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Celebrating more than 26,000 adult attachment interviews: mapping the main adult attachment classifications on personal, social, and clinical status

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ABSTRACT

Since the development of the Adult Attachment Interview (AAI) in 1985, more than 26,000 AAIs have been administered, coded, and reported, representing 170 (wo-)man-years of work. We used multinomial tests and analyses of correspondence to compare the AAI distributions in various cultural and age groups, in mothers, fathers, high-risk, and clinical samples with the combined samples of North American non-clinical, non-risk mothers (22% dismissing, 53% secure, 8% preoccupied, and 17% unresolved loss or other trauma). Males were more often classified as dismissing and less frequently classified as secure compared to females (except adoptive fathers), and females were more frequently classified as unresolved (but not more often preoccupied) compared to males. A combination of high scores on the unresolved and insecure-preoccupied dimensions was shared by borderline personality disorder, autism spectrum disorders, and gender dysphoria, while combined high scores on the unresolved and insecure-dismissing dimensions characterized anxiety problems, obsessive-compulsive and thought disorders.

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How did the "Adult Attachment Interview" (AAI; George et al., 1985) contribute to the interdisciplinary domain of developmental psychopathology in the past 40 years? It is time for an update of our meta-analytic study on "The first 10,000 Adult Attachment Interviews" conducted some 15 years ago (Bakermans-Kranenburg & Van IJzendoorn, 2009). In that study, which included more than 200 studies, we

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analyzed over 10,500 Adult Attachment Interview classifications to assess the distributions of AAI classifications – secure-autonomous, insecure-dismissing, insecure-preoccupied, and unresolved loss or other trauma – in a large variety of samples. This exploratory analysis showed that clinical groups had higher frequencies of insecure and unresolved attachment classifications than "typical" nonclinical groups. Internalizing symptoms tended to entail higher frequencies of preoccupied and unresolved attachment classifications compared to "typical," nonclinical groups, whereas dismissing and preoccupied attachment classifications were overrepresented in disorders with externalizing features. Adults with past or present experiences of abuse or suffering from post-traumatic stress disorder (PTSD) were mostly classified as unresolved, whereas – contrary to our expectations – depressive symptoms were associated with attachment insecurity in general but not with unresolved loss or trauma in particular. Despite the impressive number of AAI studies conducted in the first few decades after its birth, at the time of publication (2009), research on clinical groups was still rather scarce, and the diversity of the samples involved was limited. For a robust mapping of AAI classifications on personal (e.g. gender), social (e.g. socioeconomic status), and clinical (e.g. diagnosis of Major Depressive Disorder) characteristics, larger numbers of classification distributions were needed. Fifteen years after our first mapping of the AAI distributions, we are better positioned to test the hypotheses we initially derived from the first 10,000 AAIs.

A revolutionary shift from self-reported content to discourse process

Why does the AAI – a semi-structured hour-long interview – attract so much attention, which is evident by its extensive use in multiple research settings, despite its labor-intensive training, application, transcription, and coding? The main reason is not that it has been indispensable for assessing an individual's mental representations with respect to attachment. Surely, the first formal publication on the AAI (Main et al., 1985) sounded the clarion call for going from observing nonverbal child attachment behavior to adult verbal behavior triggered by questions about past attachment experiences with one's caregivers. After all, over the years, the development, validation, and use of numerous self-report questionnaires inspired by attachment theory aimed at measuring past and present attachment experiences at the level of attitudes or representations have proliferated. These include, among others, the Adult Attachment Questionnaire (AAQ; Simpson et al., 1996), the Adult Attachment Scale (AAS; Collins & Read, 1990), the Attachment Style Questionnaire (ASQ; Feeney et al., 1994), Experiences in Close Relationships (ECR; R. C. Fraley & Shaver, 2000), the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) or the Parental Bonding Instrument (PBI; Parker et al., 1979) (see for a review of more than 25 attachment measures Ravitz et al., 2010).

The introduction of the AAI by Main et al. (1985) should be considered a truly revolutionary shift in the study of adult attachment because of its moving away from the conscious self-reported content of attachment experiences which questionnaires tap on, and emphasizing the "unconscious" linguistic characteristics of one's discourse in response to semi-structured interview questions. Although it is an autobiographical interview in which the interviewees self-report experiences with their caregivers and how they think these might have influenced who they are today, the content of these self-reported narratives is not taken at face value. Rather, the coding of the verbatim transcript is primarily (though not exclusively) focused on the *coherence* of the narrative in terms of Grice's (1975) linguistic maxims of quality, quantity, relevance, and manner (Hesse, 2016). Trained coders rate the coherence in which interviewees speak (rather than the content of what they say). In cases where their attention is directed toward the present interview setting, they are inclined to strike a positive image of themselves to the interviewer and their past attachment experiences, violating maxims of quality and quantity (e.g. building an idealized image of the self and the past or "forgetting" negative experiences) which might lead to a Dismissing classification (Ds). Another discourse style -Preoccupied attachment (E)- is characterized by an exaggerated attention to negative past experiences, overinvolvement with past attachment relationship issues, leading to discourse violations of relevance and manner (e.g. getting lost in extensive narratives about past negative experiences and losing sight of the discourse context). A secure-autonomous autobiographical narrative is characterized by a balance between attention to past and present with a coherent account, even when childhood attachment experiences are perceived difficult (Beijersbergen et al., 2006). A fourth classification, Unresolved loss or other trauma, is marked by (often momentary) disoriented, confused speech around experiences of loss of an attachment figure or other potentially traumatic events such as maltreatment (Bakkum et al., 2022).

The conundrums of self-reported adult attachment assessments were, however, clearly illustrated by Mary Main's work on developing a self-report adult attachment questionnaire, the Berkeley Leiden Adult Attachment Questionnaire (BLAAQ, Main et al., 1991). The questions in the BLAAQ were closely aligned with core AAI questions and its coding system, leading to great expectations about replicable convergent validity with the interview. The BLAAQ was expected to become the quickest and most efficient alternative attachment measure in large samples. Unfortunately, after many years, this attempt had to be discontinued because it ran aground on replication and validation efforts in several student populations at the UC Berkeley and Leiden University. The failure with the BLAAQ indicated that self-reports on attachment-related characteristics might be notoriously biased; indeed, the usual acquiescence response bias shows a non-negligible systematic genetic component (Runze & Van IJzendoorn, 2024). Moreover, questions about attachment-related issues provoke biases related to the type of attachment

representation of the respondent. Specifically, "deactivating" insecure-dismissing respondents tend to be more positive about their attachment histories, psychological issues, and intimate relationships, whereas "hyperactivating" insecure-preoccupied subjects might inflate their attachment-related frustrations and worries about psychological difficulties (Dozier & Lee, 1995; Kobak & Sceery, 1988; Pianta et al., 1996).

Mainly because of the revolutionary shift from self-reports of the content of attachment experiences to the careful analysis of verbal behavior (i.e. coherence of speech), the AAI seemed especially attractive to clinical researchers (see Minde & Hesse, 1996). The clinical promise of the AAI seems to reside in its focus on relationship experiences with attachment figures that are often included in the conventional diagnostic tools of a large variety of clinical symptoms and disorders, in particular in personality disorders (Levy et al., 2015). AAI-related information is often part and parcel of conceptualizing current life difficulties based on past experiences with key figures (often one's parents). Furthermore, different types of psychotherapy emphasize supporting the clients in their efforts to make sense of untoward past experiences (Fonagy & Bateman, 2008; Levy et al., 2015), and the AAI promotes the identification and processing of such experiences. Lastly, for clinical and non-clinical researchers alike, the AAI promises insight into the mental drivers of parents' interactions with their children and the intergenerational transmission of attachment. Only because of the power of the parents' AAI to predict the children's attachments a transmission gap not closed by parental sensitive responsiveness could be uncovered (Van IJzendoorn, 1995). This gap set in train a myriad of studies on a large number of alternative transmission mediators beyond the usual suspects (Verhage et al., 2016). The AAI has, therefore, been one of the most generative hypothesis-producing instruments in attachment theory (Hesse, 2016).

AAI as a source of inspiration for a large variety of domains

To illustrate the soaring use of AAI studies and their impact on many fields of applied and fundamental research of human development and psychopathology, we used VOSviewer version 1.6.20 (free to download from www.vosviewer.com; Van Eck & Waltman, 2023) to create a map of relations between the Adult Attachment Interview (or AAI) and concepts used in 699 papers referring to the AAI.

For details, see Appendix A and see the detailed dynamic map on: https://app.vosviewer.com/?json=https%3A%2F%2Fwww.dropbox.com%2Fscl%2Ffi%2Fvj316a2f9n77h51w95a4r%2FVOSviewer_1300939005009426341.json%3Frlkey%3D5tcprjm7gkdavxjrq2sf2iezs%26dl%3D1.

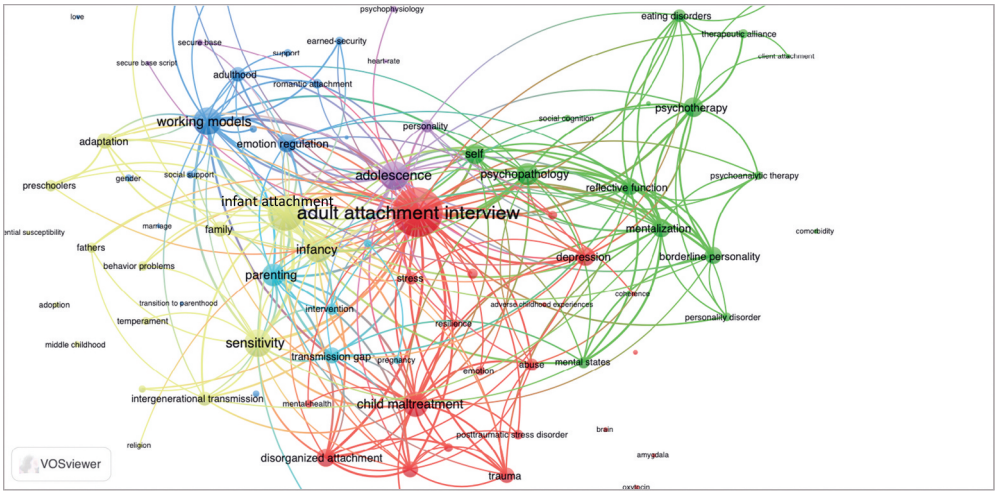

Figure 1. Map of relations between the adult attachment interview and other concepts. Note. The co-occurrence of a pair of terms can be stronger or weaker, that is being paired more or less often, and VOSviewer visualizes the strength of the "pair bonding" with thicker or thinner lines. Terms can have a higher or lower weight, that is they might be more or less strongly embedded in the network of relations. In VOSviewer this weight is visualized with larger or smaller labels and coloured circles. The map also presents coloured clusters of paired concepts which indicate pairs being more strongly linked within the cluster than to terms in other clusters. Figure 1 is a screen shot of a dynamic map that can be found through the following link: https://app.vosviewer.com/?json=https%3A%2F%2Fwww.dropbox.com%2Fscl%2Ffi%2Fvj316a2f9n77h51w95a4r%2FVOSviewer_1300939005009426341.json%3Frlkey%3D5tcprjm7gkdavxjrq2sf2iezs%26dl%3D1. This dynamic map may be zoomed in or out to see more details of the connections between more terms.

The map of co-occurrences shows six clusters indicated by different colours. The densest network of concepts is coloured in red and shows how influential the AAI has been in the domain of child maltreatment studies and related domains such as posttraumatic stress disorder, depression, dissociation, and child disorganized attachment. The green cluster reflects the centrality of psychopathology in AAI research, especially in the domains of personality disorders and various psychotherapeutic approaches. Some theoretical concepts take a central position in this cluster as well, with prominent positions for reflective function and mentalization. The blue cluster reflects strong associations between concepts such as working models and emotion regulation, and seems focused on romantic relationships in adulthood. The yellow cluster visualizes the influences of the AAI on family studies, and the focus on the association with parental sensitivity and infant attachment. Intergenerational transmission of attachment belongs to this cluster but is, of course, also related to the domain of transmission gap and parenting in the light blue cluster. Finally, the purple cluster shows the importance of the AAI in studies on adolescence in relation to psychophysiological work and the social psychology attachment style (i.e. self-reported attachment questionnaires) literature. The footprints of the AAI illustrate the vast territory of its ever-expanding habitat and mirrors Mary Main's perpetual disregard of any disciplinary border.

The present study

In this paper, we update our study on the first 10,000 AAIs (Bakermans-Kranenburg & Van IJzendoorn, 2009), which mapped the frequencies of AAI classifications in samples characterized by different personal, social, and clinical statuses. For consistency, we address the same objectives with similar descriptive approaches to the ones we used in the 2009 study. In a series of analyses on the distributions of AAI classifications in various cultural and age groups, in mothers, fathers, high-risk, and clinical samples, we use multinomial tests and analyses of correspondence of the three-way (i.e. secure, insecure-dismissing, and insecure-preoccupied) and four-way (i.e. secure, insecure-dismissing, insecure-preoccupied, and unresolved) distributions of attachment classifications to compare them with a combination of "typical" samples of North American non-clinical mothers (three-way distribution: 25% dismissing, 59% secure, 16% preoccupied attachment representations, and four-way distribution: 22% dismissing, 53% secure, 8% preoccupied, and 17% unresolved loss or other trauma). The analyses are restricted to AAI classifications coded according to the Main et al. (2003) system for validity and comparability reasons. The current study is a quantitative synthesis of AAI classifications, but it is not a conventional meta-analysis of effect sizes extracted from empirical studies. Of note, the dataset consists of the "raw" distributions of 3-way or 4-way AAI classifications mapped on a two-dimensional or three-dimensional space in which several moderators (e.g. clinical status) are also projected. In that sense, it shares more characteristics with a secondary analysis than a meta-analysis or an individual participant data analysis (see Van IJzendoorn & Bakermans-Kranenburg, 2024).

Having shown the use of the AAI across the past 40 years and its widespread impact on a large variety of (sub-)disciplines and research topics, we examine the following hypotheses derived from the previous study (Bakermans-Kranenburg & Van IJzendoorn, 2009), and which we pre-registered on OSF (https://osf.io/zf82c/). First, we expect the majority of non-clinical adults to be classified as secure-autonomous. Within the insecure attachment categories, we expect to find somewhat higher percentages of insecure-dismissing classifications compared to insecure-preoccupied or unresolved classifications, parallel to the "typical" or "normative" infant attachment distribution (Madigan et al., 2023). Second, it is hypothesized that insecure adult attachment classifications tend to be gender-specific, with males showing a higher frequency of insecure-dismissing classifications and females showing a higher frequency of insecure-preoccupied classifications. Third, if sufficient studies from the majority world are available, we expect that adult attachment in those countries to show a distribution of more than half secure-autonomous classifications. At the same time, the distributions of insecure-dismissing, insecure-preoccupied, and unresolved attachment classifications might be specific to socioeconomic or cultural contexts. Fourth, we hypothesize that physically handicapped adults without psychiatric symptoms show similar attachment classification frequencies to "typical" groups, analogous to the attachment distribution of physically handicapped children assessed via the Strange Situation Procedure (SSP; Ainsworth et al., 1978). Fifth, we expect that insecure-preoccupied attachment classifications may be overrepresented in disorders with an internalizing component, whereas insecure-dismissing classifications will be more prevalent in samples characterized by externalizing disorders. We also hypothesize unresolved attachment classifications to be overrepresented in all clinical groups.

Methods

Data collection

The data collection and analytic procedures have been preregistered at OSF (https://osf.io/zf82c/). In the first search, we used ((TS=("Adult Attachment Interview")) NOT TS=(animal*)) NOT TS=(chem*) as search terms in Web of Science Clarivate and, to ensure the inclusion of grey literature, Preprint Citation Index, ProQuest Dissertations and Theses Citation Index, excluding meta-analyses and reviews, and excluding papers published before 2005 as these older papers would have been included in our 2009 study and were already available. The search produced 688 hits that were screened based on title and abstract (or, in the case of dissertations, only based on title) by MJBK and OD. After a training set of $k = 30$, they independently screened a set of $k = 300$ papers. Intercoder reliability was *kappa* = .77. Next, MJBK and OD screened the remaining papers independently, selecting $k = 362$ studies after removing one duplicate record. In a second, independent search, we used the same interface but slightly different sources (adding biomedical sciences to the social and behavioral sciences) and added December 2023 to the search. The search resulted in 89 hits that were non-overlapping with the first search results. Screening based on title and abstract included 38 extra studies (see Figure 2).

After the first screening rounds, studies were selected or deselected during the coding procedures. Studies were deselected when they (a) did not present AAI distributions despite the expectation based on title and abstract, (b) used a different coding system than the Main et al.'s Adult Attachment Scoring and Classification System (2003), (c) reported on less than 10 participants with AAI classifications, or (d) reported having predetermined proportions of AAI classifications (i.e. giving no information about the "spontaneous" distribution of AAI classifications in the specific sample). When several papers reported on the same sample, we selected the study with the largest sample size, except when information on essential moderators was missing, in which case we included the study providing this information. Three authors (MBK, OR, RC) were involved in this second round of screening, resulting in a set of 217 papers reporting on 268 samples. Kappas for screening were .77–.82 ($k = 91$). Combining this set of studies with the set from the 2009 paper led to a total set of 354 studies with 474 samples, for which, in total, 298 three-way distributions and 345 four-way distributions could be derived. The total number of included AAIs was $N = 26{,}443$ (see Figure 2).

Coding

After calibrating the coding system on $k = 20$ studies, the three coders (MBK, OD, RC) independently rated $k = 62$ studies for distributions and moderators (i.e. study and sample characteristics, see Table 1). Intercoder reliabilities were .96 and .97 (average intraclass correlation coefficient, ICC, single measure, absolute agreement) for the continuous variables, including the AAI distributions, and .85 and .91 (average kappa) for the categorical variables. After establishing satisfactory reliability, the remaining studies were independently coded and questions that came up were discussed to consensus through email or online meetings. When studies reported on several samples (e.g. clinical and control groups, males and females), AAI distributions and moderator variables were coded for each sample separately. When study participants were interviewed twice, we included the first AAI for comparability with other studies.

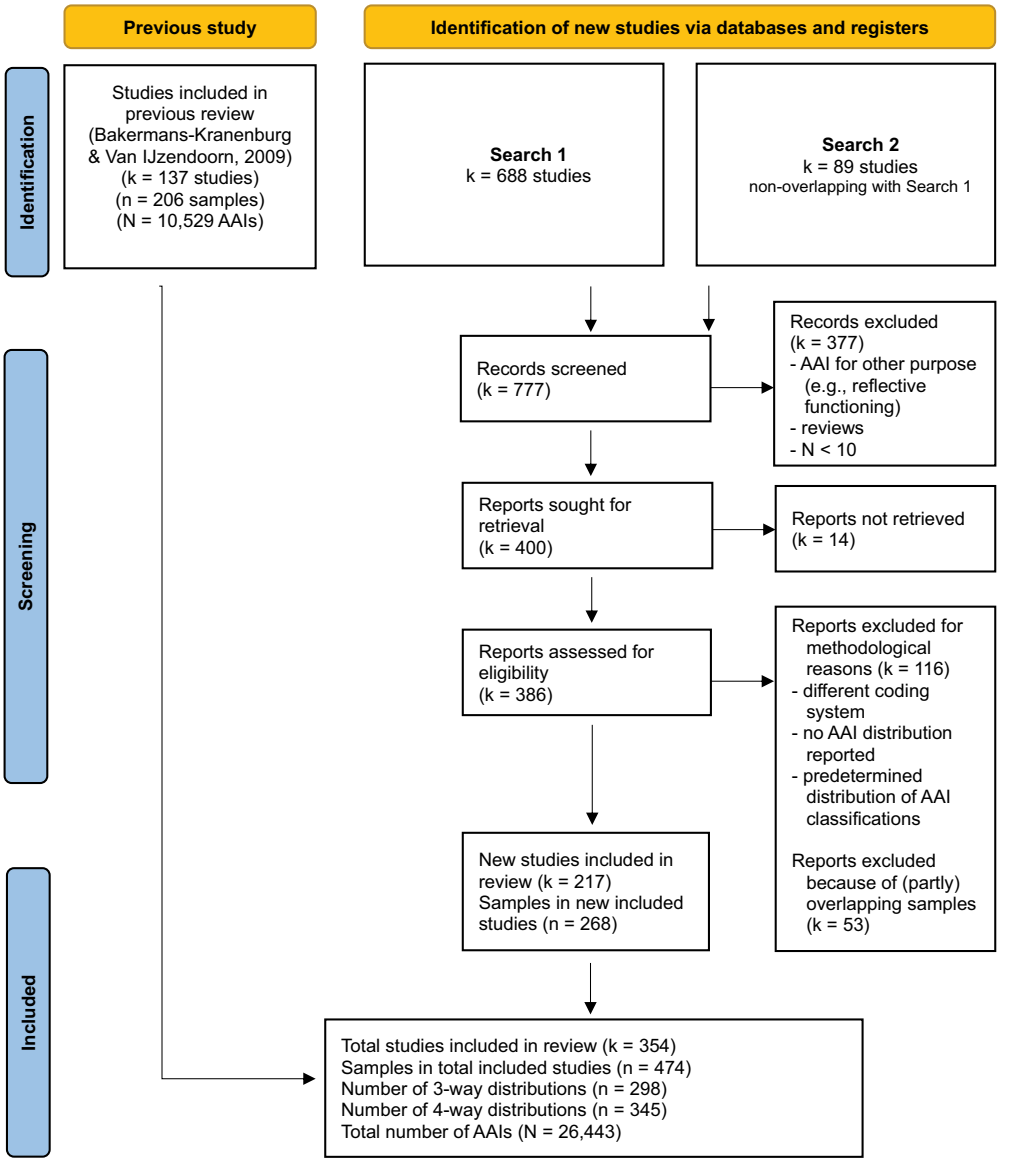

Figure 2. Flow-chart for the updated systematic review of AAI classifications.

We coded clinical groups according to the description provided in the study and/or if the Methods paragraph reported that more than 50% of the participants had the specific disorder. For clustering the disorders into Externalizing, Internalizing, and Thought Disorders, we used the Hierarchical Taxonomy of Psychopathology (HiTOP) model (Ringwald et al., 2023). The individual disorders and their clustering are presented in Table 1.

The selected studies provided AAI distributions of 160 samples with non-clinical (including pregnant and adoptive/foster) mothers, 35 samples of non-clinical (including expecting and adoptive) fathers, 46 samples with non-clinical adolescents, 55 at-risk groups (e.g. single low SES mothers, adolescent mothers, or adult adoptees), 138 samples with clinical adults, adolescents, or parents of clinical children, and 40 other samples (e.g. adults without children, professional caregivers).

Table 1. Coding system for the variables extracted for this study.

Variable		Coding description	
General study characteristics			
Publication	0	refereed journal	
	1	chapter	
	2	dissertation	
	3	grey literature	
Year of publication			
Intercoder reliability		three-way (kappa):	
		four-way (kappa):	
Sample characteristics			
N coded AAIs			
Mean age			
Gender	0	female	
	1	male	
	2	mixed ➔	proportion males:
Parental status	1	adult parent	
	2	adolescent parent	
	3	adult non-parent	
	4	adolescent non-parent (<20 yrs)	
	5	pregnant/expecting parent	
	6	adoptive/foster parent	
Continent	1	North America	
	2	Europe	
	3	other ➔	4 South America 5 Africa 6 Australia/New Zealand 7 Middle East 8 Asia
SES	0	middle/high/mixed	
	1	low (>80% low SES)	
Ethnicity	0	"white"	
	1	non-"white"	
	2	mixed ➔	proportion non-"white:"
At risk	0	no	
	1	yes	
Language	0	English	
	1	non-English	
Clinical	0	no	
	1	yes ➔	see Type of clinical
	2	parent of clinical child	
Type of clinical			*Cluster*
	1	depression (incl bipolar)	Internalizing
	2	anxiety	Internalizing
	3	addiction (substance, alcohol, internet)	Externalizing
	4	eating disorders	Internalizing
	5	somatoform	
	6	schizophrenia	Thought disorder
	8	OCD	Internalizing
	9	antisocial	Externalizing
	10	borderline	Internalizing
	11	suicidal	

(*Continued*)

Table 1. (Continued).

Variable	Coding description		
	12	maltreated	
	13	physical handicap	
	14	PTSD	Internalizing
	18	gender dysphoria	
	19	burn-out	
	20	reactive attachment disorder	
	21	autism	
	16	comorbid	
	17	mixed	

Data analysis

We analyzed both the three-way and four-way AAI classification distributions. Because only part of the studies reported on the CC category as a separate classification, we combined the U and CC classifications into one category in the four-way categorization.

Multinomial tests

Following the 2009 paper, we conducted a series of multinomial tests with the 3-way and 4-way distributions of the samples of non-clinical, non-risk North American mothers' AAI classifications as a criterion. The distributions in the various sets of samples (e.g. at-risk samples) were then compared with the proportions of these normative distributions. Following the strategy of the 2009 paper, we set the critical alpha level for these comparisons at .001 to compensate for the large number of tests. Because proportion tests do not require the number of individuals in the norm distribution to be included in the degrees of freedom, the total *N*s were not inflated. It should be noted that the *N*s for the three-way and four-way distributions are different and only partially overlapping, as some studies report only three-way distributions, others only four-way distributions, and yet others report both.

Categorical data analysis

To illustrate the configuration of AAI classifications in various groups of participants, we used correspondence analysis, similar to our earlier approach (Bakermans-Kranenburg & Van IJzendoorn, 2009). Correspondence analysis allows for simultaneously examining configurations of attachment classifications and types of groups, and revealing specific patterns of attachment in relation to particular types of respondents (ANACOR; Greenacre, 1985). The analysis uses singular value decomposition of the standardized residuals and weights the singular vectors by the square root of the singular values multiplied by the inverse square root of the number of participants in the norm sample. In the graphical representation of the correspondence analysis results, the origin represents the distribution of categories and samples in the norm group, in our case, non-clinical, non-risk North American

mothers. The standardized residuals for the AAI insecure-dismissing (Ds), secure (F), and insecure-preoccupied (E) distributions can be perfectly represented in two dimensions, and those for the Ds, F, E, and unresolved (U) distributions in three dimensions, but a two-dimensional solution is often an economical representation of the variation in the data and facilitates interpretation. As a result, the graphical representations show which groups have similar distributions over AAI categories and which AAI categories have similar distributions over groups. They also show which groups deviate strongly from the baseline distribution, and in what direction. With the North American, non-clinical, non-risk mother (or "typical") samples providing the baseline, the total distributions of samples outside North America and those of fathers, adolescents, at-risk, and clinical groups were projected into the graphical representation of the norm group using regression-type procedures (Greenacre, 1985). We also distinguished among the various clinical groups and projected these into the graphical space, and combined the clinical groups in clusters of more internalizing versus externalizing symptomatology and thought problems in accordance with the HiTOP model (Ringwald et al., 2023). The computations were performed using ANACOR in SPSS28.

Results

Cumulative numbers of AAIs over the years

Figure 3 presents the cumulative numbers of (unique) AAIs with normal and clinical participants reported over time, and the cumulative numbers of AAIs with female, male, and mixed gender samples. A line demarcating the year 2009 has been plotted in the figure to indicate the state of the art at the time of our previous overview. It is clear from the figure that the number of AAIs has remained steadily increasing and appears not to have reached a saturation point yet. Two things stand out: First, the number of non-clinical participants is about three times larger than that of clinical participants. Our screening process indicated that in clinical samples, the AAI is also often used for the measurement of other constructs (e.g. reflective functioning), and the number of administered AAIs may be (much) larger than the number of those coded with the Main et al.'s (2003) Adult Attachment Scoring and Classification System (or earlier versions of the system). This is reflected in the number of studies identified in the literature search that were excluded from the current study, and the broader use of the AAI is also clearly demonstrated in the VOSviewer results of Figure 1. Second, despite enhanced interest in fathers, the number of AAIs with male participants still falls substantially behind the number of AAIs with female participants, although the number of mixed samples (without separate distributions for males and females) shows that both genders are well represented in the total set of studies.

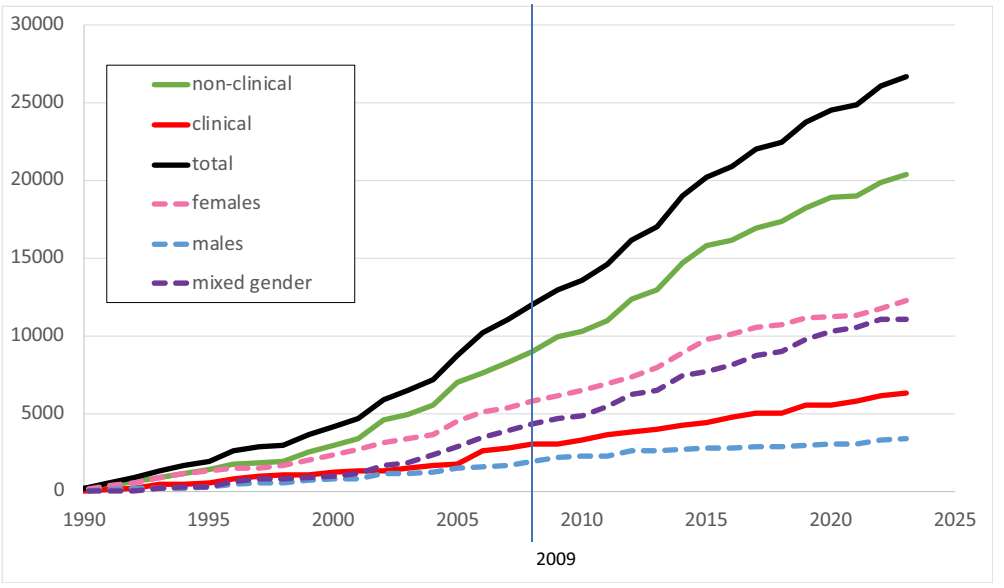

Figure 3. Cumulative number of adult attachment interviews with normal and clinical respondents, and with male and female respondents, since 1990. Note. The line demarcating the year 2009 indicates the state of the art at the time of our previous overview (Bakermans-Kranenburg & Van IJzendoorn, 2009).

Attachment representations in non-clinical adults and North American typical mothers

In the combined sample of $N = 15{,}754$ non-clinical adults, 30% were classified as Ds, 54% as F, and 14% as E (total $n = 10{,}678$). With the category U included, the combined sample of non-clinical adults showed the following distribution: 25% was classified as Ds, 50% as F, 8% as E, and 17% as U/CC ($n = 12{,}140$). Thus, supporting our first hypothesis, the majority of non-clinical adults were classified as secure-autonomous, with higher percentages of insecure-dismissing compared to insecure-preoccupied or unresolved classifications, parallel to the infant attachment distribution in combined typical groups (Madigan et al., 2024).

In the combined sample of North American, non-clinical, non-risk mothers (total $N = 2{,}031$), the three-way distribution ($n = 1{,}257$) was 25% Ds, 59% F, and 16% E, and the four-way distribution ($n = 1{,}654$) was 22% Ds, 53% F, 8% E, and 17% U/CC. This group included four samples from low SES backgrounds. Excluding these four low-SES samples, the figures were 24% Ds, 60% F, and 15% E for the three-way classification ($n = 1642$), and 19% Ds, 56% F, 9% E, and 16% U/CC for the four-way distribution ($n = 1{,}305$). These figures are very similar to those found in our previous paper (23% Ds, 58% F, 19% E and 16% Ds, 56% F, 9% E, 18% U/CC) with combined samples that were about half the size of the current combined samples (Bakermans-Kranenburg & Van IJzendoorn, 2009). Although we used this group of middle- and high-SES mothers (excluding the low-SES groups) as the norm group for comparison with other samples in our 2009 analyses, we feel that a typical group including low-SES participants is more representative of the population of non-clinical North American mothers without additional risks (such as being adopted or bereaved). Therefore, the group of North American non-clinical, non-risk mothers was used as the norm distribution for the multinomial tests (Table 2) and correspondence analyses (Figures 4–10). We noted that not all studies

contributing to this norm distribution reported adequate interrater reliabilities (kappa ≥ .60) for AAI coding. Excluding studies that did not, we found that the three-way and four-way distributions did not change significantly (χ^2[2, $N = 834$) = 7.12, $p = .03$ and χ^2(3, $N = 777$) = 3.15, $p = .37$, respectively). Table 2 presents an overview of the distributions of the norm group and the various other combined samples, with multinomial tests for the comparisons with the norm group. Tables 3–5 present tests for gender (Table 3), continent and language (Table 4), and clinical and at-risk groups (Table 5) with the best matching comparison group instead of the norm group of North American, non-clinical, non-risk mothers.

Gender and age group: attachment representations in females, males, mothers, fathers, and adolescents

Comparisons with the norm distribution of typical North American mothers can be found in Appendix B and Table 2. Here we compared each group with the group that was best comparable except for gender. Contrasting the distributions of non-clinical, non-risk males with those of non-clinical, non-risk females (with the latter distribution as norm) did not reveal a gender difference for the three-way distribution $\chi^2(2, N = 2{,}200) = 12.92$, $p = .002$, but showed a different four-way distribution in males $\chi^2(3, N = 2{,}200) = 160.95$, $p < .001$ (see Table 3). Comparing fathers to mothers, fathers' three-way distribution was similar to mothers' distribution, but fathers' four-way distribution (30% Ds, 46% F, 8% E, and 15%, U/CC) was different from mothers' distribution, $\chi^2(3, N = 804) = 33.58$, $p < .001$. A similar pattern emerged for the comparison between pregnant mothers and expecting fathers, with non-different three-way distributions, but a different four-way distribution for expecting fathers (33% Ds, 48% F, 7% E, and 12% U/CC) compared to pregnant mothers (20% Ds, 56% F, 9% E, and 15% U/CC), $\chi^2(3, N = 852) = 88.35$, $p < .001$ (Table 3). Adoptive fathers' three-way distribution was similar to the distribution of adoptive and foster mothers, but their four-way distribution (37% Ds, 52% F, 7% E, and 4% U/CC) was different from adoptive and foster mothers (20% Ds, 49% F, 4% E, and 27% U/CC), $\chi^2(3, N = 54) = 36.48$, $p < .001$ (Table 3). Note that the group of adoptive fathers was small, and no AAIs of foster fathers were available.

In adolescents, contrasting the distributions of non-clinical, non-risk male adolescents (42% Ds, 53% F, and 4% E) with the female adolescent distribution (31% Ds, 58% F, and 11% E) as norm did not reveal a difference for the three-way distribution $\chi^2(2, N = 125) = 10.82$, $p = .004$, but showed a deviation for the four-way distribution $\chi^2(3, N = 533) = 79.49$, $p < .001$, with males (37% Ds, 41% F, 6% E, and 16% U/CC) showing more Ds and fewer U/CC classifications than females (22% Ds, 45% F, 6% E, and 27% U/CC) (Table 3).

In sum, direct comparisons between female and male samples showed no significant differences in the three-way distributions, but consistent differences in the four-way distributions. The four-way distributions for males reflected higher frequencies of Ds classifications, in line with our hypothesis. Unlike our hypothesis, we found no over-representation of E classifications in females. In adoptive/foster mothers and female adolescents, we found relatively high proportions of U/CC classifications.

Attachment representations in non-English languages and on different continents

Language plays a critical role in the AAI, and we thus tested whether it affects the distribution of AAI classifications. We contrasted the AAI distributions of typical females

that were administered and coded in languages other than English (e.g. Italian, German, Japanese, or Dutch) with the best matching comparison group, that is, typical females' English AAIs. Non-English AAIs displayed no different three-way distribution (25% Ds, 58% F, and 15% E, $\chi^2[2, N = 1{,}975] = 8.46$, $p = .02$), but showed a different four-way distribution (21% Ds, 56% F, 8% E, and 15% U/CC, $\chi^2[3, N = 2{,}612] = 19.72$, $p < .001$), with somewhat fewer U/CC classifications than the English AAIs (Table 4).

The vast majority of AAIs have been administered in North America and Europe. Using the distribution of North America with 25% Ds, 58% F, and 15% E as the norm, Europe had a similar three-way distribution with 26% Ds, 56% F, and 16% E, $\chi^2(2, N = 2{,}045) = 3.96$, $p = .14$), but differed significantly in terms of the four-way distribution (North America: 20% Ds, 49% F, 9% E, and 22% U/CC, Europe: 20% Ds, 55% F, 9% E, and 15% U/CC, $\chi^2[3, N = 2{,}613] = 75.88$, $p < .001$), with more F classifications and fewer U/CC classifications than the North American distribution (Table 4). AAI distributions from Asia were not different from North America, and Australia and the Middle East differed only in their four-way distributions (Australia $\chi^2[3, N = 170] = 50.24$, $p < .001$, with residuals indicating more F classifications and fewer U/CC classifications; Middle East $\chi^2[3, N = 399] = 28.67$, $p < .001$, with residuals indicating more Ds classifications). South America was represented by only one study, which reported a four-way distribution that did not differ significantly from the North American distribution (Table 4).

Thus, regarding our third hypothesis that AAI classifications would show a universal distribution of secure-autonomous versus insecure representations but cultural differences in the distribution of insecure representations, the data indeed demonstrated that on most continents the secure-autonomous group is the largest, except in Australia, where in the three-way distribution the insecure-dismissing group was the largest, with 44% Ds and 42% F (note, however, that this combined sample represents two small studies with total $n = 64$, and that the distribution was not significantly different from the North American three-way distribution). None of the continents showed an overrepresentation of E classifications. An overrepresentation of Ds classifications was found in the Middle East. Europe had a four-way distribution with relatively fewer U/CC classifications (see Table 4).

Attachment representations in clinical and at-risk groups

We compared the various clinical groups to the combined sample of $N = 20{,}308$ non-clinical interviewees. Results are presented in Table 5. In the overall non-clinical group, 29% were classified as Ds, 55% as F, and 14% as E (total $n = 12{,}435$). With the category U included, the combined sample of non-clinical participants showed the following distribution: 25% was classified as Ds, 50% as F, 8% as E, and 17% as U/CC ($n = 14{,}290$). For the various clinical groups, the results show consistently deviating three-way and four-way distributions (see Table 5), with the exception of a small sample of somatoform patients ($\chi^2[2, N = 35] = 13.23$, $p = .001$), and, more importantly, adults with physical handicaps. The distributions of classifications for adults with physical handicaps (such as blindness or deafness) were not different from the distributions for non-clinical adults (three-way, $\chi^2[2, N = 27] = 0.18$, $p = .92$, and four-way, $\chi^2[3, N = 105] = 6.33$, $p = .10$). This result supports for our fourth hypothesis that physically handicapped adults without psychiatric symptoms would show similar attachment representations as non-clinical norm groups.

Table 2. Distributions (percentages, residuals) of non-clinical, non-Risk North-American Mothers and various sets of samples, with multinomial tests for the comparison with the Norm Group.

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	N	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
North-American mothers[a]	1257	25 0.0	59 0.0	16 0.0		1654	22 0.0	53 0.0	8 0.0	17 0.0	
North-Am mothers middle-high SES[a]	1171	24 −7.5	60 16.1	15 −8.5	0.961 p = .62	1305	19 −39.4	56 35.9	9 15.8	16 −12.3	10.4 p = 0.015
Mothers[a]	2759	25 22.3	58 −2.8	15 −19.5	1.62 p = .45	3375	22 13.2	53 −3.2	9 24.2	16 −34.2	4.46 p = 0.22
Non-mothers[a]	179	41 −3.5	106 1	31 2.5	0.51 p= .78	556	20 −12.3	54 4.3	11 18.5	15 −10.5	10.19 p = 0.017
Pregnant mothers	1467	24 −1.5	59 46.9	12 −45.4	11.96 p = .003	1179	20 −24.4	56 33.1	9 10.7	15 −19.4	7.14 p = 0.068
Adoption/foster mothers	243	28 6.8	59 1.8	12 8.6	2.68 p = 0.26	313	20 −5.9	49 −11.9	4 −13	27 30.8	**25.96** **p < .001**
Adolescent mothers	335	50 85.3	32 −91.6	18 6.4	**130.04** **p < .001**	447	40 69.8	29 −132.8	4 −23.4	38 86.4	**215.58** **p < .001**
Females[a]	4952	25 34	58 43.6	14 −77.6	9.44 p = 0.009	5971	21 −39	53 21	9 30.6	17 −12.6	3.41 p = 0.33
Males[a]	1307	29 65.5	55 −30.9	13 −34.6	**20.73** **p < .001**	2200	32 217.1	47 −140.4	8 7.4	13 −84.2	**133.82** **p < .001**
Fathers	558	30 27.3	54 −25.4	16 −1.8	7.37 p = 0.025	804	30 67.2	46 −52.5	8 −0.9	15 −13.8	**33.63** **p < .001**
Expecting fathers	483	29 26.5	56 7.9	8 −34.4	**23.08** **p < .001**	852	33 92.6	48 −45.6	7 −5.2	12 −41.8	**62.78** **p < .001**
Adoptive fathers	84	32 11	44 −5.6	8 −5.4	8.59 p = 0.014	54	37 8.1	52 −0.6	7 −0.3	4 −7.2	11.2 p = .01
Adolescents[a]	2408	35 250.3	55 −98.4	10 −151.8	**171.33** **p < .001**	2762	33 295.4	50 −75.9	6 −62	11 −157.5	**217.73** **p < .001**
Male adolescents[a]	125	42 21.3	53 −6.6	4 −14.7	**26.23** **p < .001**	533	37 78.7	41 −62.5	6 −9.6	16 −6.6	**69.36** **p < .001**
Female adolescents[a]	221	31 12.8	58 −2.4	11 −10.4	6.02 p = 0.049	340	22 1.2	45 −28.2	6 −7.2	27 34.2	**26.57** **p < .001**
Females English[a]	2947	25 30	59 43.2	13 −73.2	**14.07** **p < .001**	3329	22 −11.7	52 −41.8	9 19.9	18 33.6	4.66 p = .20

(*Continued*)

Table 2. (Continued).

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	N	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
Females non-English[a]	1975	25	58	15	0.17	2612	21	56	8	15	9.42
		3.5	3	−6.5	p = 0.92		−28.6	65.6	8	−45	p = .02
North America[b]	2840	25	58	15	1.29	3207	20	49	9	22	**65.29**
		12.5	8.7	−21.2	p = 0.53		−58.9	−129.1	26.7	161.3	**p < .001**
Europe[b]	2045	26	56	16	3.98	2613	20	55	9	15	16.1
		36	−40.1	4.1	p = 0.14		−40.9	54.1	35	−48.2	p = .001
South America[b]						66	15	44	3	38	**21.39**
							−4.5	−6	−3.3	13.8	**p < .001**
Australia[b]	64	44	42	14	12.22	170	12	76	5	7	**35.94**
		12	−10.8	−1.2	p = 0.002		−17.4	38.9	−5.6	−15.9	**p < .001**
Middle East[b]	291	27	43	8	**15.15**	399	30	46	6	18	**17.78**
		23.3	−9.9	−13.3	**p < .001**		32.2	−26.5	−8.9	3.2	**p < .001**
Asia[b]	128	16	74	10	12.26	178	13	61	5	21	11.28
		−12	19.5	−7.5	p = 0.002		−15.2	13.7	−5.2	6.7	p = .01
Non-Clinical (all)	12,435	29	55	14	**173.68**	14,290	25	50	8	17	**80.23**
		612.5	−358	−254.5	**p < .001**		415.1	−436.3	23.8	−2.6	**p < .001**
Clinical (all)	3834	37	28	30	**1395.56**	4222	26	23	12	40	**2096.92**
		505	−1083.4	578.4	**p < .001**		167.2	−1286	169.1	949.7	**p < .001**
Internalizing	1467	36	26	33	**631.67**	1970	27	23	12	38	**970.34**
		183.8	−442.9	259.2	**p < .001**		90.9	−606.1	79	436.2	**p < .001**
Externalizing	796	45	23	30	**407.20**	634	32	13	16	40	**461.65**
		165.2	−276.3	111	**p < .001**		63.2	−257.2	51.8	142.2	**p < .001**
Thought disorders	188	59	26	15	**122.88**	162	43	17	7	33	**97.09**
		64	−62.9	−1.1	**p < .001**		34.4	−58.9	−1.0	25.5	**p < .001**
Parent of clinical child	384	35	34	30	**104.2**	329	29	31	12	29	**70.35**
		40.5	−94.4	53.9	**p < .001**		21.6	−73.4	13.7	38.1	**p < .001**
At risk (all)	1801	37	43	18	**200.50**	2097	27	36	8	31	**357.85**
		233.8	−272	38.2	**p < .001**		88.8	−371.3	−0.4	282.9	**p < .001**

Percentages for the three-way distributions do not always add to 100% because of CC classifications in the distributions of some samples. Significant chi-square values ($p < .001$) are presented in bold.

[a]Non-clinical, non-risk ("typical").

[b]Adult, non-clinical females.

Table 3. Gender differences in Distributions of Attachment Representations, with the most adequate comparison groups.

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	*N*	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
Females (non-clin, non-risk)	4952	25 0.0	58 0.0	14 0.0		5971	21 0.0	53 0.0	9 0.0	17 0.0	
Males (non-clin, non-risk)	1307	29	55	13	12.92 p = .002	2200	32 239.1	47 −140.4	8 −14.5	13 −84.2	**160.95** **p < .001**
Mothers (non-clin, non-risk)	2759	25 0.0	58 0.0	15 0.0		3375	22 0.0	53 0.0	9 0.0	16 0.0	
Fathers (non-clin, non-risk)	558	30 24.4	54 −26.5	16 2.1	6.39 p = .004	804	30 67.2	46 −52.5	8 −8.9	15 −5.8	**33.58** **p < .001**
Pregnant mothers	1467	24 0.0	59 0.0	12 0.0		1179	20 0.0	56 0.0	9 0.0	15 0.0	
Expecting fathers	483	29 25.3	56 −6.0	8 −19.3	12.46 p = .002	852	33 109.6	48 −71.1	7 −13.7	12 −24.8	**88.35** **p < .001**
Adoptive/Foster mothers	243	28 0.0	59 0.0	12 0.0		313	20 0.0	49 0.0	4 0.0	27 0.0	
Adoptive fathers	84	38 8.2	52 −6.1	10 −2.2	4.06 p = .13	54	37 17.0	52 3.0	7 3.0	4 −23.0	**36.48** **p < .001**
Female adolescents (typical)	221	31 0.0	58 0.0	11 0.0		340	22 0.0	45 0.0	6 0.0	27 0.0	
Male adolescents (typical)	125	42	53	4	10.82 p = .004	533	37 78.7	41 −19.9	6 1.0	16 −59.9	**79.49** **p < .001**

Percentages for the three-way distributions do not always add to 100% because of CC classifications in the distributions of some samples.

Table 4. Continent and language differences in distributions of attachment representations.

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	N	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
North-America	2840	25 0.0	58 0.0	15 0.0		3207	20 0.0	49 0.0	9 0.0	22 0.0	
Europe	2045	26 25.7	56 −43.8	16 18	3.96 p = 0.14	2613	20 11.4	55 158.6	9 8.8	15 −178.9	**75.88** **p < .001**
South America						66	15 −3.2	44 −3.3	3 −3.9	38 10.5	11.3 p = 0.01
Australia	64	44 11.7	42 −10.9	14 −0.8	11.54 p = 0.003	170	12 −14	76 45.7	5 −7.3	8 −24.4	**50.24** **p < .001**
Middle East	291	27 22.1	43 −10.3	8 −11.7	13.2 p = 0.001	399	30 40.2	46 −10.5	6 −12.9	18 −16.8	**28.67** **p < .001**
Asia	128	16 −12.7	74 19.2	10 −6.6	12.01 p = 0.002	178	13 −11.6	61 20.8	5 −7	21 −2.2	11.93 p = 0.008
Language (Typical females)											
English	2947	25 0.0	59 0.0	13 0.0		3329	22 0.0	52 0.0	9 0.0	18 0.0	
Non-English	1975	25 −11.4	58 −32.1	15 43.4	8.46 p = 0.02	2612	21 −23.0	56 105.2	8 −15.8	15 −66.5	**19.72** **p < .001**

Percentages for the three-way distributions do not always add to 100% because of CC classifications in the distributions of some samples.

Table 5. Distributions of attachment representations in clinical and At-risk groups, compared with Non-clinical groups.

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	N	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
Non-Clinical (all)	12,435	29 0.0	55 0.0	14 0.0		14,290	25 0.0	50 0.0	8 0.0	17 0.0	
INTERNALIZING	1467	36 119.2	26 −402.5	33 283.3	**639.50** **p < .001**	1970	27 38.8	23 −531.5	12 81.4	38 411.3	**842.64** **p< .001**
EXTERNALIZING	796	45 129.7	23 −253.9	30 124.3	**361.10** **p < .001**	634	32 44	13 −238	16 51.8	40 142.2	**427.37** **p< .001**
Depression	387	39 39.4	28 −102.6	30 63.1	**137.71** **p < .001**	495	25 −0.8	34 −78.5	13 22.4	28 56.9	**75.98** **p < .001**
Anxiety	28	43 3.7	29 −7.7	29 4.0	9.45 p = 0.01	231	37 27.2	23 −62.5	7 −2.5	33 37.7	**83.26** **p < .001**
Addiction[a]	300	42 38.2	42 −42.4	16 4.1	**27.52** **p < .001**	164	26 2.8	25 −39.5	22 23.1	25 13.6	**67.86** **p < .001**
Eating	372	27 −3.8	41 −46.7	27 50.4	**61.39** **p < .001**	468	28 16.2	30 −87.5	16 36.6	24 34.6	**88.3** **p < .001**
Somatoform	35	49 6.6	26 −10.6	26 4	13.23 p = 0.001						
Schizophrenia	188	59 55.4	26 −57.5	15 2.1	**86.62** **p < .001**	162	43 29.5	17 −54.0	7 −1.0	33 25.5	**81.1** **p < .001**
OCD	25	72 11.5	12 −9.3	4 −2.1	**28.82** **p < .001**	25	60 8.8	12 −9.5	4 −1.0	24 1.8	**20.69** **p < .001**
Antisocial	496	27 91.4	11 −211.6	38 120.1	**440.13** **p < .001**	470	34 41.2	9 −198.5	14 28.7	45 128.6	**403.19** **p < .001**
Borderline	360	44 51.8	10 −166.5	46 114.7	**419.37** **p < .001**	206	22 −5.5	7 −89	22 28.5	49 66	**251.16** **p < .001**
Suicidal	69	23 −2.1	23 −18.2	42 20.3	**57.17** **p < .001**	69	16 −6.3	13 −25.5	7 −0.5	64 32.3	**109.94** **p < .001**
Maltreated	294	20 −22.9	39 −42.1	36 65.0	**123.23** **p < .001**	492	20 −28.5	29 −115	12 34.2	40 109.3	**224.69** **p < .001**
Physical handicap	27	26 −1.0	59 0.8	15 0.1	0.18 p = .92	105	18 −10.3	59 3.5	13 4.6	21 2.1	6.33 p = .10
PTSD	197	27 1.8	31 −35.1	29 33.3	**57.58** **p < .001**	161	10 −24.3	7 −68.5	7 −1.9	76 94.6	**400.35** **p < .001**

(*Continued*)

Table 5. (Continued).

	Three-way					Four-way					
	N	Ds % res	F % res	E % res	χ^2 *p*	N	Ds % res	F % res	E % res	U/CC % res	χ^2 *p*
Gender dysphoria	114	40 17.0	24 −28.0	22 11.0	**32.86** **p < .001**	94	26 −5	37 −23	17 6.7	44 21.3	**37.81** **p < .001**
Burn-out	50	40 5.2	28 −14.1	32 8.9	**19.86** **p < .001**	50	20 −2.5	2 −24	10 1	68 25.5	**100.29** **p < .001**
React Att Disorder	10	30 1.5	0 −2.8	20 1,3	6.68 p = 0.04	10	30 0.5	0 −5	20 1.2	50 3.3	13.31 p = 0.004
Autism	20	45 3.1	15 −8.2	40 5.1	**16.89** **p < .001**	20	25 0	15 −7	20 2.4	40 4.6	14.72 p = 0.002
Comorbid	98	42 14.8	17 −34.6	33 19.9	**61.25** **p < .001**	384	29 17	15 −136	8 −0.7	48 119.7	**318.92** **p < .001**
Mixed	585	32 26.5	34 −111.1	28 84.6	**135.6** **p < .001**	449	24 −6.3	24 −117.5	8 1.1	44 122.7	**259.02** **p < .001**
At risk	1801	37 152.9	43 −221.3	18 68.4	**113.03** **p < .001**	2097	27 24.5	36 −307.0	8 −0.4	31 282.9	**308.85** **p < .001**

Percentages for the three-way distributions do not always add to 100% because of CC classifications in the distributions of some samples.
[a]Five samples with substance abuse, one sample with internet addiction.

Groups with Internalizing problems deviated strongly from the non-clinical norm distributions, for both the three-way distribution of 36% Ds, 26% F, and 33% E, χ^2 (2, $N = 1{,}467$) = 639.50, $p < .001$), and the four-way distribution of 27% Ds, 23% F, 12% E, and 38% U/CC, $\chi^2(3, N = 1{,}970) = 842.64$, $p < .001$. Externalizing problems were also accompanied by strongly deviating distributions, three-way 45% Ds, 23% F, and 30% E, $\chi^2(2, N = 796) = 361.10$, $p < .001$, and four-way 32% Ds, 13% F, 16% E, and 40% U/CC, $\chi^2(3, N = 634) = 427.34$, $p < .001$. The group of studies on Thought disorders completely overlapped with studies on schizophrenia. In Table 5 the results for this group can be found under Schizophrenia, which shows strongly deviating three-way ($\chi^2[2, N = 188] = 86.62$, $p < .001$) and four-way ($\chi^2[3, N = 162] = 81.1$, $p < .001$) distributions, with overrepresentations of 59% Ds in the three-way distribution, and 43% Ds and 33% U/CC classifications in the four-way distribution.

In sum, both Internalizing and Externalizing problems were characterized by an overrepresentation of insecure adult attachment classifications. Our fifth hypothesis predicted that E classifications would be overrepresented in disorders with an internalizing component, whereas Ds classifications would be overrepresented in disorders with an externalizing component. This pattern is not as evident as one might expect. Although Ds classifications were clearly overrepresented in groups with Externalizing disorders, E classifications were prominent in both Externalizing and Internalizing disorders. In line with the second part of our hypothesis, U/CC classifications were overrepresented in virtually all clinical groups, and were associated with Internalizing and Externalizing disorders to a similar extent (see Table 5).

Graphical display of AAI classifications distributions

In the next step, we projected the various groups into the plots of three-way and four-way AAI distributions of the samples of non-clinical, non-risk North American mothers. The centers of the plots represent the norm distribution, at the intersection of the Ds, F, E vectors for the three-way classification in Figures 4, 7 , and 9, and at the intersection of the Ds, F, E, and U/CC vectors for the four-way classification in Figures 6, 8 , and 10. The three-way distributions can be represented in a two-dimensional space. Based on weights derived from the norm group, the formula for calculating the x-coordinate for each other (combined) sample from the frequencies of the Ds (nDs), the F (nF), and the E (nE) classifications was $x = (.012 * nDs + .310 * nF - 1.206* nE)/(.284 * (nDs + nF + nE))$. The formula for calculating the y-coordinate was $y = (-.688 * nDs + .231 * nF + .215* nE)/(.157 * (nDs + nF + nE))$. It should be noted that the resulting graphical representations are not perfectly aligned with the numerical approach in Table 2, because the two dimensions explain 100% of the variance in the norm group, but less than 100% in other groups. Figure 4 shows that the combined samples of females, non-English females, non-clinical groups, and groups with a physical handicap are projected quite close to the center, implying that their distributions are similar to the norm group distribution. Groups further away from the center deviate more from the norm group. Perpendicular lines from a specific group onto the Ds, F, and E vectors indicate the overrepresentation (or underrepresentation) of those classifications in that specific group. For example, the perpendicular line from the projection of At-risk groups to the Ds vector shows that Ds representations are overrepresented in At-risk groups, and this effect is even stronger in OCD, where the perpendicular line to the Ds vector touches it further from the center.

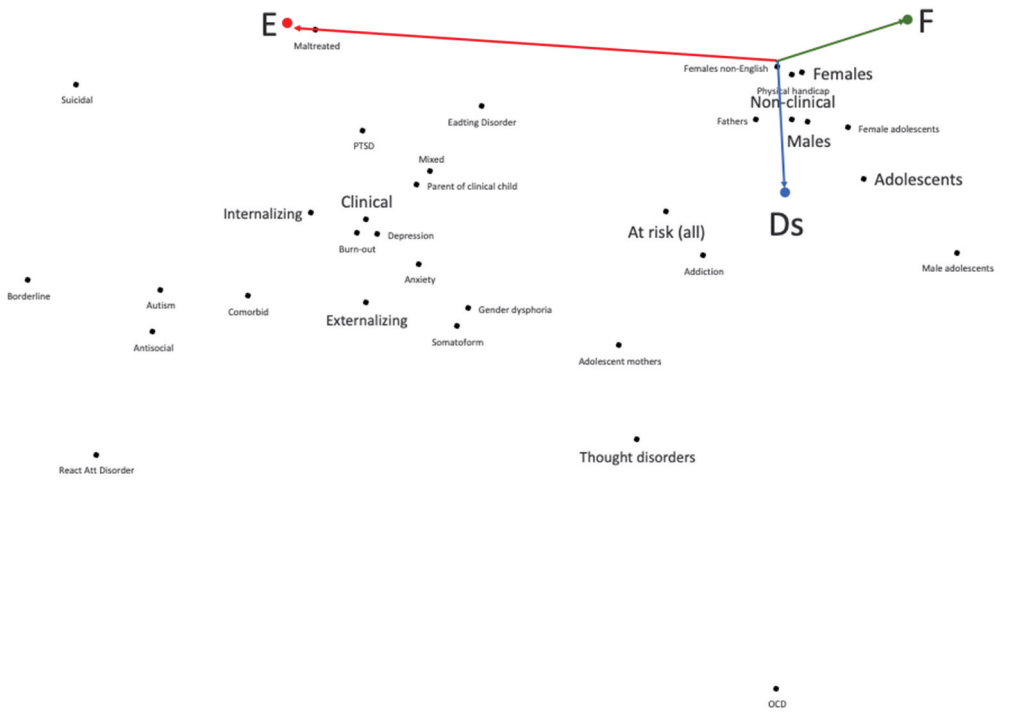

Figure 4. Three-way adult attachment interview classifications, overall. Note: The center of the plot, at the intersection of the Ds, F, and E vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, and E vectors indicate the overrepresentation (or underrepresentation) of those classifications in that specific group.

Four-way distributions are best represented in a three-dimensional space. The dimensions explained 45%, 31%, and 24%, respectively, of the variance in the group of non-clinical, non-risk North American mother samples that was the norm group. Figure 5 shows the projections of the four vectors in the three possible two-dimensional spaces (using dimensions 1 and 2, 1 and 3, and 2 and 3). Dimension 1 distinguishes in particular between U and the other three classifications, dimension 2 distinguishes the U and F classifications from the Ds and E classifications, and dimension 3 distiguishes in particular E from the other classifications. For ease of interpretation, we plotted the combined samples in a two-dimensional space based on dimensions 1 and 3. The formula for calculating the x-coordinate for each group from the frequencies of the Ds (nDs), F (nF), E (nE) and U/CC (nUCC) classifications was $x = (.051 * nDs - .407 * nF + .138 * nE + 1.128 * nUCC)/(.305 * (nDs + nF + nE + nUCC))$. The formula for calculating the y-coordinate was $y = (.556 * nDs - .024 * nF - 1.330 * nE + .021 * nUCC)/(.218 * (nDs + nF + nE + nUCC))$.

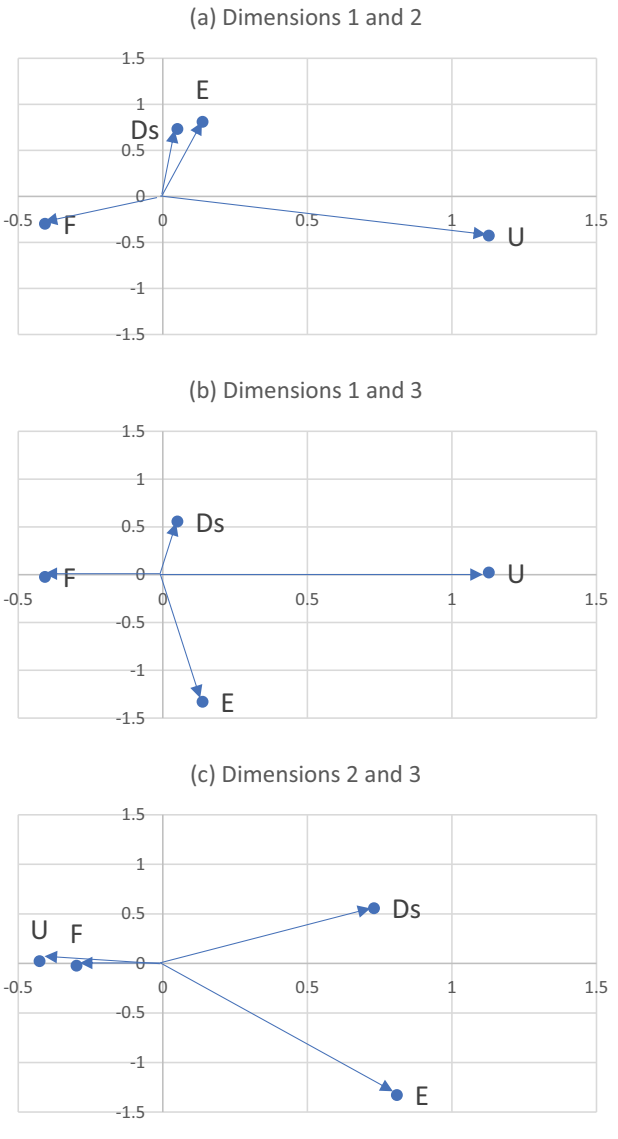

Figure 5. Projections of the four-way AAI classifications in three two-dimensional spaces. Note: The four AAI classifications are projected in a three-dimensional space, with x-, y-, and z-coordinates, resulting in three two-dimensional representations (representing dimensions 1 and 2, 1 and 3, 2 and 3, respectively. Dimension 1 distinguishes in particular between U and the other three classifications, dimension 2 distinguishes the U and F classifications from the Ds and E classifications, and dimension 3 distiguishes in particular between E and the other classifications. For ease of interpretation, we plotted the combined samples in a two-dimensional space based on dimensions 1 and 3.

Figure 6 shows the position of the various combined samples relative to the Ds, F, E, and U/CC vectors, and relative to each other and to the centre representing the norm group. Females are very close to the centre, and males and fathers are characterized by some overrepresentations of Ds but not U/CC classifications. Compared to Figure 4, Figure 6 reveals that OCD is not only

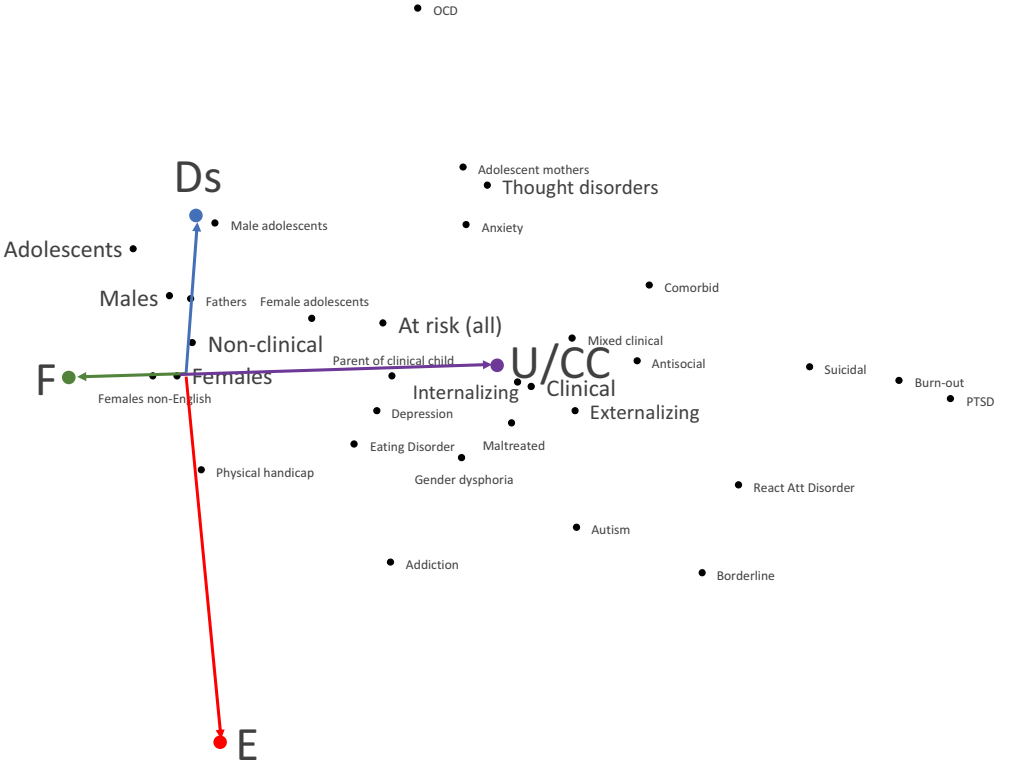

Figure 6. Four-way adult attachment interview classifications, overall. Note: The center of the plot, at the intersection of the Ds, F, E, and U/CC vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, E, and U/CC vectors indicate the overrepresentation (or underrepresentation) of those classifications in that specific group.

characterized by an overrepresentation of Ds classifications, but also by an overrepresentation of U/CC classifications. More generally, clinical groups are concentrated to the right of the centre, in the direction of the U/CC vector, indicating an overrepresentation of U/CC classifications.

Figures 7 and 8 display the projections of AAI classifications across genders and continents. Figure 7, displaying three-way distributions, shows that mothers and fathers are relatively close to each other, in particular with respect to E and F classifications, but fathers are projected somewhat more into the Ds direction. An overrepresentation of F classifications is found in Asian samples, whereas more Ds classifications characterize Australia and the Middle East. E classifications are relatively fewer in the Middle East than in Australia. Figure 8 shows that adding the U/CC vector does not change much in the position of fathers and mothers, but brings Asia closer to the center of the plot and moves North America from the center into the direction

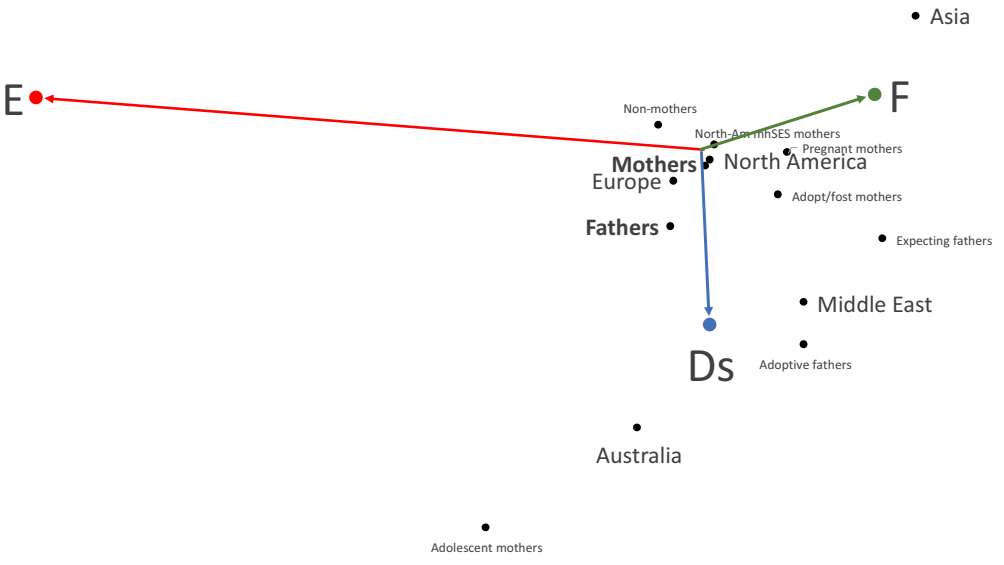

Figure 7. Three-way adult attachment interview classifications across gender and continents. Note: The center of the plot, at the intersection of the Ds, F, and E vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, and E vectors indicate the overrepresentation (or underrepresentation) of those classifications in that specific group.

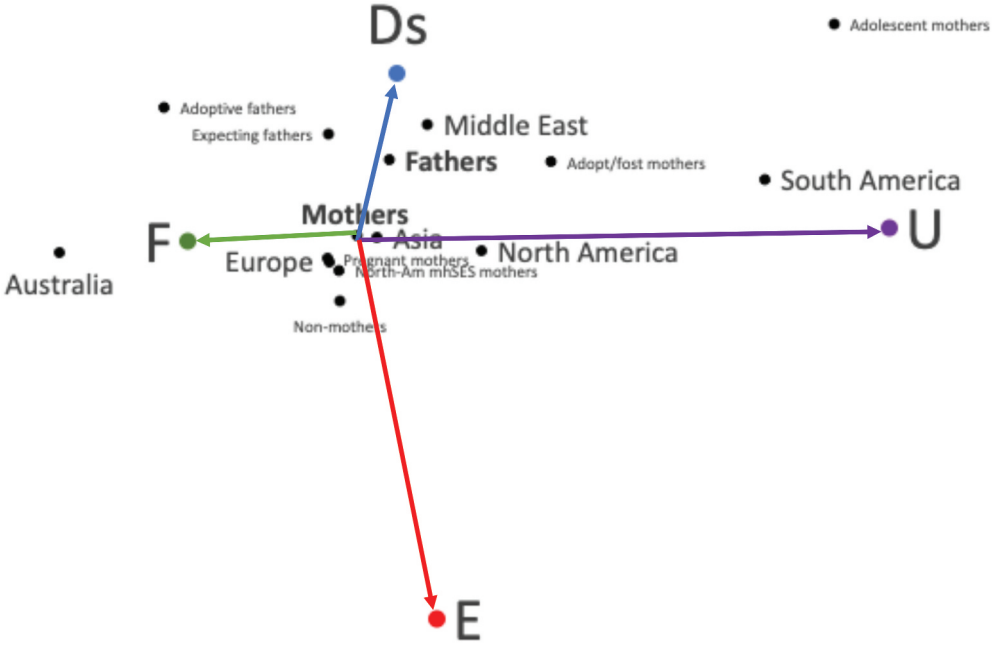

Figure 8. Four-way adult attachment interview classifications across gender and continents. Note: The center of the plot, at the intersection of the Ds, F, E, and U/CC vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, E, and U/CC vectors indicate the over-representation (or underrepresentation) of those classifications in that specific group.

of more U/CC classifications. South America comes into the picture with an overrepresentation of U/CC classifications. The largest distance from the center is for adolescent mothers, who are projected far into the directions of the U/CC and Ds vectors, away from the F vector.

In Figures 9 and 10 the clinical and at-risk groups are projected in plots with the typical North American mothers representing the center. With the exception of physical handicaps, all clinical groups are positioned away from the F vector. Maltreated samples are located in the E direction without any increase of Ds classifications, whereas gender dysphoria samples are characterized by both E and Ds. Samples characterized by externalizing diagnoses have a greater weight on the Ds vector than those characterized by internalizing disorders, and samples characterized by internalizing disorders have a greater weight on the E vector than samples characterized by externalizing disorders, though the latter difference is small. Thought disorders are projected mainly in the direction of the Ds vector, although the perpendicular line from thought disorders onto the E vector indicates that E classifications are also overrepresented. In Figure 10, it is evident how characteristic of clinical groups the U/CC classification is. The three clusters of Internalizing, Externalizing, and Thought Disorders are all projected in the direction of the U/CC vector, and Suicidal, Burn-out, and PTSD groups are particularly characterized by the presence of U/CC.

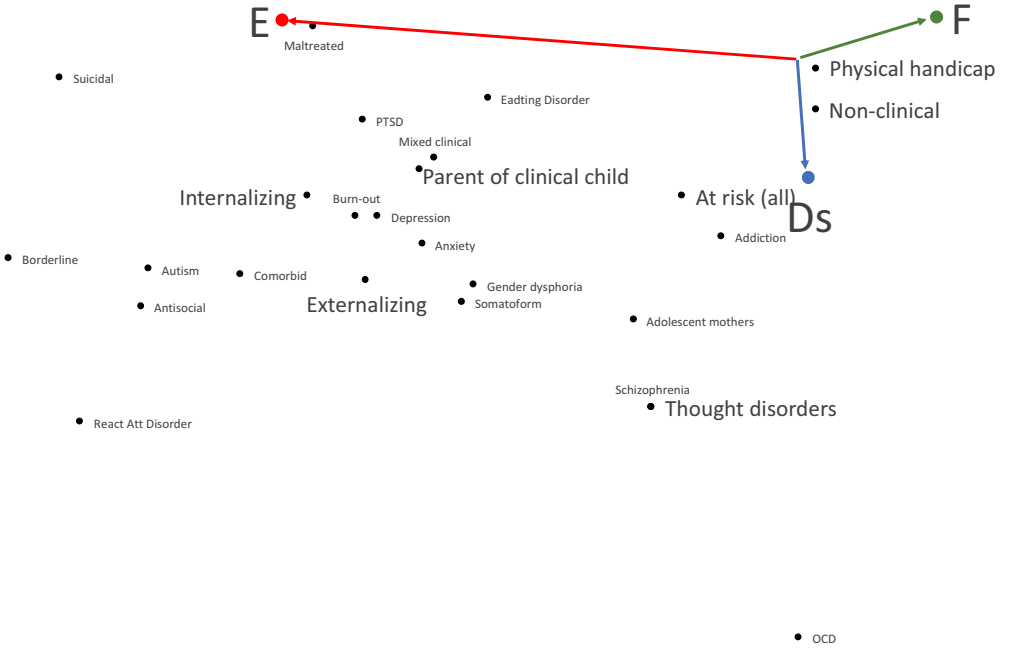

Figure 9. Three-way adult attachment interview classifications, clinical groups. Note: The center of the plot, at the intersection of the Ds, F, and E vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, and E vectors indicate the overrepresentation (or under-representation) of those classifications in that specific group.

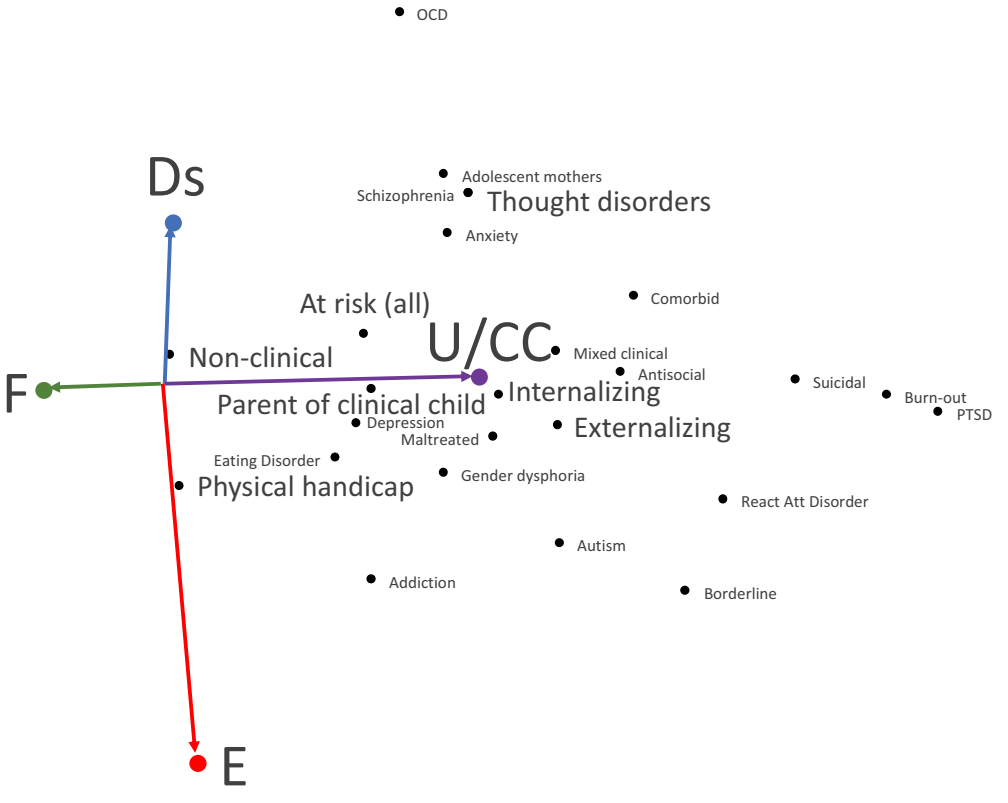

Figure 10. Four-way adult attachment interview classifications, clinical groups. Note: The center of the plot, at the intersection of the Ds, F, E, and U/CC vectors, represents the norm distribution of typical North-American mothers. Distributions closer to the center are more similar to the norm. Perpendicular lines from a specific group on to the Ds, F, E, and U/CC vectors indicate the over-representation (or underrepresentation) of those classifications in that specific group.

Discussion

Fifteen years ago, we reported on the distributions of just over 10,000 AAIs administered with respondents of various ages, genders, countries of residence, and clinical status. In the current study, we renewed the literature search and updated the analyses, with a focus on five preregistered hypotheses, which we discuss below. Although the corpus of studies, now including 26,443 AAIs, has not expanded to the same extent in all directions, testing most of our hypotheses was facilitated by increased numbers of studies and samples since 2009.

AAI distributions in non-clinical samples

Our first hypothesis predicted that the majority of non-clinical adults would be classified as secure-autonomous, with somewhat higher percentages of insecure-dismissing compared to insecure-preoccupied or unresolved classifications. Indeed, the majority of non-clinical adults were classified as secure-autonomous (54%), and more were insecure-dismissing (30%) than insecure-preoccupied (14%). In the four-way distribution, 17%

was classified as unresolved or Cannot Classify. Notably, compared to the three-way distribution, the four-way distribution showed a decrease in all three not-unresolved classifications (four-way distribution: 25% classified as insecure-dismissing, 50% secure-autonomous, 8% as insecure-preoccupied). Although the percentages in the three-way and four-way distributions cannot be directly compared as they refer to both overlapping and non-overlapping studies, they suggest that respondents with any of the three main classifications can be additionally classified as unresolved, with a larger chance to be unresolved for participants who are insecure-preoccupied. Compared to the global distribution of infant SSPs with a total of 9921 non-risk, non-clinical children (14% avoidant, 58% secure, 11% resistant, and 17% disorganized (Madigan et al., 2023), relatively more typical adults are classified as insecure-dismissing in the AAI than children classified as insecure-avoidant in the SSP. Of note, for infant attachment assessed in the SSP, Madigan et al. (2023) identified a temporal trend with studies having reported smaller proportions of avoidant infant – parent classifications over 35 years. In theory, and assuming stability over time (but see R. Fraley, 2002), higher proportions of dismissing AAIs (administered with adults) could be explained by higher proportions of insecure-avoidant infants in the past. If this is true, we would expect the frequency of insecure-dismissing AAI classifications to become smaller over the next decades. For infant disorganized attachment, other etiological factors such as maltreatment and socioeconomic risks have been identified in addition to parental unresolved loss or trauma (Cyr et al., 2010); nevertheless, the proportions of disorganized infant attachment and the proportion of adults who are classified as unresolved are the same.

Although not explicit in our hypotheses, the finding that insecure-dismissing attachment representations were overrepresented in adolescents aligns with our expectations. The percentage of insecure-dismissing classifications (35% in the combined three-way distribution, 33% in the combined four-way distribution) is very similar to what we reported 15 years ago (Bakermans-Kranenburg & Van IJzendoorn, 2009), and may reflect adolescents' focus on independence. Note that the largest adolescent sample to date ($N = 819$, Groh et al., 2014) also reported 35% insecure-dismissing classifications. It might be considered remarkable that in adolescents the AAI, capturing not a conscious self-portrait but representations of attachment, elicits so many response patterns that based on their idealization or overreliance on independence must be classified as insecure-dismissing. This finding raises two questions that may be addressed in future research. First, longitudinal studies may examine whether a shift in attachment representations from *not* insecure-dismissing (pre-adolescence) to dismissing (during adolescence) and back (post-adolescence) is a common phenomenon. Adolescence may be, at least for some adolescents, a period during which the relationship with their parents has become less close, while stable romantic relationships have not yet developed, triggering a more self-reliant, dismissing perspective. Second, it is worth examining whether insecure-dismissing attachment representations have the same correlates or different predictive power during adolescence compared to adulthood. If adolescence proves to be a moderator of such correlates, having an insecure-dismissing attachment representation might have a different meaning and/or different consequences during adolescence compared to adulthood.

Are AAI distributions different between genders?

Our second hypothesis pertained to gender differences. Based on arguments that gender differences in attachment are not expected during infancy but would emerge in middle childhood (Del Guidice & Belsky, 2010), we expected that the distribution for adult males would reflect a higher frequency of insecure-dismissing attachment classifications, and that adult females would more often express an insecure-preoccupated state of mind concerning past experiences with their caregivers. This is not what we found when we focus on the three-way classifications. None of the analyses with adequate comparison groups (i.e. males compared to females, fathers to mothers, male to female adolescents, etc.) showed a distribution for males that was significantly divergent from the female distribution. One explanation for this finding might be that males who participate in attachment studies are self-selected, such that their potentially higher interest in family and relationship issues is reflected in their (relative) openness to think and talk about attachment-related experiences. Another explanation may be that differences between males and females on the AAI are less prominent than on attachment styles as measured with questionnaires such as the Experiences in Close Relationships (ECR; Brennan et al., 1998, e.g.; Weber et al., 2022), which show hardly any overlap with attachment representations as measured with the AAI (Roisman et al., 2007). It may also be that such gender-specific differences are only apparent under stressful conditions; life history theories would predict that harsh environments push males into the direction of less investment in personal relationships, while females would be drawn to maximizing attachment strategies to ensure continued male investment (Belsky et al., 1991). However, it has also been suggested that with ecological stress, avoidance increases in both sexes but more steeply in women, thus narrowing any difference between males and females (Del Giudice, 2019).

Despite the absence of gender differences in the three-way AAI distributions, all four-way distributions for the male groups were different from the respective female norm distributions. Males were more often classified as insecure-dismissing and less frequency classified as secure-autonomous in the AAI compared to females (except for adoptive fathers), and females were more frequently classified as unresolved in the AAI compared to males. In the four-way AAI distributions, we did not find an overrepresentation of insecure-preoccupied adult attachment classifications in females. However, adoptive and foster mothers, as well as female adolescents, were relatively frequently classified as unresolved in the AAI. Regarding foster and adoption mothers, we cautiously speculate that this might partly reflect any pregnancy or child loss in their life history (Bakermans-Kranenburg et al., 1999); such traumatic experiences may, as a results, trigger AAI discourse of past loss or trauma in ways that deem such transcripts unresolved. Such a hypothesis, however, requires further exploration. The relatively high rates of unresolved loss in female adolescents (not found in male adolescents or in mixed adolescent samples) beg other explanations. Whereas compared to adults, adolescents tend to experience fewer losses, it is possible that once a loss of a loved one is experienced in this relatively early developmental stage, female adolescents may have significant difficulty resolving it.

AAI distributions across the globe

In terms of differences between geographical regions, the most pressing conclusion is that large parts of the world are not represented in the corpus of AAI studies. Not a single study from the African continent is available. In addition, only one study from South America and three studies from Australia were included in current analyses. A similar phenomenon was noted for studies using the SSP (Madigan et al., 2023), although at least some studies on infant attachment on the African continent have been reported (Mooya et al., 2016; True et al., 2001). Notably, the South American AAI study is exemplary in its design, comparing urban and rural subsamples (Gojman et al., 2012). Such differences within countries may be more pronounced than differences between countries (as for maternal sensitivity, see Mesman et al., 2016). As could be expected, the largest numbers of AAIs were administered in North America, but Europe follows as a close second. In the Middle East, most of the studies were conducted in Israel.

In terms of frequencies per continent, the three-way AAI distributions were not different. However, the four-way distributions did show between-continent differences, with more secure-autonomous AAIs and fewer unresolved AAIs reported in Europe and Australia compared to North America. The Middle East showed a distribution with more insecure-dismissing attachment representations, which is surprising given the traditional overrepresentation of ambivalent infant attachment in this continent that was confirmed in the most recent meta-analysis (Madigan et al., 2023). Interestingly, the overrepresentation of secure infant SSP attachment in Asia (Madigan et al., 2023) was accompanied by an overrepresentation of secure-autonomous AAI classifications on that continent, but the difference with the norm distribution was not significant.

As much as we regret the small numbers of AAI studies in the majority world, we happily note the substantial increase of AAIs in non-English languages, and the rather similar distributions found for these AAIs. It suggests that the interview is applicable to various language areas, and ready for more worldwide use. It also shows that training and reliability in the coding of AAIs is transferable to other languages than English. It is worth noting here that the reported intercoder reliability of the AAI, an important part of the instrument's psychometric qualities, has increased over the years. While early studies sometimes reported only one coder per study (and thus no intercoder reliability) or modest kappa values, the reliability has increased over the years, with correlations between year of publication and kappas for three-way and four-way intercoder reliabilities amounting to .30. This is a huge compliment for our colleagues organizing the many training institutes devoted to enabling new generations of researchers and clinicians to reliably apply the AAI.

Increasing interrater reliability of the AAIs over time is also relevant to the decreasing associations between parents' attachment representations and child-parent attachment quality over time (Verhage et al., 2016). Madigan et al. (2023) noted that diminished reliability or ecological validity of the respective measures for adult (AAI) and infant (SSP) attachment might be responsible for the lower intergenerational transmission of attachment found in more recent studies. They argue that this would not be the case for the SSP,

shifting the burden of proof to the AAI. However, given that our findings demonstrate *increasing* rather than *decreasing* reliability of AAI coding over time, the research agenda might better focus on substantive factors explaining the decline in intergenerational transmission of attachment.

AAI in clinical samples: the primacy of the unresolved classification

One of the most intriguing issues in the discussion regarding adult attachment classifications is the justification for the unresolved category as an independent phenomenon separate from the insecure-preoccupied classification. Studies on the latent dimensional structure of the AAI rating scales have tended to uncover two dimensions, dismissing and preoccupied, with unresolved absorbed in the preoccupied dimension (e.g. Haltigan et al., 2014). In a more recent analysis of a large, combined dataset of 3,218 AAIs, however, Raby et al. (2022) found that the two-dimensional model fitted the data well but a three-dimensional solution with unresolved as the third dimension was not incompatible with the data either. The strong association between the preoccupied and unresolved dimensions, however, seemed statistically less ideal, and multicollinearity might make statistical models less replicable. Nevertheless, the three-dimensional model is of course a better fit with Main's theoretical assumption that unresolved loss or other trauma exists and can be assessed in the AAI as a separate category. The model also fits empirical data on the intergenerational transmission of attachment better (Van IJzendoorn & Makino, 2023).

The correspondence analysis of the current study showed that the unresolved classification in the AAI represents an important independent vector, and is particularly relevant for clinical groups. The unresolved vector is clearly different from the preoccupied vector when the four-way AAI classifications of the norm group are projected on three two-dimensional spaces (see Figure 5). In all three projections the unresolved vector is different from the dismissing and preoccupied vectors. Furthermore, our correspondence analysis makes clear why the unresolved category is perhaps redundant for describing (clusters of) typical groups but is indispensable to make sense of AAIs from respondents with atypical psychological symptoms or functioning. It is clear that the unresolved classification does not contribute much to the differentiation of mothers from fathers or "non-mothers," or pregnant mothers from expectant fathers (see Figure 8). But the AAI distributions of all clinical groups except adults with physical handicaps hover around the point of gravity occupied by the U/CC classification, in line with our hypothesis.

Importantly, unresolved classifications were overrepresented in clinical samples characterized by either externalizing or internalizing disorders, while externalizing and internalizing disorders could not be differentiated as clearly by the insecure-dismissing and insecure-preoccupied dimensions as we would have expected. Groups characterized by PTSD, burnout or suicidal symptoms, for example, are strongly differentiated from typical groups on the unresolved dimension, while they are less different on the dismissing or preoccupied dimensions. Fine-grained differentiations result from the combination of high scores on the unresolved and insecure-preoccupied dimensions that characterizes borderline personality disorder, autism spectrum disorders, and gender dysphoria whereas anxiety problems, obsessive-compulsive or thought disorders seem to be better characterized by a combination of high scores on the unresolved and insecure-dismissing

dimensions (see Figure 10). In short, dissolving the unresolved category in the insecure-preoccupied classification would make the AAI much less useful for clinical applications. It seems that Mary Main was right in holding onto the somewhat outlandish and complicated AAI classification of unresolved loss and other trauma. In addition, the unresolved attachment classification in the AAI perfectly fits Bowlby's (1975) third volume on Loss in his foundational trilogy on attachment, and it seems a crucial category for clinical studies. Unfortunately, the data did not allow for distinguishing between unresolved loss and unresolved trauma, as individual studies did not consistently report on the two subcategories. Disentangling these different types of Unresolved may be relevant particularly in clinical samples, although there may be substantial overlap empirically (e.g. Harari et al., 2009). Taken together, the unresolved category and coding system certainly need more psychometric work (Bakkum et al., 2022) before being dismissed or dissolved.

Categorical and dimensional approaches to coding the AAI

We limited the multinomial and correspondence analyses in the current paper to the first AAI assessment in studies with more than one AAI conducted in the context of longitudinal studies (e.g. Perez, 2006) or intervention projects with pre- and post-tests (e.g. Levy et al., 2006; Maxwell et al., 2017; Tmej et al., 2021), and, importantly, to studies reporting three-way and/or four-way classifications. Although it has been argued that categorical approaches are essential because the discourse on attachment would be radically limited without them (Steele & Steele, 2021), a rich source of information from studies with dimensional measures remained therefore uncharted and might be addressed in follow-up secondary analyses. For example, AAI studies that reported continuous rating scales (e.g. the coherence and unresolved rating scales of the AAI coding system), Q-sort data coded with Kobak's et al. (1993) approach, or measured Secure Base Script Knowledge in the AAI (Waters & Facompré, 2021) might provide the opportunity to compare the predictive validity of classificatory versus continuous approaches of the AAI (Haltigan et al., 2014; Van IJzendoorn & Bakermans-Kranenburg, 2014). Roisman et al. (2014) correctly argued that even within a large study such as the NICHD Early Child Care Research Network, it would be impossible to establish incremental validity of the categorical versus continuous measurements because of their strong associations. This statistical problem might be avoided in a secondary analysis comparing the incremental validity to predict developmental outcomes of rating scales versus classifications. For example, based on AAI classification distributions the difference between externalizing and internalizing problems remains rather small, even if one takes their phenotypic correlations and genotypic commonalities (Neumann et al., 2020) into account. Continuous indices derived from the AAI might have more discriminatory power to differentiate between specific disorders or symptoms and internalizing and externalizing types of disorders.

Blind spots on the AAI map

The VOSviewer map (Figure 1) presents a large range of connections within and between both parts of developmental psychopathology, typical and atypical development, with a nice balance between typical (left side of the map) and atypical developmental issues (right side of the map). The map shows the exemplary synergizing

role of the AAI in this flourishing interdisciplinary domain that was initiated by Alan Sroufe, Michael Rutter, and Dante Cicchetti, admirers of Main's work (Cicchetti & Sroufe, 2000; Sroufe & Rutter, 1984). Of course, some prominent blank spots on the map cannot be overlooked. Conspicuously absent is the pairing of the AAI with neurobiological, neuroendocrinological and psychophysiological concepts. The (dynamic) map (https://app.vosviewer.com/?json=https%3A%2F%2Fwww.dropbox.com%2Fscl%2Ffi%2Fvj316a2f9n77h51w95a4r%2FVOSviewer_1300939005009426341.json%3Frlkey%3D5tcprjm7gkdavxjrq2sf2iezs%26dl%3D1) shows rather isolated positions of oxytocin, amygdala, and heart rate (but see Nguyen et al., 2024; Riem et al., 2016), and genetics concepts remain under the radar because they showed less than 5 co-occurrences with the AAI (but see Bakermans-Kranenburg et al., 2011; Caspers et al., 2007; Fearon et al., 2015). Thin lines connect the AAI to fathers, gender, and differential susceptibility, and diversity in terms of sociocultural concepts is still invisible although rather loud lip-service is being paid to its relevance, not the least by the authors of this paper. Randomized controlled trials using the AAI as screening or outcome measure are also almost non-existent (but see Levy et al., 2006) and before translating the AAI to clinical (diagnostic or therapeutic) practice much more replicable intervention work is badly needed (Van IJzendoorn & Bakermans-Kranenburg, 2024).

Conclusion and future directions

In conclusion, despite the massive work involved in conducting the AAI and coding its transcribed narrative, more than 26,000 AAIs have been reported in the scientific literature since the inception of the interview some 40 years ago (Main et al., 1985). These numbers imply at least 26,000 hours of interviewing, 150,000 hours of transcribing, and, including training and establishing intercoder reliability, more than 150,000 hours of coding, with a total of at least 326,000 hours or 170 years of (40 h/w) work. Given the immense investment, it is perhaps no wonder that most AAI studies have included modest numbers of participants (on average $N = 75$) and that this number has not really increased in the past 15 years. To overcome this limitation AAI researchers may need to join forces in consortia with coordinated research designs using the AAI, or harmonize and integrate existing AAI datasets to address outstanding questions in a more powerful way than has been possible in underpowered studies of the past. The move to collaborative attachment research in CATS (Verhage et al., 2020) and CASCADE (Madigan et al., 2023) is most promising, especially when AAI datasets are integrated on the individual participant level meta-analysis (IPD, Roisman & van IJzendoorn, 2018). IPD meta-analyses might be used to test substantive hypotheses (e.g. Verhage et al., 2018) but also to generate and validate automatized coding of the AAIs using artificial intelligence, reducing what might otherwise be another 170 years of work in the next decade. These new directions may save the AAI from fading into a small niche in an ever more expansive domain of large-scale basic and applied developmental psychopathology research.

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OD; Data Curation, Investigation, Writing – Review & Editing.
RC: Data Curation, Investigation, Writing – Review & Editing.
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