



## Mothers who murdered their child: An attachment-based study on filicide

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### ABSTRACT

The current study examined whether attachment theory could contribute to identifying risk factors involved in filicide. Participants were 121 women: mothers from the normative population (NPM,  $n=61$ ), mothers with mental illness (MIM,  $n=37$ ), and filicidal mothers, i.e., mothers who had murdered their child (FM,  $n=23$ ). Descriptive variables were collected and the Adult Attachment Interview was used to assess mental representations of attachment relationships using the traditional coding system and the Hostile/Helpless (HH) attachment state of mind coding. Unresolved, Insecure, Entangled, and Helpless representations of attachment relationships were overrepresented in the FM group. When a constellation of descriptive and attachment-based risk factors was taken into account, the HH attachment state of mind was found to contribute significantly to distinguishing between MIM and FM groups. As predicted, when the Bayesian Information Criterion was applied to multinomial regression models, descriptive variables were shown to be less able alone than in association with attachment-based classifications to disentangle the increased risk for committing filicide.

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### Introduction

*Filicide* refers specifically to the murder by parents of children aged 1 year or more, but the term is also more broadly employed as a synonym of both *infanticide*, murder within the first year of life, and *neonaticide*, murder within the first 24 h of life (Friedman, Horwitz, & Resnick, 2005).

Child abuse and maltreatment are difficult to estimate, and the killing of children by their parents is often miscategorized as death by another cause (UNICEF, 2003). The attempts that have been made to establish the exact number of children killed by parents indicate that the number is underestimated (Brookman & Nolan, 2006; Friedman & Resnick, 2007; McKee, 2006). Nevertheless, epidemiological data indicate that more than a half of deaths in infancy and childhood are caused by parents, and in industrialized countries, the official filicide rate ranges from 2.4 to 7.0 per 100,000 inhabitants (Flynn, Shaw, & Abel, 2013; Porter & Gavin, 2010).

The main area of inquiry in this field is the identification of the factors that increase the risk of committing filicide because early detection would allow the implementation of prevention programs able to protect children from this threat. A search of

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the main scientific databases (i.e., PubMed, PsychINFO, Scopus, Web of Science, and Web of Knowledge) for articles published between 2000 and 2013 with the term *filicide* in the title, abstract, and keywords yielded about 110 papers. Other than a few studies which have tried to go beyond an epidemiological approach (e.g., see Katz, 2013, for an analysis of the narratives of children who have survived attempted filicide), most of these papers are based on descriptive data obtained from public hospitals, police force registers, administrative case records, newspaper reports, or self-report procedures (Flynn et al., 2013; Liem & Koenraadt, 2007; McKee & Bramante, 2010; UNICEF, 2012; Warren-Gordon, Byers, Brodt, Wartak, & Biskupski, 2010). Although valuable, these studies suffer from understandable drawbacks in sample recruitment and data collection and are characterized by the lack of a consistent approach for defining risk factors in this population and of a priori hypotheses to structure data collection. Studies based on self-report measures may suffer from bias in reporting at-risk behaviors. Not relying on a single source of information but instead taking into account multiple variables has thus been indicated as the future strategy for research in this field (Friedman et al., 2005; Sidebotham, 2013).

Studies conducted thus far have identified some common risk factor for neonaticide: unwanted children, young women from low socioeconomic status, lack of prenatal care, and no stable couple relationship. For filicide, which implies a more comprehensive range of mothers and conditions, there is a debate on the most predictive factors. It is recognized that filicide is not a uniform phenomenon; instead, it encompasses heterogeneity of circumstances (Sidebotham, 2013). Among parental risk factors, higher rates of unemployment and lack of financial resources (Liem & Koenraadt, 2007) or previous traumatic experiences have been reported but not unanimously confirmed (Camperio Ciani & Fontanesi, 2012; Friedman et al., 2005). Less controversial is the incidence of psychiatric diagnoses, present in most case studies, where other risk factors such as low educational level or single parenthood have not always been detected (McKee & Bramante, 2010; Friedman & Resnick, 2007; Grussu, 2012). In particular, psychosis and anxiety/mood disorder are the most frequent diagnoses, with a prevalence of psychotic features associated with mood disorders (Friedman et al., 2005).

It has to be noted, however, that this datum is often influenced by sample recruitment (i.e., whether research data come from imprisoned perpetrators or psychiatrically hospitalized women) and by the timing of the diagnosis, often after the filicide event. It has also been remarked recently that most studies lack a control group, essential for the determination of predictive variables, and the inclusion in studies of mothers with mental illness who have not killed their children would help clarify the role of psychiatric disorders in filicide (Friedman et al., 2005).

Attachment theory (Bowlby, 1969–1980; Cassidy & Shaver, 2008) has recently been proposed as a fruitful theoretical background to guide the interpretation of filicide case reports because it explains the emotion regulation processes in the caring task (Mastrorandi, De Vita, & Umani Ronchi, 2012; McKee & Egan, 2013). Attachment is a theory of psychopathology and of normal development (Cicchetti & Cohen, 2006; Sroufe, Carlson, Levy, & Egeland, 1999), and it is also considered an authoritative theoretical framework for conceptualizing filicide as the outcome of intergenerational transmission of inadequate maternal role development (Mugavin, 2008).

One of the main strengths of attachment theory is that it has generated reliable procedures for investigating the entire life span from an intergenerational and developmental perspective. Among them, the Adult Attachment Interview (AAI) is unanimously recognized as the gold standard for investigating attachment states of mind in adults (Bakermans-Kranenburg & van IJzendoorn, 2009; George, Kaplan, & Main, 1996). Developed for assessing attachment in low risk populations and interpreted by the highly reliable coding system developed by Main and colleagues (Hesse, 2008; Main, Goldwyn, & Hesse, 2002), it was subsequently also employed for investigating attachment in at-risk contexts, where the association between insecure and unresolved attachment (U) and subsequent and/or concurrent developmental outcomes (e.g., dissociative symptoms; depression; anxiety disorders; borderline personality disorder) have been reported (Barone, Fossati, & Guiducci, 2011; Dutra, Bureau, Holmes, Lyubchik, & Lyons-Ruth, 2009; Liotti, 1992; Lyons-Ruth & Jacobvitz, 2008). Lyons-Ruth and colleagues developed a further assessment tool, the Hostile/Helpless (HH) coding system (Lyons-Ruth, Melnick, Yellin, & Atwood, 1995–2005), which was able to reliably capture attachment states of mind at the AAI. This was intended for use with at-risk populations and applied when relational, physical, and/or emotional trauma is present together with disorganized and unintegrated mental contents. The HH categories of attachment disorganization are overrepresented in at-risk populations, such as those with borderline personality disorder, anti-social adolescents, patients with posttraumatic stress disorder, and adults showing aggressive behaviors in the couple relationship (Babcock, Jacobson, Gottman, & Yerington, 2000; Bakermans-Kranenburg & van IJzendoorn, 2009; Barone et al., 2011; Stovall-McClough & Cloitre, 2006). Data from at risk parents' samples, such as neglecting and severely maltreating mothers (Kobak, Cassidy, Lyons-Ruth, & Zir, 2006), show a clear prevalence of unresolved traumatic experiences, coded as attachment disorganization, which constitute the main risk factor in these mothers' attachment states of mind (Adshead & Bluglass, 2005; Barone, Bramante, & Lionetti, 2013; Frigerio, Costantino, Ceppi, & Barone, 2013). These findings seem to suggest that an attachment theoretical approach could fruitfully contribute to the identification of essential mechanisms underlying various forms of atypical or aberrant maternal behaviors in the caring task. It could also help move beyond the mainly descriptive approach taken so far, based on variables identified in retrospective analyses or case records from which no conclusion can be drawn about influence and causality.

In sum, three issues appear to represent the main weaknesses of the search for factors predictive of filicide: (a) considering the descriptive variables derived from case studies and administrative reports as conclusive risk factors for filicide behavior, especially when these are taken singly; (b) the lack of a priori study designs and control groups, with data based purely on administrative and newspaper records; and (c) the absence of a theoretical approach able to give a robust explanation of

filicide and generate hypotheses for ethically designed prospective studies with control groups able to represent a reliable basis for filicide prevention programs.

## The Current Study

The present study aimed to investigate the separate and combined effect of descriptive and attachment derived risk variables in predicting assignment to a filicide mother group. We simultaneously took into account the main descriptive risk factors identified in the current scientific debate (i.e., low socio-economic status, previous traumatic experiences, and the presence of a psychiatric diagnosis) and results from the AAI, including the HH coding system.

Three groups of participants were involved in the study: mothers from a normative population (NPM,  $n = 61$ ), mothers with mental illness (MIM,  $n = 37$ ), and mothers who had committed filicide (FM,  $n = 23$ ).

The aim of the study was threefold: (a) to investigate differences between the three groups of mothers – NPM, MIM and FM – concerning single descriptive variables (i.e., SES, previous traumatic events, psychiatric diagnosis) and attachment-related variables (i.e., attachment states of mind); (b) to identify the constellation of descriptive and attachment related factors which best predicts ascription to the filicide mothers-FM group; and (c) to investigate the role of specific variables within the best model in predicting the assignment of mothers to the FM group versus the NPM or the MIM group.

The current study was guided by the following hypotheses: (a) the three groups would differ in terms of SES, psychiatric diagnosis, traumatic events, and attachment states of mind distributions; (b) attachment-related variables (i.e., Insecure, Unresolved/Cannot classify – U/CC, and unintegrated HH, HH attachment states of mind) together with descriptive variables (i.e., low SES, psychiatric diagnosis, traumatic events) would have a cumulative effect in predicting the belonging to the three different groups; (c) in addition to the occurrence of a psychiatric diagnosis, Unresolved/Cannot classify (U/CC) and unintegrated HH (HH) attachment states of mind would increase the mother's probability of being assigned to the FM group condition if compared to the NPM or MIM group condition.

## Method

### Procedure

Three groups of European Caucasian participants, matched by age, were included in the study: NPM, MIM, and FM. NPM were recruited from kindergarten and day care services, assuming as exclusion criteria the presence of lifetime mental illness. MIM were recruited from psychotherapy waiting lists at mental health facilities. All but two of the FM were enrolled through forensic psychiatric hospitals (the other two were recruited from housing communities). All participants gave informed consent. Psychiatric diagnoses for the MIM and FR groups were obtained from reports conducted in a psychiatric hospital or other mental health facility by expert clinicians using the Structural Clinical Interview for DSM-IV Axis I Disorders SCID I.

The AAI was administered to each woman (from 12 to 37 months after filicide for the FM group) and coded by two reliability certified independent researchers in accordance with version 7.1 of the coding system (Main et al., 2002); and with the HH attachment state of mind coding system-HH (Lyons-Ruth et al., 1995–2005). Rating could not be carried out with complete masking for every case, since family history is part of the interview. Nevertheless, the coders were not aware of the psychiatric diagnosis or of details about filicide allegations. Inter-rater reliability was computed on a random selection of 20% of the interviews. LB coded the first 50% of interviews according to the Main et al. classification system (Main et al., 2002); and FL coded the same interviews according to the HH coding guidelines (Lyons-Ruth et al., 1995–2005). The second set was coded by LB according to the HH classification system (Lyons-Ruth et al., 1995–2005) and by FL according to the Main et al. guidelines (Main et al., 2002). The interrater agreement for the HH attachment state of mind was 83% (Cohen's  $k = .87$ ) and 80% for Main and colleagues' coding system (Cohen's  $k = .85$ ).

### Participants

Participants were 121 women: mothers from the normative population (NPM,  $n = 61$ ), mothers with mental illness (MIM,  $n = 37$ ) and filicidal mothers (FM,  $n = 23$ ). The NPM group ranged in age from 23 to 45 ( $M = 34.11$ ,  $SD = 5.41$ ). The socioeconomic makeup of the group was: 8.2% ( $n = 5$ ) low; 75.4% ( $n = 46$ ) medium; and 16.4% ( $n = 10$ ) high. No current mental illness or lifetime psychiatric diagnosis was reported among the NPM group.

The MIM group ranged in age from 24 to 46 ( $M = 33.54$ ,  $SD = 5.55$ ), and the socioeconomic distribution was 27% ( $n = 10$ ) low, 64.9% ( $n = 24$ ) medium, and 8.1% ( $n = 3$ ) high. Of the MIM group, 81% ( $n = 30$ ) met criteria for a mood or anxiety disorder with psychotic features, and 19% ( $n = 7$ ) met the criteria for a psychotic disorder.

The age range for the FM group was 22–44 ( $M = 34.13$ ,  $SD = 5.64$ ). Their socioeconomic distribution was 39.1% ( $n = 9$ ) low, 56.5% ( $n = 13$ ) medium, and 4.3% ( $n = 1$ ) high.

The age range for the murdered children was 6 months to 7 years of age, with 17.4% ( $n = 4$ ) of them killed in the first year of life, 56.5% ( $n = 13$ ) during their preschool years, and 26% ( $n = 6$ ) in the primary school period. Of the FM group, 43.5% ( $n = 10$ ) had a history of lifetime mental illness prior to filicide ( $n = 7$  mood disorder,  $n = 3$  psychotic disorder). After filicide,

all participants but one got a psychiatric diagnosis resulting in 47.8% ( $n = 11$ ) of them meeting the criteria for mood disorder, and 47.8% ( $n = 11$ ) meeting the criteria for psychotic disorder.

### Measures

**Socioeconomic Status.** Mothers' socioeconomic status was rated according to criteria of the most recent demographic report of the Italian Statistic Institute – ISTAT (2012) and operationalized as follows: *low* (i.e., junior high school or less; semi-skilled workers or unemployed), *medium* (i.e., standard college or university graduation with stable employment), and *high* (i.e., university graduation or more, administrators, managers).

**Psychiatric diagnosis: SCID I.** The Structural Clinical Interview for DSM-IV Axis I Disorders, Italian version (SCID I; First, Spitzer, Gibbon, & Williams, 1994; Mazzi, Morosini, de Girolamo, Lussetti, & Guaraldi, 2000) was used for assessing anxiety/mood disorder with psychotic features and psychotic disorder as both were identified in filicide case records as risk factors (Flynn et al., 2013). In scoring the SCID I, only the current Axis I diagnosis that represented the main clinical problem of participants was considered.

**Traumatic events.** Past traumatic events (1 = presence; 0 = absence) were operationalized from an attachment perspective either as (a) the loss of a significant attachment figure in infancy and/or childhood and/or (b) being subjected to frightening/abusive experiences involving attachment figures, including physical and sexual abuse directly experienced or observed and extreme emotional threats (Main et al., 2002). The presence of a traumatic event was derived both from clinical reports and from the verbatim AAI transcripts (George et al., 1985).

**Attachment Mental Representations: The AAI.** The AAI (George et al., 1996) was used to obtain mental representations of attachment. The AAI is a semi-structured interview investigating the quality of past experiences with primary caregivers and how these experiences are internalized in the current attachment state of mind. The AAI is considered in the scientific literature to be the golden standard procedure for investigating adult attachment mental representations, and interviewers undergo extensive training followed by reliability tests in order to guarantee inter-rater consistency (Hesse, 2008). Each AAI lasts about one hour and is audio-recorded to allow a verbatim transcription for the coding according to the standard Main et al. (2002) and Hostile-Helpless, Lyons-Ruth and colleagues' coding systems (Lyons-Ruth et al., 1995–2005).

**Main et al. (2002) coding system:** In traditional AAI coding, participants are assigned to one of three organized or a disorganized attachment states of mind, depending upon their ability to organize memories and feelings about previous significant relationships with primary caregivers. Participants classified as Secure Autonomous (F) are able to organize into a coherent evaluation both positive and negative experiences and to freely address the role of past attachment relationships on their current personalities and attitudes. An insecure dismissing (Ds) classification is given to those who devalue and derogate or idealize previous attachment relationships and have a tendency to minimize the effect of past experiences on the present and negative feelings. Conversely, when a subject is assigned to the insecure enmeshed (E) category, his/her transcript is characterized by a tendency to maximize negative emotions when recollecting memories about past attachment relationships, presenting a passive or confused and angry preoccupation with attachment figures. Finally, a further disorganized category can be applied both to insecure and secure transcripts when a subject presents lapses of monitoring of discourse in discussing previous loss or trauma, resulting in an unresolved attachment category (U), indicating lack of resolution of past abusive/traumatic experiences or about the loss of a significant one. Finally, a Cannot Classify (CC) category is applied when a transcript cannot be confidently assigned to any of the aforementioned organized categories, resulting in a combination of multiple attachment states of mind. Current convention is to collapse the U and CC categories because of potential commonalities in etiology and outcome into a single disorganized category U/CC (Bakermans-Kranenburg, 2008).

**HH coding system:** The HH coding system was proposed by Lyons-Ruth and colleagues (Lyons-Ruth et al., 2005) to further discriminate states of mind reflecting traumatic relational and/or physical experiences, which are given a primary classification of HH. Individuals receiving a HH attachment state of mind classification seem unable to bring contradictions in past or current attachment experiences to a conscious level, resulting in dissociation between these events and the ability to reflect upon them and a consequently unintegrated stance. The hallmark of the HH profile is that the subject continues to identify with an attachment figure perceived as malevolent (Hostile subtype) or abdicates his/her parental role (Helpless subtype) or both, with little conscious reflection, and is thereby at risk for intergenerational transmission of dysfunctional violent or abdicating parental role (Lyons-Ruth et al., 1995–2005). Individuals coded as primarily Hostile tend to openly describe their negative attachment experiences in childhood but do not acknowledge painful feelings and maintain an evasive tone. Conversely, those who received a Helpless classification present signs of identification with a caregiver perceived as fearful or overwhelmed in the parental role; they acknowledge negative and painful feelings but often with a passive stance. Finally, there can be participants in whom signs of both hostile and helpless states of mind are present, resulting in a mixed HH classification.

**Table 1**  
Socio-demographic variables and traumatic events.

	NPM ( <i>n</i> = 61) <i>n</i> (%)	MIM ( <i>n</i> = 37) <i>n</i> (%)	FM ( <i>n</i> = 23) <i>n</i> (%)	Likelihood ratio ( <i>df</i> )	<i>p</i>
Age	<i>M</i> = 34.11 (5.41)	<i>M</i> = 33.54 (5.55)	<i>M</i> = 34.13 (5.64)		
SES				13.45 (4)	.009
Low	5 (8.2%)	10 (27%)	9 (39.1%)		
Medium	46 (75.4%)	24 (64.9%)	13 (56.5%)		
High	10 (16.4%)	3 (8.1%)	1 (4.3%)		
Axis I				165.63 (4)	<.001
Psychotic	0	30 (81%)	11 (47.8%)		
Anxiety-mood with psychotic features	0	7 (19%)	11 (47.8%)		
Traumatic events	27 (44.3%)	28 (75.8%)	20 (86.9%)	18.09 (4)	<.001

### Analytic plan

Descriptive statistics are reported for SES, psychiatric diagnoses, traumatic events, and attachment distribution; the association between these variables and the NPM, MIM, and FM groups was investigated. Both three-way (Secure autonomous, Insecure Dismissing, Insecure Enmeshed) and four way attachment distributions (with the Unresolved/Cannot classify attachment category included) – according to [Main et al.'s \(2002\)](#) coding procedure – are reported.

Five regression models were then compared through the Bayesian Information Criterion applied to a Vector Generalized Linear Model function (VGLM; [Yee, 2010, 2013](#)) for multinomial categorical data analysis. The VGLM function was used to identify a set of predictors that best explained the dependent ordered variable group operationalized as low (NPM), medium (MIM) and high (FM) risk condition. First descriptive predictors and then attachment-related variables were included step-by-step in the regression models. The null model – *model 0* – contained the intercept only. Model 1 included psychiatric diagnosis (0 = absence, 1 = mood/anxiety disorder with psychotic features, 2 = psychotic disorder) and SES (1 = low, 2 = medium, 3 = high) as predictors; and to model 2 was added the contribution of traumatic events (0 = absence, 1 = presence). Following this, three models, with attachment state of mind predictors added to the descriptive variables, were tested: in model 3, the contribution of the HH attachment state of mind was investigated (0 = non-HH, 1 = HH); model 4 included the contributions of insecure (1 = non F, 0 = F) and unresolved (1 = U, 0 = non U) attachment states of mind. Finally, in model 5 the role of all predictors simultaneously was explored. Multinomial regression models were compared by means of the Bayesian Information Criterion (BIC); the lower the BIC, the better the variables identified in the model fit of the data.

Finally, estimated probabilities of belonging to NPM, MIM, and FM group were computed on the contingency table derived from the best model identified via BIC, to test the additive contribution of attachment in predicting the FM group condition versus NPM and MIM.

All analyses were performed using the statistical software R ([R Development Core Team, 2012](#)) and the VGAM package for Vector Generalized Linear and Additive Models ([Yee, 2013](#)).

## Results

### Descriptive statistics

NPM, MIM, and FM were compared along SES, diagnosis, and traumatic events using the Generalized Linear Model, with Poisson link function. Results, reported in [Table 1](#), showed a significant difference between groups for all the variables investigated.

Patterns of attachment in NPM, MIM, and FM groups were then compared on [Main et al.'s \(2002\)](#) coding system. The three groups were non-independent for the three-way (i.e., Secure autonomous, Insecure Dismissing and Insecure Enmeshed, likelihood ratio = 18.28(4), *p* = .001, see [Table 2](#)) and four-way (i.e., when the CC/U category was included; likelihood ratio = 26.06(4), *p* < .001, [Table 3](#)) attachment distributions. Analysis of residuals showed that for the FM group, the Insecure Enmeshed attachment pattern was prevalent in the three-way distribution, and the Unresolved/Cannot classify classification was prevalent in the four-way comparison. The unintegrated HH classification was found to be similarly prevalent

**Table 2**  
Attachment states of mind: [Main et al. \(2002\)](#) coding system, 3-way comparison.

	NPM ( <i>n</i> = 61) <i>n</i> (%) residuals	MIM ( <i>n</i> = 37) <i>n</i> (%) residuals	FM ( <i>n</i> = 23) <i>n</i> (%) residuals	Likelihood ratio ( <i>p</i> )
F	38 (62.3%) 10.27	12 (32.5%) -4.81	5 (21.7%) -5.45	18.28 ( <i>p</i> = .001)
DS	12 (19.7%) -4.63	15 (40.5%) 4.90	6 (26.1%) -0.27	
E	11 (18%) -5.64	10 (27%) -0.09	12 (52.2%) 5.73	

F, Secure Autonomous; DS, Insecure Dismissing; E, Insecure Enmeshed.

**Table 3**  
Attachment states of mind: Main et al. (2002) coding system, 4-way comparison.

	NPM (n = 61) n (%) residuals	MIM (n = 37) n (%) residuals	FM (n = 23) n (%) residuals	Likelihood ratio (p)
F	33 (54.1%) 10.31	9 (24.3%) -4.76	3 (13%) -5.55	26.06 (p < .001)
DS	11 (18%) -3.12	12 (32.4%) 3.44	5 (21.7%) -0.32	
E	8 (13.1%) 0.44	6 (16.2%) 1.41	1 (4.3%) -1.85	
U/CC	9 (14.8%) -7.63	10 (27%) -0.09	14 (60.9%) 7.72	

F, Secure Autonomous; DS, Insecure Dismissing; E, Insecure Enmeshed; U/CC, Unresolved/Cannot classify.

**Table 4**  
Attachment states of mind: Unintegrated Hostile/Helpless coding system.

	NPM (n = 61) n (%) residuals	MIM (n = 37) n (%) residuals	FM (n = 23) n (%) residuals	Likelihood ratio (p)
Not HH	57 (93.4%) 17.88	27 (72.9%) -1.17	8 (34.8%) -2.70	30.84 (p < .001)
HH	4 (6.6%) -4.38	10 (27%) 2.67	15 (65.2%) -7.79	

HH, unintegrated Hostile/Helpless state of mind.

in the MIM group and even more so in the FM group, likelihood ratio = 30.84(4),  $p = .001$  (see Table 4). Among HH filicidal mothers, 46% were coded as Helpless, 27% as Hostile, and in 27%, both relational schemas were present, resulting in a mixed HH category.

Lower rates of both HH and insecure/Unresolved attachment states of mind were reported in mothers belonging to the normative group.

#### Comparison between multinomial regression models in predicting NPM, MIM, and FM

Afterward, to identify the model that best explained the order of the dependent variable (the three groups, i.e., NPM, MIM, and FM), the roles of descriptive predictors (SES, diagnosis, traumatic events) and attachment states of mind were investigated by comparing different models using BIC. The vector Generalized Linear Model (VGLM) for multinomial categorical data analysis was employed (Yee, 2010). As reported in Table 5, when unintegrated HH state of mind was added as a predictor together with SES, psychiatric diagnosis, and traumatic events (model 3), the BIC decreased from 110 for the model with only the descriptive variables included (model 1) to 106.55, resulting in the best model to explain data distribution. In contrast, the insecure and unresolved attachment categories did not contribute significantly to the power of the descriptive variables in explaining data (BIC = 115.59; see Table 5).

#### Estimated probabilities of belonging to NPM, MIM or FM: the additive role of attachment-related variables

Finally, the estimated probabilities of belonging to the NPM, MIM, or FM group were computed on the contingency table derived from the best model (see model 3). Table 6 reports fitted probabilities, with each row of the table representing the conditional probability distribution based on the combinations of factor levels. In mothers with low socioeconomic status (lines 1–9), the estimated probability of belonging to the FM versus NPM and MIM condition was higher when a diagnosis of a psychotic disorder was present together with the experience of a traumatic event and a HH attachment state of mind (.807, .913, and .983, respectively, for the psychotic disorder alone, with a traumatic event and with a HH attachment state of mind, lines 7, 8, 9). The same results were obtained for mothers with medium socioeconomic status (lines 10–21): the estimated probability of belonging to the FM condition was higher when psychotic disorder, traumatic events, and the HH attachment state of mind variables were taken into account (.874, .761, .946, respectively, for the psychotic disorder alone, with a traumatic event and with a HH attachment state of mind, lines 19, 20, 21). For mothers with medium socioeconomic status, but not low, the presence of a mood/anxiety disorder with psychotic features increased the probability of belonging to the FM group *only* when a traumatic event or a HH attachment state of mind was present (.790, line 15). Finally, for high

**Table 5**  
Socio-demographic and attachment-related variables predicting group belonging.

Dependent variable: group	
Model	BIC
Model 0 – intercept	234.59
Model 1 – SES + diagnosis	110.81
Model 2 – SES + diagnosis + traumatic events	110.52
Model 3 – SES + diagnosis + traumatic events + HH	106.55
Model 4 – SES + diagnosis + traumatic events + Insecure + U/CC	115.49
Model 5 – SES + diagnosis + traumatic events + Insecure + U/CC + HH	113.79

U/CC, Unresolved/Cannot classify; HH, unintegrated Hostile/Helpless.

**Table 6**

Estimated probability of belonging to NPM, MIM or FM groups based on the variables implied in the best model found (model 3, Table 5). In bold are reported the highest estimated probabilities for each variables combination.

	SES <sup>a</sup>	Diagnosis <sup>b</sup>	Traumatic events+	HH++	LRM probability	MIM probability	FM probability
1	1	0	0	0	<b>.876</b>	.123	.002
2	1	0	1	0	<b>.737</b>	.258	.005
3	1	1	0	0	.129	<b>.790</b>	.081
4	1	1	0	1	.026	<b>.649</b>	.325
5	1	1	1	0	.056	<b>.763</b>	.181
6	1	1	1	1	.011	<b>.443</b>	<b>.546</b>
7	1	2	0	0	.003	.190	<b>.807</b>
8	1	2	1	0	.001	.086	<b>.913</b>
9	1	2	1	1	.000	.017	<b>.983</b>
10	2	0	0	0	<b>.958</b>	.041	.001
11	2	0	0	1	<b>.809</b>	.188	.003
12	2	0	1	0	<b>.902</b>	.096	.001
13	2	0	1	1	<b>.628</b>	.364	.008
14	2	1	0	0	.328	<b>.646</b>	.026
15	2	1	0	1	.082	<b>.790</b>	.128
16	2	1	1	0	.163	<b>.774</b>	.063
17	2	1	1	1	.034	<b>.697</b>	.268
18	2	2	0	0	.010	<b>.430</b>	<b>.560</b>
19	2	2	0	1	.002	.124	<b>.874</b>
20	2	2	1	0	.004	.235	<b>.761</b>
21	2	2	1	1	.001	.054	<b>.946</b>
22	3	0	0	0	<b>.987</b>	.013	.000
23	3	0	1	0	<b>.968</b>	.032	.000
24	3	1	1	0	.390	<b>.590</b>	.020
25	3	1	1	1	.105	<b>.795</b>	.100
26	3	2	1	0	.013	<b>.494</b>	<b>.492</b>

Note: Each row of the table represents the conditional probability distribution based on the combinations of factor levels.

<sup>a</sup> 1, Low SES; 2, Medium SES; 3, High SES.

<sup>b</sup> 1, anxiety/mood disorder with psychotic features; 2, psychotic disorder; 0, none; +1, at least one traumatic event; 0, none; ++1, unintegrated Hostile/Helpless attachment, 0, none.

SES mothers (lines 23 to 26), no specific pattern able to distinguish between the MIM and FM group emerged. This datum deserves further reflection, given that only one mother from the filicidal group belonged to a high SES.

## Discussion

The current study investigated the separate and combined predictive role of known descriptive factors and attachment theory based risk factors for filicide. Three groups of mothers were involved: NPM, MIM, and FM. The factors examined included descriptive variables already identified in the literature (i.e., psychiatric diagnosis, socioeconomic status, and the occurrence of a past traumatic experience; Friedman et al., 2005; McKee & Bramante, 2010) and attachment state of mind. Attachment state of mind was included to represent the contribution of parental attachment patterns to the relative risk for filicide (Frigerio et al., 2013; Kobak et al., 2006; Mugavin, 2008).

Our intention was to overcome the limitation of considering only single descriptive variables by first analyzing constellations of descriptive factors and then including a further, explicative one. Attachment theory provided a valuable theoretical framework able to identify risk factors involved in the caring task from an explicative perspective. The recruitment of three groups of mothers, from low to high risk status, allowed us to isolate and estimate the relative contributions of attachment and mental illness to filicide and at the same time test the concurrent contribution of some relevant descriptive variables (i.e., socioeconomic status and occurrence of previous traumatic events in the lifetime).

To more clearly focus the contribution of attachment theory to filicide risk, which pertains to the field of high risk parenthood, two different coding procedures were applied. First, the robust and well-known Main et al. (Main and Goldwyn, 1984; Main et al., 2002) coding system, originally developed for normative populations, was used. Then, the more recent HH-HH coding system by Lyons-Ruth et al. (1995–2005), which was developed to add further information on attachment representations in at risk populations, was used. The first hypothesis of the study, that the three groups would differ in terms of SES, psychiatric diagnosis, traumatic events, and attachment states of mind distributions, was confirmed. Our findings showed that the groups differed along all the descriptive and attachment-based variables investigated. Both MIM and FM had lower socioeconomic status, a higher rate of occurrence of previous traumatic events, and more insecure, unresolved, and HH attachment states of mind. These initial data showed that two areas of attachment classification, as determined with the Main and colleagues' and the Lyons-Ruth et al.'s coding systems, respectively, were overrepresented. These were Insecure/Entangled (i.e., mental representations characterized by a tendency to maximize negative emotions and angry preoccupations about past attachment relationships), Unresolved (i.e., the presence of an attachment traumatic memory

not fully integrated into consciousness), and the HH pattern. Although the two at risk groups showed similar rates for the descriptive variables of socioeconomic status and occurrence of previous traumatic events, FM were more likely to have these attachment mental representations. Rather than mental illness alone, it involved anger toward past attachment relationships, the non-resolution of thoughts about an attachment traumatic event, and unintegrated attachment mental representations that appear to play a major role in filicide, confirming the value of including attachment variables among the constellation of risk factors considered. These data are in line with previous studies addressing attachment states of mind in samples at risk for intrafamily violence (Adshad & Bluglass, 2005; Bakermans-Kranenburg & van IJzendoorn, 2009; Frigerio et al., 2013; Lyons-Ruth & Jacobvitz, 2008), suggesting that the intergenerational transmission of at risk experiences within attachment relationships may determine a relevant increase in the chances of filicide.

The prevalence of the Helplessness subtype in the FM group is worth noting. It suggests a need to gather even more detailed information concerning the pathognomonic impairments that this group of mothers could encounter in the caring task. Compared with the Hostile subtype, whose painful feelings are omitted and who identify with a malevolent and devaluated attachment figure in an attempt to master unbearable feelings, Helpless participants present identification with a caregiver perceived as abdicating his/her parental role and have a personal feeling of vulnerability and of struggling with a continuing sense of badness, unworthiness, and fearful affect in the caring task.

Results also confirmed our second hypothesis, that the effect of attachment-related variables (i.e., insecure, unresolved, and HH states of mind) would be cumulative with descriptive variables (i.e., low socioeconomic status, psychiatric diagnosis, traumatic events) in predicting belonging to a group. Comparison between multinomial regression models showed that descriptive variables (i.e., low socioeconomic status, the presence of a mental illness diagnosis, or previous traumatic experiences) were less able alone than in association with attachment-based variables to explain the differences between filicide mothers and those belonging to the normative population or to the group who had a mental illness diagnosis but had not harmed their children. Contrary to what had been expected, only unintegrated HH states of mind (and not simply Unresolved/Cannot classify and insecure ones) contributed significantly to predicting filicide. Our data suggest that the most fruitful approach for investigating potential filicide predictors is to employ a statistical model that allows the simultaneous analysis of multiple variables. This facilitates the identification of a constellation of descriptive and explicative mechanisms that interact with one another, making effective inquiry in this field an attainable goal (Friedman & Resnick, 2007).

Our third hypothesis assumed that specific attachment states of mind would distinguish the FM group from the NPM and MIM group independently of psychiatric diagnosis, and the approach used to analyze data allowed us to estimate the respective roles of the two variables (i.e., psychiatric diagnosis and HH attachment states of mind) in predicting filicidal behavior. Our data showed that having a psychiatric diagnosis was related equally to the probability of belonging to the MIM or the FM group and was not in itself a distinctive predictor of appurtenance to the filicide group. It was indeed the additive role of the HH attachment states of mind, related to the inability to reflect upon past negative experiences that significantly increased the probability of filicidal behavior in our sample of mothers. This was particularly true where the psychiatric diagnosis was the one usually prevalent in filicidal mothers (Flynn et al., 2013), i.e. psychotic disorder, which cannot thus be considered in itself a predictor of filicide. Concerning the other recurrent diagnosis (McKee & Bramante, 2010), i.e., anxiety/depressive mood disorder with psychotic features, even if to a lesser extent than for psychosis, the analysis of multiple predictors yielded the same finding: the psychiatric diagnosis was not per se a significant risk factor for being in the filicide group, but its association with an HH states of mind was.

To summarize, the descriptive variables identified so far in the literature, not predictive of filicide group appurtenance on its own, became strongly so in association with an attachment state of mind that denote feelings and thoughts about painful and traumatic intergenerational attachment experiences not integrated into consciousness.

### Limitations, future directions and clinical implications

To date, this is the first study to simultaneously take into account multiple variables, comparing different groups and assuming a specific theoretical approach for investigating high risk maternal behavior for children's safety. We used the highly reliable and well-validated AAI according to two different systems. This approach allowed us to obtain a more reliable and accurate picture of the mechanisms underlying filicide and to overcome the limitations already noted for the descriptive, often retrospective, reports in the literature. The use of a multinomial statistical model based on a set of categorical variables, and assumption of the independent variable group as an ordered category from low to high-risk status, enabled the analysis of a constellation of risk factors.

Despite these strengths, some limitations need to be taken into account in interpreting results. First, although comparing different models with BIC allowed us to go beyond the limits of analyses that only calculate *p* values, which are strongly affected by sample size, a larger sample of filicidal mothers – possibly recruited within a multicenter study – is needed to allow for a more reliable generalization of these findings. A second limitation pertains to coding of the AAI, which is based on autobiographical memories, and therefore, not completely blind. Another limitation is that our study involved only mothers, and although attachment pattern data do not reflect gender (Cassidy & Shaver, 2008), gender differences have been reported in analyses of risk factors for filicide (Flynn et al., 2013); thus, whether our attachment-based model is also relevant for paternal filicide still needs to be tested. Finally, traumatic events were collected both from clinical reports and from the AAI for the FM and MIM group but not for the NPM, for whom no clinical reports were available. The rate of traumatic events in this group could thus be partially underestimated.



Notwithstanding these limitations, our results suggest specific directions for gaining a more reliable and valid picture of the complex constellation of factors increasing the risk of maternal filicide. The highly reliable instrument used in the current study for assessing attachment mental representations in mothers (AAI, see also Hesse, 2008) may represent a useful tool for clinicians and social workers for early detection of those factors that need to be addressed (see Moss, Dubois-Comtois, Cyr, Tarabulsky, St-Laurent, & Bernier, 2011)

If a more rigorous attachment based approach to research in this field is adopted, it may be possible to identify reliably these risk factors, a first step toward the development of supportive measures to help identify and subsequently prevent filicide.

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