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Research paper

Differences and similarities of risk factors for suicidal ideation and attempts among patients with depressive or bipolar disorders

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ABSTRACT

Background: Substantial literature exists on risk factors for suicidal behaviour. However, their comparative strength, independence and specificity for either suicidal ideation or suicide attempt(s) remain unclear.

Methods: The Helsinki University Psychiatric Consortium (HUPC) Study surveyed 287 psychiatric care patients with ICD-10-DCR depressive or bipolar disorders about lifetime suicidal behaviour, developmental history and attachment style, personality and psychological traits, current and lifetime symptom profiles, and life events. Psychiatric records were used to confirm diagnosis and complement information on suicide attempts. Multinomial regression models predicting lifetime suicidal ideation and single or repeated suicide attempts were generated.

Results: Overall, 21.6% patients had no lifetime suicidal behaviour, 33.8% had lifetime suicide ideation without attempts, and 17.1% had a single and 27.5% repeated suicide attempts. In univariate analyses, lifetime suicidal behaviour was associated with numerous factors. In multivariate models, suicidal ideation was independently predicted by younger age, severe depressive disorder, bipolar disorder type II/nos, hopelessness, and childhood physical abuse. Repeated suicide attempts were independently predicted by younger age, female sex, severe depressive disorder with or without psychotic symptoms, bipolar disorder type II/nos, alcohol use disorder, borderline personality disorder traits, and childhood physical abuse.

Limitations: Cross-sectional and retrospective study design, utilization of clinical diagnoses, and relatively low response rate.

Conclusions: Risk factors for suicidal ideation and attempts may diverge both qualitatively and in terms of dose response. When effects of risk factors from multiple domains are concurrently examined, proximal clinical characteristics remain the most robust. All risk factors cluster into the group of repeated attempters.

1. Introduction

Nearly a million people worldwide die annually by suicide, and suicide prevention is among the primary global and public health objectives (World Health Organization, 2014). Central risk factors for suicide are a previous suicide attempt (Gonda et al., 2012; Hawton et al., 2013) and mood disorders (Arsenault-Lapierre et al., 2004; Cavanagh et al., 2003). Although mood episodes, suicidal ideation, and suicide attempts are major indicators of risk, numerous other factors likely also have an influence (Isometsa, 2014). Psychological factors, including hopelessness, impulsivity, and other personality traits (O'Connor and Nock, 2014), and adult and childhood negative life events (Norman et al., 2012; Van Orden et al., 2010) presumably affect the diathesis of suicidal behaviour (Mann, 2003). Relatively few clinical studies have examined various putative and clinical risk factors concurrently.

For research on suicidal behaviour in mood disorders, a common limitation is non-segregation of risk factors for suicidal ideation and attempts (Sokero et al., 2003). Because both share common risk factors, study designs should allow differentiating

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risk factors for each. In large-scale epidemiological studies with such design (Nock et al., 2008a; 2009; Nock et al., 2010), mood disorders are substantial predictors for suicidal ideation, but do not appear to well explain transition from ideation to suicidal acts. Instead, characteristics associated with anxiety and impaired impulse control appear important for suicide attempts. In epidemiological studies, however, the severity or course of disorders are not accurately measured and accounted for in the analyses. Since of all suicide deaths half die by the first lifetime attempt (Isometsa and Lonnqvist, 1998), the evaluation of risk factors for both suicide ideation and attempts will aid in identifying those at suicide risk and may clarify underlying factors that contribute to suicide deaths.

Systematic reviews of risk factors for suicide attempts and deaths highlight the significance of proximal clinical risk factors, such as severity of depressive symptomatology and co-morbidity, including anxiety disorders, cluster B traits, and substance abuse (Chesney et al., 2014; Hawton et al., 2013, 2005; Oquendo et al., 2006; Schaffer et al., 2015b). These factors, however, are less often concurrently investigated with other putative risk factors within a single study design. Most of all, studies including some but not all of these risk factors may be susceptible to confounded associations. Further, such studies are unable to investigate thoroughly the independence of effects or to weight the relative importance of early adverse experiences and trait- and state-related proximal or distal risk factors. Therefore, comprehensive study designs that cover multiple domains of risk factors and apply multivariate analyses are called for in order to address these methodological challenges (Brezo et al., 2006; Maniglio, 2011; Norman et al., 2012; Oquendo et al., 2006; Schaffer et al., 2015a).

Risk of suicide attempt is known to vary considerably with severity of depressive syndromes (Holma et al., 2014; 2010; Sokero et al., 2005). Similarly, retrospectively evaluated worst lifetime suicide ideation (Beck et al., 1999) and worst-point more active suicidal thoughts among contemporary ideators within the same sample (Joiner et al., 2003) appear to both be strong predictors of subsequent suicide completion, and the latter also for past suicide attempts. To our knowledge, no previous study has evaluated retrospectively self-rated worst depressive or anxiety symptoms and risk for suicidal behaviour.

The aims of this study are (1) concurrent examination of numerous potential risk factors from multiple domains for suicidal behaviour, including childhood adverse experiences, personality traits, and clinical diagnostic and symptomatic characteristics, for suicidal behaviour in depressive and bipolar disorder within one sample. We also explore lifetime worst depressive and anxiety symptom scores, reported retrospectively, as risk factors. Furthermore, we (2) investigate differences between risk factors for suicidal ideation and single or repeated suicide attempts. We hypothesize (a) an increasing intensity of risk factors along a continuum of suicidal behaviour as a marker for dose-response relationships, and (b) factors associated with impaired self-control, e.g. borderline personality traits and substance use, to cluster among the group of repeat attempters.

2. Methods

2.1. Setting

The Helsinki University Psychiatric Consortium (HUPC) Study is a collaborative research project between The Faculty of Medicine, University of Helsinki; the Department of Health and the Mental Health Unit of the National Institute of Health and Welfare, Helsinki; the Department of Social Services and Health Care, Psychiatric Services, City of Helsinki; and the Department of Psychiatry, Helsinki University Central Hospital, Helsinki, Finland. The catchment area (mean population 1 139 222 in 2012) encompasses the Helsinki metropolitan area, including the cities of Helsinki, Espoo, Vantaa, Kauniainen, Kerava, and Kirkkonummi, where free-of-charge psychiatric secondary care services are provided to the residents of the area. The study was carried out in all 10 communal mental health centres, each corresponding to specific areas, in 24 of the 35 psychiatric inpatient wards, in one of the 8 day-care hospitals, and in two residential communities. Participants were requested to fill in a web browser-based survey by specific notebooks via mobile access. An option for a paper-and-pencil version of the survey was provided. The Ethics Committee of Helsinki University Central Hospital approved in 2010 the study design reported for the first time in detail here.

2.2. Sampling procedure

The HUPC project aimed at establishing a representative cohort of patients suffering from a mood or psychotic disorder in psychiatric care within the area. This study report is based on the mood disorder part of the project and includes patients with depressive disorder or bipolar disorder. Other main diagnoses, such as anxiety or eating disorders, which may occasionally occur in mood disorder units, are excluded.

To accomplish representativeness, patients were sampled according to the resident population (half from the Helsinki City Department of Social Services and Health Care, Psychiatric Services; half from the Helsinki University Central Hospital Psychiatric Department) and drawn by stratified sampling method in regional units (omitting tertiary care units). During the sampling process (12 January 2011–20 December 2012) patients were randomly drawn by either identifying all eligible patients on a certain day or week in a unit or by randomly selecting from patient lists. Within hospital settings, every fifth non-involuntary entry was identified. All $\geq$ 18-year-old patients were considered eligible. The few exclusion criteria were mental retardation, neurodegenerative disorders, and insufficient Finnish language skills. Each identified patient was fully informed of the study, and the volunteers gave written informed consent.

2.3. The sample

Since the research project primarily aimed at detailed analyses of mood disorder patients, sampling was enriched within this group during a later period. In addition, the sampling procedure was not completely adhered to within a few participating units. Of the 904 patients drawn from mood disorder units, 784 were invited to participate, with 375 declining and 409 consenting. Due to limited data collecting resources, 74 patients were lost, and 336 patients eventually completed the survey, resulting in a response rate of 43% (336/784). The sampling procedure is illustrated in detail in Fig. 1.

After exclusion of other principal lifetime diagnoses and missing surveys due to human or technical errors owing to mobile access, the final study sample presented herein consists of 287 patients with either depressive disorder or bipolar disorder. Of the sample, nearly three-fourths were female and the mean age was 39.9 years. Slightly over one-third were married or cohabiting, and one-third reported no professional education. Less than one in five had a university-level education. More than one-fourth were employed or studying, and two-thirds reported lifetime smoking. The sociodemographic characteristics of the sample are presented in Table 1.

Because of the lower-than-expected response rate, we investigated risk of selection biases. We compared the cohort with the entire patient population in treatment within the services in

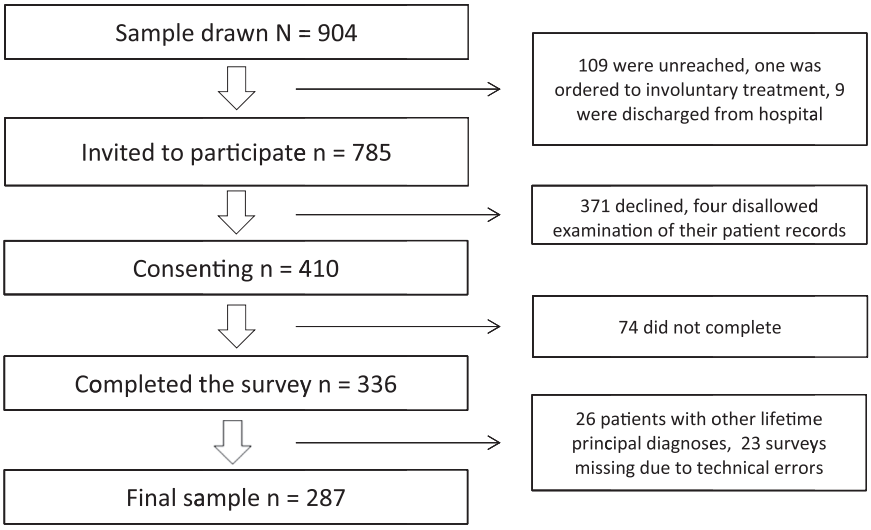

Fig. 1. Flow chart of sampling of depressive and bipolar disorder patients in the HUPC study.

2011–2012 by segregating the sample according to depressive or bipolar disorder and respective regional source of treatment organization. No significant differences were found in terms of age or gender in any analyses, although there was a trend for women to more often participate in the survey in the depressive disorder subsample (data available on request).

2.4. The survey

The survey consisted of a broad set of self-report instruments that were carefully designed to cover numerous risk factors from multiple domains for suicidal behaviour. The content of the survey is presented in detail in Table 2.

Background and sociodemographic variables (Table 1) included marital status (categorized as single, cohabiting, married, divorced or separated, or widowed); residency (living alone, with parents, with own family or in intimate relationship, residential community, or other); educational attainment (completed part of comprehensive school, completed comprehensive school, completed part of upper secondary school, or completed upper secondary school); occupational education (none, apprenticeship contract, vocational school, vocational college or university of applied science, or academic degree); working status (unemployed or laid off, on sick leave, on pension for psychiatric reasons, on pension for somatic reasons, student, employed, or not working for some other reason); and smoking status (never smoked, ex-smoker, occasional smoker, regular smoker). In addition, the survey inquired about the average grade in comprehensive school, self-reported height and weight, and being a care-giver (with a conditional question about the number of minors). Somatic health was inquired about by asking whether a physician had diagnosed the patient with a chronic somatic illness requiring continuous or recurrent treatment (and a conditional open-ended question about the type of illness).

2.5. Information from patient records

Additionally, we extracted from the patient's psychiatric records information on the number of prior psychiatric hospitalizations (and among bipolar disorder patients on the polarity leading to hospitalization), disability pension, and to estimate the duration of the disorder, the date of the first and current contact with contemporary services.

2.6. Measurement of suicidal behaviours

The survey assessed suicidal behaviours with translated questions adopted from the National Comorbidity Survey (NCS) (Kessler et al., 1999) asking about lifetime suicidal ideation ("Have you ever seriously thought about committing suicide?"), plans ("Have you ever made a plan for committing suicide?"), and attempts ("Have you ever attempted suicide?") along with a conditional question about the number of lifetime suicide attempts. To complement self-reported information, we obtained the number of lifetime suicide attempts from patient records (defined as involving at least some degree of intention to die). Information on the number of suicide attempts was then aggregated by selecting the one that indicated a higher count and coded as one to six (or more). For the purposes of this study, the sample was divided into four mutually exclusive subcategories of lifetime suicidal behaviour as a dependent variable: (a) non-suicidal, (b) lifetime suicidal ideation without attempts, (c) one lifetime suicide attempt, and (d) two or more lifetime suicide attempts.

2.7. Diagnostic procedures

The study diagnoses were based on the patients' clinical diagnoses assigned by the attending physicians. However, the authors (K.A., I.B., B.K., M.K.) critically evaluated the validity of the principal clinical diagnoses by re-examining all available information from patient records, and if necessary, made a more precise lifetime principal diagnosis. The diagnostic classification followed the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), Diagnostic Criteria for Research (World Health Organization, 1993). Each patient was given hierarchically a diagnosis regarded as the most severe and pervasive over the lifetime, in which severe depressive, bipolar affective, and psychotic disorders were given precedence over other conditions. However, bipolar affective disorder was classified into type I and II disorders, based on the established Finnish practice of applying Diagnostic and Statistical Manual of Mental Disorders (DSM) – compatible classification in national treatment guidelines (Bipolar affective disorder, Current Care Guidelines, 2013). Recurrent (hypo)manic episodes provoked by antidepressant treatment without lifetime spontaneous mood elation were diagnosed as 'Bipolar affective disorder, unspecified' (F31.9). Besides assigning one lifetime principal diagnosis, additional comorbid diagnoses of lifetime substance harmful use or dependence, or concurrent diagnosis of emotionally unstable, borderline type (F60.31, abbreviated as BPD) and

Table 1
Sociodemographic characteristics of the Helsinki University Psychiatric Consortium (HUPC) Study sample (N = 287) according to the classification of lifetime suicidal behaviors.

Characteristics	No suicidal ideation (n, %)		Suicidal ideation, no attempts (n, %)		One suicide attempt (n, %)		Two or more suicide attempts (n, %)		Total sample (N, %)	
Sex[f]										
Men	20	32.3	29	29.9	12	24.5	17	21.5	78	27.2
Women	42	67.7	68	70.1	37	75.5	62	78.5	209	72.8
Marital status[a, g]										
Not cohabiting	22	36.7	38	39.2	18	36.7	33	41.8	111	38.9
Married or cohabiting	25	41.7	34	35.1	20	40.8	26	32.9	105	36.8
Divorced	11	18.3	24	24.7	11	22.4	19	24.1	65	22.8
Widowed	2	3.3	1	1	0	0	1	1.3	4	1.4
Education[a,h]										
University	17	28.3	17	17.5	11	22.4	7	8.9	52	18.2
College	21	35	21	21.6	13	26.5	17	21.5	72	25.3
Vocational school or apprenticeship training	9	15	21	21.6	14	28.6	24	30.4	68	23.9
No professional education	13	21.7	38	39.2	11	22.4	31	39.2	93	32.6
Employment status[a,i]										
Unemployed	11	18.3	11	11.3	2	4.1	6	7.6	30	10.5
Sick leave	20	33.3	31	32	17	34.7	20	25.3	88	30.9
Disability pension	9	15	24	24.7	13	26.5	24	30.4	70	24.6
Working or studying	15	25	29	29.9	14	28.6	23	29.1	81	28.4
Not working, other reason	5	8.3	2	2.1	3	6.1	6	7.6	16	5.6
Smoking[b,j]										
Never	24	40	35	36.5	15	30.6	16	20.3	90	31.7
Lifetime smoking	36	60	61	63.5	34	69.4	63	79.7	194	68.3
Caregiver to a minor[c, k]										
No	36	61.0	66	68.0	32	68.1	57	73.1	191	68.0
Yes	23	39.0	31	32.0	15	31.9	21	26.9	90	32.0
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Age[e,l]	44.0	11.4	39.4	13.1	40.8	13.5	36.7	12.9	39.9	13.0
BMI[d, e, m]	28.2	5.9	28.2	6.2	27.8	5.7	27.0	5.2	27.8	5.8

Abbreviations: SD=Standard Deviation, BMI=Body Mass Index.
*Significant at ≤ 0.01 level.
[f] $\chi^2=2.628$; df 3; $p=0.453$.

[a] Data missing for 0.7% of patients, $n=285$.
[b] Data missing for 1.0% of patients, $n=284$.
[c] Data missing for 2.1% of patients, $n=281$.
[d] Data missing for 3.5% of patients, $n=277$.
[e] Analysis of variance (ANOVA).
[g] $\chi^2=4.438$; df 9; $p=0.880$.
[h] $\chi^2=21.018$; df 9; $p=0.013$.
[i] $\chi^2=14.571$; df 12; $p=0.266$.
[j] $\chi^2=7.722$; df 3; $p=0.052$.
[k] $\chi^2=2.245$; df 3; $p=0.523$.
[l] $F_{3,\ 283}=3.925$; $p=0.009^*$.
[m] $F_{3,\ 273}=0.743$; $p=0.527$.

antisocial personality disorder (F60.2) were recorded due to their particular clinical relevance. In cases with contradictory clinical opinions, divergence between research and clinical diagnosis, or other ambiguity, senior research psychiatrists (M.H., E.I., G.J., J.O.) were consulted for settlement. A total of 42 cases (12.5% of the mood disorder sample) were consulted.

2.8. Statistical analyses

Missing data were imputed by using Bayesian imputation available in the Mplus 7.1 software (Muthén and Muthén, 2012), where observed values are used to predict unobserved ones by simply exploiting the covariance between variables (Enders, 2010). Very long instruments were divided into smaller subsets (ten to twenty variables) to avoid excessively long imputation times. Only scales with less than 20% missing data were imputed and used in analyses.

For statistical analyses, lifetime diagnostic variables were aggregated as follows: a) depressive disorder in 3 hierarchical categories of i) severe with psychotic symptoms, ii) severe without psychotic symptoms, and iii) moderate or dysthymia; b) bipolar affective disorder in 2 categories of i) type I (abbreviated as BD-I) and ii) type II or unspecified (abbreviated as BD-II/nos); and c) alcohol harmful use or dependence (abbreviated as AUD) as a composite variable.

In univariate analyses χ^2-, Mann–Whitney U-, Kruskal–Wallis, and One-Way ANOVA tests were used as indicated, with α threshold set at ≤ 0.01 because of multiple testing. A multivariate nominal regression model was formed with non-suicidal group as the reference category and predicting various types of suicidal behaviour. Categorical variables were entered as dummy-coded. Pre-set independent variables were age, sex and lifetime principal mood disorder diagnostic variables (group of depressive episode or recurrent depressive disorder, moderate and dysthymia as the reference category). Additional factors were entered according to

Table 2
The survey of the Helsinki Psychiatric Consortium (HUPC) study.

Multiple domain of risk factors	Questionnaire (Abbreviation)	Items	Cronbach α
a) Family and developmental history and adult attachment			
Childhood maltreatment and growth circumstances	The Trauma and Distress Scale (TADS) (Klosterkotter et al., 2005; Patterson et al., 2002)	46	
Emotional abuse			0.838
Physical abuse			0.750
Sexual abuse			0.908
Emotional neglect			0.899
Physical neglect			0.675
Adult attachment style[a]	The Experiences In Close Relationships – Revised Questionnaire (ECR-R) (Fraley et al., 2000)	36	
Anxious			0.939
Avoidant			0.908
Questions about 1st degree family history of mental disorder[b]		3	
Questions about 1st degree family history of substance abuse[b]		3	
b) Personality and psychological factors			
Personality traits on 30 facets of the Five-Factor Model (FFM)	The 'Short Five' (S5) (Konstabel et al., 2012)	60	
Neuroticism			0.882
Extraversion			0.864
Openness			0.782
Agreeableness			0.681
Conscientiousness			0.817
Borderline personality disorder traits	The McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD) (Zanarini et al., 2003)	10	0.750
Impulsivity	The Barrat Impulsiveness Scale (BIS-11) (Patton et al., 1995)	30	0.879
Self-efficacy	The General Self-Efficacy Scale (GSE) (Schwarzer and Jerusalem, 1995)	10	0.861
Schizotypal personality traits	The Schizotypal Personality Questionnaire – Brief Version (SPQ-B) (Raine and Benishay, 1995)	22	0.923
c) Current life situation			
Recent 12 – month stressors	The List of Threatening Experiences (LTE-Q) (Brugha et al., 1985; Brugha and Cragg, 1990)	12	
Social support	The Perceived Social Support Scale Revised (PSSS-R) (Blumenthal et al., 1987)	12	0.943
d) Ability to function			
Ability to function	The Sheehan Disability Scale (SDS) (Sheehan, 1983; Sheehan et al., 1996; Sheehan and Sheehan, 2008)	3	0.828
e) Current mood and anxiety			
Depressive symptoms	The Beck Depression Inventory (BDI) (Beck et al., 1961)	21	0.924
Anxiety symptoms	The Overall Anxiety Symptoms and Impairment Scale (OASIS) (Norman et al., 2011, 2006)	5	0.899
Hopelessness	The Hopelessness Scale (HS) (Beck et al., 1974)	20	0.922
f) Lifetime symptom profiles			
Lifetime worst depressive symptoms	Modified questions of BDI about worst lifetime symptoms	21	0.879
Lifetime worst anxiety symptoms	Modified questions of OASIS about worst lifetime symptoms	5	0.838
Screen for bipolar disorder and manic or hypomanic symptoms	The Mood Disorder Questionnaire (MDQ) (Hirschfeld et al., 2000)	15	0.898[c]
Lifetime prevalence and distress of psychic experiences	The Community Assessment of Psychic Experiences (CAPE) (Stefanis et al., 2002)	46	
Positive symptoms			0.859[d]
Depressive symptoms			0.852[d]
Negative symptoms			0.880[d]
g) Substance use			
Past 12-month alcohol use	The Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993)	10	0.894
Screen questions for past 12 month other substance abuse or dependence	The Psychiatric Research Interview for Substance and Mental Disorders (PRISM) (Hasin et al., 1996)	2	

[a] After a conditioned question about ever having an intimate relationship in adulthood.
[b] After a conditioned question about treatment requiring or impairing problems with 1st degree relative, five separate options for responses.
[c] Cronbach α presented for the first 13 questions about manic or hypomanic symptoms or behaviours of the MDQ questionnaire.
[d] Cronbach α presented for the frequency of the symptoms subscale.

separate risk factor domains by selection and counterbalancing of factors with the strongest association and rejecting non-significant associations step by step. In the final multivariate regression model, all variables were entered simultaneously to examine independent effects, and adjusted odds ratios (AORs) are presented. To avoid circularity, suicidal items in sum scores of BDI, worst lifetime BDI, and MSI-BPD were omitted. For identical reasons, the diagnosis of emotionally unstable, borderline type disorder was not used in modelling. All statistical analyses were carried out with IBM SPSS Statistic version 21.

3. Results

3.1. Clinical characteristics of the sample

The clinical characteristics and distribution of suicidal behaviour within the sample are presented in Table 3. Of the 287 patients, 62 (21.6%) reported no lifetime suicidal ideation or attempts, 97 (33.8%) reported lifetime suicidal ideation without attempts, 49 (17.1%) had a single suicide attempt, and 79 (27.5%) had two or more lifetime attempts. Of the 97 patients who reported

Table 3
Clinical Characteristics of the Helsinki University Psychiatric Consortium (HUPC) Study Sample (N = 287) According to the Classification of Lifetime Suicidal Behaviors.

Characteristics	No suicidal ideation (n, %)		Suicidal ideation, no attempts (n, %)		One suicide attempt (n, %)		Two or more suicide attempts (n, %)		Total sample (n, %)	
Suicidal behavior	62	21.6	97	33.8	49	17.1	79	27.5	287	100
Diagnosis[a, e]										
Depressive disorder										
Severe with psychotic symptoms	2	3.2	4	4.1	1	2.0	7	8.9	14	4.9
Severe without psychotic symptoms	12	19.4	45	46.4	21	42.9	27	34.2	105	36.6
Moderate or dysthymia	24	38.7	22	22.7	12	24.5	11	13.9	69	24.0
Bipolar affective disorder[b]										
Type I	16	25.8	4	4.1	4	8.2	12	15.2	36	12.5
Type II & NOS	8	12.9	22	22.7	11	22.4	22	27.8	63	22.0
Alcohol harmful use or dependence[f]										
No	56	90.3	81	83.5	39	79.6	47	59.5	223	77.7
Yes	6	9.7	16	16.5	10	20.4	32	40.5	64	22.3
Co-morbid emotionally unstable personality disorder[g]										
Borderline type	3	4.8	12	12.4	12	24.5	33	41.8	60	20.9
Location at the time of survey[h]										
Inpatient at the time of survey	9	14.5	8	8.2	12	24.5	26	32.9	55	19.2
Outpatients at the time of survey	53	85.5	89	91.8	37	75.5	53	67.1	232	80.8
Lifetime psychiatric hospitalization[i]										
No	33	53.2	60	61.9	23	46.9	20	25.3	136	47.4
Yes	29	46.8	37	38.1	26	53.1	59	74.7	151	52.6
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Number of hospitalizations if ever hospitalized[d, j]	2.41	1.701	2.0	1.394	3.54	4.13	6.64	8.306	4.16	5.896
Years from the first treatment contact[d, k]	6.1	6.1	4.5	5.2	6.4	6.8	6.4	6.8	5.7	6.2
Duration of the current treatment contact in years[c, d,l]	2.2	3.0	1.6	1.8	3.1	5.0	3.0	4.8	2.4	3.7

Abbreviations: NOS=not otherwise specified, SD=Standard Deviation.
**Significant at ≤ 0.001 level.

[a] All diagnoses according to the International Classification of Disease, 10th revision, Diagnostic Criteria for Research (ICD-10-DCR).
[b] ICD-10-DCR bipolar affective disorder diagnoses subclassified applying Diagnostic and Statistical Manual of Mental Disorders (DSM) compatible classification of type I and type II disorders.
[c] Data missing for 2.1% of patients, $n=281$.
[d] Kruskall–Wallis test.
[e] $\chi^2=40.022$; df 12; $p=0.000^{**}$.
[f] $\chi^2=22.802$; df 3; $p=0.000^{**}$.
[g] $\chi^2=35.135$; df 3; $p=0.000^{**}$.
[h] $\chi^2=18.862$; df 3; $p=0.000^{**}$.
[i] $\chi^2=24.431$; df 3; $p=0.000^{**}$.
[j] 17.313; df 3; $p=0.001^{**}$.
[k] 2.934; df 3; $p=0.402$.
[l] 1.337; df 3; $p=0.720$.

lifetime suicide ideation without attempts, 62 (63.9%) reported also a suicide plan. Of the 128 patients (44.6%) who had attempted suicide at least once, 8 (6.3%) reported no lifetime suicidal ideation.

Of the whole sample, 99 (34.5%) had a diagnosis of BD; of the remaining 188 patients (65.5%), 183 had depressive disorder and five dysthymia. Alcohol harmful use or dependence (AUD) was diagnosed in 64 patients (22.3%). Sixty patients (20.9%) had co-morbid diagnosis of BPD. One in five (19.2%) was an inpatient at the time of the survey, and half (52.6%) had a history of psychiatric hospitalization. The mean number of hospitalizations was 4.2 among those ever hospitalized.

3.2. Univariate analyses

In univariate analyses, the four groups of suicidal behaviour differed significantly in numerous factors in lifetime principal clinical and co-morbid diagnoses, current mood and anxiety symptoms, hopelessness, worst depressive and anxiety symptoms, psychotic-like experiences including positive, depressive, and negative symptoms, alcohol and benzodiazepine use, childhood emotional and physical abuse, adult anxious attachment style, neuroticism, impulsivity, borderline and schizotypal personality traits, self-efficacy, and functional impairment, with several other trend-level findings (Tables 3 and 4). In general, prevalence or severity of most (putative) risk factors increased in a dose-response fashion in accordance with increasing severity of lifetime suicidal behaviour.

3.3. Multivariate analyses

The findings of multinominal regression models predicting the three types of lifetime suicidal behaviour are presented in Table 5. Factors independently related to suicidal ideation without attempts included younger age, severe depressive disorder without psychotic symptoms, BD-II/nos, hopelessness, and childhood physical abuse.

Factors independently predicting a single suicide attempt included diagnosis of depressive disorder without psychotic symptoms and BPD traits.

Within the repeated suicide attempts subgroup, the AORs were numerically markedly higher than in the others. Factors predicting repeated suicide attempts were female gender, younger age, diagnosis of depressive disorder without psychotic symptoms (with an AOR of >8) and with psychotic symptoms (AOR >39), BD-II/nos (AOR >8), AUD (AOR >11), BPD traits, and childhood physical abuse (Table 5).

When multivariate models were repeated with the suicidal ideation group as the reference category, the factors between non-

Table 4
Clinical Variables of the Helsinki University Psychiatric Consortium (HUPC) Study Sample ($N=287$) According to the Classification of Lifetime Suicidal Behaviors.

Characteristics	No suicidal ideation (score/n, SD/%)		Suicidal ideation, no attempts (score/n, SD/%)		One suicide attempt (score/n, SD/%)		Two or more suicide attempts (score/n, SD/%)		Statistical analysis
Current mood and anxiety									
BDI score[a, q, y]	18.9	11.6	27.2	11.5	24.6	12.0	29.4	12.4	$F_{3,282}=9.094$; $p=0.000$**
OASIS score[b, y]	8.8	4.6	11.2	4.6	10.9	4.2	12.4	4.4	$F_{3,281}=7.736$; $p=0.000$**
HS score[a]	7.4	5.6	11.9	5.2	10.6	5.8	11.5	6.1	25.191; df 3; $p=0.000$**
Current life situation									
PSSS-R score[a, y]	42.0	12.3	39.1	12.7	38.7	12.6	40.5	13.1	$F_{3,282}=0.866$; $p=0.459$
LTE-Q sum	1.8	1.7	2.1	1.8	2.0	1.9	2.4	1.9	5.020; df 3; $p=0.710$
Lifetime psychiatric symptoms									
BDI Lifetime score[c, q, y]	34.8	10.4	43.4	9.4	38.1	11.2	45.9	9.9	$F_{3,\ 276}=13.453$ $p=0.000$**
MDQ score[b, s]	6.1	4.4	6.5	4.3	6.0	4.3	8.1	4.0	11.085; df 3; $p=0.011$
MDQ screen[b, t, x]									$\chi2=8.331$; df 3; $p=0.040$
Negative	39	65.0	67	69.1	35	71.4	40	50.6	
Positive	21	35.0	30	30.9	14	28.6	39	49.4	
OASIS Lifetime score[c]	14.6	4.0	16.7	2.6	16.3	3.3	17.1	2.8	16.873; df 3; $p=0.001$**
CAPE									
Total score[d, y]	126.4	39.5	149.7	37.4	144.6	34.2	159.3	34.0	$F_{3,\ 269}$ 9.348; $p=0.000$**
Positive symptoms, frequency[b]	25.9	5.1	28.6	7.3	28.8	5.9	30.9	7.5	22.149. df 3; $p=0.000$**
Positive symptoms, distress[e]	10.9	9.3	14.7	10.9	14.1	9.7	18.6	11.2	19.603; df 3; $p=0.000$**
Depressive symptoms, frequency[f, y]	17.5	4.4	20.7	4.4	19.7	4.7	21.9	4.6	$F_{3,\ 277}=11.556$; $p=0.000$**
Depressive symptoms, distress[g, y]	16.8	6.9	20.5	5.5	19.5	6.7	21.8	6.3	$F_{3,\ 261}=7.391$; $p=0.000$**
Negative symptoms, frequency[h, y]	30.2	7.8	34.4	8.0	33.9	8.3	34.1	7.1	$F_{3,\ 279}=4.264$; $p=0.006$*
Negative symptoms, distress[i, y]	27.3	12.2	32.1	10.1	30.1	10.3	32.6	9.5	$F_{3,\ 263}=3.377$, $p=0.019$
Lifetime substance use									
AUDIT score[j]	7.4	7.0	5.4	5.6	7.1	8.1	9.9	8.8	13.028; df 3; $p=0.005$*
AUDIT screen[j, u, x]									$\chi2=13.981$; df 3; $p=0.003$*
Negative	37	61.7	69	72.6	28	57.1	35	44.9	
Positive	23	38.3	26	27.4	21	42.9	43	55.1	
Benzodiazepine use (PRISM)									
Administration on 6 days past 12 months[g, x]									$\chi2=12.706$; df 3; $p=0.005$*
No	39	75.0	65	71.4	29	60.4	36	48.6	
Yes	13	25.0	26	28.6	19	39.6	38	51.4	
Administration most of the day on 3 consecutive days past 12 months[k, x]									$\chi2=6.098$; df 3; $p=0.107$
No	44	88.0	76	85.4	34	70.8	59	79.7	
Yes	6	12.0	13	14.6	14	29.2	15	20.3	
Developmental history and adult attachment									
TADS total score[b]	19.1	11.9	27.1	17.4	24.9	16.8	30.0	18.4	13.101; df 3; $p=0.004$*
Emotional abuse score[b]	4.9	4.2	7.1	4.9	6.0	5.0	7.9	5.4	13.421; df 3; $p=0.004$*
Physical abuse score[b]	1.7	2.1	3.2	3.5	2.9	2.8	4.1	4.2	13.446; df 3; $p=0.004$*
Sexual abuse score[j]	1.1	2.9	1.8	3.9	2.4	4.9	2.3	4.1	5.092; df 3; $p=0.165$
Emotional neglect score	7.7	4.7	10.0	5.5	9.1	6.0	10.1	5.3	8.729; df 3; $p=0.033$
Physical neglect score	3.9	3.0	5.0	3.8	4.5	3.6	5.6	4.2	6.401; df 3; $p=0.094$
ECR-R[l]									
Anxious attachment style score	3.3	1.3	3.9	1.4	4.0	1.5	4.6	1.3	22.498; df 3; $p=0.000$**
Avoidant attachment style score	3.3	1.2	3.4	1.2	3.7	1.2	3.6	1.2	3.220: df 3; $p=0.359$
Personality and psychological factors									
S5									
Neuroticism score[y]	1.5	14.4	9.9	12.8	7.9	12.8	12.6	12.8	$F_{3,\ 283}=8.781$; $p=0.000$**
Extraversion score[y]	-2.0	12.9	-4.8	14.7	-3.8	13.8	-2.3	13.1	$F_{3,\ 283}=0.755$; $p=0.520$
Openness score[y]	9.6	10.4	9.4	11.3	8.0	11.3	10.3	12.1	$F_{3,\ 283}=0.405$; $p=0.750$
Agreeableness score[y]	15.8	7.0	12.4	9.9	11.1	9.2	11.7	9.8	$F_{3,\ 283}=3.226$; $p=0.023$
Conscientiousness score[y]	4.7	11.7	1.7	11.5	1.8	10.4	-1.8	13.3	$F_{3,\ 283}=3.499$; $p=0.016$
MSI-BPD score[r]	3.7	2.6	5.4	2.4	6.1	2.5	7.1	2.2	39.901; df 3; $p=0.000$**
MSI-BPD screen[v, x]									$\chi2=28.814$; df 3; $p=0.000$**
Negative	51	82.3	60	61.9	27	55.1	30	38.0	
Positive	11	17.7	37	38.1	22	44.9	49	62.0	
BIS-11 score[a, y]	56.0	12.4	59.8	12.4	61.3	12.4	64.0	13.6	$F_{3,282}=4.682$; $p=0.003$*

Table 4 (*continued*)

Characteristics	No suicidal ideation (score/n, SD/%)		Suicidal ideation, no attempts (score/n, SD/%)		One suicide attempt (score/n, SD/%)		Two or more suicide attempts (score/n, SD/%)		Statistical analysis
SPQ-B score[a]	6.8	4.5	9.4	5.5	10.0	5.2	11.5	4.8	$F_{3,282}=9.987$; $p=0.000$**
GSE score[a]	22.6	6.0	19.5	6.3	19.4	6.5	18.5	6.2	17.111; df 3; $p=0.001$**
Ability to function									
SDS sum[m]	17.0	8.2	20.3	8.0	20.1	6.6	20.4	7.6	7.852; df 3; $p=0.049$
SDS work[o]	6.7	3.3	6.8	3.5	7.2	2.7	6.4	3.3	1.136; df 3; $p=0.768$
SDS social life[n]	5.2	3.2	6.9	2.9	6.4	3.0	6.9	2.6	12.536; df 3; $p=0.006$*
SDS family life[p]	4.7	3.3	5.6	2.8	6.0	2.7	5.4	3.1	1.894; df 3; $p=0.595$
Somatic long-term illness[h, x]									$\chi 2=1.070$; df 3; $p=0.784$
No	33	55.0	52	53.6	23	46.9	43	55.8	
Yes	27	45.0	45	46.4	26	53.1	34	44.2	

All statistical tests with Kruskall Wallis test unless otherwise specified
Abbreviations: BDI = Beck Depression Inventory, OASIS = Overall Anxiety Symptoms and Impairment Scale, HS = Hopelessness Scale, PSSS-R = Perceived Social Support Scale - Revised, LTE-Q = List of Threatening Experiences Questionnaire, MDQ = Mood Disorder Questionnaire, CAPE = Community Assessment of Psychic Experiences, AUDIT = Alcohol Use Disorders Identification Test, TADS = Trauma and Distress Scale, ECR-R = Experiences In Close Relationships - Revised, S5 = Short Five, MSI-BPD = McLean Screening Instrument for Borderline Personality Disorder, BIS = Barrat Impulsiveness Scale, SPQ-B = Schizotypal Personality Questionnaire - Brief Version, GSE = General Self-Efficacy Scale, SDS = Sheehan Disability Scale

[a] Data missing for 0.3% of patients, $n=286$.
[b] Data missing for 0.7% of patients, $n=285$.
[c] Data missing for 2.4% of patients, $n=280$.
[d] Data missing for 4.9% of patients, $n=273$.
[e] Data missing for 10.1% of patients, $n=258$.
[f] Data missing for 2.1% of patients, $n=281$.
[g] Data missing for 7.7% of patients, $n=265$.
[h] Data missing for 1.4% of patients, $n=283$.
[i] Data missing for 7.0% of patients, $n=267$.
[j] Data missing for 1.7% of patients, $n=282$.
[k] Data missing for 9.1% of patients, $n=261$.
[l] Data missing for 23.0% of patients, $n=221$.
[m] Data missing for 3.5% of patients, $n=277$.
[n] Data missing for 1.0% of patients, $n=284$.
[o] Data presented for 58.2% patients who were studying, at work or on sick leave, $n=167$.
[p] Data presented for 36.6% patients who were married or cohabiting, $n=105$.
[q] BDI item 9 or modified item for lifetime symptoms omitted for statistical tests.
[r] MSI item 2 omitted for statistical tests.
[s] Consists of the first part of the MDQ questionnaire including 13 questions inquiring about hypomanic or manic symptoms or behaviours.
[t] Positive when seven or more symptoms have occured within the same episode, and causing moderate or severe problems.
[u] Positive score >7.
[v] Positive score >6.
[x] Chi-square test.
[y] Analysis of variance (ANOVA).
* Significant at ≤ 0.01 level.
** Significant at ≤ 0.001 level.

suicidal group and lifetime ideation remained absolutely the same, only defined reversely, no significant predictors emerged for a single suicide attempt, and repeated attempts were predicted by younger age, severe depressive disorder with psychotic symptoms (AOR > 6), BPD traits, BD-I (AOR > 7), AUD (AOR > 4), and female gender with a marginal statistical significance ($p=0.054$).

Because of missing data (23%) on the Experiences in Close Relationships-Revised (ECR-R) Adult Attachment Questionnaire, largely due to respondents living alone without reported lifetime intimate relationship in adulthood, analyses were repeated in 221 participants with a complete dataset. In these multivariate models with non-suicidal group as the reference, the significant predictors found in the entire sample persisted in the respective categories (for lower numbers, psychotic and non-psychotic severe depressive disorder diagnostic categories were combined), except that BP-II/nos demonstrated marginal statistical significance for suicide ideation without attempts ($p=0.056$), BPD traits remained outside the significance level for the single attempter category, and in the repeated suicide attempts category the adjusted estimate for ECR-R adult anxious attachment indicated trend-level statistical significance ($\beta=0.364$, S.E. 0.195, $p=0.062$).

4. Discussion

In this observational study of patients with depressive or bipolar disorder in psychiatric secondary care, we expectedly found numerous factors from multiple risk factor domains to associate with suicidal ideation and attempts. However, in multivariate analyses, independent significant associations emerged for age, gender, lifetime principal mood and alcohol use disorders, BPD traits, hopelessness, and childhood physical abuse. Whereas depressive symptomatology and hopelessness are salient predictors of suicidal ideation, repeated suicide attempts are markedly predicted by severity of mood disorder, BPD traits, and alcohol use disorder. Our findings indicate that when concurrently evaluated, independent risk factors for suicidal ideation and attempts comprise mostly proximal clinical factors rather than developmental or personality factors, and that dose-response and qualitative patterns exist.

4.1. Strengths and limitations of the study

Strengths of this naturalistic study include a regionally representative sample of mood disorder patients in psychiatric

Table 5
Multinominal regression models for different categorical classifications of lifetime suicidal behaviour.

Variable	No lifetime suicidal behaviour Reference category	Lifetime suicidal ideation without attempts						One lifetime attempt						Two or more lifetime attempts					
		β	Exp(B)	Exp(B) (95CI)	S.E.	Wald	Sig	β	Exp(B)	Exp(B) (95CI)	S.E.	Wald	Sig	β	Exp(B)	Exp(B) (95CI)	S.E.	Wald	Sig
Female gender	1.0	0.308	1.361	0.580–3.192	0.435	0.501	0.479	0.675	1.965	0.737–5.234	0.500	1.824	0.177	1.100	3.004	1.113–8.106	0.506	4.718	0.030*
Age	1.0	-0.038	0.963	0.933–0.994	0.016	5.522	0.019*	-0.022	0.978	0.945–1.013	0.018	1.513	0.219	-0.067	0.935	0.902–0.969	0.018	13.516	0.000***
Depressive disorder																			
Severe with psychotic symptoms	1.0	1.758	5.802	0.758–44.407	1.038	2.867	0.090	0.869	2.384	0.169–33.655	1.351	0.414	0.520	3.665	39.048	4.414–345.419	1.112	10.857	0.001***
Severe without psychotic symptoms	1.0	1.605	4.980	1.856–13.364	0.504	10.159	0.001***	1.543	4.680	1.550–14.130	0.564	7.492	0.006**	2.130	8.416	2.549–27.790	0.609	12.217	0.000***
Bipolar disorder[a]																			
Type I	1.0	-0.831	0.436	0.113–1.676	0.687	1.462	0.227	-0.406	0.666	0.164–2.707	0.715	0.322	0.570	1.207	3.344	0.911–12.276	0.664	3.310	0.069
Type II or unspecified	1.0	1.380	3.975	1.260–12.542	0.586	5.543	0.019*	1.149	3.154	0.875–11.366	0.654	3.086	0.079	2.089	8.080	2.155–30.300	0.674	9.599	0.002**
Alcohol use disorder[b]	1.0	0.860	2.363	0.737–7.576	0.594	2.094	0.148	1.102	3.010	0.873–10.376	0.631	3.045	0.081	2.410	11.129	3.412–36.294	0.603	15.960	0.000***
MSI-BPD score	1.0	0.137	1.147	0.957–1.376	0.093	2.203	0.138	0.268	1.307	1.065–1.604	0.105	6.546	0.011*	0.391	1.478	1.200–1.821	0.106	13.514	0.000***
HS score	1.0	0.096	1.101	1.027–1.180	0.035	7.434	0.006**	0.046	1.047	0.969–1.132	0.040	1.374	0.241	0.066	1.068	0.989–1.153	0.039	2.841	0.092
TADS physical abuse score	1.0	0.153	1.165	1.011–1.342	0.072	4.480	0.034*	0.111	1.117	0.955–1.307	0.080	1.927	0.165	0.185	1.204	1.035–1.400	0.077	5.784	0.016*

All diagnoses according to the International Classification of Disease, 10th revision, Diagnostic Criteria for Research (ICD-10-DCR).
Abbreviations: MSI-BPD=McLean Screening Instrument for Borderline Personality Disorder, HS=Hopelessness Scale, TADS=Trauma and Distress Scale.

* Significant at ≤0.05 level.
** Significant at ≤0.01 level.
*** Significant at ≤0.001 level.
[a] ICD-10-DCR bipolar affective disorder diagnoses subclassified applying Diagnostic and Statistical Manual of Mental Disorders (DSM) compatible classification of type I and type II disorders.bAlcohol harmful use or dependence.
[b] Alcohol harmful use or dependence.

secondary care within the Finnish metropolitan area. We investigated a comprehensive set of potential risk factors from several domains, including developmental history and attachment style, personality and psychological factors, lifetime principal mood and co-morbid alcohol use disorder, current and lifetime severity of mood and anxiety symptoms, including psychotic-like experiences, recent substance use, current life situation, and functional impairment. The sample includes both depressive unipolar and bipolar disorder patients, permitting mutual comparison. We used continuous measures in assessments, increasing statistical sensitivity, and specifically, analyses included instead of dichotomous categorization subthreshold BPD traits and worst lifetime subjective severity of depressive and anxiety symptoms. Most importantly, the study design allows investigation of risk factors separately for suicidal ideation and attempts, within a continuum of lifetime severity of suicidal behaviour.

The results should be interpreted bearing in mind the study limitations. First, cross-sectional and retrospective assessments preclude firm causal inference. Second, retrospective recall biases may exist, for example, if recollections of negative childhood experiences were related to the severity of mood disorder or suicidal behaviour (Hardt and Rutter, 2004). Prospective and retrospective assessments of childhood maltreatment demonstrate relative correspondence on risk for mental disorders (Scott et al., 2012), and latter may constitute an acceptable second-best method for research. Third, the 43% response rate is not as high as we expected. Sampling was, however, conducted amidst busy routine everyday clinical practice, some volunteers were lost due to technical reasons and limited data collecting resources, and the survey was extensive and time-consuming, together influencing the relatively low response rate. The sample did not differ in terms of age and gender from the total patient population in the health care organizations, and the demographics correspond to the screening-based, representative Vantaa Depression Study (MDD) and Jorvi Bipolar Study (BD) cohorts from the area (Mantere et al., 2004; Melartin et al., 2002) (data available on request). Sample selection bias can neither be demonstrated nor ruled out. However, should a selection bias in sampling exist, it would cause bias in our findings pertaining to risk factors only to the degree that these factors and their potency are different among patients not included in the cohort. Fourth, study diagnoses were based on clinical diagnoses according to the ICD-10-DCR, the official classification of mental disorders in Finland, and validated by reviewing the patient records. We are confident that all patients suffered from a mood disorder, whereas precise subtype or degree of severity may remain somewhat inaccurate. For example, the delay in diagnosis of bipolar disorder is well-known (Mantere et al., 2004). We cannot exclude the possibility that high severity of depressive disorder or presence of alcohol use disorders might have been more accurately recognized among individuals with suicidal behaviour. Fifth, although assessments included an extensive set of potential risk factors, some putative risk factors such as post-traumatic stress disorder (Gradus et al., 2010; Panagioti et al., 2012) remained unexamined. In particular, known high-risk states of bipolar mixed and depressive mixed episodes (Holma et al., 2014; Valtonen et al., 2008), and possible role of agitated or mixed unipolar depression (Sani et al., 2011) could not be investigated. Lastly, this study was naturalistic and patients received secondary-level psychiatric care, uncontrolled by authors. Possible effects of treatment on findings remain unknown.

4.2. Suicidal ideation without suicide attempts

We evaluated risk factors for pure suicidal ideation without lifetime suicide attempts. Suicidal ideation was independently predicted by younger age, diagnoses of depressive disorder without psychotic symptoms and BD-II/nos, hopelessness, and childhood physical abuse. The adjusted estimate for psychotic severe depressive disorder was numerically high, but statistically marginal ($p=0.09$), possibly due to the few cases without lifetime suicide attempt. As the multivariate models show and in accordance with previous studies investigating specifically suicidal ideation among clinical mood disorder cohort samples (Sokero et al., 2003; Valtonen et al., 2005) and with epidemiological data from the World Mental Health (WMH) Surveys (Nock et al., 2008a; 2009), depression and hopelessness are substantial predictors of suicidal ideation. Patients with severe depressive disorder without psychotic symptoms and BD-II/nos demonstrate comparable relative risk ratios for suicidal ideation, whereas the negative finding related to BD-I may be explained by a subpopulation of BD-I patients drawn from an inpatient setting and exhibiting mainly manic polarity during the course of illness. In our sample, BD-I patients ranked in the extreme position along the suicidal behaviour continuum, with few participants representing suicidal ideation without attempts. Otherwise, the course of bipolar disorder is predominantly depressive (Judd et al., 2003; Pallaskorpi et al., 2015). Hopelessness, depressive symptoms, and suicidal ideation represent different aspects of a shared depressive construct (Shahar et al., 2006); a decline in depression and hopelessness is followed by a decline in suicidal ideation (Sokero et al., 2006).

Childhood physical abuse was independently associated with suicidal ideation and attempts. Consistent with evidence from a community sample (McHolm et al., 2003) and from the WMH Surveys (Bruffaerts et al., 2010), our findings suggest that this association may primarily indicate a vulnerability to suicidal ideation. By controlling numerous other factors, BPD traits in particular, we confirm previous findings of suicidal behaviour being associated independently with childhood adverse experiences (Bruffaerts et al., 2010; Enns et al., 2006). Various childhood adverse experiences have similar effects on suicidal behaviour (Hoertel et al., 2015); childhood physical and sexual abuse may, however, be more deleterious than others (Belik et al., 2007; Bruffaerts et al., 2010; Joiner et al., 2007). Also, higher suicidal intent and hopelessness are found in victims of childhood sexual abuse (Lopez-Castroman et al., 2013; Spokas et al., 2009). Low prevalence of reported childhood sexual abuse in our sample may account for our negative finding. Additionally, childhood adversities predispose to different mental disorders including mood, anxiety, substance use, and borderline personality disorders (Afifi et al., 2012; Battle et al., 2004; Green et al., 2010; Keyes et al., 2012; Pirkola et al., 2005; Scott et al., 2010; Widom et al., 2009), all of which in turn may act as mediators for suicidal behaviour (Bebbington et al., 2009; Fergusson et al., 2000). Childhood adversities are also associated with earlier onset and more chronic course of mood disorders (Etain et al., 2013; Garno et al., 2005b; Hovens et al., 2015; Nanni et al., 2012). Lastly, hereditary impulsive-aggressive traits may be associated with both exposures to domestic violence in childhood and suicidal behaviour in adulthood (Brodsky et al., 2001).

The major risk factors for suicidal ideation appear to be related to severity of depressive symptomatology and concurrent hopelessness and to childhood physical abuse. However, causal pathways and possible indirect effects between childhood physical abuse and suicidal behaviour remain unexamined in our study.

4.3. Suicide attempts

Several risk factors from multiple domains cluster in the group of repeat suicide attempters. The independent predictors of repeated suicide attempts are female gender, younger age, severe depressive disorder with or without psychotic symptoms, BD-II/nos, AUD, BPD traits, and childhood physical abuse. The gender

difference in risk between suicide completion and attempt is well established (Nock et al., 2008b; Schrijvers et al., 2012), and other studies exploring risk factors specifically for repeated suicide attempts have identified younger age (Choi et al., 2013; Jeon et al., 2010), BD (Jeon et al., 2010), alcohol use disorder (Lopez-Castroman et al., 2011), and more severe clinical characteristics or high co-morbidity (Choi et al., 2013; Pagura et al., 2008). In our sample, severe depressive disorder without psychotic symptoms and BD-II/nos demonstrate comparable risk ratios, which are higher in the repeated suicide attempts category, albeit with overlapping confidence intervals with the ideation and single attempt categories. Likewise, the incidence of suicide attempt in MDD and BD is comparable in similar depressive syndromal states (Holma et al., 2014). Our data indicate that among suicide ideators, BD-I markedly predisposes to repeated suicide attempts. As established, repeated attempts in mood disorders are also associated with comorbid BPD (Corbitt et al., 1996; Garno et al., 2005a; Soloff et al., 2000). Our findings furthermore indicate that for every self-reported BPD trait on the MSI-BPD scale, the risk for a single suicide attempt increases by approximately 30%, and for repeated suicide attempts by 50%; a similar proportional increase as found on suicide attempt rate ratio for every unit increase in BPD traits (Stringer et al., 2013). Although we conducted analyses by excluding the suicidal item of the MSI-BPD scale, correlations of the scale with MDQ (Baryshnikov et al., 2015) or substance use warrant caution in interpretations. Otherwise, the Finnish MSI-BPD scale demonstrates good sensitivity, specificity, and internal consistency (Melartin et al., 2009). The most prominent odds for repeated suicide attempts in our analyses were associated with lifetime alcohol use disorder ($>$ 11-fold) and severe depressive disorder with psychotic symptoms ($>$ 39-fold). Whether psychotic symptoms in mood disorders increase risk for suicidal behaviour is controversial (Grunebaum et al., 2001), with post-discharge register-based studies of severe depressive disorder with psychotic symptoms, employing different sampling methods, revealing contrasting results (Leadholm et al., 2014; Suominen et al., 2009). Warman et al. (2004) found that psychotic suicide attempters report stronger suicidal ideation and more likely reattempt suicide. In our sample, patients with severe depressive disorder with or without psychotic symptoms showed identical levels of current and worst depressive symptoms and hopelessness, and thus, the difference in risk may be more attributable to the consequences of psychotic disturbance as such.

In support of Forman et al. (2004), our findings indicate that repeated suicide attempts are associated with the most severe clinical characteristics, such as severity of depression, psychotic symptoms, substance use, and childhood physical abuse, even after controlling for BPD traits. Furthermore, as hypothesized, in this group particularly important are the risk factors that impair self-control such as AUD and BPD traits.

4.4. Negative findings

Commenting briefly on negative findings, we found no independent increased risk for suicidal behaviour associated with psychotic-like experiences recently reported in adolescent and general samples (DeVylder et al., 2015; Kelleher et al., 2014, 2012), or with the Five-Factor Model personality traits reported in a general population sample (Bluml et al., 2013). In addition to differences in methodologies and samples studied, we also controlled for a broader set of potential risk factors, including both AUD and BPD traits. The literature on attachment styles and suicidal behaviour provides mixed results for adult anxious or avoidant attachment styles (Grunebaum et al., 2010; Lizardi et al., 2011; Palitsky et al., 2013), and our study is the first to adjust analyses of attachment styles for BPD traits. Adult anxious attachment in our subsample indicated trend-level significance for repeated suicide attempts, thus warranting further research. In our study, impulsivity, as generally measured, failed to show independent effects on suicidal behaviour, and other evidence suggests a stronger association with other facets of impulsivity such as aggression (Keilp et al., 2006; Perroud et al., 2011) or affective instability (Palmier-Claus et al., 2012; Yen et al., 2004). Therefore, although the aforementioned psychological factors are associated with suicidal behaviour, the effect appears to either be mediated or overshadowed by other more proximal clinical factors.

5. Conclusions

We found clinical variables, including severity of depressive symptoms, lifetime alcohol harmful use or dependence, BPD traits, childhood physical abuse, and hopelessness, to be most strongly associated with lifetime suicidal behaviour. Adjustments for numerous risk factors from multiple risk factor domains strengthen the significance of our results and support inclusive study designs when investigating putative risk factors for suicidal behaviour. To the extent possible to resolve by our data, risk factors for suicidal behaviour in depressive and bipolar disorders seem mainly analogous. Several distal vulnerability factors may contribute to suicidal behaviour via more proximal factors, such as severity of depression and hopelessness, BPD traits, and substance misuse. Risk factors for suicidal ideation and attempts appear both different and similar, qualitatively and in dose response. Suicide attempters, however, demonstrate more severe mood disorder, alcohol use, and impaired self-control.

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