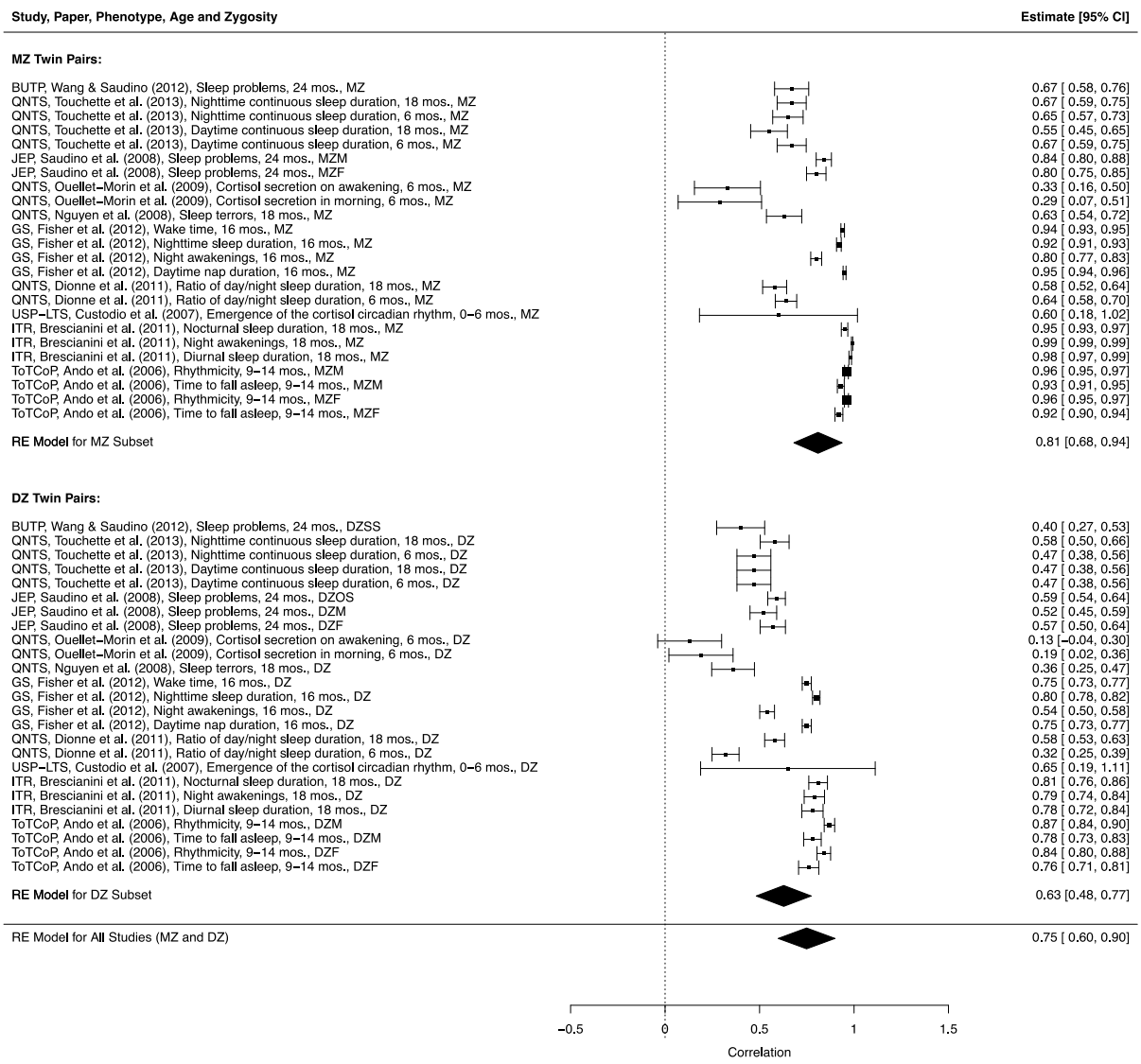
[a] Total number of twin pairs = 79,044

eFigure 3. Bar Chart of Number of Twin[a] Pairs by Continent

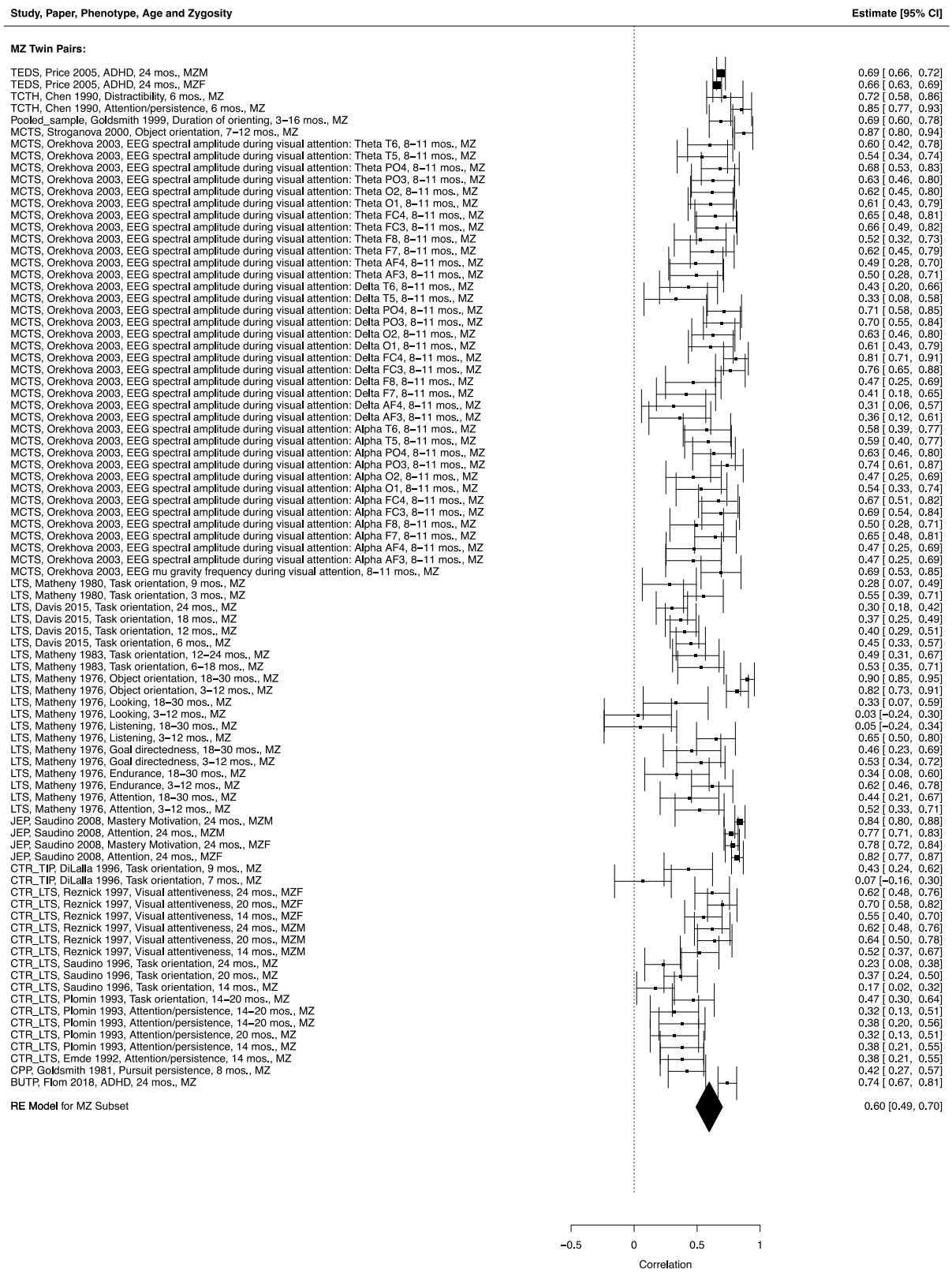


[a] Total number of twin pairs = 79,044

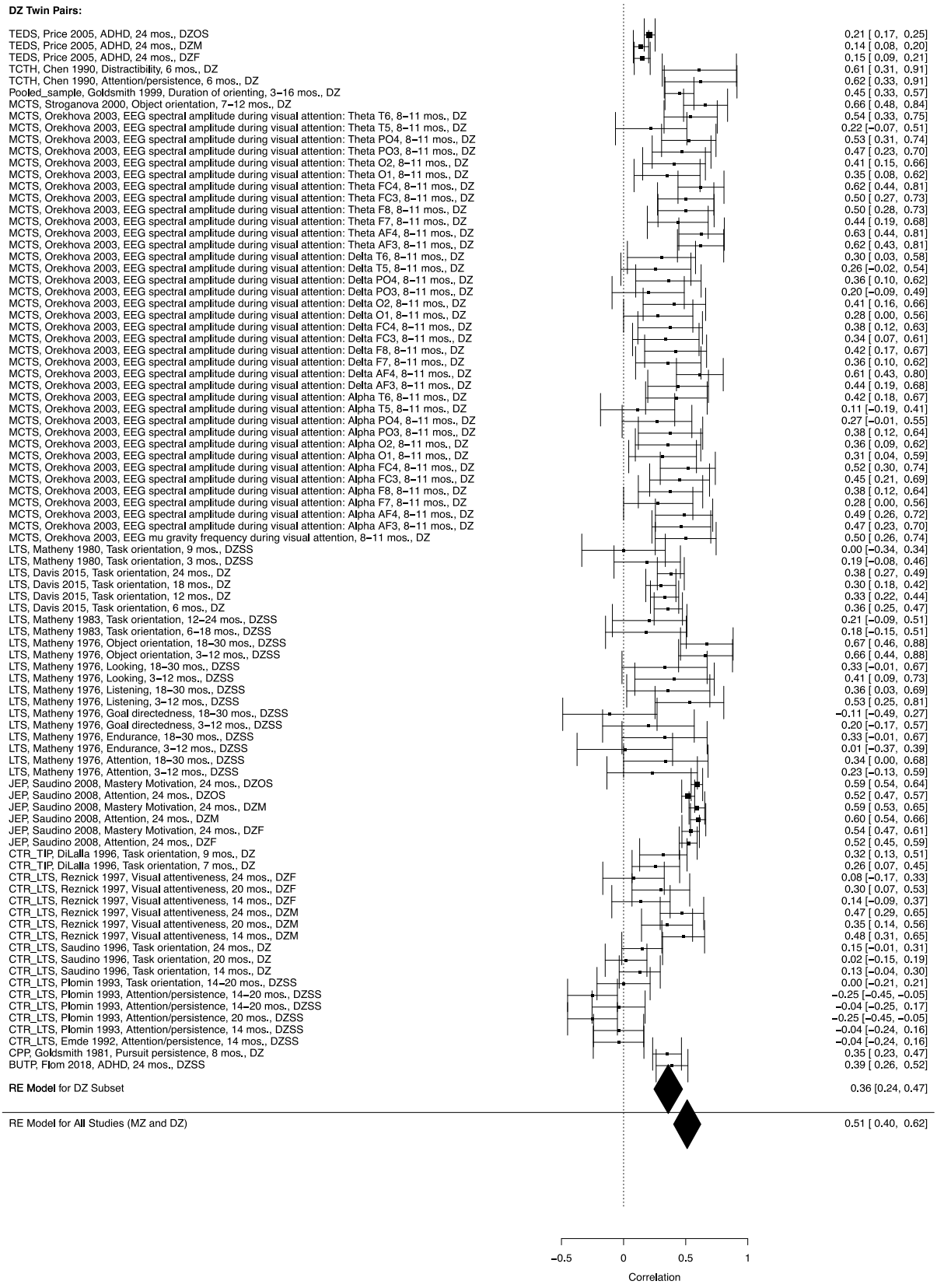
eFigure 4. Sleep Functions Forest Plot



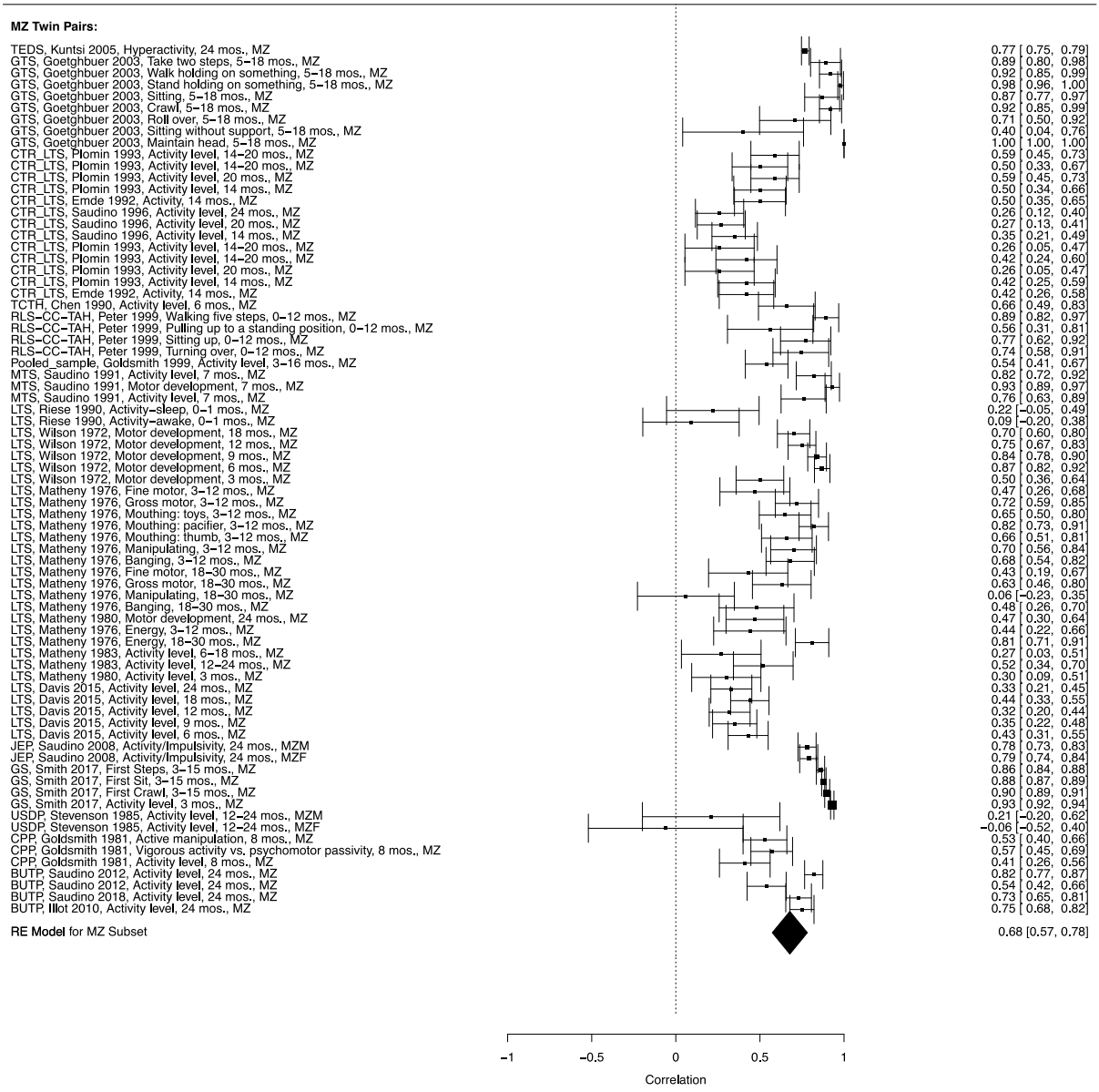
eFigure 5. Attention Functions Forest Plot



eFigure 5 (Continued)



eFigure 6. Psychomotor Functions Forest Plot



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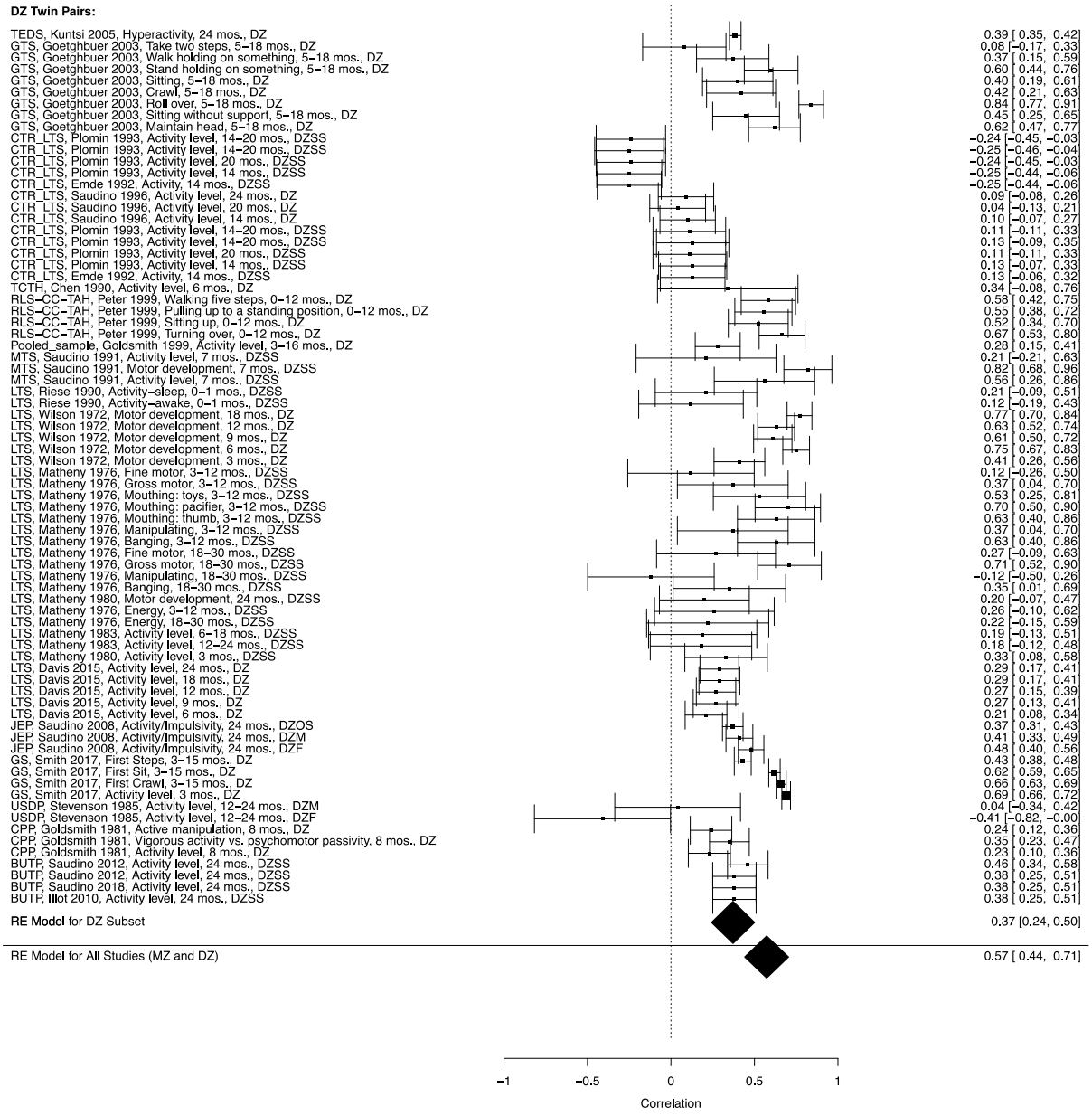
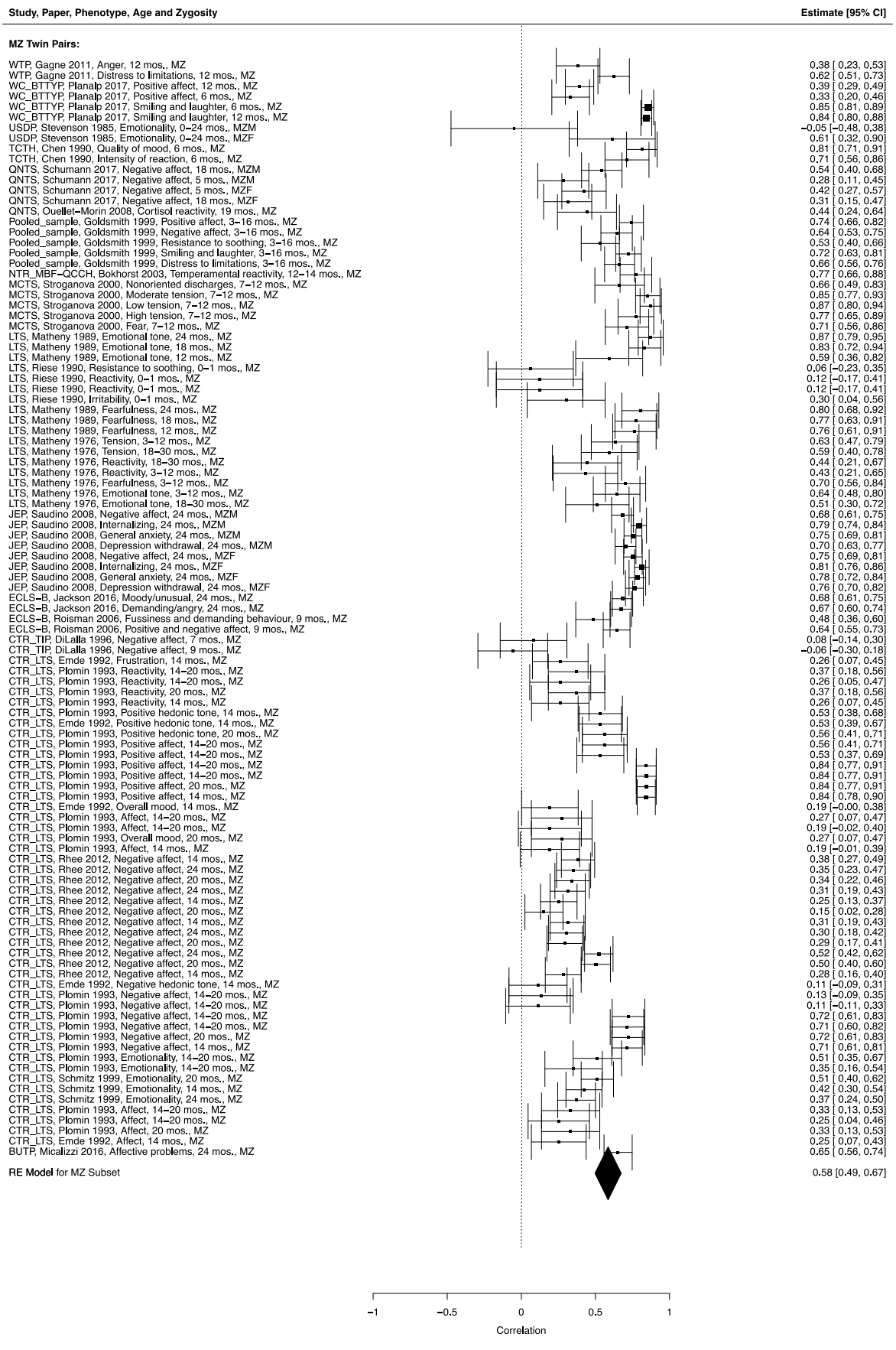


eFigure 7. Emotional Functions Forest Plot



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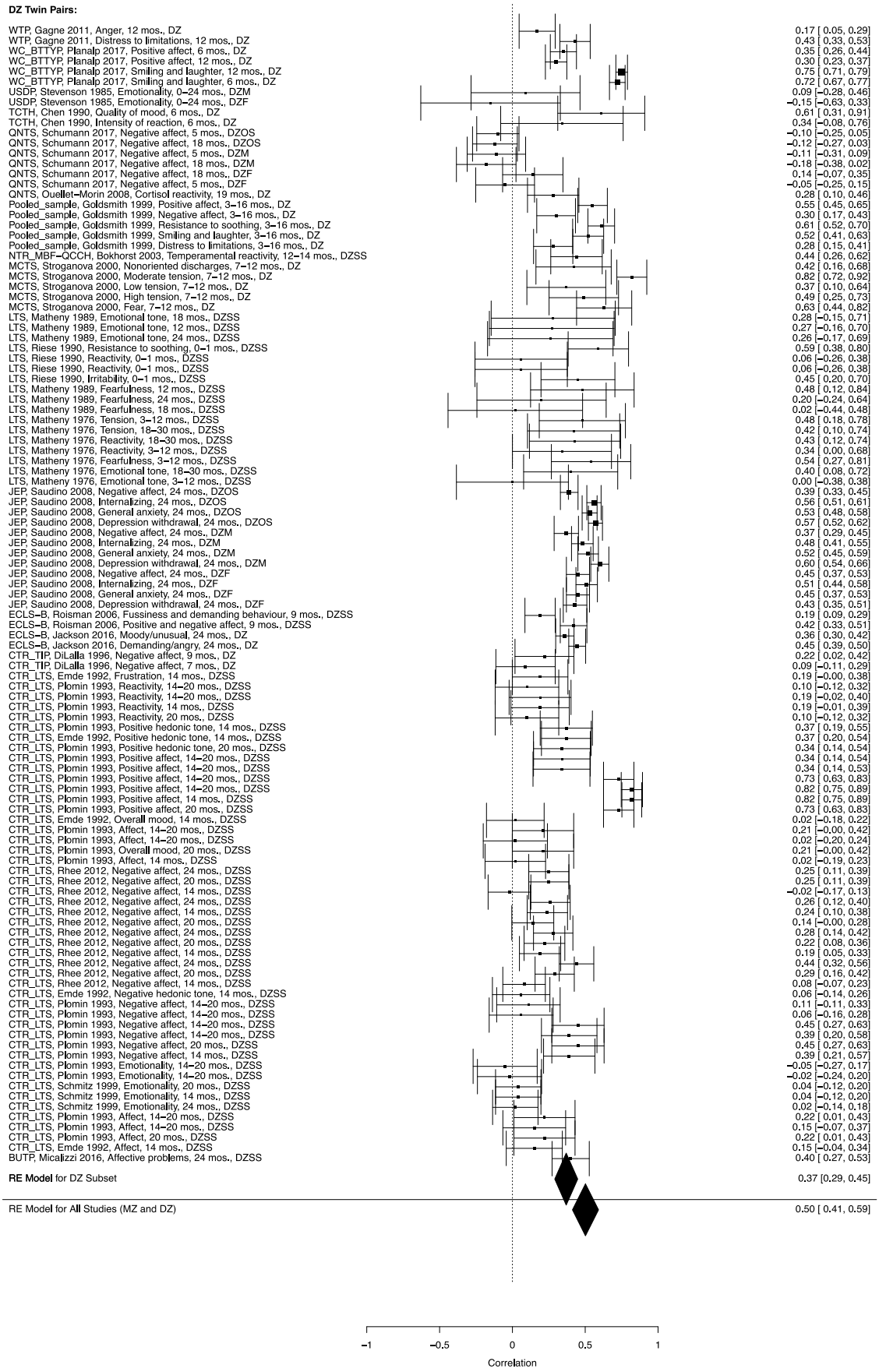
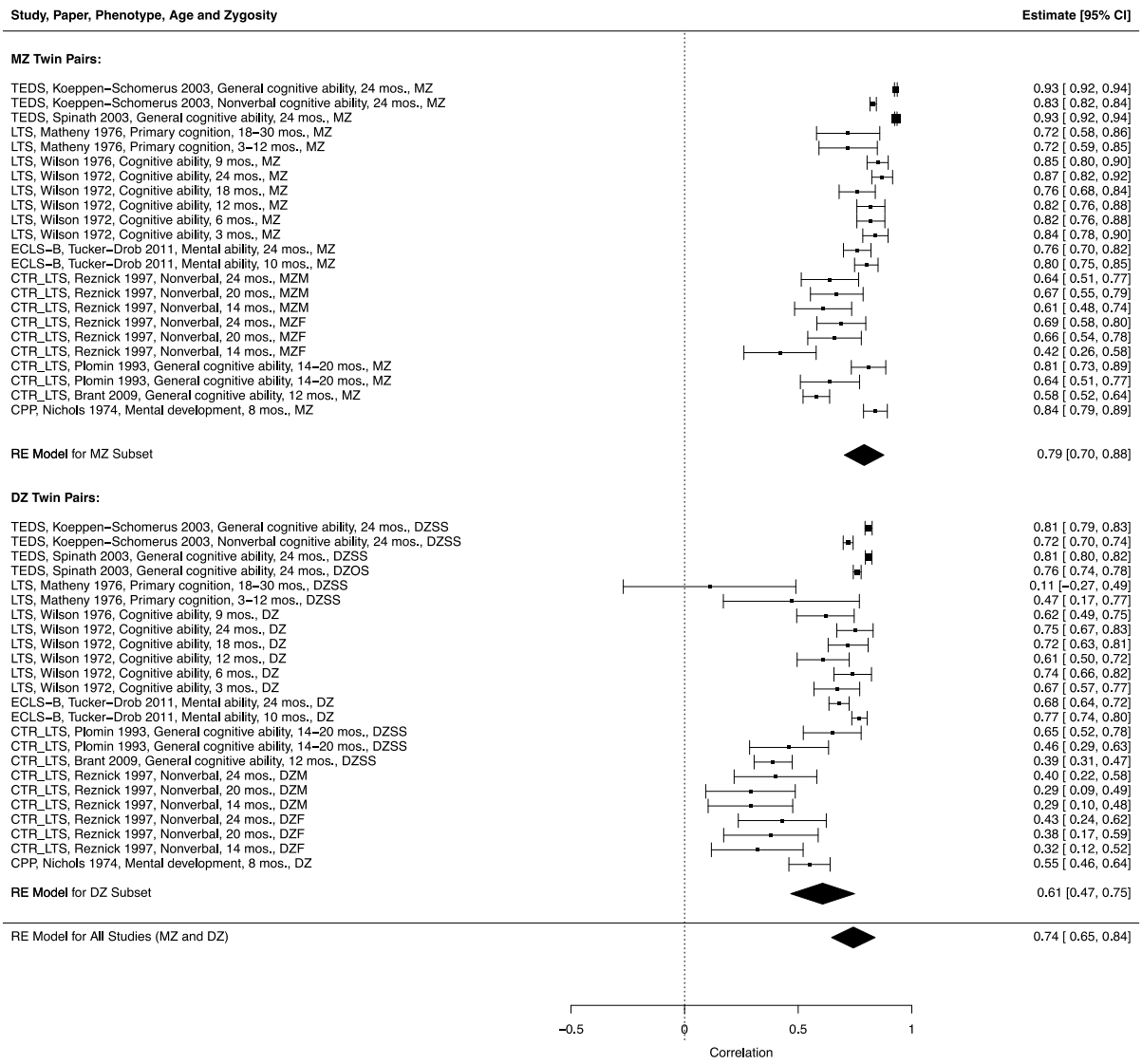
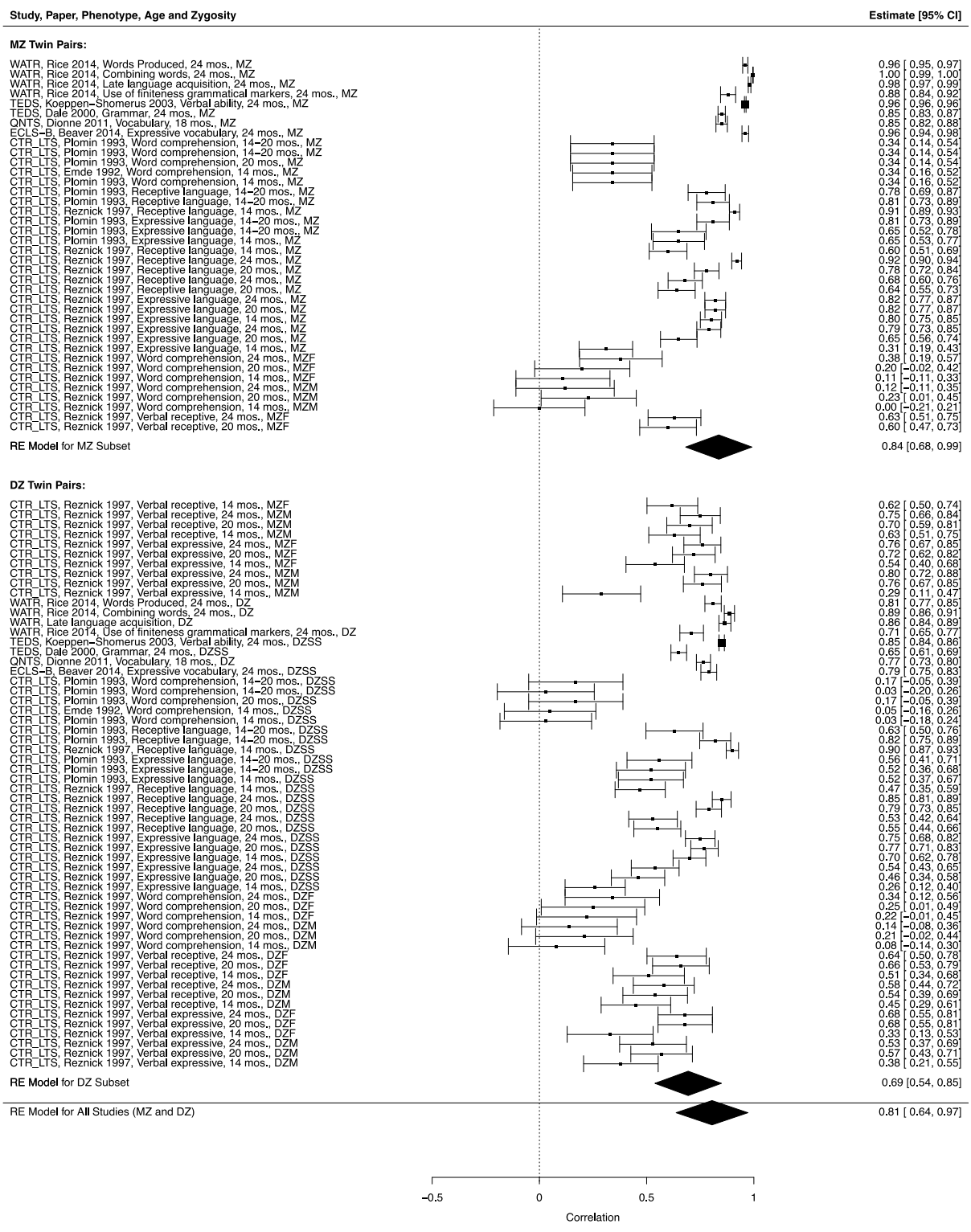


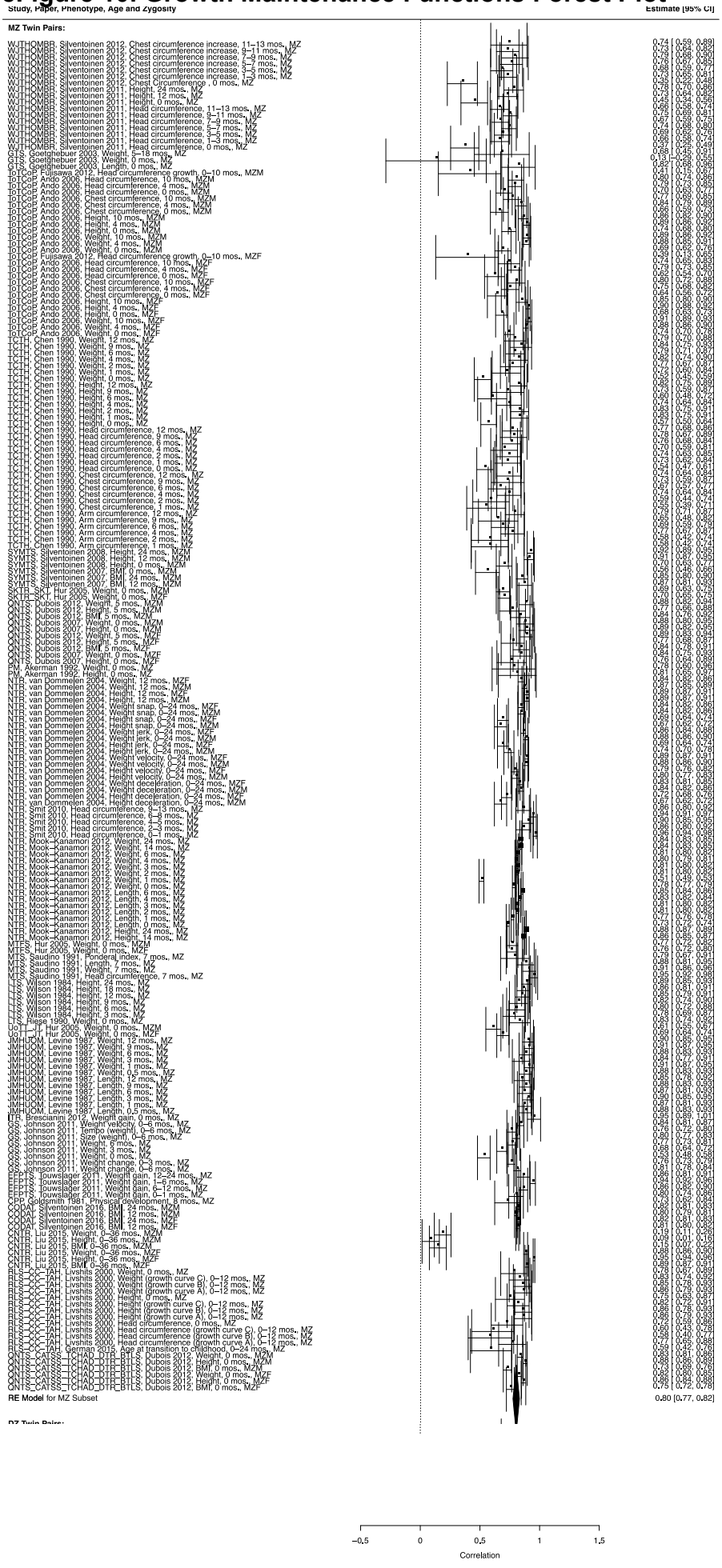
eFigure 8. Basic Cognitive Functions Forest Plot

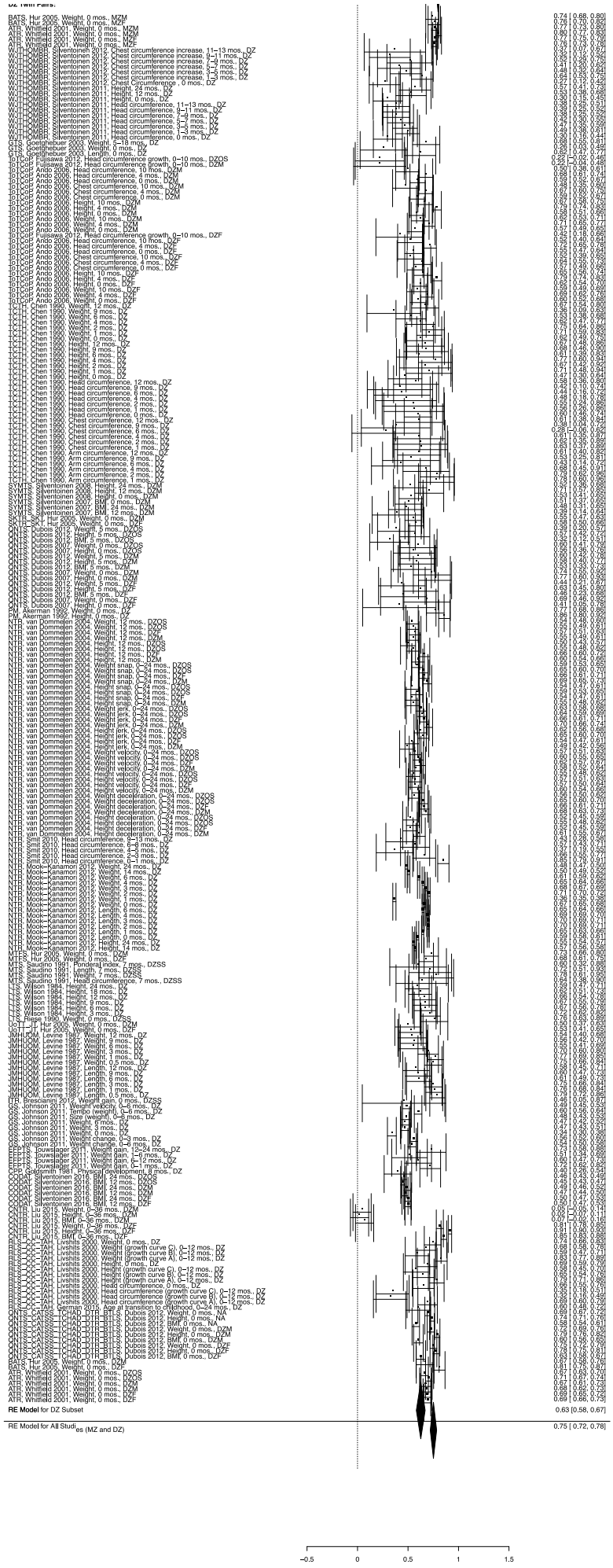


eFigure 9. Mental Functions of Language Forest Plot

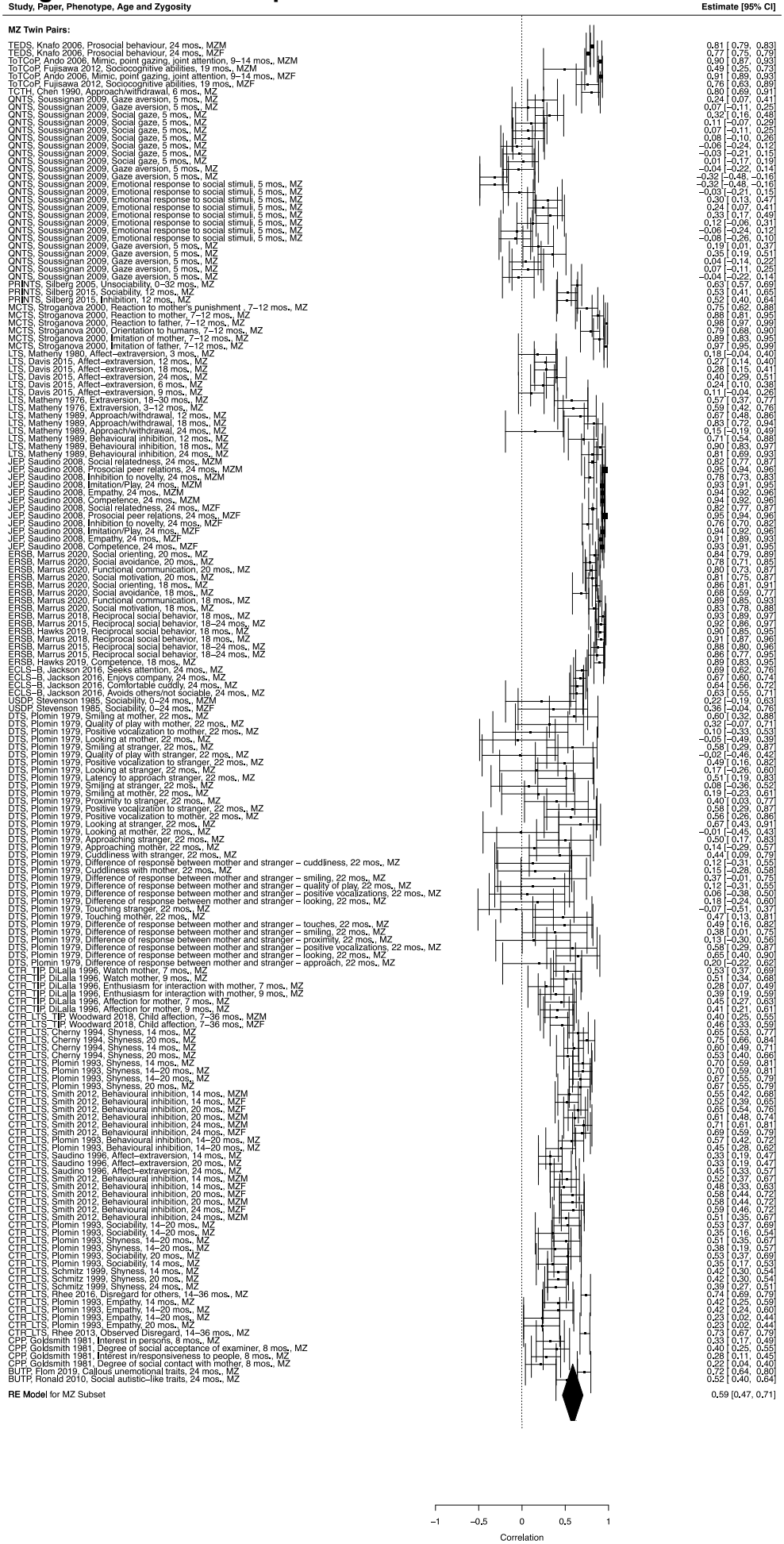


eFigure 10. Growth Maintenance Functions Forest Plot

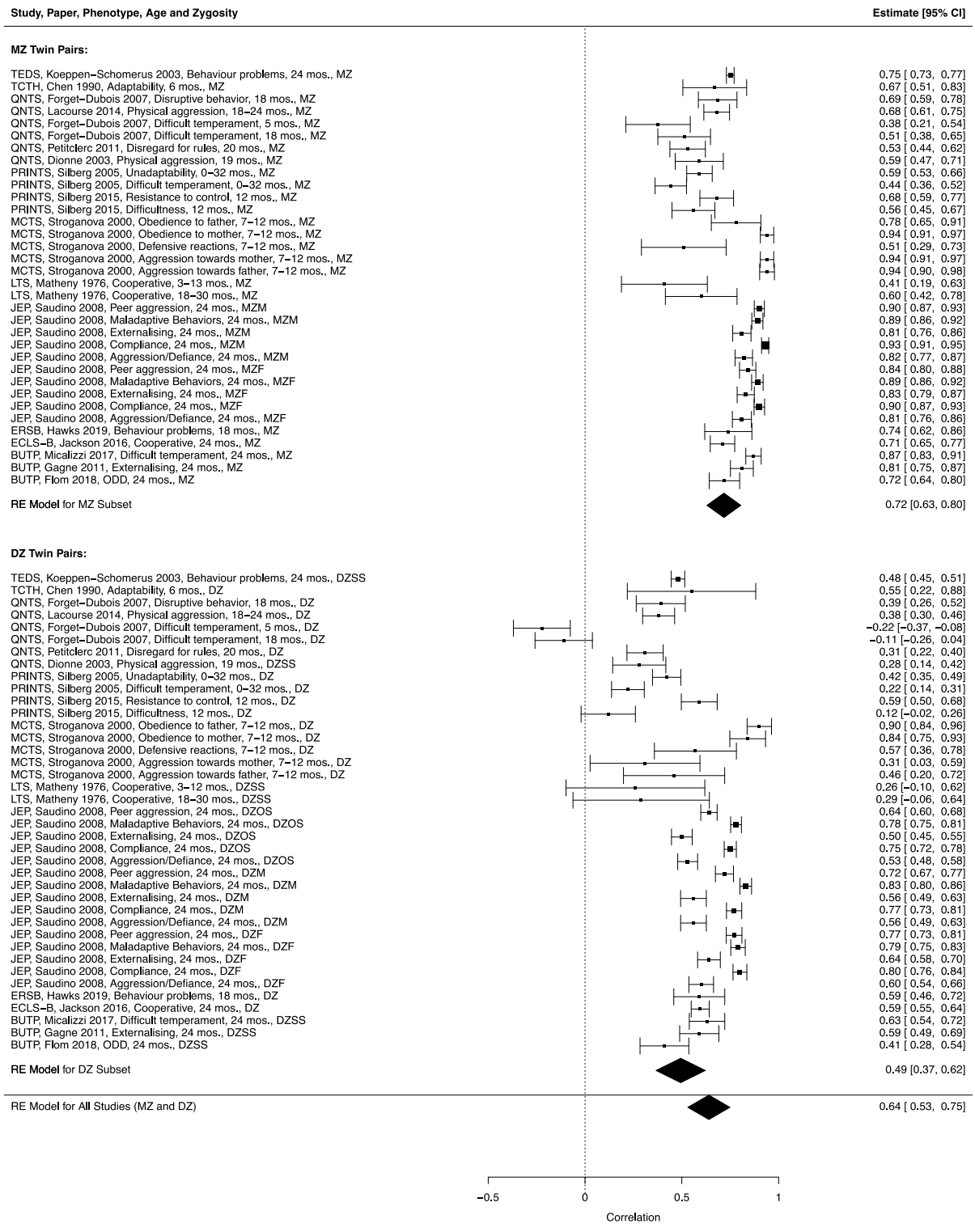




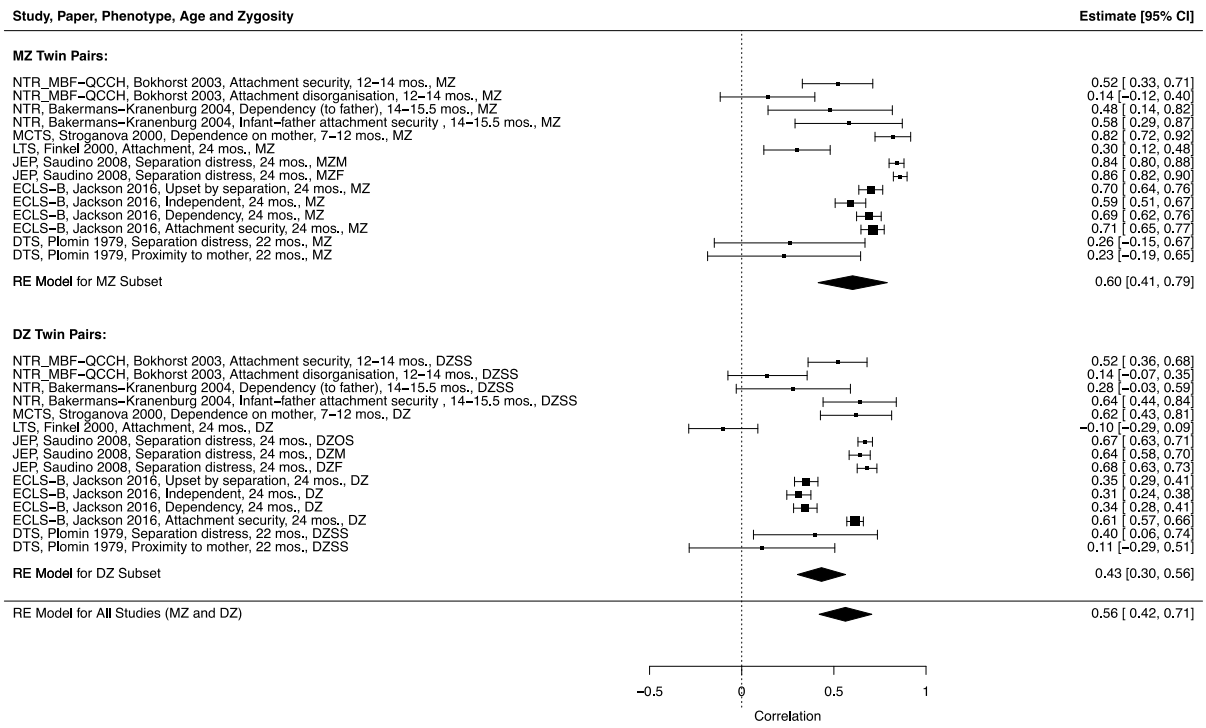
eFigure 11. Basic Interpersonal Interactions Forest Plot



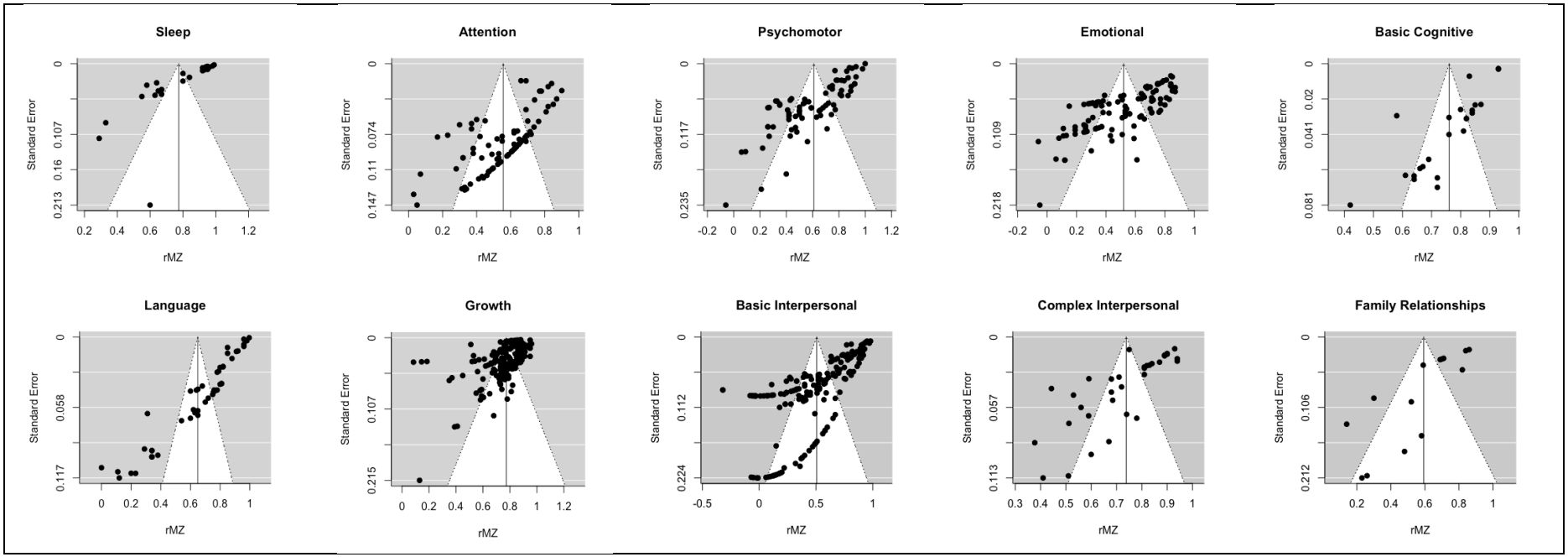
eFigure 12. Complex Interpersonal Interactions Forest Plot



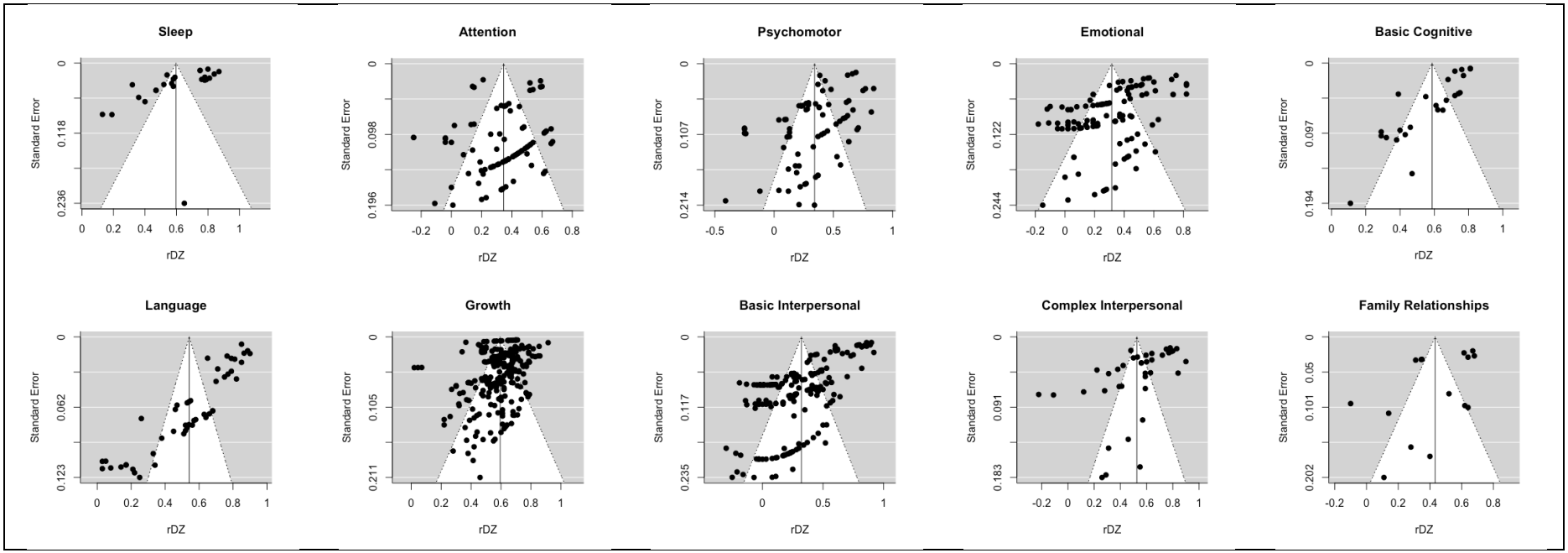
eFigure 13. Family Relationships Forest Plot



eFigure 14. Funnel Plots of Association Between Monozygotic Twin Correlation and Standard Error in Phenotype Categories With ≥10 Estimates

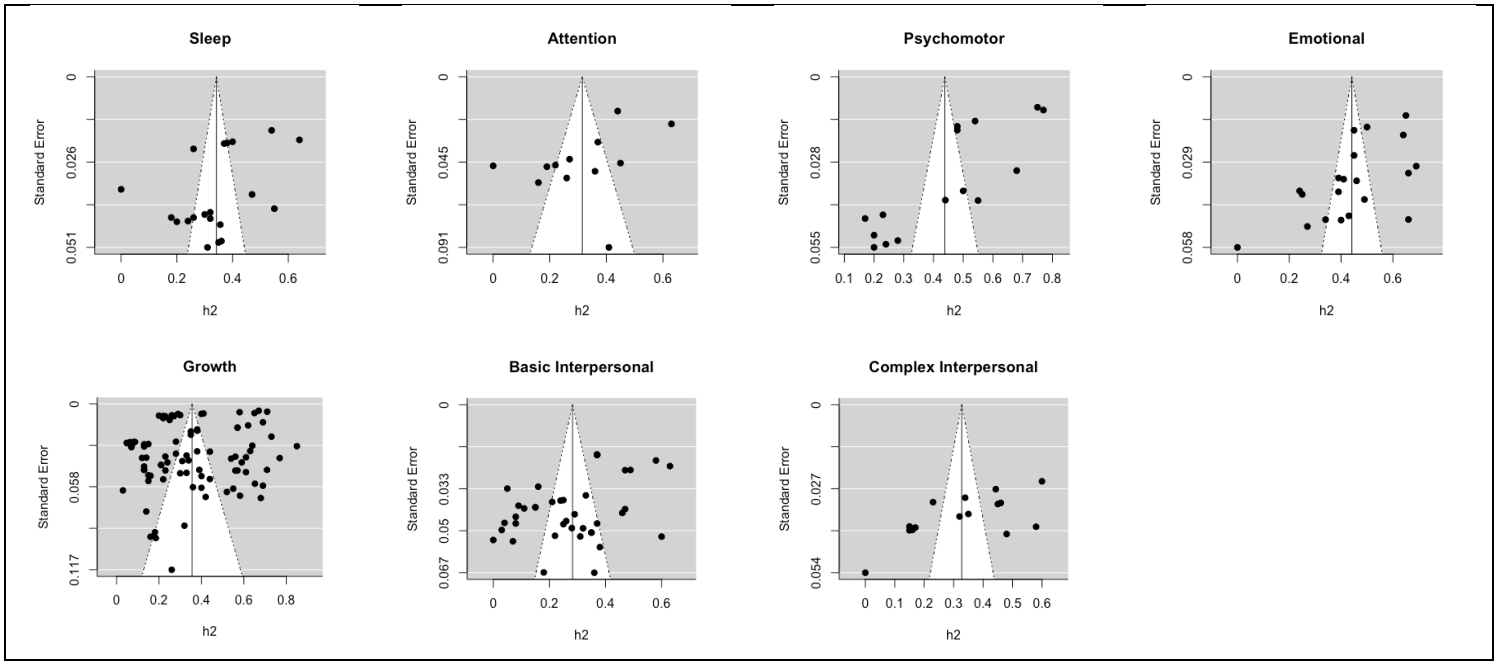


eFigure 15. Funnel Plots of Association Between Dizygotic Twin Correlation and Standard Error in Phenotype Categories With ≥10 Estimates

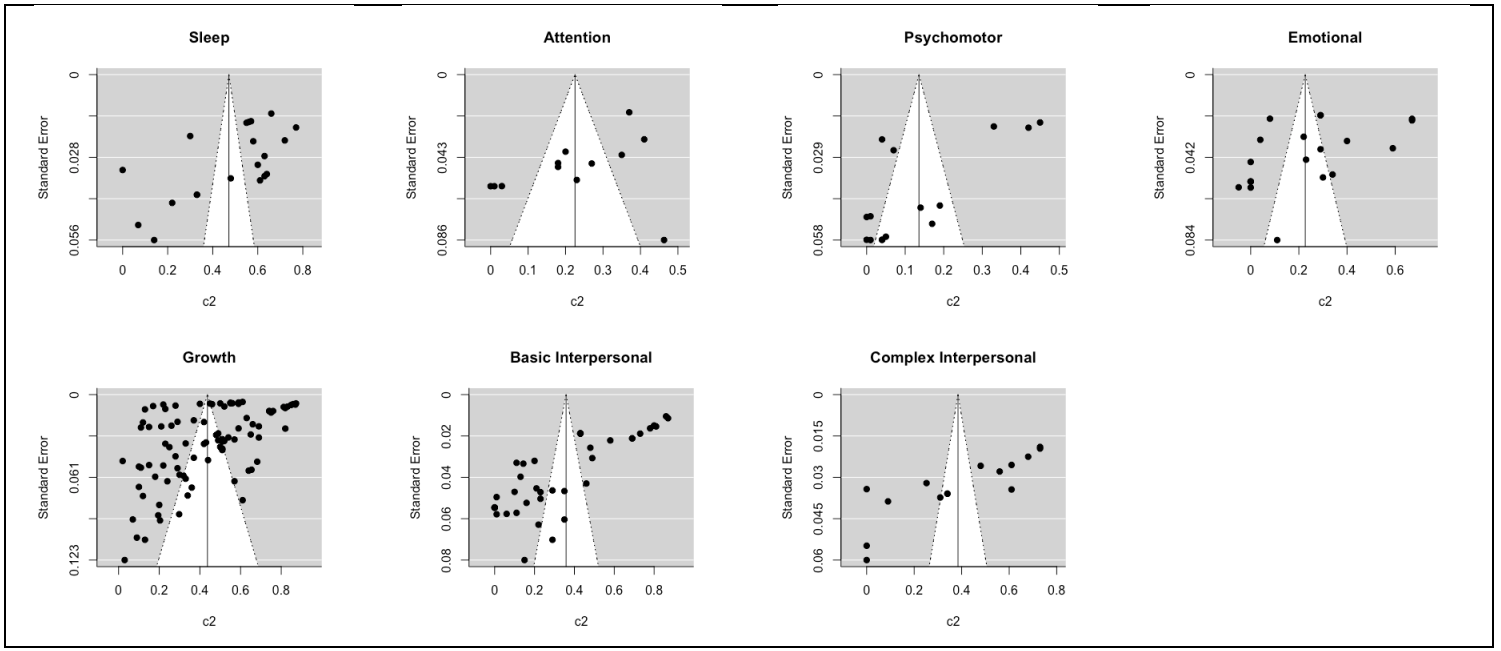


Note. r_{DZ} = dizygotic twin correlation

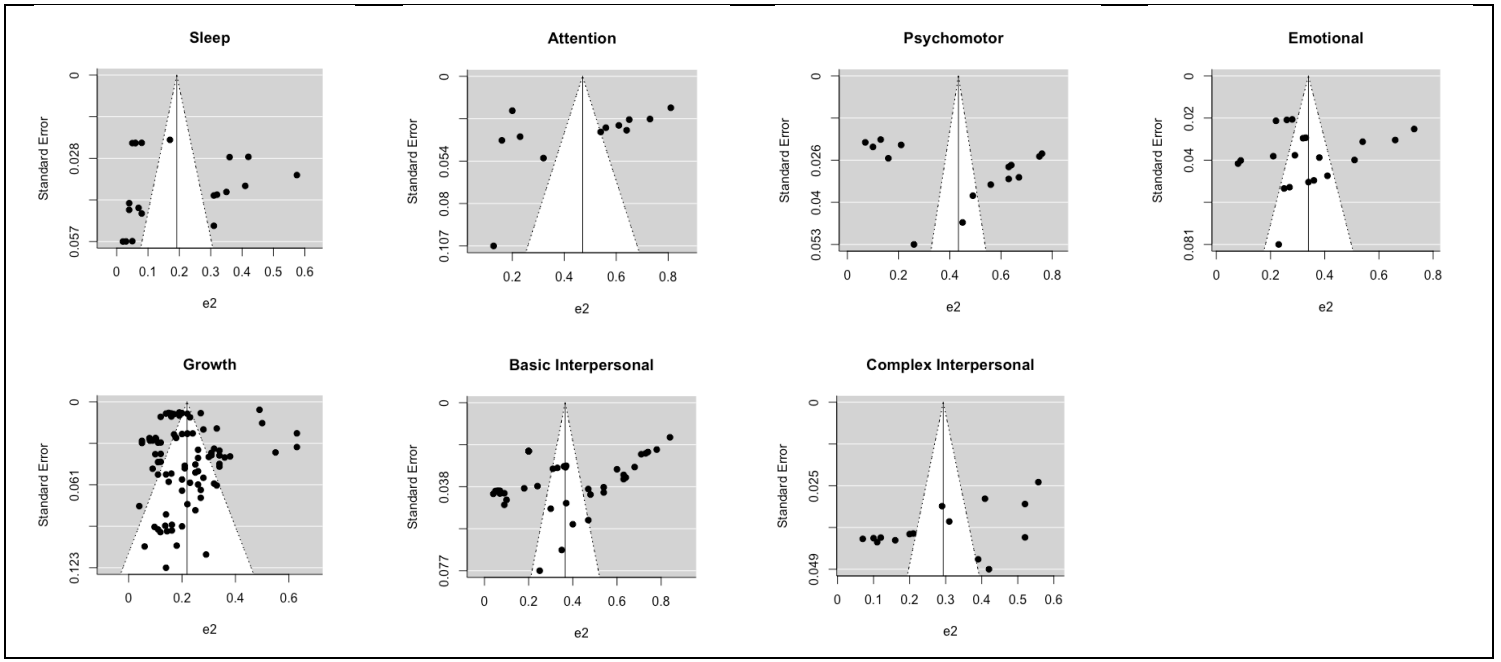
eFigure 16. Funnel Plots of Association Between Heritability and Standard Error in Phenotype Categories With ≥10 Estimates



eFigure 17. Funnel Plots of Association Between Shared Environment and Standard Error in Phenotype Categories With ≥10 Estimates

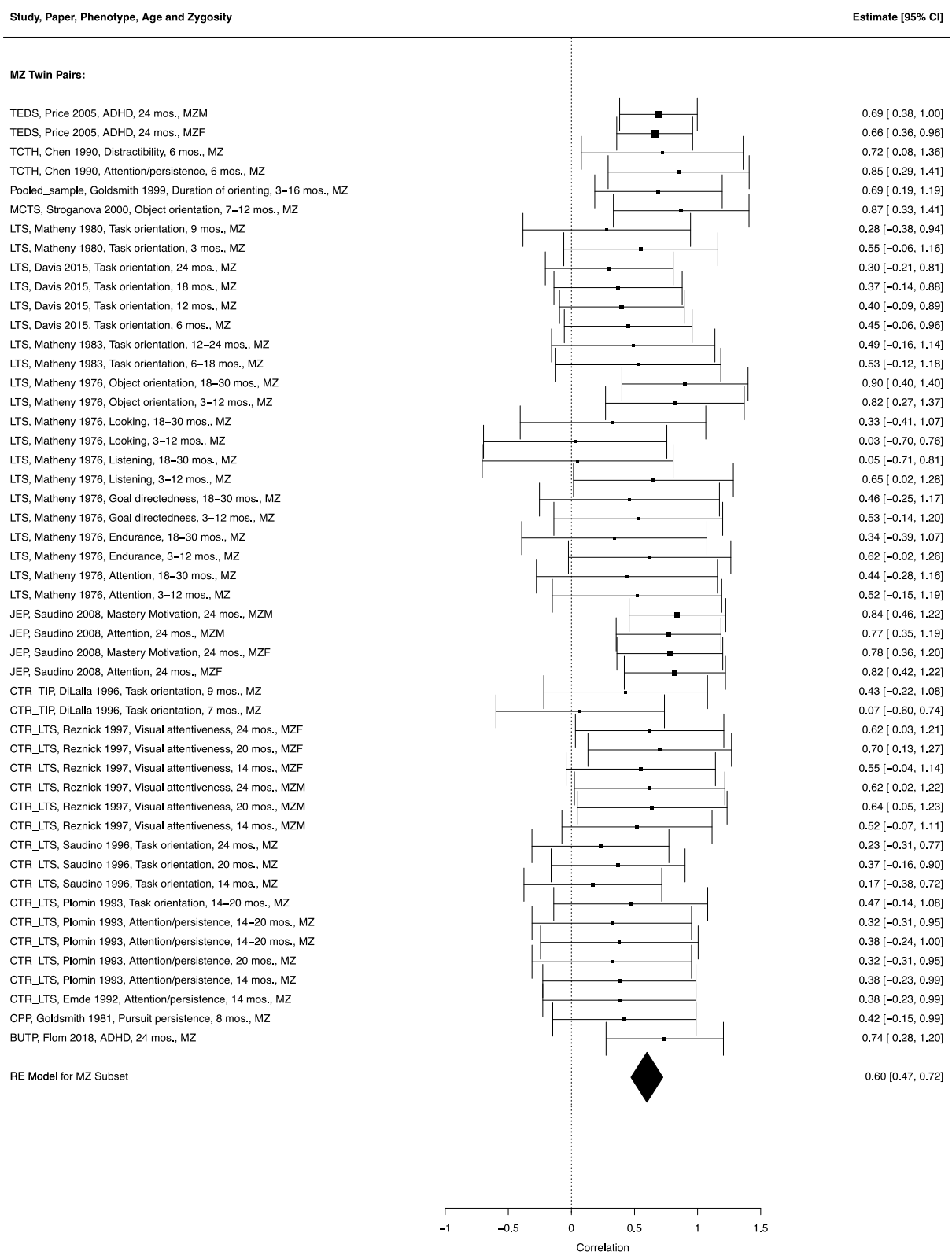


eFigure 18. Funnel Plots of Association Between Nonshared Environment and Standard Error in Phenotype Categories With ≥10 Estimates



eFigure 19. Bar Plot of Quality Assessment Scores

eFigure 20. Sustaining Attention Forest Plot



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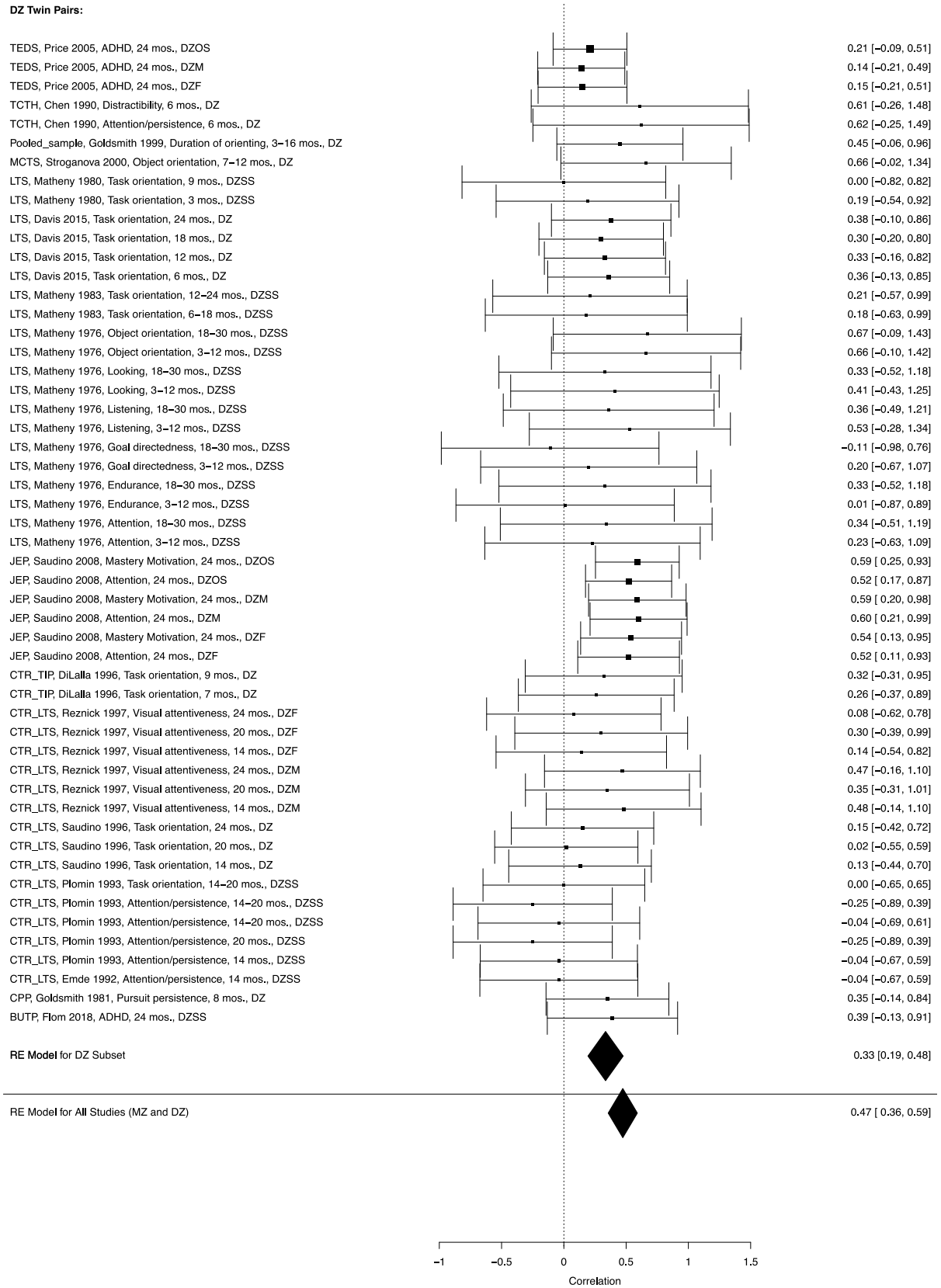
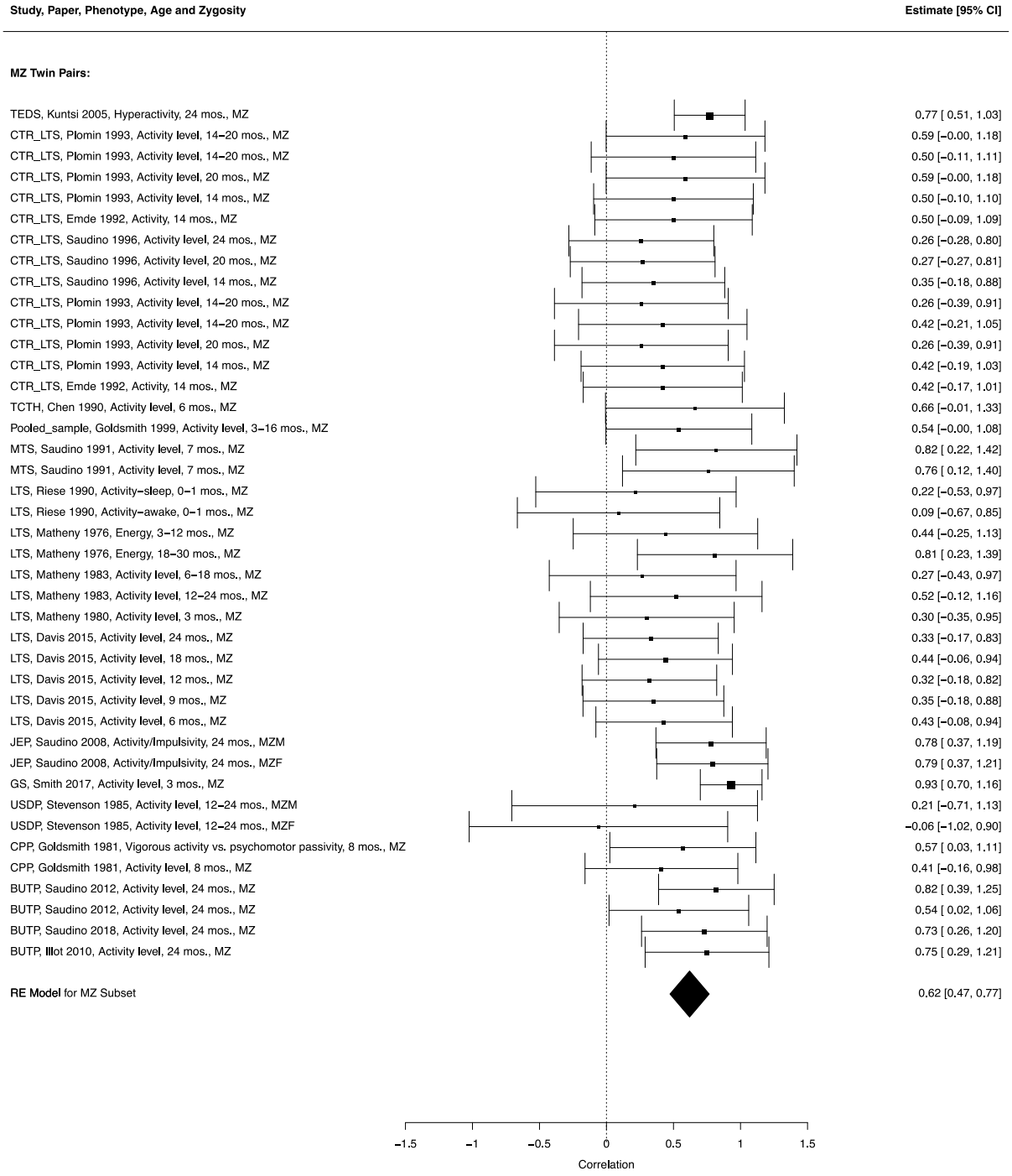


eFigure 21. Psychomotor Control Forest Plot



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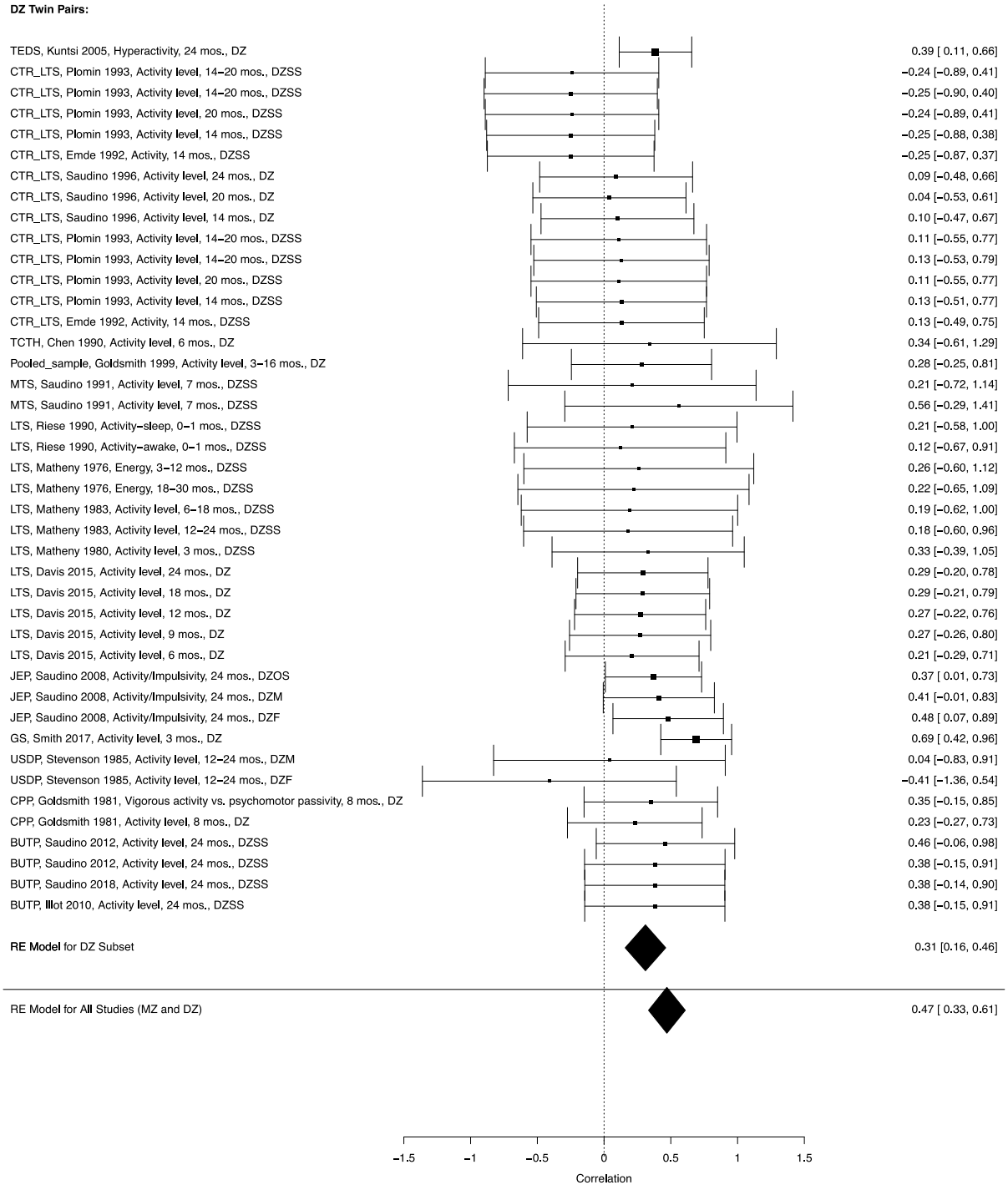
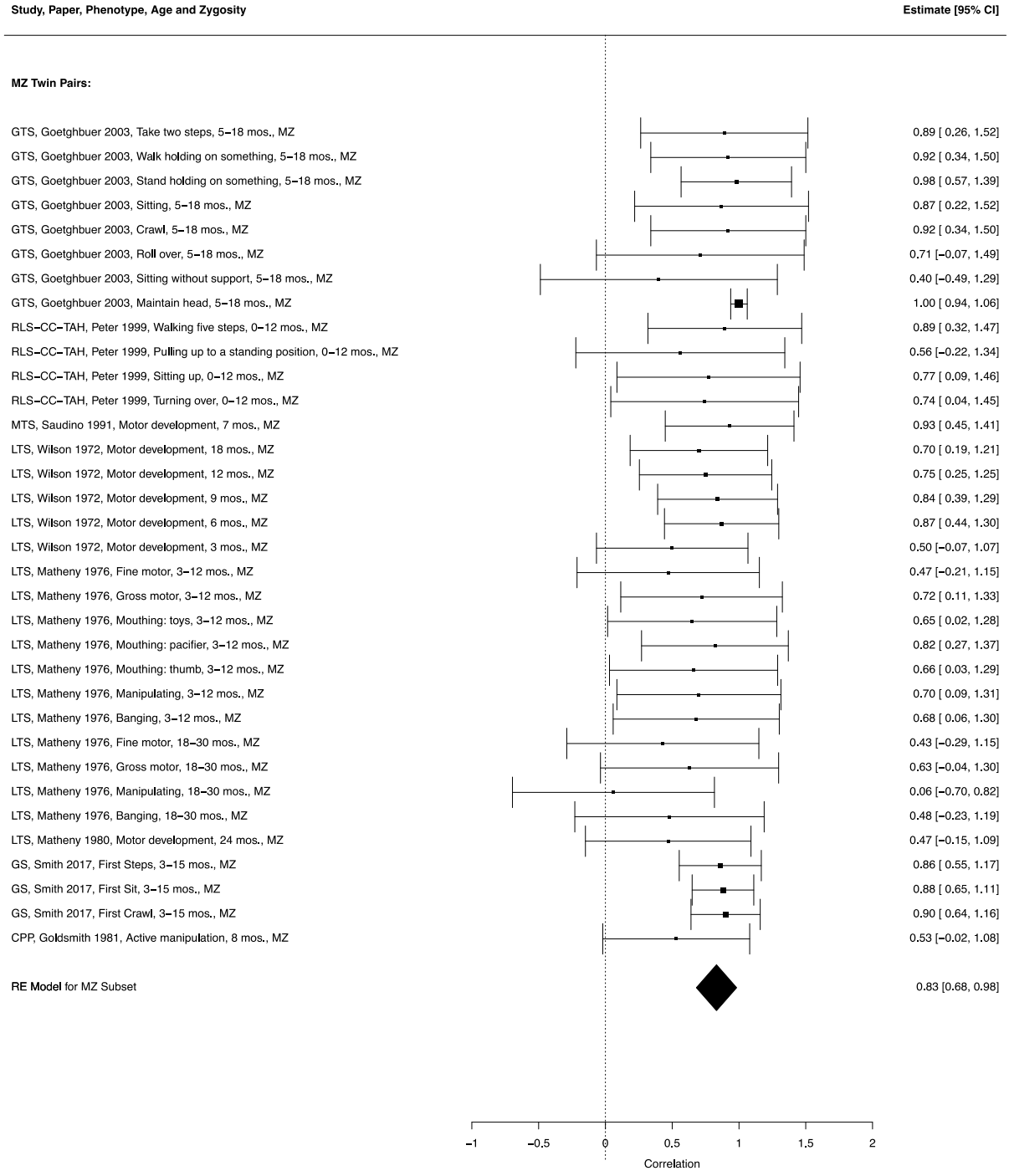


eFigure 22. Organization of Psychomotor Functions Forest Plot



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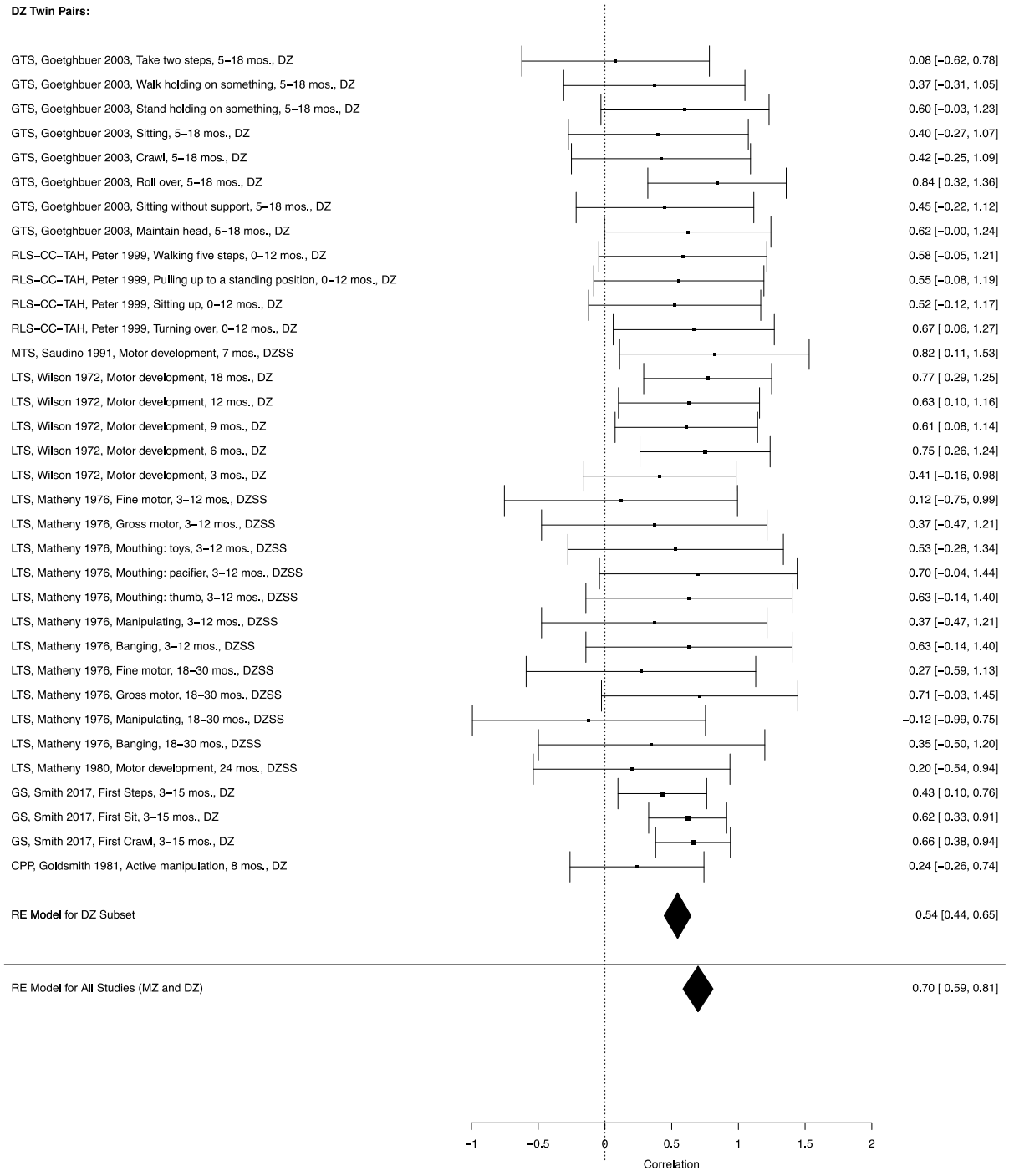
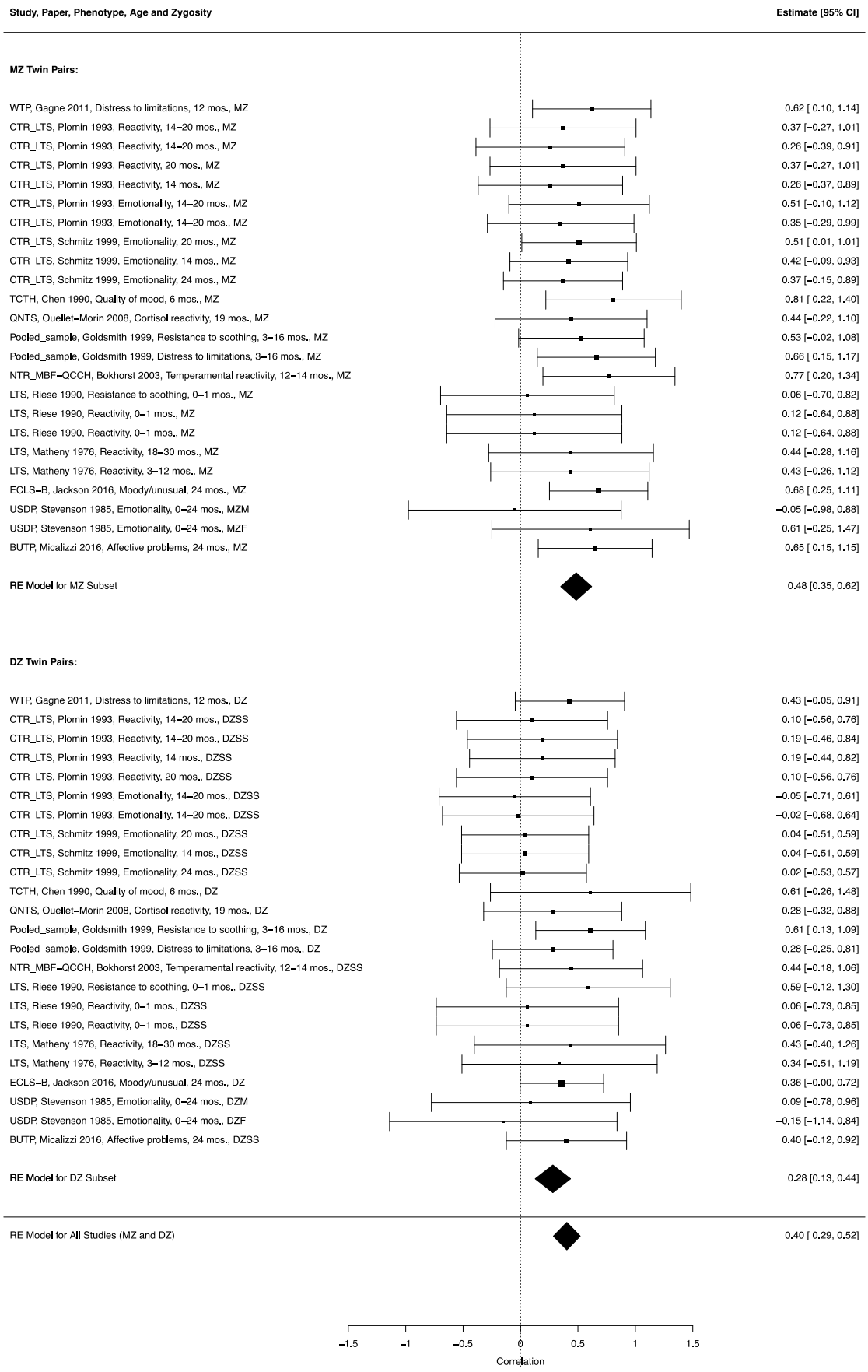
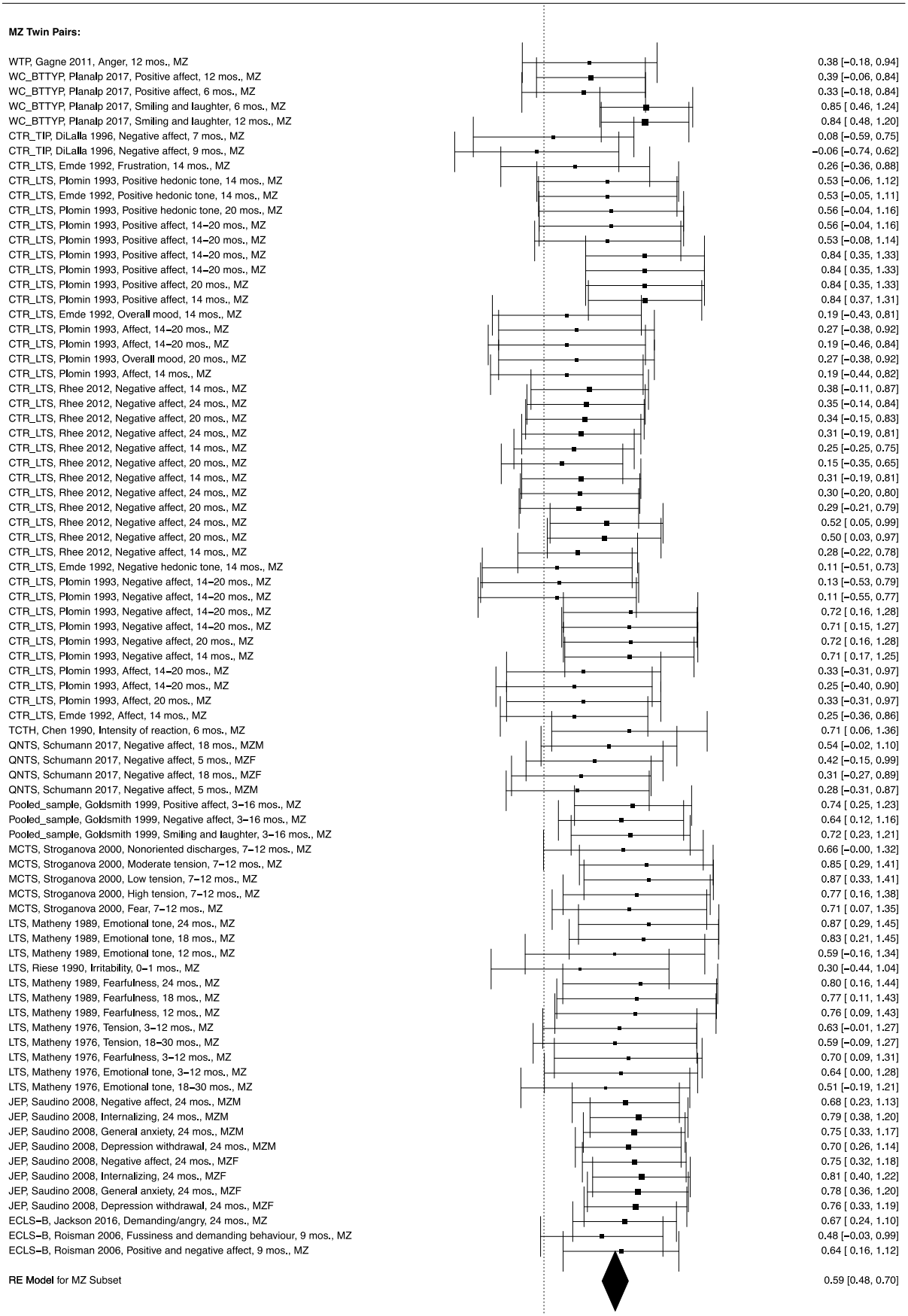


eFigure 23. Regulation of Emotion Forest Plot



eFigure 24. Range of Emotion Forest Plot



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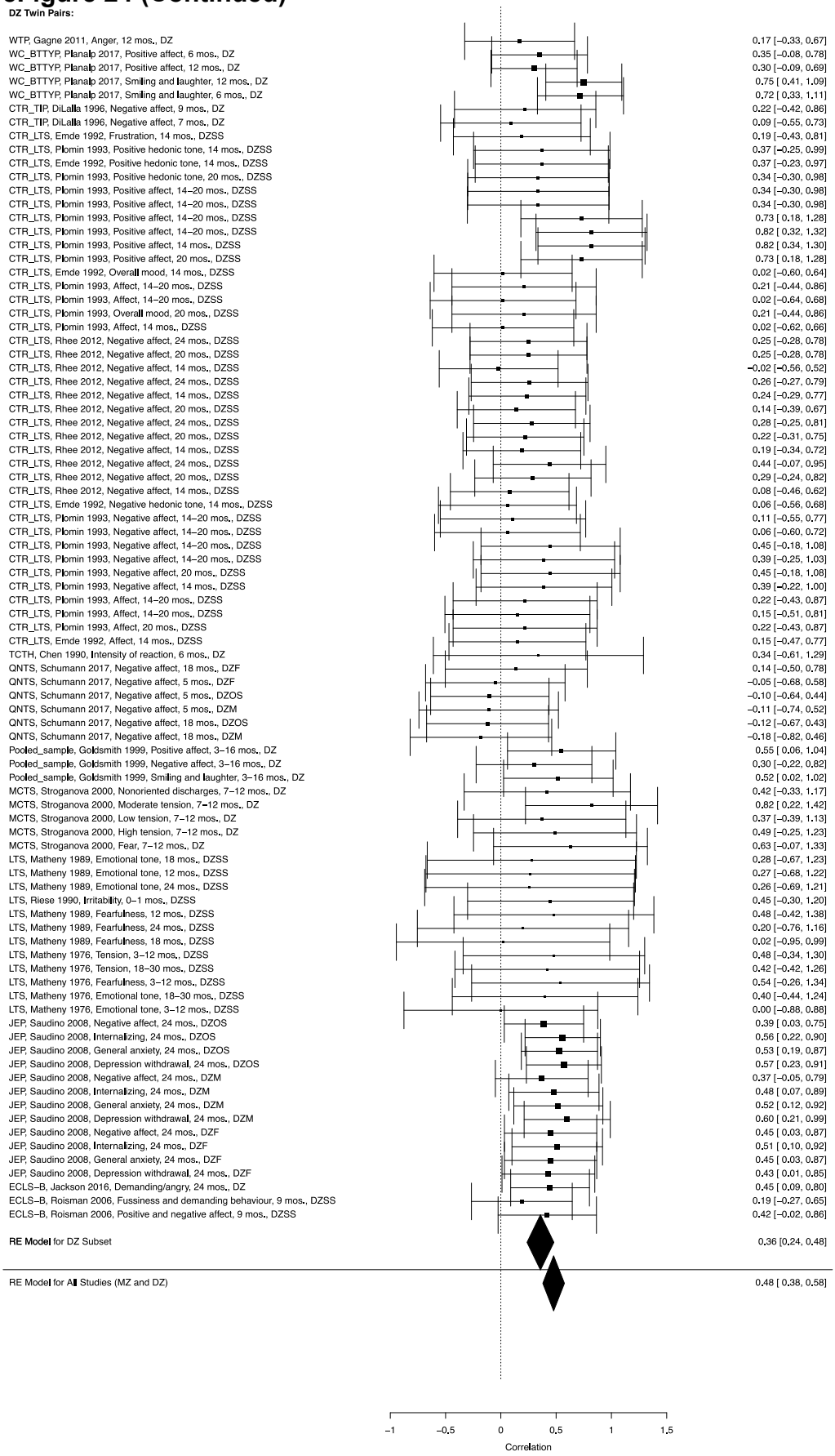
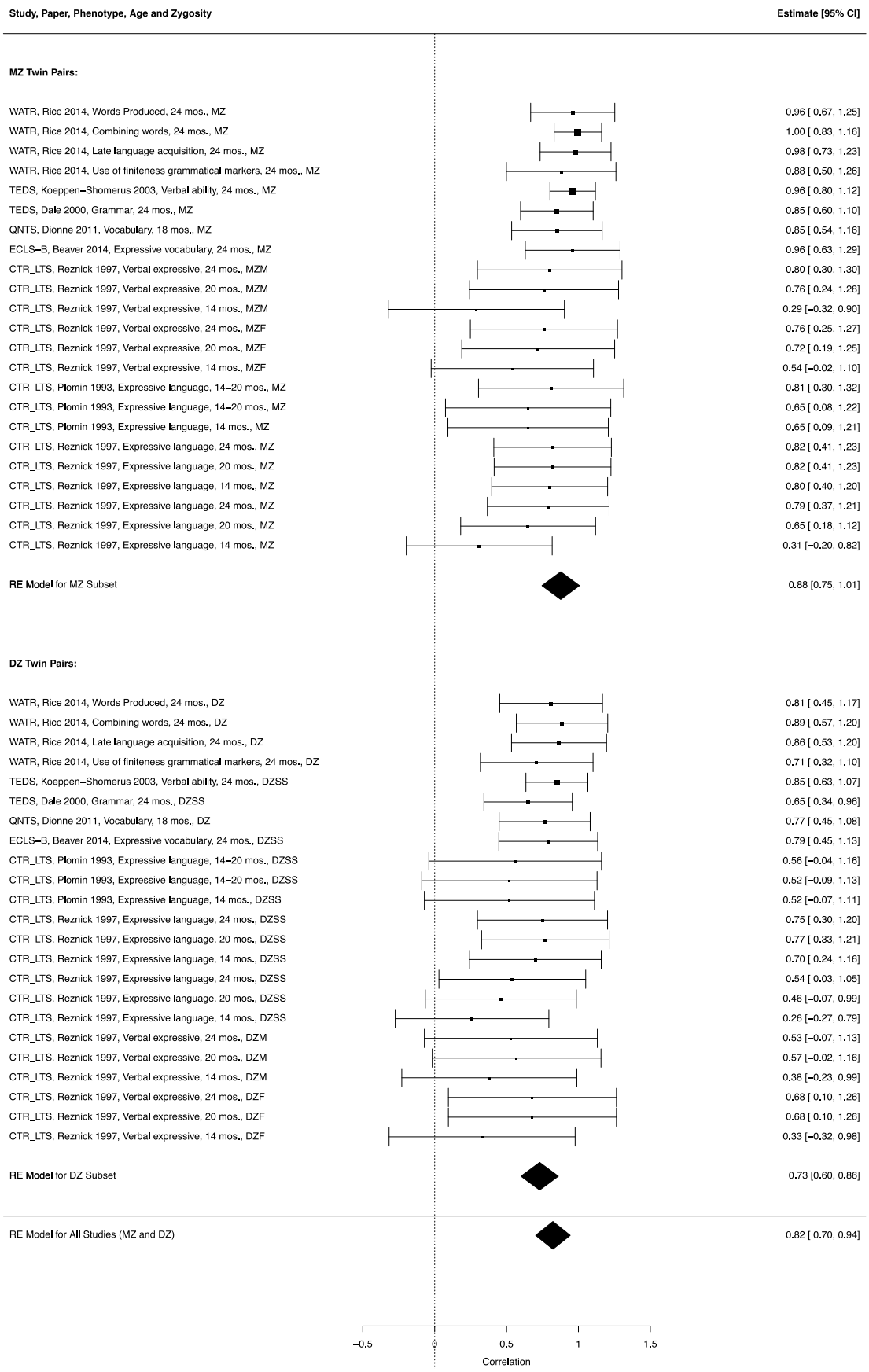
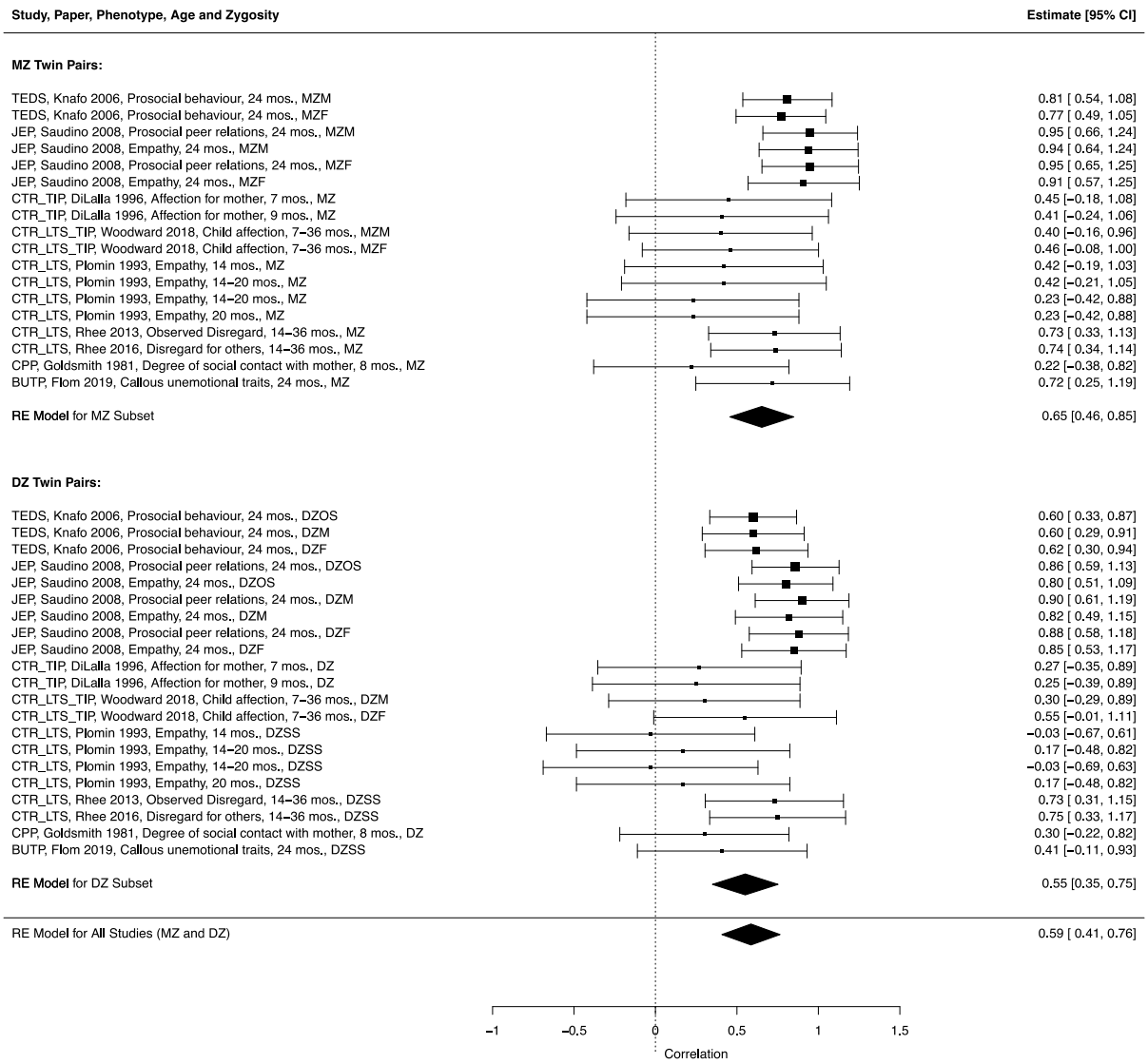


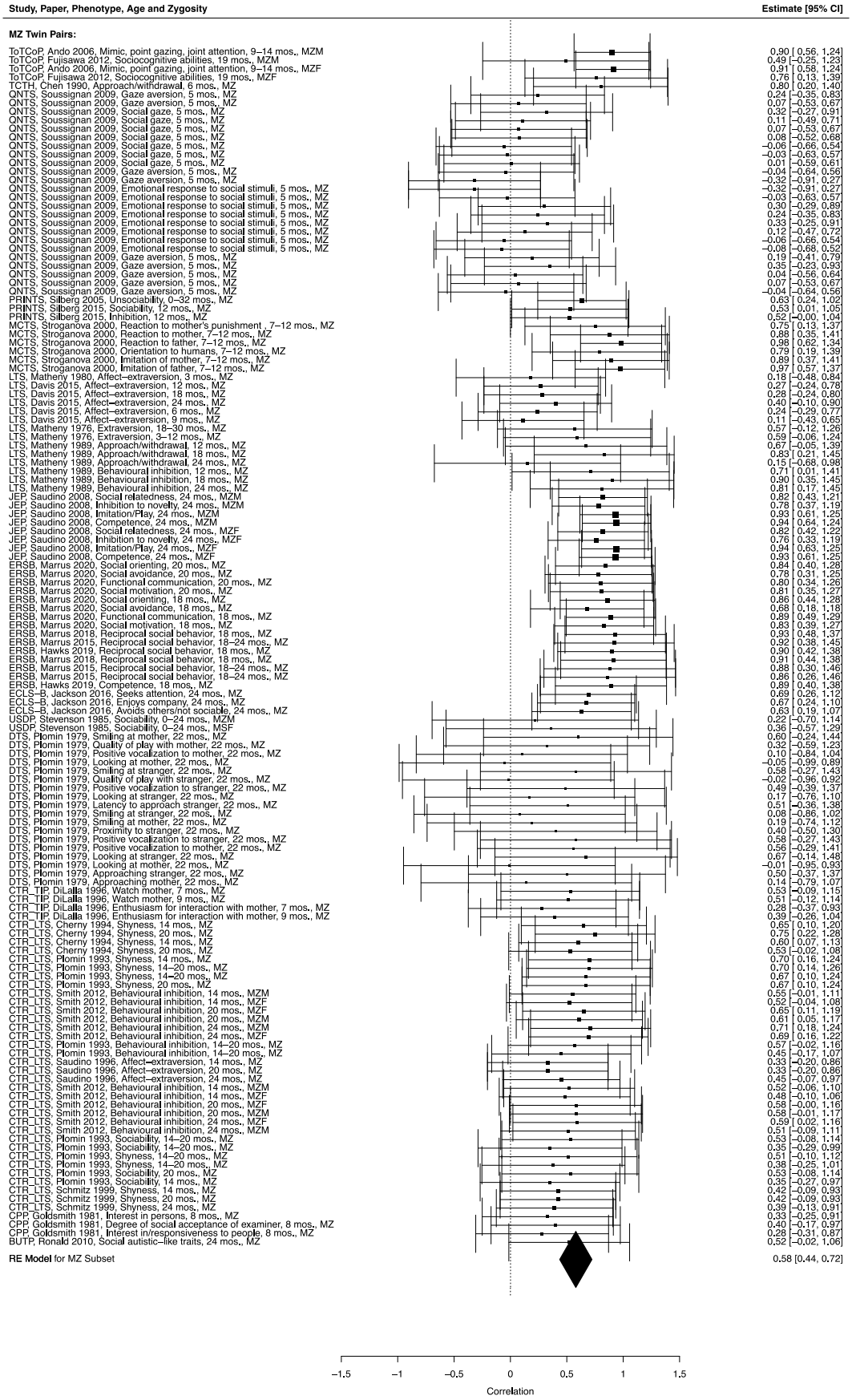
eFigure 25. Expression of Language Forest Plot



eFigure 26. Respect and Warmth in Relationships Forest Plot



eFigure 27. Social Cues in Relationships Forest Plot



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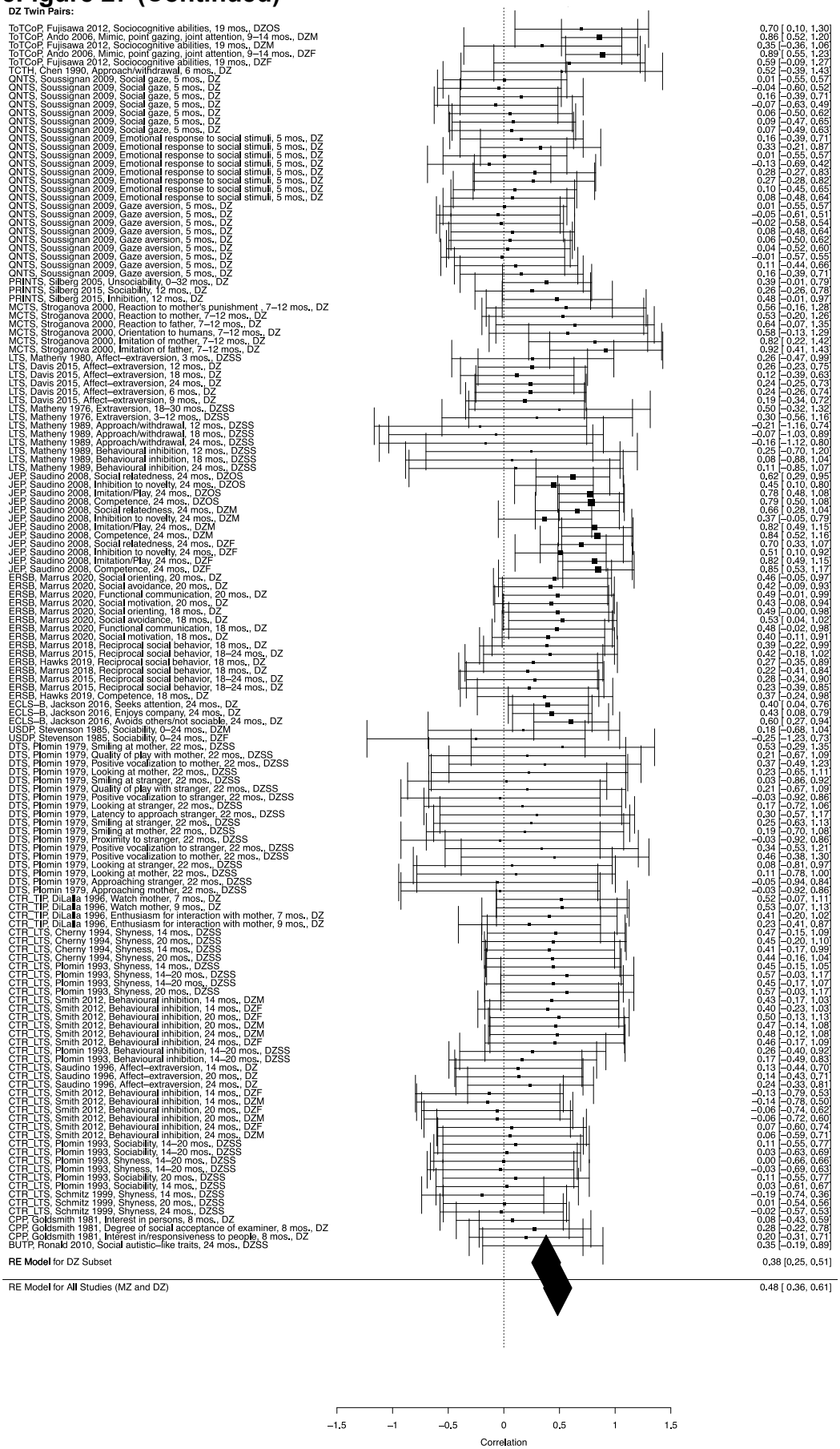
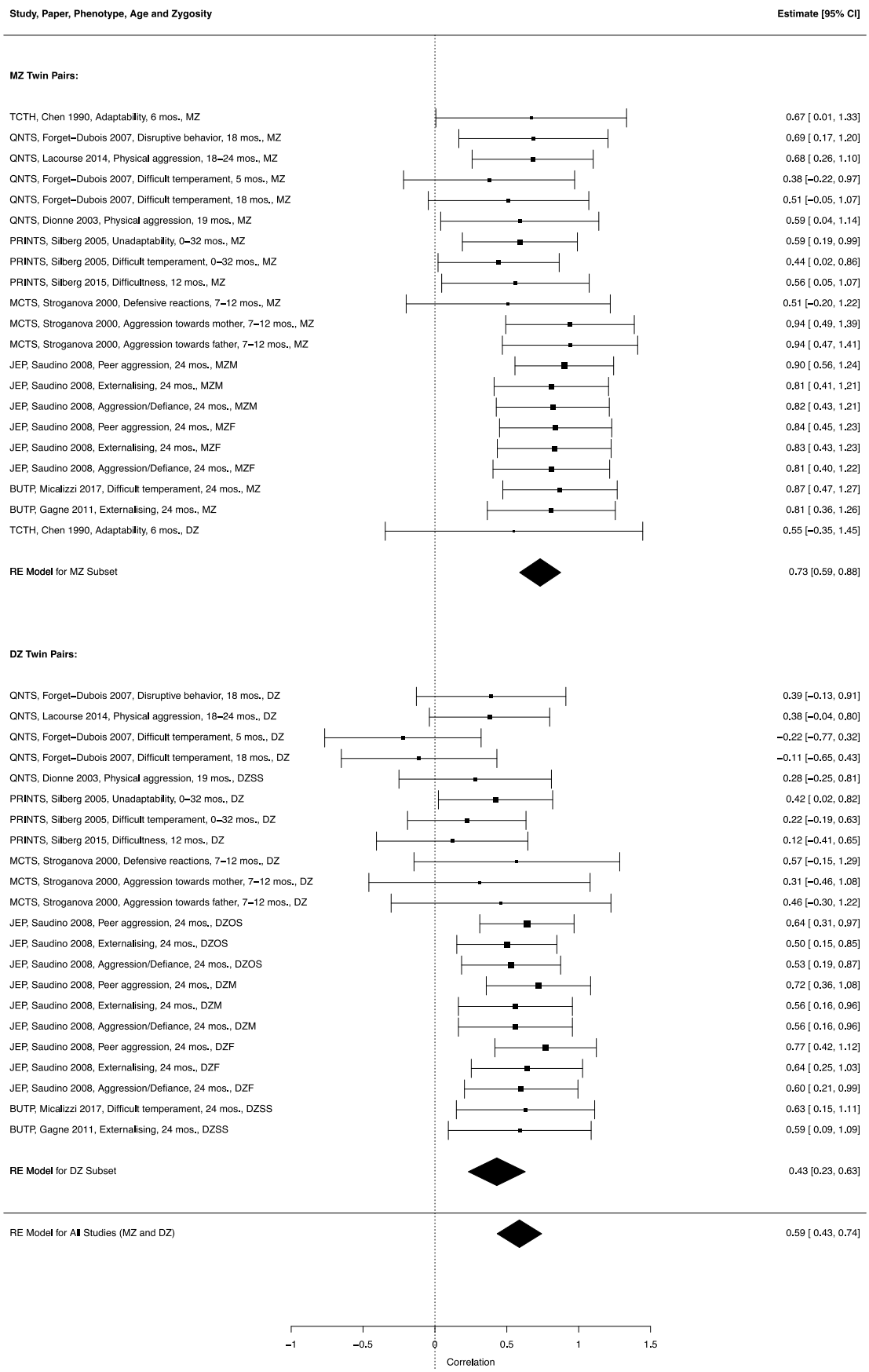
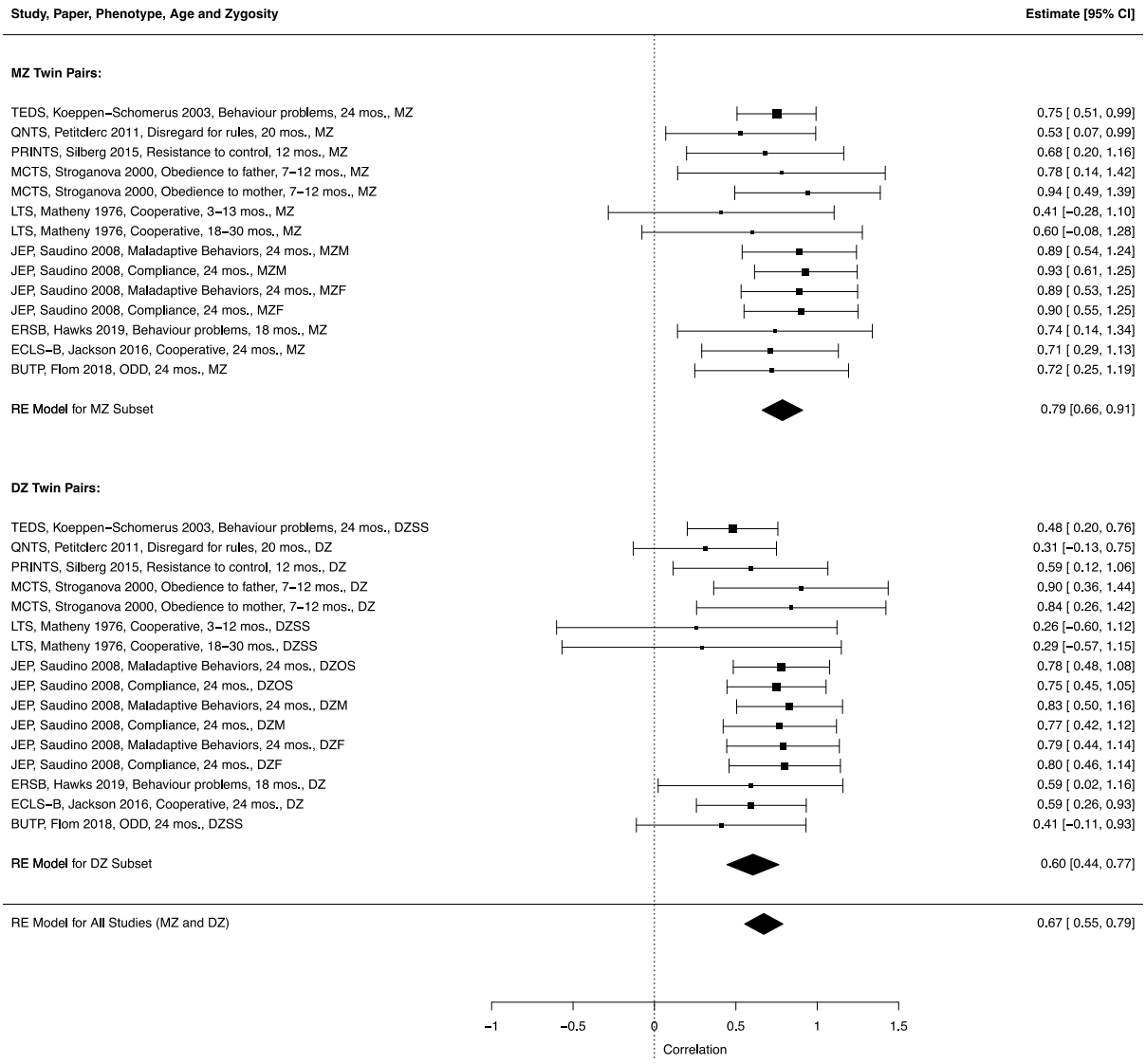


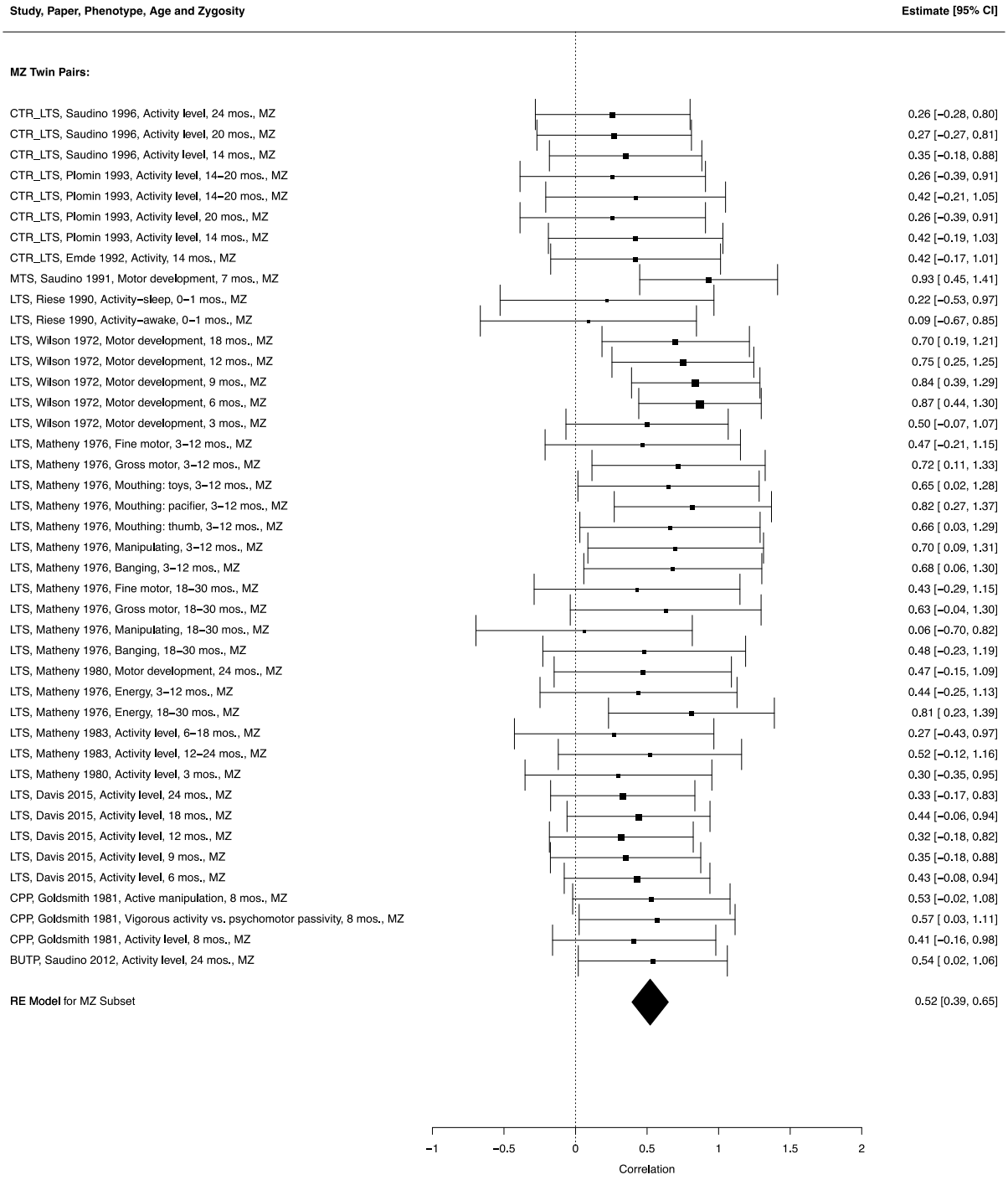
eFigure 28. Regulating Behaviors Within Interactions Forest Plot



eFigure 29. Interacting According to Social Rules Forest Plot



eFigure 30. Psychomotor Functions (Observer Report) Forest Plot



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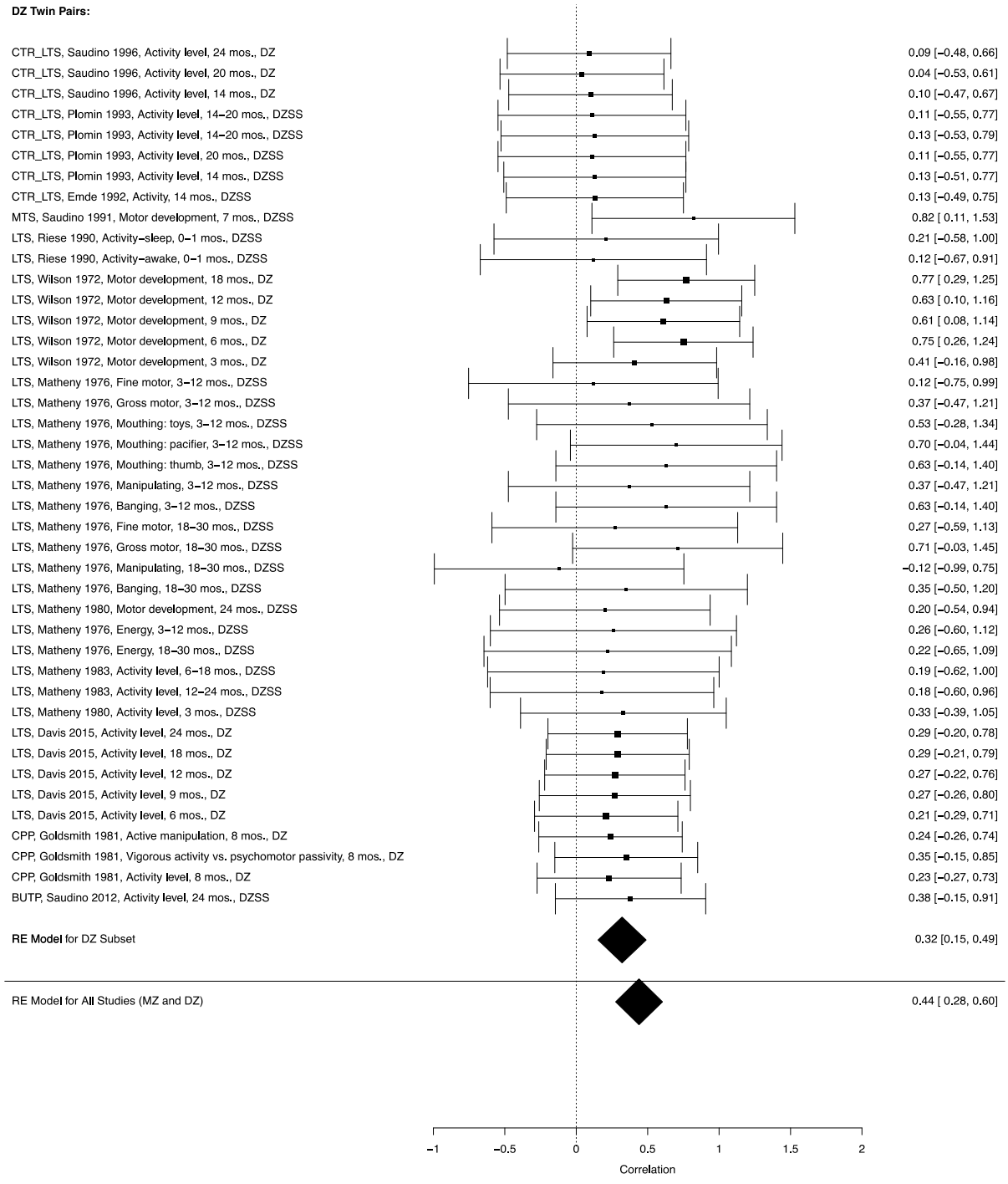
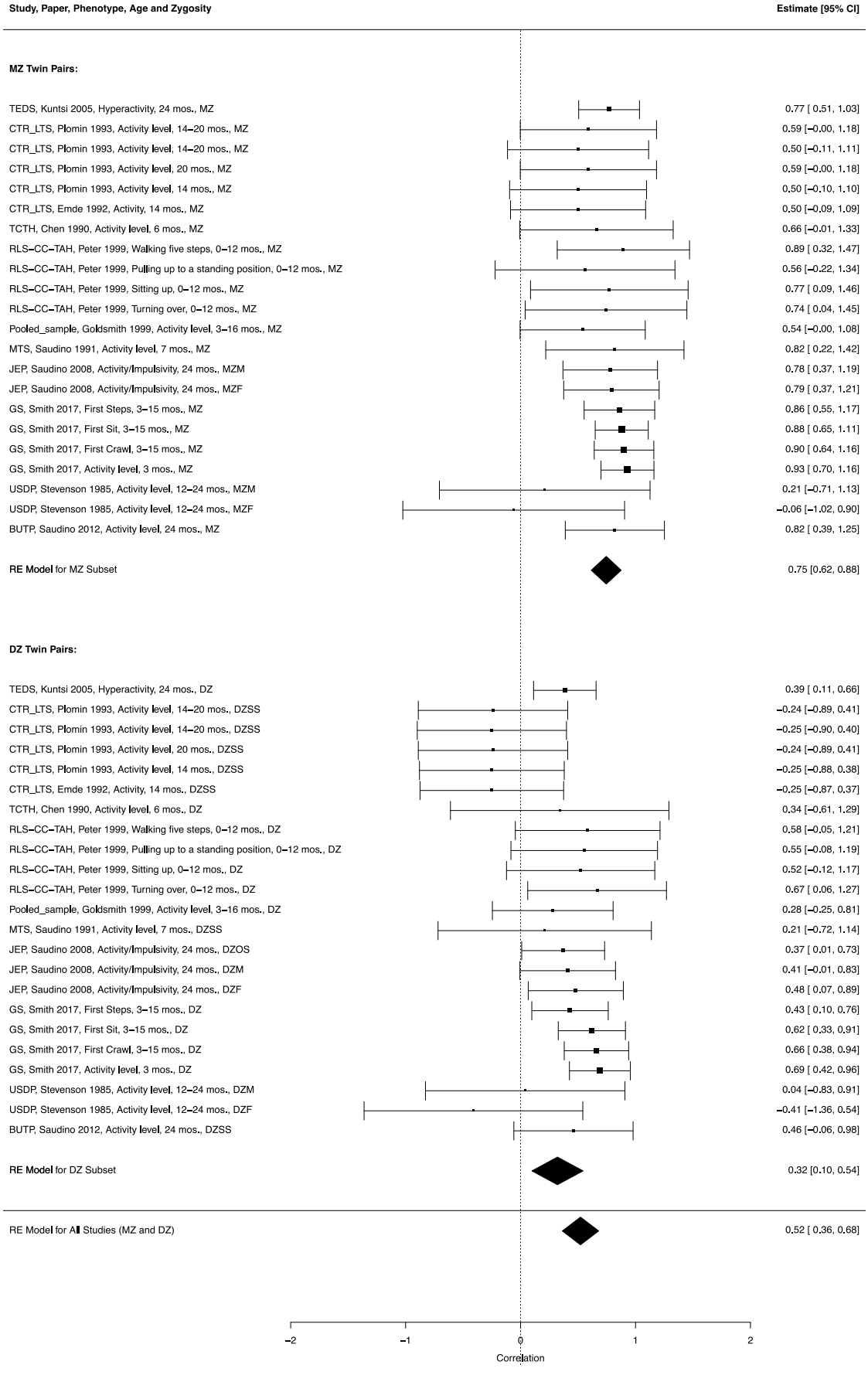
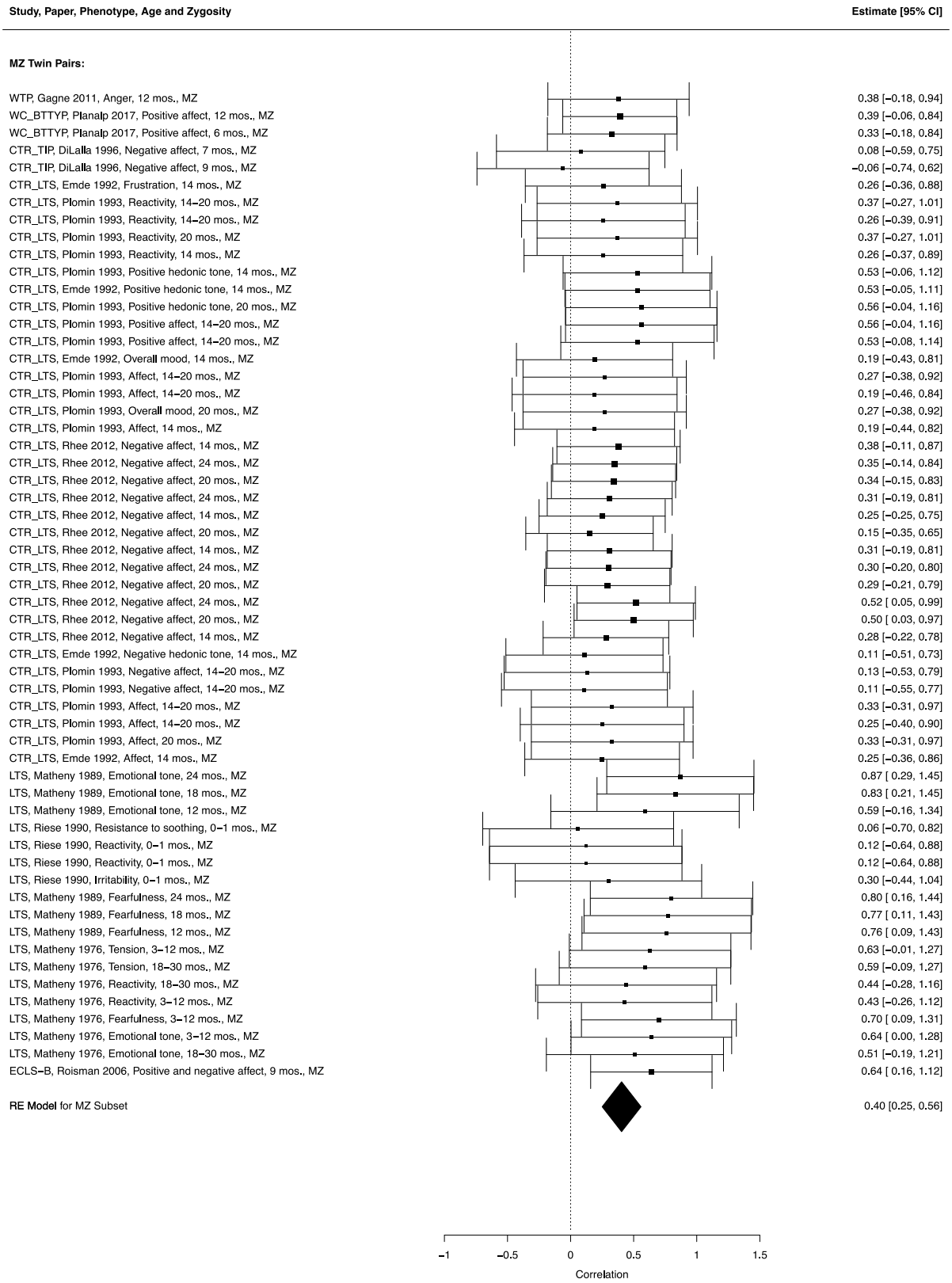


eFigure 31. Psychomotor Functions (Parent Report) Forest Plot



eFigure 32. Emotional Functions (Observer Report) Forest Plot



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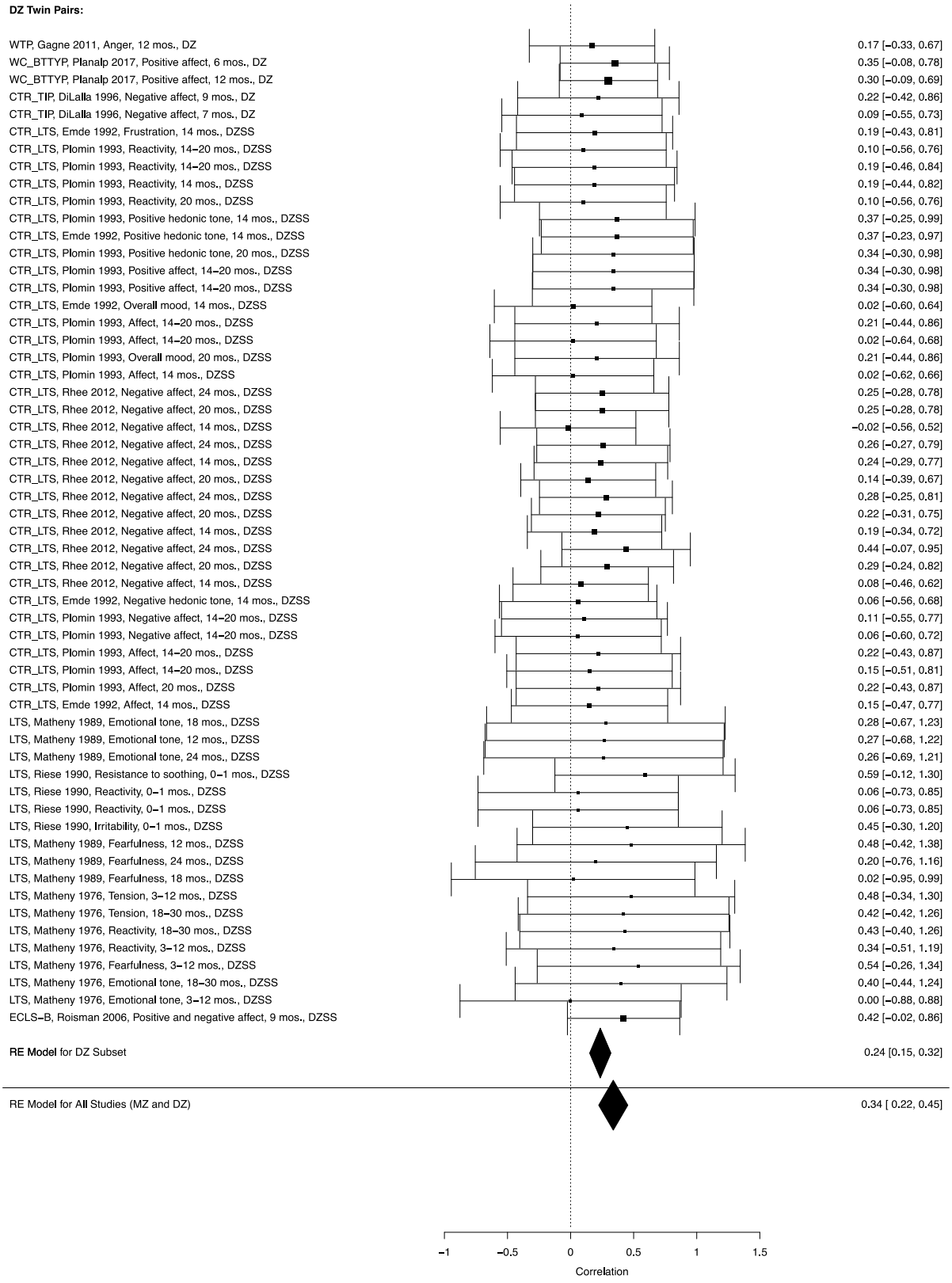
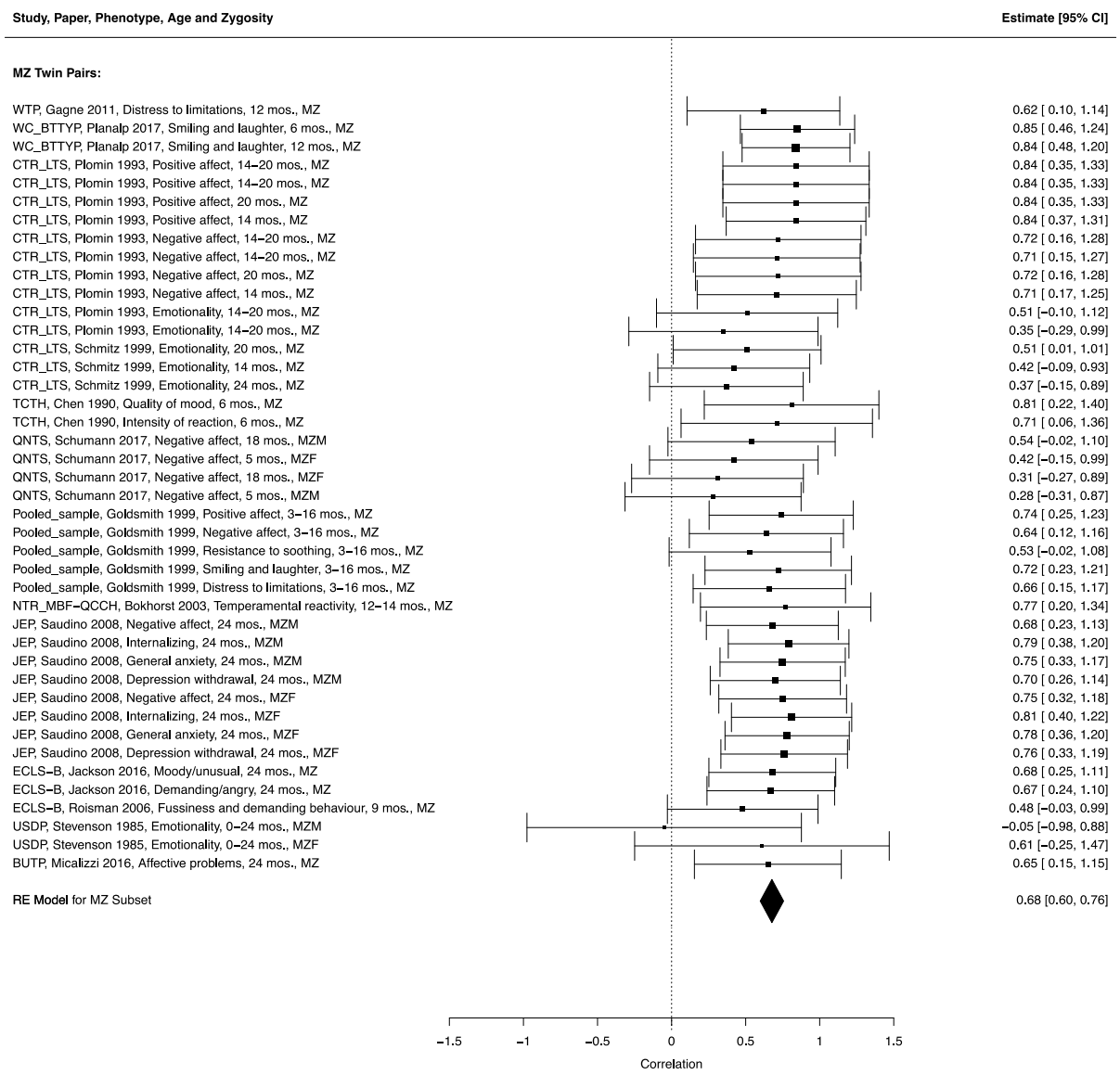


eFigure 33. Emotional Functions (Parent Report) Forest Plot



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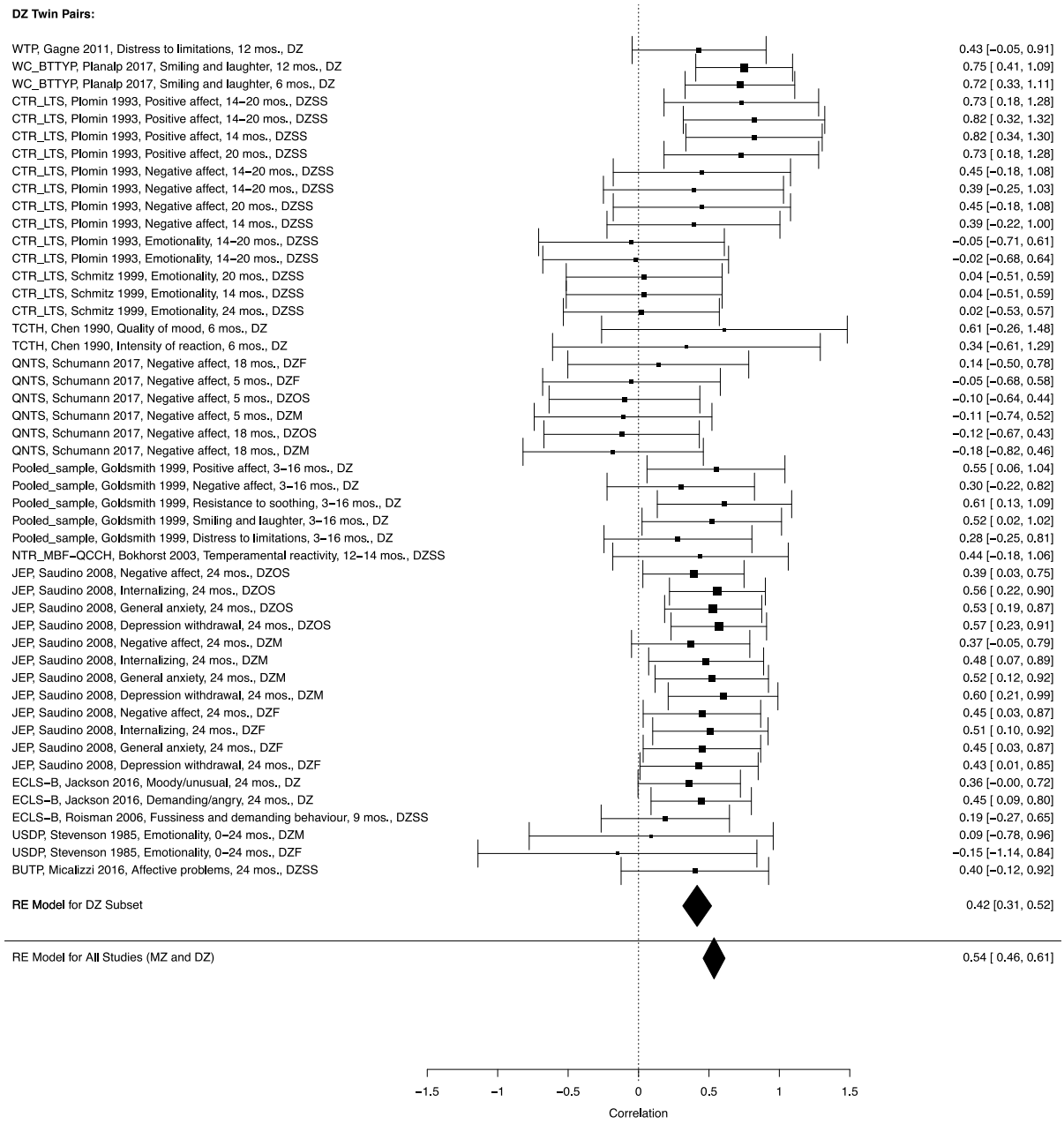
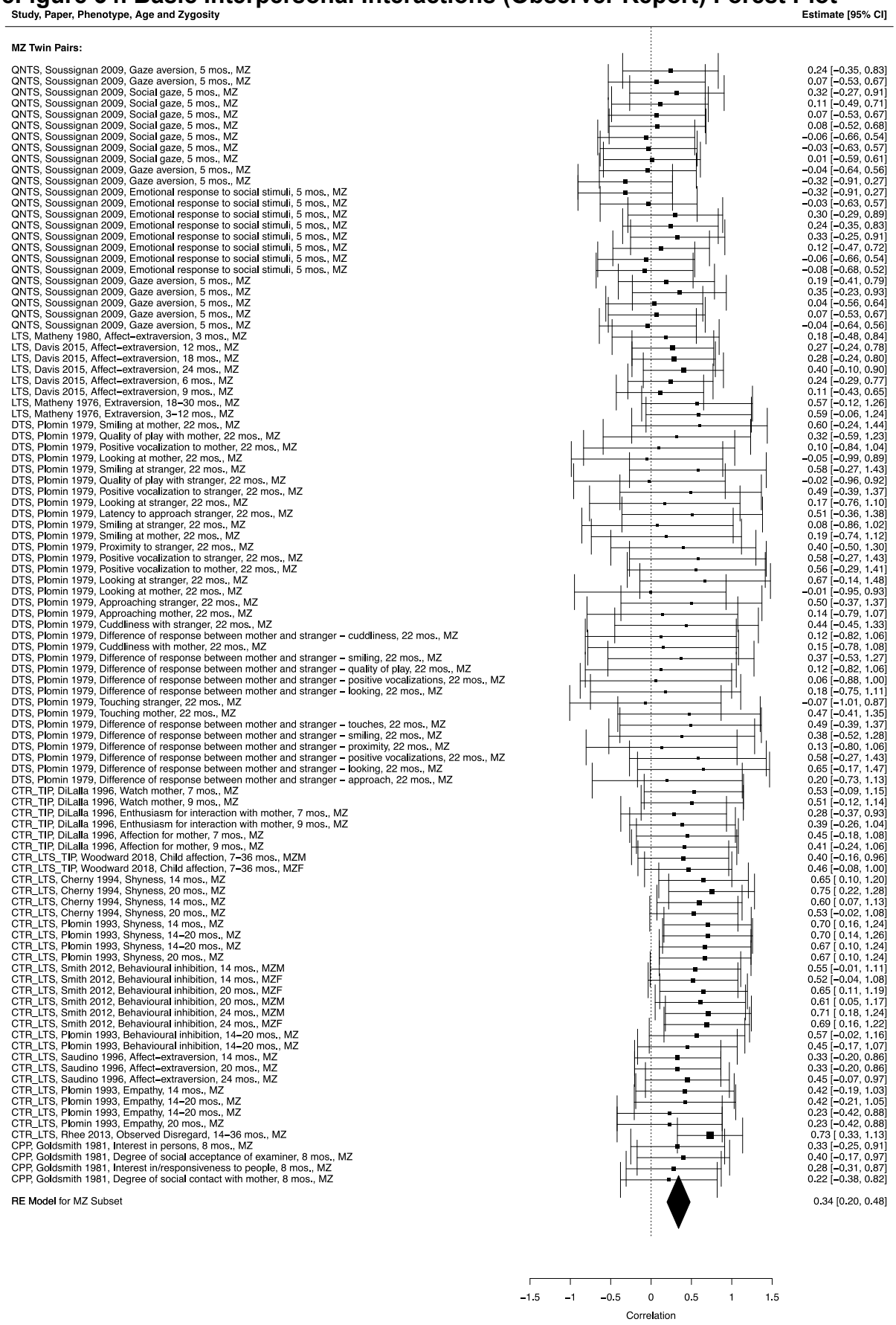


eFigure 34. Basic Interpersonal Interactions (Observer Report) Forest Plot



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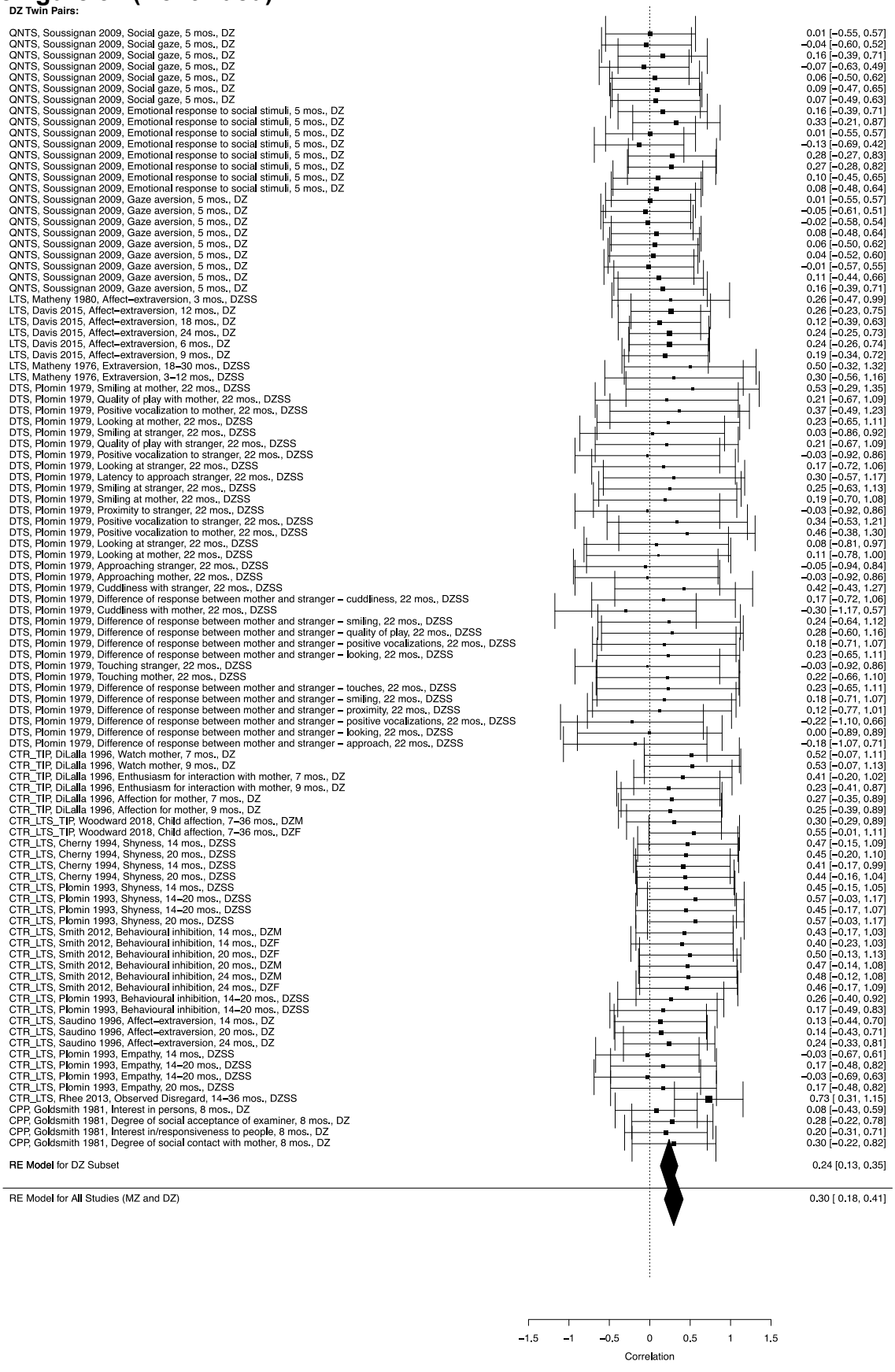
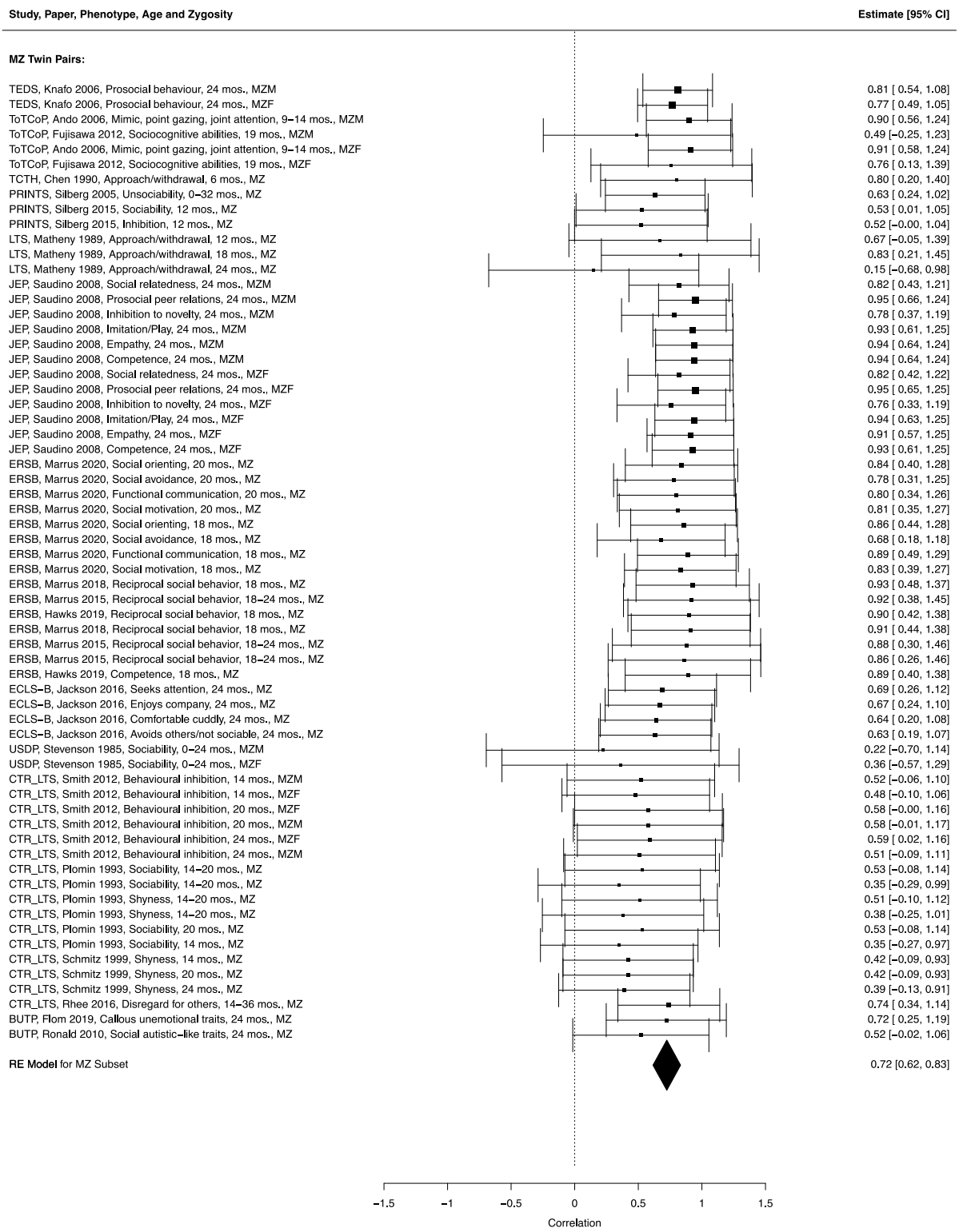


eFigure 35. Basic Interpersonal Interactions (Parent Report) Forest Plot



eFigure 35 (Continued)

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