Trends
in Psychiatry and Psychotherapy

JOURNAL ARTICLE PRE-PROOF
(as accepted)

Original Article

Exploring protective factors in a high-risk subsample: the pivotal role of paternal support in preventing depression in a cohort of young adults

Barbara Tietbohl-Santos, Bruno Braga Montezano, Taiane de Azevedo Cardoso, Thaíse Campos Mondin, Fernanda Pedrotti Moreira, Luciano Dias de Mattos Souza, Ricardo Azevedo da Silva, Flavio Kapczinski, Karen Jansen, Ives Cavalcante Passos

http://doi.org/10.47626/2237-6089-2024-0804

Original submitted Date: 22-Jan-2024

Accepted Date: 10-Apr-2024

Exploring protective factors in a high-risk subsample: the pivotal role of paternal support in preventing depression in a cohort of young adults

Barbara Tietbohl-Santos[a,b,e,f], Bruno Braga Montezano[a,b], Taiane de Azevedo Cardoso[c], Thaíse Campos Mondin[d], Fernanda Pedrotti Moreira[d], Luciano Dias de Mattos Souza[d], Ricardo Azevedo da Silva[d], Flavio Kapczinski[a,b], Karen Jansen[d], Ives Cavalcante Passos[a,b]

[a]Graduate Program in Psychiatry and Behavioral Sciences, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil.
[b]Molecular Psychiatry Laboratory, Hospital de Clínicas de Porto Alegre, Porto Alegre, RS, Brazil .
[c]IMPACT - Institute for Mental and Physical Health and Clinical Translation, School of Medicine, Deakin University, Australia.
[d]Graduate Program in Health and Behavior, Catholic University of Pelotas, Pelotas, RS, Brazil.
[e]Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Canada.
[f]Alliance Group, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil.

Corresponding author:
Ives Cavalcante Passos
Phone: +55 512 101 8845
E-mail: ivescp1@gmail.com

Abstract

Background: Major depressive disorder (MDD) is a global concern due to its widespread prevalence and morbidity. Identifying protective factors in high-risk individuals, including those with a familial predisposition, maltreatment history, and socio-economic vulnerabilities, is crucial.

Methods: We assessed a high-risk subsample within a young adult population cohort (n = 791; mean age = 31.94 [SD = 2.18]) across three waves. Using multiple regression models to analyse higher education, feeling supported, spirituality, psychotherapy access, higher socioeconomic status, involvement in activities, cohabitation, and family unity in Waves 1 and 2, and their association with MDD resilience at Wave 3

Results: In the high-risk group, MDD incidence was 13.7% (n=24). Paternal support had a protective effect on MDD incidence (OR = 0.366; 95% CI [0.137 to 0.955], p = 0.040) and suicidal attempt risk (OR = 0.380; 95% CI [0.150 to 0.956], p = 0.038). Higher resilience scores were also protective (OR = 0.975; 95% CI [0.953 to 0.997], p = 0.030), correlating with reduced BDI (r = 0.0484; B = -0.2202; 95% CI [-0.3572 to -0.0738]; p = 0.003) and MADRS scores (r = 0.0485; B = -0.2204; 95% CI [-0.3574 to -0.0741]; p = 0.003).

Conclusions: Our paper emphasizes reorienting the MDD approach, focusing on positive prevention strategies. It highlights fathers' crucial role in family-based interventions and promoting resilience in high-risk populations.

Funding: CAPES - Finance Code 001 and financial support from CNPq, with ICP and KJ as CNPq research fellows.

Keywords: protective factors, major depressive disorder, at-risk population, cohort, social support, paternal support, resilience.

1. Introduction

Major Depressive Disorder (MDD) has consistently occupied a notable position among the leading ten contributors to disability-adjusted life-years (DALYs) across diverse age brackets, retaining this status for individuals aged 10–49, as documented in the latest report by The Global Burden of Diseases.[1] Furthermore, the presence of depression and anxiety in early life poses a significant threat to one's future physical and mental well-being, educational achievements, financial stability, and interpersonal relationships.[2] Given the far-reaching consequences of depressive episodes and the alarmingly high prevalence of this disorder, it becomes imperative to gain a deeper understanding of the individuals who are most susceptible to its development and the factors that either contribute to or mitigate its occurrence.

Parental mental health problems increase the chance of an individual to experience a depressive episode by 42% [3] and are a well-established risk factor for child psychopathology.[4] Substantial research indicates that the offspring of depressed mothers are at increased risk for psychological and social maladjustment [5] and that children of depressed parents are more likely to experience depression, phobias, panic disorders, substance misuse and problematic gaming during adolescence.[6,7] It is worth noting that both genetic factors and the family environment make substantial and significant contributions to the familiarity of depression [8] and other mental disorders [9].

Protective factors can be viewed as positive traits and influences that can facilitate healthy development. Their significance lies not necessarily in the promotion of normal development in any environment, but they play a crucial role when there is an interplay with risk factors.[10] The most frequently discussed environmental factors encompass individual characteristics and various categories of supportive relationships, including parents, neighborhood, peers, and school.[11] In addition, Askeland et al. (2020) associate individual factors such as goal orientation, self-confidence, social competence, social support, and family cohesion with a reduction in depressive symptoms.[12] In contrast, Solmi et al. (2021) highlight the lack of convincing support for either risk or protective factors for Major Depressive Disorder (MDD).[13] Despite being extensively examined in cross-sectional research, these studies frequently lack the essential longitudinal

dimension required for a comprehensive assessment of their impact on MDD prevention in high-risk individuals [14].

Addressing this research gap, our study strives to enrich existing knowledge by providing a nuanced understanding of the effectiveness of various protective factors in preventing depressive symptoms among high-risk individuals. The primary objective is to leverage prior knowledge about protective factors and assess their preventive impact on depressive symptoms within this specific subsample of a population cohort comprising high-risk young adults.

2. Methods

2.1. Study design

This paper is a longitudinal study derived from a subsample from a population cohort. The first wave (T1) of data collection spanned from 2007 to 2009. The second wave (T2) occurred approximately five years later, spanning from 2012 to 2014, and the third wave (T3) was conducted from 2018 to 2020, roughly a decade after the T1. All young adults who were part of the initial phase were invited to return for a follow-up assessment. Participants were informed about the research objectives and provided informed consent. The study received approval from the Research Ethics Committee of the Universidade Católica de Pelotas under protocol number 2008/118. Further information about the study's design has been previously published elsewhere.[15]

2.2. Participants

In the initial wave, a total of 1560 participants, aged between 18 to 24 years, residing in urban Pelotas, Brazil, were included. The rate of participation in the third follow-up assessments was 50.7%, with a total of 791 individuals (n = 791). The substantial loss in follow-up observed in our study was primarily attributable to the disruptions caused by the COVID-19 pandemic. At T3, the average age of participants was 31.94 years 31.94 (SD = 2.18). Those respondents who were identified as having a psychiatric disorder were referred to appropriate healthcare services as required.

2.3. Data Sources/ Measurements

Socio-demographic Characteristics

Participants completed a comprehensive questionnaire that covered various socio-demographic and economic questions at T1. These variables encompassed sex, skin color, age, marital status, years of education, occupational status, access to psychotherapy, and spirituality factors, including participation in a religious group, attending religious services, and having a religion. In addition to these questions, participants were asked family-related questions regarding the structure of their family, such as cohabitation and the number of individuals within the family. Furthermore, individuals reported their economic classification based on the criteria established by the Brazilian Association of Research Companies - ABEP.[16]

Social support

Perceived social support pertains to the subjective perception of the care and assistance one receives from social relationships. This perception encompasses emotional support (e.g., expressions of empathy), instrumental support (e.g., assistance with household tasks), and informational support (e.g., financial advice) that can be provided by various sources, such as friends or family.[17] In our study, the assessment of the subjective feeling of support involved a series of dichotomous questions collected at T1. These questions covered whether the participant felt supported in general and specifically whether they felt supported by particular individuals within their family, including parents, siblings, partners, and their own children, if applicable.

Resilience

The measurement of resilience as a trait was conducted using the Resilience Scale for Adults (RSA) at T2.[18] The RSA consists of 33 items and employs a 7-point Likert scale. This scale is designed to evaluate protective factors associated with personal attributes and support systems that have been demonstrated to promote adaptation in the face of psychosocial adversities.

Childhood Trauma Questionnaire

This retrospective, self-reported, standardized instrument is specifically designed for assessing childhood trauma, standing as one of the most widely employed measures for this construct [19]. The CTQ comprehensively examines five categories of maltreatment experiences—specifically, emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect—employing a Likert-scale approach to assess the severity of each incident. It is noteworthy that the instrument has undergone validation for use in Brazilian Portuguese.[20] The questionnaire was also used to collect information about the participants' sense of family unity during childhood.

High-Risk for MDD

The high-risk criterion was determined by assessing the participants' family psychiatric history at T1. They were asked whether someone in their family had ever been diagnosed with a psychiatric disorder. In cases of a positive response, participants were then asked a series of questions related to each specific family member. To meet the high-risk criteria, at least one immediate family member needed to have a prior diagnosis of a mental health disorder. Notably, we initially explored the possibility of incorporating additional variables into our definition of high-risk for MDD beyond participants' family psychiatric history at T1. However, upon careful consideration, we found that including additional variables would result in a significantly restricted sample size for analysis.

Main Outcome

The assessment of MDD was carried out using the Mini International Neuropsychiatric Interview – PLUS (MINI – PLUS) [21] by trained psychologists at each time point. In cases where there was uncertainty regarding the diagnosis of MDD, subjects underwent a reassessment using the semi-structured clinical interview for DSM Structured Clinical Interview [22] to confirm the diagnosis.

Secondary Outcomes

Furthermore, the MINI – PLUS collected at T3 was utilized to gather clinical history information regarding depression severity, including the age of onset of first depressive disorder, history of psychiatric in-patient care, history of lifetime suicide attempts, and current suicide ideation. The severity of depressive symptoms was also evaluated at T3 using both the Montgomery-Asberg Depression Rating Scale [23] and the Beck Depression Inventory [24].

2.4. Variables

To assess demographic variables, we employed multinomial categorical variables for sex, skin color, age, marital status, and occupational status, along with economic classification based on the ABEP strata. Some variables were dichotomous, such as access to psychotherapy, participation in a religious group, attendance at religious services, having a religion, cohabitation with the individuals' father and mother, perceived social support from those in the individuals' social circle, as well as certain depression-related variables like previous psychiatric in-patient treatment, previous suicidal attempts, and current suicidal ideation. Additionally, we generated quantitative variables to measure years of education, age of the first depressive episode, resilience scores, and depression severity scores.

Creating a high-risk variable involved establishing a dichotomous measure for a positive immediate family history, after excluding individuals already diagnosed with MDD at baseline. Moreover, in relation to our main outcome, the absence of MDD at T3, we established a dichotomous variable concerning the diagnosis of MDD according to the MINI – PLUS.

2.5. Statistical Methods

All statistical analyses were conducted using R programming language (version 4.3.1), with packages "tidyverse", "MASS", "dplyr", and "epiDisplay". No imputation or adjustment for missing data was performed, the analysis being carried out exclusively on the observed cases. The number of individuals with missing data for in each variable can be seen at Supplementary table 3. Significance in all statistical tests was established at $p < 0.05$. The analysis was conducted in accordance with the following steps:

Group Selection

Initially, participants were identified based on the high-risk criterion. This subsample was subsequently scrutinized with respect to our primary outcome—specifically, the absence of MDD at T1 and the presence of the diagnosis at T3. Following this, the cohort was stratified into four sub-groups: "incident," "recurrent," "recovered," and "resilient." In this study, "incident" refers to individuals experiencing their first episode of depression at T3, "recurrent" denotes those with a history of depressive episode both at T1 and T3, "recovered" signifies individuals who have previously experienced depression at T1 but are asymptomatic at T3, and "resilient" characterizes participants who have never encountered depressive episodes despite being at risk. Given our focus on investigating protective factors in resilient individuals, we proceeded to compare a subgroup of high-risk individuals who experienced incident cases of Major Depressive Disorder (MDD) with those demonstrating resilience. This approach was taken as individuals classified in the recovered and recurrent groups would no longer solely be considered "at-risk" for depression.

Descriptive Statistics and Bivariate Analysis

The descriptive data were presented, detailing mean and standard deviation, along with absolute and relative frequency. Subsequently, we examined the incidence of MDD within the high-risk group and the entire sample. Following this, normality assessments were conducted for continuous variables using the Shapiro-Wilk test. The socio-demographic and economic characteristics of both groups underwent analysis through

the t-test, Chi-square, and Mann-Whitney U test, as appropriate. The same methods were applied to assess the multiple proposed protective characteristics. Additionally, a bivariate analysis explored group differences regarding suicide attempts, current suicide risk, in-patient psychiatric treatment, and age of the first depressive episode. Variables with a significance level of $p<0.200$ in this analysis were included in the subsequent multivariate analysis.

Multivariate Analysis

Logistic regressions were utilized to explore the connection between protective factors and resilience, examining group distinctions in relation to these factors and employing resilience to MDD (inverted incidence of MDD variable) as the dependent variable. Subsequently, logistic regressions were performed incorporating the previously identified significant protective factors, now exploring various outcomes such as suicide attempts, current suicide risk, in-patient psychiatric treatment, and the age of the first depressive episode as dependent variables. This aimed to determine whether the protective factors identified for resilience to MDD had implications for these crucial indicators of depression severity. Additionally, linear regressions were executed to delve into the association between significant protective factors and the severity of depression scores (MADRS and BDI). Then, additional post-hoc bivariate analyses were conducted investigating differences between groups with higher and lower frequencies of the identified protective factors and how these factors influenced various secondary measures of depression severity.

3. Results

3.1. Participants

At T3, complete data on depression incidence were available for 780 individuals. Subsequently, we excluded recurrent (n=23) and recovered individuals (n=66), focusing our analysis on the resilient (n=627) and incident (n=64) cases. These participants were

then categorized based on our risk criteria into high-risk (n=175) and normal-risk groups (n=417). Observations with missing data on the risk criterion were omitted, resulting in a final participant count of 669 individuals. Among these, a significant difference in sex distribution between the groups was noted (p=0.001), with females constituting 70.3% of the high-risk group (n=123) and 55.9% of the normal-risk group (n=233). No other significant differences were observed in sociodemographic variables, as detailed in Supplementary Table 1. At T3, the normal-risk group exhibited a 7.67% incidence of new MDD cases (n=32). In contrast, the high-risk subgroup displayed an MDD incidence of 13.7% (n=24), signifying a 78.5% higher incidence of depression compared to their normal-risk counterparts (p=0.032).

Within the high-risk group (n= 175), no significant differences were observed in socio-demographic and economic characteristics between high-risk participants with and without a new diagnosis of MDD, as depicted in Table 1.

Table 1. Characteristics of the Resilient vs Incident for depression groups in the high-risk subsample.

Characteristics	Resilient depression High-Risk Group (n= 151)	Incident depression High-Risk Group (n= 24)	p-value
Gender[a]			0.0808
Male	49 (32.5%)	3 (12.5%)	
Female	102 (67.5%)	21 (87.5%)	
Age[b]	20.6 (1.92)	20.1 (2.05)	0.9532
Skin Color[a]			0.162
Not-White	44 (29.1%)	11 (45.8%)	
White	107 (70.9%)	13 (54.2%)	
Economic Classification[a]			0.0555
High	84 (56.4%)	8 (33.3%)	
Intermediate	61 (40.9%)	16 (66.7%)	
Low	4 (2.7%)	0 (0%)	
Education[a]			0.261
Incomplete High School or lower	59 (39.1%)	15 (65.2%)	

High school	69 (45.7%)	6 (26.1%)	
Secondary Education	23 (15.2%)	2 (8.7%)	
Lives With Father[a]			0.289
Yes	65 (43%)	7 (29%)	
No	86 (57%)	17 (71%)	
Divorced Parents[a]			0.293
Yes	96 (32.4%)	11 (46%)	
No	170 (67.6%)	13 (54%)	
Paternal Support[a]			0.00613
Yes	104 (74.3%)	10 (43.5%)	
No	36 (25.7%)	13 (56.5%)	
Maternal Support[a]			0.283
Yes	135 (92.5%)	20 (83.3)	
No	11 (7.5%)	4 (16.6)	
Resilience Score (RSA)[c]	140 (127-151)	127 (110 - 139)	0.009698
CTQ scores[c]	11.5 (6-20)	18.5 (9.5-30)	0.03253
Suicide attempt[a]			0.00000177
yes	12 (7.9%)	11 (45.8%)	
no	139 (92.1%)	13 (54.2%)	
Suicide ideation[a]			0.0552
yes	10 (6.6%)	5 (20.8%)	
no	141 (93.4%)	19 (79.2%)	
Paternal Diagnosis[a]			0.757
Yes	33 (21.9%)	4 (16.7%)	
No	118 (78.1%)	20 (83.3%)	
Maternal Diagnosis[a]			0.639
Yes	83 (55%)	15 (62.5%)	
No	68 (45%)	9 (37.5%)	

Table 1. Characteristics of the Resilient vs Incident for depression groups in the high-risk subsample.

RSA = Resilience Scale for Adults; CTQ = Childhood Trauma Questionnaire;
a Absolute and relative (%) frequencies, p-value according to Chi-square test;
b Mean (standard deviation), p-value according to t-test;
c Median (25th/75th quartiles), p-value according to Mann-Whitney U test.

3.2. Descriptive Data

The primary significant protective factors against the incidence of MDD within the high-risk group included having a supportive father and exhibiting higher resilience scores. The subsequent data pertains to our initial comparisons between the incident group and the resilient high-risk group, followed by post-hoc analysis investigating differences between groups with higher and lower frequencies of the identified protective factors.

Comparisons between incident and resilient high-risk groups.

Participants in the resilient group were more likely to report having a supportive father (n=104; 74.3%) compared to the incident group (n=10; 43.5%; p-value = 0.006). Interestingly, the same pattern did not emerge for maternal support, as a majority of our sample reported feeling supported by their mothers. Additionally, resilient individuals reported higher resilience scores (140; [127-151]) compared to the incident group (127; [110-139]; p=0.009). The resilient group appeared to have lower exposure to trauma, reflected in lower CTQ scores (11.5; [6-20]), in contrast to the incident group (18.5; [9.5-30]; p=0.032). Resilient individuals also had a lower frequency of suicidal attempts (n=12; 7.9%) compared to incident individuals (n=11; [45.8%]; p < 0.001). The groups did not significantly differ regarding suicidal ideation at T3, parental marital status, cohabitation with the father, parental mental health diagnosis, and other socio-economic variables. Additional details are provided in Table 1. Differences between groups with a significance level of p<0.200, were incorporated into the subsequent multivariate analysis. These encompassed socio-economic level, skin color, paternal support, resilience scores, and CTQ scores.

Comparisons between high risk individuals according to presence vs absence of paternal support.

Individuals who reported having a supportive father displayed lower depression severity scores (MADRS= 0 [0-6]; BDI= 6.5 [1-16]) compared to those reporting an absent father (MADRS= 4 [2-16]; p= 0.0002 and BDI=13 [8-26]; p= 0.001). The presence of a supportive father was also correlated with lower rates of psychiatric in-treatment (p= 0.0422). Interestingly, the groups did not exhibit differences in resilience scores, the presence of paternal psychiatric diagnosis, or CTQ scores. Furthermore, no distinctions were observed in socioeconomic characteristics, as indicated in Table 2.

Table 2. Characteristics of high-risk individuals according to presence vs absence of paternal support.

Characteristics	Presence of Paternal Support (n=114)	Absence of Paternal Support (n=49)	p-value
Gender[a]			0.171
Male	37 (78.7%)	10 (21.3%)	
Female	77 (66.3%)	39 (33.6%)	
Depressive Symptoms (MADRS score)[c]	0 (0-6)	4 (2-16)	0.0002
Depressive Symptoms (BDI score)[c]	6.5 (1-16)	13 (8-26)	0.00197
Resilience Scores (RSA)[c]	138 (125-149)	134 (119-146)	0.4266
Age of first depressive episode[a]	20.0 (5.35)	17.7 (4.92)	0.0642
Suicide attempt (lifetime)[b]			0.0520
Yes	11 (9.6%)	11 (22.4%)	
No	103 (90.4%)	38 (77.6%)	
Suicidal ideation (current)[b]			0.162
Yes	107 (93.8%)	3 (85.7%)	
No	7 (6.2%)	46 (93.9%)	
Psychiatric in-patient treatment [b]			0.0422

Yes	0 (0%)	3 (6.1%)	
No	114 (100%)	46 (93.9%)	
Paternal Psychiatric Diagnosis [b]			0.858
Yes	24 (21%)	9 (18.4%)	
No	90 (79%)	40 (81.6%)	
CTQ [c]	11 (6-20)	15 (8-27)	0.037

Table 2. Characteristics of high risk individuals according to presence vs absence of paternal support. MADRS = Montgomery-Asberg Depression Rating Scale; BDI= Beck Depression Inventory; RSA = Resilience Scale for Adults; CTQ = Childhood Trauma Questionnaire;

a Mean (standard deviation), p-value according to t-test;

b Absolute and relative (%) frequencies, p-value according to Chi-square test;

c Median (25th/75th quartiles), p-value according to Mann-Whitney U test.

Comparisons between high risk individuals with higher and lower resilience scores

Participants were stratified based on the 25% (Q1=< 124) and 75% percentile (Q4=> 149) of their RSA scores for comparative analysis. Those who scored higher were older at baseline (mean = 20.92; SD= 1.82) than those who scored lower (mean= 20.13; SD= 2.00; p= 0.03832). Individuals with higher resilience scores also exhibited lower depression severity scores (MADRS= 2 [0-6]; BDI= 5 [2-11]) than those who had lower resilience scores (MADRS= 5 [1.5-14.5]; p= 0.0001 and BDI= 12 [4.75-27.2]; p= 0.002). Additionally, individuals with higher resilience scores had a lower frequency of suicidal attempts (n= 4; 7.8%) compared to those with lower scores (n= 11; 25%; p= 0.045). It is noteworthy that the groups did not differ concerning their history of past trauma. Additional information about group characteristics regarding resilience scores can be found in Table 3.

Table 3. Characteristics according to resilience levels (High vs Low)

Characteristics	High Resilience (n=51)	Low Resilience (n=44)	p-value
Sex[b]			0.0517
Male	21 (41.2%)	9 (20.4%)	
Female	30 (58.8%)	35 (79.6%)	
Age at Baseline[a]	20.92 (1.82)	20.13 (2.00)	0.03832
Father Support[b]			0.215
Present	34 (77.3%)	27 (62.8%)	
Absent	10 (22.7%)	16 (37.2%)	
Depressive Symptoms (MADRS score)[c]	2 (0-6)	5 (1.5 - 14.5)	0.001223
Depressive Symptoms (BDI score)[c]	5 (2-11)	12 (4.75 - 27.2)	0.00265
Age of first depressive episode[a]	20.84 (6.22)	19.55 (5.35)	0.3184
Suicide attempt (lifetime)[b]			0.0450
Yes	4 (7.8%)	11 (25%)	
No	47 (92.2%)	33 (75%)	
Suicidal ideation (current)[b]			0.0545
Yes	2 (3.9%)	8 (18.2%)	
No	49 (96.1%)	36 (81.8%)	
Psychiatric in-patient treatment[b]			1
Yes	1 (1.9%)	1 (2.3%)	
No	50 (98.1%)	45 (97.7%)	
Paternal Psychiatric Diagnosis[b]			0.172
Yes	10 (19.6%)	15 (34%)	
No	41 (80.4%)	29 (66%)	
Maternal Psychiatric Diagnosis[b]			1
Yes	28(54.9%)	24 (54.5%)	
No	23 (45.1%)	20 (45.5%)	
CTQ[c]	12 (5 - 23.5)	18 (9.75 - 30)	0.05397

Supplementary Table 3. Characteristics according to Resilience Levels (High vs Low). Individuals grouped according to first and fourth percentiles of the distribution of RSA scores [Q1=< 124; Q4=>149]; MADRS = Montgomery-Asberg Depression Rating Scale; BDI= Beck Depression Inventory; RSA = Resilience Scale for Adults; CTQ = Childhood Trauma Questionnaire;

a Mean (standard deviation), p-value according to t-test;
b Absolute and relative (%) frequencies, p-value according to Chi-square test;
c Median (25th/75th quartiles), p-value according to Mann-Whitney U test.

3.3. Outcome Data

Supportive Father

The presence of a supportive father at T1 reduced in 63% the likelihood of developing depression at T3 (Odds Ratio = 0.366 ; 95% CI [0.137 to 0.955], p = 0.040). Also, having a supportive father reduced the risk of suicidal attempt in T3 in 62% (Odds Ratio = 0.380 ; 95% CI [0.150 to 0.956], p = 0.038)

Resilience Scores

Higher resilience scores were associated with a minor, albeit significant, effect on MDD prevention in high-risk individuals. (Odds Ratio = 0.975; 95% CI [0.953 to 0.997], p = 0.030). Furthermore, there was also a small but significant correlation between the resilience scores and depression severity in T3, according to both the BDI scores (r = 0.0484; B = -0.2202 ; 95% CI [-0.3572 to -0.0738]; p = 0.003), and the MADRS scores (r = 0.0485; B = -0.2204 ; 95% CI [-0.3574 to -0.0741]; p = 0.003).

Other Protective Factors

Several other potential protective factors, including having a religion, participating in a religious group, attending religious services, having access to psychotherapy, higher socioeconomic status, involvement in educational or professional activities, cohabitation with mother or father, a sense of family unity during childhood, and feeling supported by

siblings, mother, and/or spouse, were not found to be statistically significant for MDD prevention, as indicated in Supplementary Table 2.

4. Discussion

This study delved into the influence of potential protective factors on the incidence of MDD within a subsample of a young adult cohort. Paternal support emerged as a critical factor, preventing MDD in high-risk individuals. This finding resonates with a recent meta-analysis that explored the dynamic nature of social support across the lifespan, underscoring the significance of parental support for adolescents, which evolves over time to encompass peer and spouse support.[25] Furthermore, it aligns with the broader literature on social support, where cohort studies, meta-analyses and systematic reviews have consistently demonstrated its protective impacts against depressive symptoms, post-traumatic stress disorder (PTSD), and suicidal ideation in young adults.[25–29] To our knowledge, this study is among the first to demonstrate how paternal support plays a significant protective role in averting the development of MDD in high-risk individuals in a large cohort of young adults.

Furthermore, it was revealed that having a supportive father not only decreases the severity of depressive symptoms, but also reduces the risk of suicide attempts. These findings resonate with other studies that have highlighted the protective effect of paternal support in the context of adolescent suicidality.[30] Intriguingly, individuals who perceived support from their fathers did not demonstrate significant differences in resilience or trauma scores compared to those without such support in our study. Remarkably, even when controlling the analysis for these variables, father support exhibited protective effects against MDD. This evidence implies that a supportive father may wield greater significance in MDD prevention than individual characteristics, such as high resilience, even when considering past traumatic events. This phenomenon might be attributed to high-risk individuals, such as those with a positive family psychiatric history, potentially having lower intrinsic characteristics that contribute to better mental health outcomes, such as self-esteem[31] and IQ[32]. Consequently, they may rely more on their environment to receive positive influences to prevent depression.

It's noteworthy that, contrary to expectations, while paternal support emerged as a significant factor for MDD prevention, maternal support did not. This contradicts previous findings highlighting the paramount influence of maternal support in averting MDD in children and adolescents.[33] Given that a substantial majority (86.5%) of our overall sample reported feeling supported by their mothers, we hypothesize that the combined influence of positive maternal and paternal figures may be necessary to prevent MDD, as evidenced in previous studies.[34,35] Indeed, it appears that the interaction of maternal and paternal parenting needs consideration when predicting youth symptoms.[36] Nevertheless, our study underscores the impactful role of a supportive father when maternal support is already in place.

Moreover, our study contributes to the body of literature by showing a small significant association between RSA scores and the prevention of MDD diagnosis, along with an inverse correlation between RSA scores and depressive symptoms scores. Extensive research has demonstrated that resilience plays a mediating role in the association between trauma and mood disorders [37,38], between victimization and suicidality [39], and it is linked to overall better treatment outcomes for anxiety [40], PTSD [26], and even clinical illnesses.[41] In fact, a recent meta-analysis demonstrated that individuals with mood disorders exhibit lower resilience compared to those without mood disorders [42]. It is conceivable that more extensive studies with larger sample sizes may be requisite to comprehensively explore the nuanced aspects of resilience in relation to other MDD-related outcomes, such as the age of the first depressive episode and the number of mood episodes, which did not attain significance in our analysis.

Our group's recent systematic review has highlighted several protective factors in high-risk cohorts, some of which couldn't be confirmed in the present study.[11] Although other types of support, such as support from siblings, friends, and partners have been observed in multiple prior cross-sectional studies [43–45], they did not exhibit a significant protective effect in our study. Moreover, variables such as spirituality, access to psychiatric treatment/psychotherapy, engagement in educational activities, family composition, and family cohesion have previously demonstrated a protective effect on mental health outcomes [46–50]. However, these factors did not exhibit a significant

association with MDD prevention in our study. The complexities of these relationships and how they interact to shape resilience in high-risk circumstances warrant further investigation. Future studies are needed to better comprehend the intricate interplay of these factors.

While this study makes a valuable contribution to the literature, as there are few cohort studies that were able to assess how protective factors affect the incidence of MDD in high-risk individuals, it does have some limitations that should be considered. Firstly, the way the question was framed regarding support may introduce bias, as individuals can have a broad and subjective understanding of support. In addition, we did not analyze support in its various facets, such as emotional support or financial support. Additionally, the limited number of incident cases of MDD in high-risk individuals may have influenced the findings. The scarcity of male participants in the incident depressed group, with only three males, could introduce gender bias. Finally, the study did not inquire about the participants' subjective feelings of support at T3, which means there is no evidence that the levels of perceived support remained consistent over time. These limitations should be taken into account when interpreting the results.

This young adult cohort study offers valuable insights into how a range of protective factors can influence the incidence of MDD in high-risk individuals. These findings have the potential to foster changes in the approach of psychological interventions within this population. Rather than solely focusing on mitigating negative factors, the emphasis may shift towards actively promoting positive elements.[51] Additionally, the study highlights the crucial role of engaging fathers and the significance of employing family-based strategies to enhance mental well-being in high-risk populations.

5. Funding

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001. This work received

financial supports from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brasil. ICP and KJ are CNPq research fellows.

6. Conflict of Interest

All authors report no competing interests.

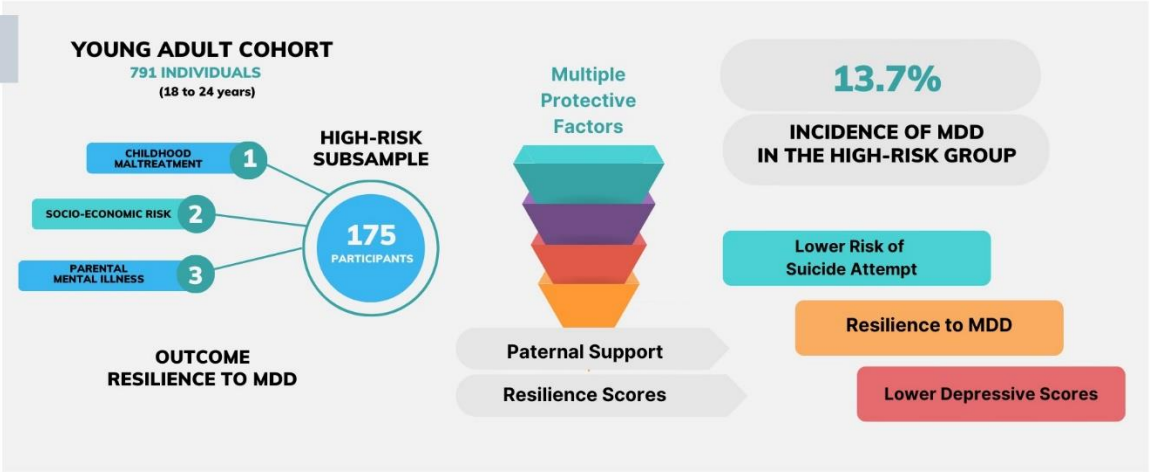
References

1. Vos T, Lim SS, Abbafati C, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*. 2020;396(10258):1204-1222. doi:10.1016/S0140-6736(20)30925-9
2. Wang D, Jiang Q, Yang Z, Choi JK. The longitudinal influences of adverse childhood experiences and positive childhood experiences at family, school, and neighborhood on adolescent depression and anxiety. *J Affect Disord*. 2021;292:542-551. doi:10.1016/J.JAD.2021.05.108
3. Dachew B, Ayano G, Duko B, Lawrence B, Betts K, Alati R. Paternal Depression and Risk of Depression Among Offspring: A Systematic Review and Meta-Analysis. *JAMA Netw Open*. 2023;6(8):e2329159. doi:10.1001/jamanetworkopen.2023.29159
4. Ramchandani P, Psychogiou L. Paternal psychiatric disorders and children's psychosocial development. *Lancet Lond Engl*. 2009;374(9690):646-653. doi:10.1016/S0140-6736(09)60238-5
5. Goodman SH, Rouse MH, Connell AM, Broth MR, Hall CM, Heyward D. Maternal depression and child psychopathology: a meta-analytic review. *Clin Child Fam Psychol Rev*. 2011;14(1):1-27. doi:10.1007/s10567-010-0080-1
6. Roza TH, Rabelo-da-Ponte FD, Spritzer DT, et al. Depression in mothers at childhood: Direct and indirect association with problematic gaming in late adolescence/young adulthood. *J Psychiatr Res*. 2023;159:14-21. doi:10.1016/j.jpsychires.2023.01.022
7. Weissman MM, Wickramaratne P, Nomura Y, Warner V, Pilowsky D, Verdeli H. Offspring of depressed parents: 20 years later. *Am J Psychiatry*. 2006;163(6):1001-1008. doi:10.1176/ajp.2006.163.6.1001
8. Thapar A, McGuffin P. A twin study of depressive symptoms in childhood. *Br J Psychiatry J Ment Sci*. 1994;165(2):259-265. doi:10.1192/bjp.165.2.259
9. Schaefer JD, Caspi A, Belsky DW, et al. Enduring mental health: Prevalence and prediction. *J Abnorm Psychol*. 2017;126(2):212-224. doi:10.1037/ABN0000232
10. Brasso C, Giordano B, Badino C, et al. Primary Psychosis: Risk and Protective Factors and Early Detection of the Onset. *Diagnostics*. 2021;11(11). doi:10.3390/DIAGNOSTICS11112146
11. Tietbohl-Santos B, Shintani, O.A. OA, Montezano, B.B. BB, Passos IC. Protective factors against depression in high-risk children and adolescents: a systematic

review of longitudinal studies. *Press*.
12. Askeland KG, Bøe T, Breivik K, Greca AML, Sivertsen B, Hysing M. Life events and adolescent depressive symptoms: Protective factors associated with resilience. *PLOS ONE*. 2020;15(6):e0234109. doi:10.1371/journal.pone.0234109
13. Solmi M, Dragioti E, Arango C, et al. Risk and protective factors for mental disorders with onset in childhood/adolescence: An umbrella review of published meta-analyses of observational longitudinal studies. *Neurosci Biobehav Rev*. 2021;120:565-573. doi:10.1016/j.neubiorev.2020.09.002
14. Afifi TO, MacMillan HL. Resilience following Child Maltreatment: A Review of Protective Factors. *Can J Psychiatry*. 2011;56(5):266-272. doi:10.1177/070674371105600505
15. Jansen K, Ores L da C, Cardoso T de A, et al. Prevalence of episodes of mania and hypomania and associated comorbidities among young adults. *J Affect Disord*. 2011;130(1):328-333. doi:10.1016/j.jad.2010.10.007
16. Critério Brasil - ABEP. Accessed October 30, 2023. https://www.abep.org/criterio-brasil
17. Scardera S, Perret LC, Ouellet-Morin I, et al. Association of Social Support During Adolescence With Depression, Anxiety, and Suicidal Ideation in Young Adults. *JAMA Netw Open*. 2020;3(12):e2027491. doi:10.1001/jamanetworkopen.2020.27491
18. Friborg O, Hjemdal O, Rosenvinge JH, Martinussen M. A new rating scale for adult resilience: what are the central protective resources behind healthy adjustment? *Int J Methods Psychiatr Res*. 2003;12(2):65-76. doi:10.1002/mpr.143
19. Bernstein DP, Fink L, Handelsman L, et al. Initial reliability and validity of a new retrospective measure of child abuse and neglect. *Am J Psychiatry*. Published online 1994. doi:10.1176/ajp.151.8.1132
20. Grassi-Oliveira R, Stein LM, Pezzi JC. Tradução e validação de conteúdo da versão em português do Childhood Trauma Questionnaire. *Rev Saude Publica*. 2006;40(2):249-255. doi:10.1590/S0034-89102006000200010
21. Amorim P. Mini International Neuropsychiatric Interview (MINI): validação de entrevista breve para diagnóstico de transtornos mentais. *Rev Bras Psiquiatr*. Published online 2000. doi:10.1590/s1516-44462000000300003
22. Del-Ben CM, Vilela JAA, Crippa JA de S, Hallak JEC, Labate CM, Zuardi AW. Confiabilidade da "Entrevista Clínica Estruturada para o DSM-IV - Versão Clínica" traduzida para o português. *Rev Bras Psiquiatr*. Published online 2001. doi:10.1590/s1516-44462001000300008
23. Montgomery SA, Asberg M. A new depression scale designed to be sensitive to change. *Br J Psychiatry J Ment Sci*. 1979;134:382-389. doi:10.1192/bjp.134.4.382
24. Campos RC, Gonçalves B. The Portuguese version of the Beck Depression Inventory-II (BDI-II): Preliminary psychometric data with two nonclinical samples. *Eur J Psychol Assess*. 2011;27(4):258-264. doi:10.1027/1015-5759/a000072
25. Gariépy G, Honkaniemi H, Quesnel-Vallée A. Social support and protection from depression: systematic review of current findings in Western countries. *Br J Psychiatry*. 2016;209(4):284-293. doi:10.1192/bjp.bp.115.169094
26. Liu CH, Zhang E, Wong GTF, Hyun S, Hahm H "Chris." Factors associated with

depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for U.S. young adult mental health. *Psychiatry Res*. 2020;290:113172. doi:10.1016/j.psychres.2020.113172
27. Narita Z, Devylder J, Bessaha M, Fedina L. Associations of self-isolation, social support and coping strategies with depression and suicidal ideation in U.S. young adults during the COVID-19 pandemic. *Int J Ment Health Nurs*. 2023;32(3):929-937. doi:10.1111/inm.13138
28. Rueger SY, Malecki CK, Pyun Y, Aycock C, Coyle S. A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. *Psychol Bull*. 2016;142(10):1017-1067. doi:10.1037/bul0000058
29. Santini ZI, Koyanagi A, Tyrovolas S, Mason C, Haro JM. The association between social relationships and depression: A systematic review. *J Affect Disord*. 2015;175:53-65. doi:10.1016/j.jad.2014.12.049
30. Teismann T, Forkmann T, Glaesmer H, Egeri L, Margraf J. Remission of suicidal thoughts: Findings from a longitudinal epidemiological study. *J Affect Disord*. 2016;190:723-725. doi:10.1016/j.jad.2015.09.066
31. Krauss S, Orth U, Robins RW. Family environment and self-esteem development: A longitudinal study from age 10 to 16. *J Pers Soc Psychol*. 2020;119(2):457-478. doi:10.1037/pspp0000263
32. Haren NEM van, Setiaman N, Koevoets MGJC, Baalbergen H, Kahn RS, Hillegers MHJ. Brain structure, IQ, and psychopathology in young offspring of patients with schizophrenia or bipolar disorder. *Eur Psychiatry*. 2020;63(1):e5. doi:10.1192/j.eurpsy.2019.19
33. Vaughan CA, Foshee VA, Ennett ST. Protective Effects of Maternal and Peer Support on Depressive Symptoms during Adolescence. *J Abnorm Child Psychol*. 2010;38(2):261-272. doi:10.1007/s10802-009-9362-9
34. Calandri E, Graziano F, Testa S, Cattelino E, Begotti T. Empathy and Depression Among Early Adolescents: The Moderating Role of Parental Support. *Front Psychol*. 2019;10. Accessed January 22, 2024. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01447
35. Patten CA, Gillin JC, Farkas AJ, Gilpin EA, Berry CC, Pierce JP. Depressive symptoms in California adolescents: Family structure and parental support. *J Adolesc Health*. 1997;20(4):271-278. doi:10.1016/S1054-139X(96)00170-X
36. Manuele SJ, Yap MBH, Lin SC, Pozzi E, Whittle S. Associations between paternal versus maternal parenting behaviors and child and adolescent internalizing problems: A systematic review and meta-analysis. *Clin Psychol Rev*. 2023;105:102339. doi:10.1016/j.cpr.2023.102339
37. Blackmon BJ, Lee J, Cochran DM, Kar B, Rehner TA, Baker AM. Adapting to Life after Hurricane Katrina and the Deepwater Horizon Oil Spill: An Examination of Psychological Resilience and Depression on the Mississippi Gulf Coast. *Soc Work Public Health*. 2017;32(1):65-76. doi:10.1080/19371918.2016.1188746
38. Vieira IS, Pedrotti Moreira F, Mondin TC, et al. Resilience as a mediator factor in the relationship between childhood trauma and mood disorder: A community sample of young adults. *J Affect Disord*. 2020;274:48-53. doi:10.1016/j.jad.2020.04.011
39. Nrugham L, Holen A, Sund AM. Associations Between Attempted Suicide, Violent

Life Events, Depressive Symptoms, and Resilience in Adolescents and Young Adults. *J Nerv Ment Dis*. 2010;198(2):131. doi:10.1097/NMD.0b013e3181cc43a2
40. Pakalniškienė V, Viliūnienė R, Hilbig J. Patients' resilience and distress over time: Is resilience a prognostic indicator of treatment? *Compr Psychiatry*. 2016;69:88-99. doi:10.1016/j.comppsych.2016.05.010
41. Pauley E, Walsh TS. Resilience in survivors of critical illness: A scoping review of the published literature in relation to definitions, prevalence, and relationship to clinical outcomes. *J Intensive Care Soc*. 2022;23(3):345-358. doi:10.1177/17511437211034701
42. Imran A, Tariq S, Kapczinski F, Cardoso T de A. Psychological resilience and mood disorders: a systematic review and meta-analysis. *Trends Psychiatry Psychother*. Published online September 10, 2022. doi:10.47626/2237-6089-2022-0524
43. Choi NG, Ha JH. Relationship between spouse/partner support and depressive symptoms in older adults: Gender difference. *Aging Ment Health*. 2011;15(3):307-317. doi:10.1080/13607863.2010.513042
44. de Beer CRM, Nooteboom LA, van Domburgh L, de Vreugd M, Schoones JW, Vermeiren RRJM. A systematic review exploring youth peer support for young people with mental health problems. *Eur Child Adolesc Psychiatry*. Published online December 10, 2022. doi:10.1007/s00787-022-02120-5
45. Kirchhofer SM, Orm S, Haukeland YB, Fredriksen T, Wakefield CE, Fjermestad KW. A systematic review of social support for siblings of children with neurodevelopmental disorders. *Res Dev Disabil*. 2022;126:104234. doi:10.1016/j.ridd.2022.104234
46. Bang H, Won D, Park S. School engagement, self-esteem, and depression of adolescents: The role of sport participation and volunteering activity and gender differences. *Child Youth Serv Rev*. 2020;113:105012. doi:10.1016/j.childyouth.2020.105012
47. Guerrero-Muñoz D, Salazar D, Constain V, Perez A, Pineda-Cañar CA, García-Perdomo HA. Association between Family Functionality and Depression: A Systematic Review and Meta-Analysis. *Korean J Fam Med*. 2021;42(2):172-180. doi:10.4082/kjfm.19.0166
48. Lucchetti G, Koenig HG, Lucchetti ALG. Spirituality, religiousness, and mental health: A review of the current scientific evidence. *World J Clin Cases*. 2021;9(26):7620-7631. doi:10.12998/wjcc.v9.i26.7620
49. Wakefield S, Kellett S, Simmonds-Buckley M, Stockton D, Bradbury A, Delgadillo J. Improving Access to Psychological Therapies (IAPT) in the United Kingdom: A systematic review and meta-analysis of 10-years of practice-based evidence. *Br J Clin Psychol*. 2021;60(1):e12259. doi:10.1111/bjc.12259
50. Zhou Z, Shek DTL, Zhu X, Dou D. Positive Youth Development and Adolescent Depression: A Longitudinal Study Based on Mainland Chinese High School Students. *Int J Environ Res Public Health*. 2020;17(12):4457. doi:10.3390/ijerph17124457
51. Connor KM, Zhang W. Resilience: Determinants, Measurement, and Treatment Responsiveness. *CNS Spectr*. 2006;11(S12):5-12. doi:10.1017/S1092852900025797



Supplementary Material

Supplementary table 1. Characteristics according to level of risk (Total sample at T3)

Characteristics	Normal-Risk Group (n= 417)	High-Risk Group (n= 175)	p-value
Sex[b]			0.00149
Male	184 (44.1%)	52 (29.7%)	
Female	233 (55.9%)	123 (70.3%)	
Age at T3	31.94 (2.21)	31.89 (2.07)	0.9532
Skin Color			0.506
Not-White	118 (68.2%)	55 (31.8%)	
White	299 (71.4%)	120 (28.6%)	

Supplementary table 1. Characteristics of the whole sample at T3

a Mean (standard deviation), p-value according to t-test;
b Absolute and relative (%) frequencies, p-value according to Chi-square test;
c Median (25th/75th quartiles), p-value according to Mann-Whitney U test;

Supplementary table 2. Statistical analysis of other potential protective factors.

Protective Factor	OR	95% CI	p-value
Maternal Support	0.560	0.158 to 2.341	0.389
Sibling Support	0.537	0.217 to 1.387	0.184
Friend Support	0.690	0.281 to 1.768	0.423

Spouse Support	2.445	0.765 to 9.634	0.157
Access to Psychotherapy	3.790	4.858 e-02 to 1.950	0.276
Having a Religious Belief	1.091	0.946 to 1.235	0.186
Belonging to a Religious Group	1.382	0.357 to 4.489	0.607
Frequently Attending to Religious Gatherings	0.840	0.544 to 1.270	0.416
Secondary Education	0.510	0.227 to 1.047	0.081
Parents Cohabitating (not separated)	0.734	0.308 to 1.779	0.485
CTQ scores	1.020	0.985 to 1.056	0.251

Supplementary Table 2. Statistical analysis of other potential protective factors (controlled for gender, ethnicity, and socio-economic level, resilience scores, and CTQ scores). Factors proven to be not statistically significant.

Supplementary table 3. Number of individuals without missing data in each variable used in the statistical analysis.

Variable	Number of participants without missing data
Sex	1560
Skin Color	1556
Age	1548
Paternal Support	1422
Maternal Support	1474
Resilience Scale Total	1239

Total MADRS Scale	779
Total BDI Scale	779
Having a Religious Belief	1560
Belonging to a Religious Group	951
Sibling Support	1406
Friend Support	1434
Spouse Support	1209
Access to Psychotherapy	212
Education	1527
Socio-Economic Level	1238
CTQ scores	1239
Presence of Paternal Diagnosis of Mental Disorder	624
Psychiatric In-Patient Treatment	779
Age of First Depressive Episode	248
Number of Depressive Episodes	176
Current Suicidal Ideation	779
Past Suicidal Attempt	779