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RESEARCH

Recovery from mental distress in youths in low-income urban areas in South America

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Abstract

Purpose Improving youth mental health is a major societal challenge. In low-income urban areas in South America, this cohort study explored rates and predictors of recovery among young people with depression and/or anxiety symptoms over two years.

Methods Adolescents (15–16 years old) and young adults (20–24 years old) with depression and/or anxiety symptoms (≥10 on Patient Health Questionnaire-8 and/or Generalised Anxiety Disorder-7) from low-income areas in Bogotá, Buenos Aires and Lima, were recruited from community organisations and educational institutions between April 2021 and November 2022 and reassessed after 6, 12 and 24 months. Sociodemographic characteristics, substance use, stressful life events, resilience, coping strategies, social capital, perceived social support, sports and arts activities, and social media engagement were explored as predictors of recovery.

Results We recruited 1437 young people. Overall recovery rates were 30.3% after 6 months, 32.6% after one year and 37.3% after two years. In a multivariable model, female gender, younger age group, more severe initial depression and anxiety symptoms, more stressful life events in the last year and before that, lower resilience levels and higher social media engagement all predicted lower recovery rates. Interaction analyses showed a decreasing effect of baseline depression symptoms over time and a poorer recovery in female adolescents, but not young adults.

Conclusions Most young people with mental distress in low-income urban areas in South America do not recover over a two-year period. Programmes to strengthen resilience and reduce social media engagement should be developed to improve outcomes of mental distress in young people.

Keywords Depression · Anxiety · Cohort · Youth · Recovery · Predictors

Background

Young people's mental health is a major societal concern and public health challenge worldwide [1]. The United Nations Department of Economic and Social Affairs [2] define 'youth' as the age from 15 to 24 years. Experiencing mental distress in the form of depression and anxiety during that age is associated with poor outcomes later in life, including social and educational impairment, physical and mental health difficulties, and higher levels of disability [3–5].

Despite the widespread concern about mental distress in young people, there is little population-based data about how many young people with depression, anxiety or both, recover over time. A systematic review found five studies reporting one-year outcomes of young people with symptoms of anxiety and/or depression without any specific mental health treatment [6]. The average recovery rate in

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the total sample of 1011 young people was 54%. A later published study with 476 participants reported a recovery rate of 52% [7]. Five studies were from high-income countries, i.e. Norway [8], Japan [9], Spain [7], Taiwan [10], and United Kingdom [11], and one from China [12].

Even less than about overall recovery rates is known about what characteristics, experiences and activities of affected young people predict whether they recover or not. Studies assessing predictors of recovery usually explored only a small number of variables. Female gender [7, 8], higher initial levels of depressive and anxiety symptoms [9, 11], and more negative life events [10] have been suggested as predictors of poorer recovery over one year.

Data are particularly needed for young people in low-income urban areas where they are exposed to a range of risk factors for poor mental health, including income inequalities [13], domestic and gang violence, poor education, low rates of regular employment, overcrowded housing, and substance use [14]. This context is particularly relevant in the Latin America and Caribbean region where, in 2011, 81% of the population were living in urban areas, expected to rise to 89% by 2050 [15].

Against this background, we conducted a longitudinal cohort study of young people with symptoms of depression and/or anxiety living in low-income urban neighbourhoods in three large cities in South America. We explored how many of those young people recover over the period of two years and aimed to identify personal characteristics, experiences, psychological factors and activities that are associated with more or less favourable recovery rates.

Methods

Study design

In a prospective longitudinal cohort study of young people with symptoms of depression and/or anxiety, we assessed recovery rates after 6, 12, and 24 months and explored which baseline variables predicted recovery. It is part of a wider research programme [16]. Previously, we compared characteristics of young people with and without symptoms of depression and/or anxiety living in low-income urban areas in a case-control design [17]. Here we report the core part of that programme, i.e. the longitudinal cohort study of those participants that reported relevant symptoms at baseline.

Setting

This study was conducted in Bogotá (Colombia), Buenos Aires (Argentina) and Lima (Peru). Participants were recruited between April 2021 and November 2022. Six-month follow-ups were conducted between November 2021 and May 2023, 12-month follow-ups between May 2022 and November 2023, and 24-month follow-ups between June 2023 and July 2024. During the first 15 months of data collection, COVID-19 social restrictions were in place that varied between the three cities and within each city over time. The restrictions reduced substantially at each follow-up, and at the 24-month follow-up, there were no restrictions anymore at any of the study sites.

Participants

In the 50% neighbourhoods with lowest incomes in each city, adolescents (15–16 years old) and young adults (20–24 years old) were invited through educational institutions and community organisations to take part in the study. The areas were identified using the Human Development Index in Bogotá and Lima, and the Unsatisfied Basic Needs Index in Buenos Aires (details in protocol paper) [16].

The inclusion criteria for participants were 15–16 years or 20–24 years of age; a score of ≥10 on the Patient Health Questionnaire-8 (PHQ-8) [18] or the Generalised Anxiety Disorder-7 (GAD-7) [19] or both; and written informed consent from young adults, or assent from 15 to 16 years olds with written informed consent from their parent or legal guardian. Exclusion criteria were a diagnosis of severe mental illness or learning disability, or illiteracy.

Procedures

The informed assent and consent processes were conducted in-person, by telephone or online. Signatures were collected during an in-person meeting or digitally. All participants were reimbursed for each assessment, equivalent to $10 US dollars. All assessments were completed in meetings with a researcher, either in-person or remotely (see Online Resource 1).

Sample size

The intended sample size was a total of 762 for the follow-up assessments. Assuming a drop-out rate of 25%, we aimed to recruit 1020 participants with symptoms at baseline, with at least 340 participants in each city (see OLA protocol paper for details about sample size calculation) [16].

Outcome variables

Outcome variables were symptoms of depression and anxiety assessed on the PHQ-8 [18] and GAD-7 [19]. Scores of ≥10 on each scale are widely established as indicating a moderate level of depression or anxiety respectively [18, 19]. All

participants met this score at baseline. At follow-ups, participants with scores ≥10 on either scale were categorised as not recovered (see Online Resource 2, Supplement).

Predictor variables

A range of variables were assessed at baseline and tested as potential predictors of recovery (see Online Resource 3, Supplement).

Socio-demographic data included age group, i.e. adolescents (15–16 years old) or young adults (20–24 years old); gender (female; male; other); mother and father received mental health treatment (each yes/no).

Whilst all participants met the threshold criterion of a score of ≥10 on PHQ-8 or GAD-7 or both at baseline, the actual baseline scores on both scales were considered as predictor variables.

Substance use was assessed using the first two questions from the Alcohol, Smoking and Substance Involvement Screening Test/ Youth Version (ASSIST/ASSIST-Y) scale [20, 21] asking whether participants had ever used tobacco, alcohol, marijuana, cocaine, amphetamines, tranquilisers, or hallucinogens (yes/no). Additionally, an item modified from the Team Addiction Severity Index (T-ASI) [22] relating to the young person's concern regarding substance use (How troubled or bothered have you been in the past 30 days by your alcohol or drug use) was included.

Stressful life events were rated using an adaptation of the Adolescent Appropriate Life Events Scale [23] by the Risk, Resilience, Ethnicity and Adolescent Mental Health (REACH) research programme [24]. Participants were asked about the experience of 30 life events (never, in the last year, more than a year ago). Life events were dichotomised using the median (in the last year: 0–2 vs. ≥3; more than a year ago: 0–6 events vs. ≥7).

We assessed *resilience* on the Connor-Davidson Resilience Scale (CD RISC-10) [25] *coping strategies* on the short version of the Child's Coping Strategy Checklist (CCSC-R1) [26] *social capital* using the short version of the Adapted Social Capital Assessment Tool (ASCAT) [27], and *perceived social support* using the Multidimensional Scale of Perceived Social Support (MSPSS) [28]. *Engagement with social media* was rated on an adaptation of the Multidimensional Facebook Intensity Scale [29, 30], *sports and arts activities* with a single question each about regular engagement in the last 30 days (yes/no).

Statistical analysis

Descriptive statistics were calculated as frequencies and percentages for categorical variables and means and standard deviations for continuous scores.

For assessing the association between baseline factors and outcomes at follow-up time points, outcomes from the three follow-up time points (6, 12 and 24 months) were first combined for each participant and included in a single analysis, assuming a constant effect of each factor on symptoms at all time-points. To allow for repeated measures from the same participants, the analysis was performed using multilevel logistic regression. Individual measurements were nested with participants, with participants included as a random effect and time-point as a fixed effect.

The effect of each baseline factor on outcomes was examined separately in univariable analyses. For the continuous variables, the shape of the relationship between each factor and the outcome was explored. Where it improved the fit of the data at $p<0.05$, squared and linear terms for each factor were retained.

We then considered the joint association between the baseline factors and outcomes in a multivariable analysis. To restrict the number of variables in this stage of the analysis, only those factors with some association with the outcome in the initial analysis ($p<0.2$) were included. A backwards selection procedure was used to retain only those variables associated with the outcome in the final model. This involves removing non-significant variables, one at a time, until only significant variables remain.

We then tested whether effects of the predictor variables in the final multivariable model varied at the different follow-up time-points and for the two age groups. For this, we computed interaction effects between each predictor variable in turn with time-point as well as age group and included them in the multivariable model. Each interaction was added to the previous final model separately, and significant interactions were retained in the model. All analyses were conducted using Stata (version 15.2).

Results

Participants and characteristics

A total of 1437 participants met the criteria for symptoms of depression and/or anxiety and formed the cohort for this study (621 in Bogotá, 341 in Buenos Aires and 475 in Lima). Figure 1 shows the CONSORT diagram of the flow of participants throughout the study and the reasons for not following up participants at each stage.

The characteristics and scores at baseline for the cohort and the number of participants who provided data for each variable are shown in Table 1.

Most participants were female gender and in the 20–24 years age group. Participants reported low levels of substance use overall, but most had used alcohol. Over half of

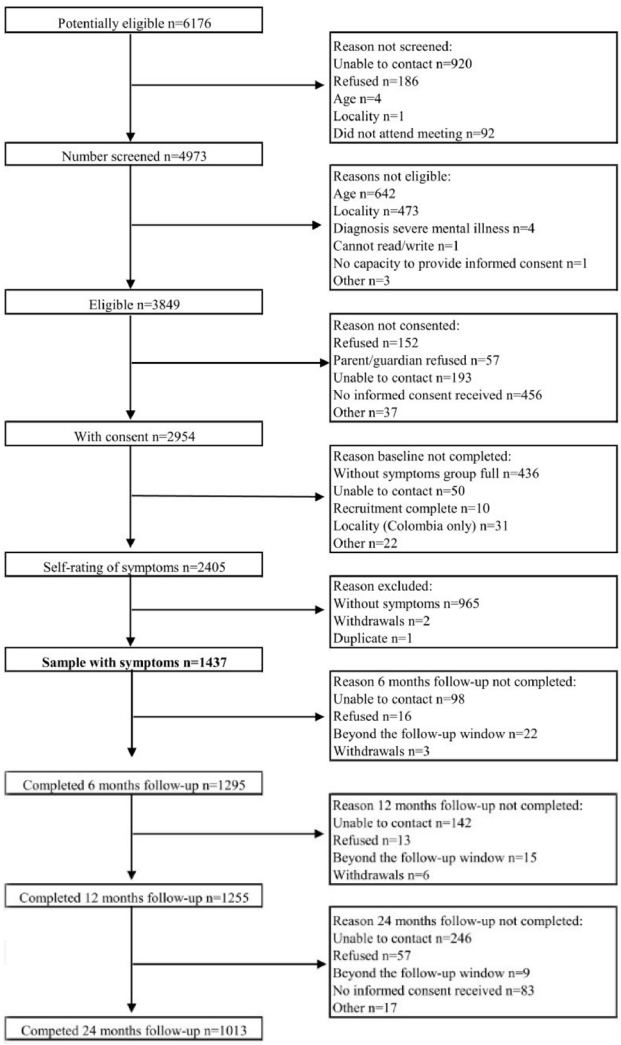


Fig. 1 CONSORT diagram showing number of participants at each stage of recruitment and 6, 12 and 24-month follow-up

participants had experienced more than two stressful life events in the last year and more than six stressful life events before that.

Of the 1437 participants at baseline, 1295 participants completed the 6-month follow-up assessment, 1255 the 12-month follow-up assessment, and 1013 the 24-month follow-up assessment. The actual mean follow-up periods were 27 (SD = ± 4), 53 (SD = ± 4) and 100 (SD = ± 10) weeks from baseline assessment. Table 2 shows gender and age group as well as baseline symptoms of those participants that were included in the cohort at each point of time.

The distribution of gender, age group and symptoms at baseline of the cohort remained similar at each of the study time-points.

Table 1 Summary of characteristics of cohort of participants at baseline

Variable	*n*	Category	Summary
Age group	1437	15–16	647 (45.0%)
		20–24	790 (55.0%)
Gender	1434	Male	387 (27.0%)
		Female	1027 (71.6%)
		Other	20 (1.4%)
Mother received	1437	No	1281 (89.1%)
MH treatment [(a)]		Yes	156 (10.9%)
Father received	1434	No	1281 (89.1%)
MH treatment [(a)]		Yes	156 (10.9%)
Baseline PHQ-8 score	1437	NA	13.8 ± 4.4
Baseline GAD-7 score	1437	NA	11.4 ± 3.9
Tobacco use (ever)	1435	No	911 (63.5%)
		Yes	524 (36.5%)
Alcohol use (ever)	1436	No	371 (25.8%)
		Yes	1065 (74.2%)
Marijuana use (ever)	1436	No	1088 (75.8%)
		Yes	348 (24.2%)
Cocaine use (ever)	1436	No	1352 (94.1%)
		Yes	84 (5.9%)
Amphetamine use (ever)	1436	No	1368 (95.3%)
		Yes	68 (4.7%)
Inhalants use (ever)	1436	No	1350 (94.0%)
		Yes	86 (6.0%)
Tranquiliser use (ever)	1436	No	1191 (82.9%)
		Yes	245 (17.1%)
Hallucinogens (ever)	1436	No	1354 (94.3%)
		Yes	82 (5.7%)
Opioids (ever)	1436	No	1421 (99.0%)
		Yes	15 (1.0%)
Stressful life events in last year	1397	0–2	657 (47.0%)
		3+	740 (53.0%)
Stressful life events more than a year ago	1397	0–6	598 (42.8%)
		7+	799 (57.2%)
Resilience score	1432	NA	22.2 ± 7.6
Coping strategies score	1436	NA	2.24 ± 0.44
Sports activities (last 30 days)	1436	No	810 (56.4%)
		Yes	626 (43.6%)
Arts activities (last 30 days)	1436	No	934 (65.0%)
		Yes	502 (35.0%)
Social capital - Structural	1407	Low	277 (19.7%)
		Medium	820 (58.3%)
		High	310 (22.0%)
Social capital - Cognitive	1432	Low	1313 (91.7%)
		High	119 (8.3%)
Perceived social support score	1427	NA	4.6 ± 1.3
Social media engagement score	1428	NA	3.0 ± 0.8

Summary statistics are number (percentage) or mean ± standard deviation

(a) Assumed to have no mental health treatment if subject responded 'unknown'

NA cells due to continuous data

Table 2 Baseline characteristics of patients remaining in the study over time

Variable	Category	Baseline [*N* = 1437]	6 months [*N* = 1295]	12 months [*N* = 1255]	24 months [*N* = 1013]
Age group	15–16	647 (45.0%)	604 (46.6%)	579 (46.1%)	460 (45.4%)
	20–24	790 (55.0%)	691 (53.4%)	676 (53.9%)	553 (54.6%)
Gender	Male	387 (27.0%)	333 (25.8%)	324 (25.9%)	230 (22.8%)
	Female	1027 (71.6%)	941 (72.8%)	910 (72.7%)	765 (75.7%)
	Other	20 (1.4%)	18 (1.4%)	18 (1.4%)	16 (1.6%)
Baseline PHQ-8	NA	13.8 ± 4.4	13.9 ± 4.3	13.9 ± 4.3	13.9 ± 4.3
Baseline GAD-7	NA	11.4 ± 3.9	11.5 ± 4.0	11.5 ± 4.0	11.4 ± 4.0

Summary statistics are number (percentage) or mean ± standard deviation

NA cells due to continuous data

Table 3 Summary of symptoms throughout the course of the study

Time-point	Number of responses	Anxiety and/or depression *n* (%)	Anxiety *n* (%)	Depression *n* (%)
Baseline	1437	1437 (100.0%)	983 (68.4%)	1274 (88.7%)
6 months	1295	902 (69.7%)	660 (51.0%)	814 (62.9%)
12 months	1255	846 (67.4%)	632 (50.4%)	778 (62.0%)
24 months	1013	635 (62.7%)	476 (47.0%)	571 (56.4%)

Recovery rates

Table 3 summarises how many participants still had symptoms at 6, 12 and 24 months after baseline.

The percentage of participants with symptoms of depression and/or anxiety reduces at each time-point. The overall recovery rates are 30·3% after 6 months, 32·6% after 12 months and 37·3% after 24 months.

Predictors of recovery

The univariable associations of each baseline variable with the persistence of symptoms at follow-ups, combining all follow-up assessments in one analysis, are shown in Table 4.

When each factor was considered separately, being in the younger age group, female or other gender, higher baseline levels of depression and anxiety, having experienced more stressful life events in the last year and before that, lower levels of resilience and coping strategies, regular arts activities in the last 30 days, less cognitive social capital, lower perceived social support and higher engagement with social media were all associated at $p < 0.05$ with still reporting symptoms above the threshold for recovery during the following 24 months. There were no main effects where higher order terms were needed.

In the next step, we explored the joint association between baseline factors and symptoms at follow-up in a multivariable analysis. The findings are also displayed in Table 4.

After adjusting for the influence of other factors, being in the younger age group, female or other gender, higher baseline levels of symptoms of depression and anxiety, more life events in the last year and before, lower resilience and higher engagement with social media were all associated with the persistence of symptoms during follow-up, suggesting that these factors are independently associated with poorer recovery.

Finally, we explored interaction effects examining the association between each baseline variable that was identified as predictive in the multivariable model with time-point and age group. The results of the multivariable model including all interaction effects at $p < 0.05$ are shown in Table 5.

The results suggest interaction effects between baseline depression levels and time-point, indicating a decreasing effect of higher baseline symptom levels over time, and between age group and gender. The odds for symptoms at follow-ups were around two times higher for females and around six times higher for other gender participants (albeit with very wide confidence intervals) in the younger age group. There was no clear difference between genders in the older age group.

No further interactions between baseline factors and time-point or age group were found to be significant in the multivariable model.

Discussion

Young people who live in low-income urban areas in Latin America and have symptoms of depression and anxiety have a low recovery rate over two years. Whilst about 30% recover after six months, the recovery rates rise only by 7% in the following 18 months, and after two years the overall recovery rate remains below 40%.

The multivariable analysis shows that female and other gender, higher baseline levels of symptoms of depression and anxiety, more stressful life events in the last year and before that, lower resilience scores and higher social media engagement were all associated with increased odds

Table 4 Univariable and multivariable associations between baseline factors and symptoms at follow-up (6, 12, 24-months combined)

Variable	Category	Not recovered *n*/*N* (%) [c]	Univariable associations		Multivariable associations	
			Odds Ratio (95% CI)	*P*-value	Odds Ratio (95% CI)	*P*-value
Age group	15–16	1165/1643 (70.9%)	1	<0.001	1	<0.001
	20–24	1218/1920 (63.4%)	0.60 (0.46, 0.78)	NA	0.66 (0.49, 0.77)	NA
Gender	Male	537/887 (60.5%)	1	<0.001	1	0.02
	Female	1794/2616 (68.6%)	1.77 (1.31, 2.39)	NA	1.42 (1.07, 1.88)	NA
	Other	44/52 (84.6%)	7.82 (2.07, 29.5)	NA	2.99 (0.85, 10.5)	NA
Mother received	No	2132/3181 (67.0%)	1	0.76	NA	NA
MH treatment [a]	Yes	251/382 (65.7%)	0.94 (0.61, 1.44)	NA	NA	NA
Father received	No	2262/3384 (66.8%)	1	0.66	NA	NA
MH treatment [a]	Yes	119/174 (68.4%)	1.15 (0.62, 2.14)	NA	NA	NA
Baseline PHQ-8 [b]	NA	NA	2.42 (2.06, 2.84)	<0.001	1.72 (1.46, 2.04)	<0.001
Baseline GAD-7 [b]	NA	NA	2.17 (1.83, 5.58)	<0.001	1.54 (1.29, 1.84)	<0.001
Tobacco use	No	1541/2304 (66.9%)	1	0.98	NA	NA
(ever)	Yes	838/1253 (66.9%)	1.00 (0.76, 1.32)	NA	NA	NA
Alcohol use	No	629/926 (68.2%)	1	0.57	NA	NA
(ever)	Yes	1753/2634 (66.6%)	0.92 (0.68, 1.24)	NA	NA	NA
Marijuana use	No	1828/2759 (66.3%)	1	0.28	NA	NA
(ever)	Yes	554/801 (69.2%)	1.19 (0.87, 1.63)	NA	NA	NA
Cocaine use	No	2262/3378 (67.0%)	1	0.85	NA	NA
(ever)	Yes	120/182 (65.9%)	0.95 (0.52, 1.71)	NA	NA	NA
Amphetamine	No	2267/3406 (66.6%)	1	0.11	NA	NA
use (ever)	Yes	115/154 (74.7%)	1.73 (0.89, 3.37)	NA	NA	NA
Inhalants use	No	2237/3351 (66.8%)	1	0.59	NA	NA
(ever)	Yes	145/209 (69.4%)	1.17 (0.67, 2.04)	NA	NA	NA
Tranquiliser use	No	1953/2952 (66.2%)	1	0.08	NA	NA
(ever)	Yes	429/608 (70.6%)	1.37 (0.96, 1.96)	NA	NA	NA
Hallucinogens	No	2265/3386 (66.9%)	1	0.97	NA	NA
use (ever)	Yes	117/174 (67.2%)	1.01 (0.55, 1.85)	NA	NA	NA
Stressful life events in	0–2	1027/1644 (62.5%)	1	<0.001	1	0.004
last year	3+	1265/1812 (69.8%)	1.66 (1.28, 2.17)	NA	1.45 (1.13, 1.86)	NA
Stressful life events	0–6	917/1443 (63.6%)	1	0.01	1	0.01
more year ago	7+	1375/2013 (68.3%)	1.41 (1.08, 1.84)	NA	1.40 (1.08, 1.80)	NA
Resilience [b]	NA	NA	0.76 (0.70, 0.83)	<0.001	0.91 (0.83, 0.99)	0.03
Coping strategies	NA	NA	0.57 (0.42, 0.77)	<0.001	NA	NA
Sports activities	No	1375/2017 (68.2%)	1	0.08	NA	NA
(last 30 days)	Yes	1008/1546 (65.2%)	0.79 (0.61, 1.03)	NA	NA	NA
Arts activities	No	1472/2265 (65.0%)	1	0.01	NA	NA
(last 30 days)	Yes	911/1298 (70.2%)	1.43 (1.09, 1.87)	NA	NA	NA
Social capital	Low	444/661 (67.2%)	1	0.93	NA	NA
- Structural	Medium	1388/2075 (66.9%)	0.99 (0.70, 1.41)	NA	NA	NA
	High	498/752 (66.2%)	0.94 (0.62, 1.42)	NA	NA	NA
Social capital	Low	2201/3260 (67.5%)	1	0.03	NA	NA
- Cognitive	High	174/292 (59.6%)	0.59 (0.37, 0.94)	NA	NA	NA
Perceived social support	NA	NA	0.81 (0.73, 0.89)	<0.001	NA	NA
Social media	NA	NA	1.25 (1.05, 1.49)	0.01	1.18 (1.00, 1.39)	0.05

(a) Assumed to have no mental health treatment if subject responded 'unknown'

(b) Odds ratios given for a 5-unit increase in factor

(c) Figures based on data from 3 time-points combined

NA cells due to continuous data, p-value already stated, variable omitted due to small numbers, or variables exclude from the multivariable analysis

Table 5 Multivariable associations between baseline characteristics and symptoms at follow-up (6, 12, 24-months combined) – including significant interactions

Variable	Subgroup	Category	Odds Ratio (95% CI)	*P*-value
Age 20–24	Male	20–24	1.05 (0.66, 1.12)	0.25
	Female	20–24	0.57 (0.42, 0.77)	<0.001
	Other	20–24	0.12 (0.01, 0.74)	0.02
Gender	Age 15–16	Male	1	0.002
		Female	2.01 (1.31, 3.11)	NA
		Other	6.64 (1.36, 32.4)	NA
	Age 20–24	Male	1	0.87
		Female	1.09 (0.75, 1.58)	NA
		Other	0.75 (0.09, 6.64)	NA
Baseline PHQ-8 [(a)]	6 months	NA	2.04 (1.62, 2.58)	<0.001
	12 months	NA	1.75 (1.40, 2.19)	<0.001
	24 months	NA	1.39 (1.10, 1.76)	0.006
Baseline GAD-7 [(a)]	NA	NA	1.55 (1.30, 1.86)	<0.001
Stressful life events in last year	NA	0–2	1	0.003
	NA	3+	1.46 (1.14, 1.88)	NA
Stressful life events more than a year ago	NA	0–6	1	0.01
	NA	7+	1.37 (1.07, 1.77)	NA
Resilience [(a)]	NA	NA	0.90 (0.82, 0.99)	0.03
Social media	NA	NA	1.18 (1.00, 1.39)	0.05

(a) Odds ratios given for a 5-unit increase in factor

NA cells due to no subgroup, continuous data or p-value already given

that the symptoms remained, meaning that participants did not recover. The effect of baseline depression symptoms decreased over time, whilst the poorer recovery rates in participants of female and other gender applied to adolescents, but not to younger adults.

Strengths and limitations

This is the largest study that has been conducted on recovery rates from depression and anxiety symptoms in young people in the world, and the only one that focused on young people in the context of low-income urban areas as well as the only one outside high-income countries or China. The participants were recruited in often challenging conditions for the researchers, and the sample size was achieved despite social restrictions because of the COVID-19 pandemic. Whilst the percentage of followed-up participants dropped over time, it remained relatively high, and the distribution of key baseline characteristics was not substantially altered at the different time-points. We used validated cut-off points for the severity of symptoms on widely established scales, and the consideration of symptoms rather than diagnostic categories makes the results independent of diagnostic systems. We considered a range of potential predictors in one comprehensive analysis. For assessing predictor variables and outcomes, standardised methods were used, and at all three sites, trained researchers implemented a consistent protocol.

However, the study has also limitations. Firstly, the sample cannot be assumed to be representative for all young people living in low-income areas of the included cities. Whilst non-representativeness can affect the frequencies of variables, associations of variables as tested in the analysis of predictors of outcomes are usually more robust against selection biases. However, the low recovery rates identified in this study may have been influenced by an over-recruitment of participants with already persistent symptoms at baseline. Secondly, the social restrictions because of the pandemic may have affected the assessments at baseline and during the first year. Yet, at the end of the study no restrictions were in place anymore. Thirdly, although the approach and methods were informed by the existing literature, all the analyses were exploratory and not hypothesis testing. And finally, there is a risk of false negative findings in the multivariable analysis – despite the large sample size – so that the absence of a significant predictive association cannot necessarily be seen as evidence that the given predictor variable has no impact.

Comparison with the literature

The recovery rate over one year is less favourable than found in previous studies [6]. The adverse conditions in low-income urban areas in South America might make recovery from mental distress more difficult than for young people in other settings.

Our finding of higher baseline symptom levels [9, 11], female gender [7, 8] and more stressful life events [10] as predictors of poorer recovery rates is consistent with the findings of previous research.

That more stressful life events in the last year predict poorer outcomes implies that the initial mental distress was not only a direct response to the experience of the recent life events [31]. If the distress had been just an immediate

response to recently experienced events and reflected a type of adjustment difficulty, one may have expected a recovery a few months after the end of those stressors.

This is the first study showing that the influence of baseline depression symptoms decreases over time. It appears plausible that symptom levels at a defined point of time have less impact the more time passes on.

To our knowledge, this is the first evidence showing a long-term positive influence of higher resilience and lower engagement with social media. Coping strategies, cognitive social capital, arts activities and social support were associated with recovery in univariable analyses but not in the multivariable model. Since their influence seems to be explained through the effect of variables that finally stayed in the model, one should be cautious interpreting their relevance based on this study.

The UN 'youth' definition spans age groups that traditionally are addressed by distinct disciplines, i.e. Child and Adolescent Psychiatry/Psychology and Adult Psychiatry/Psychology with a transition between the two at the age of 18 years. This is the first study finding that the younger age group within 'youth' had significantly lower recovery rates and that the impact of gender applied to the younger group but was not evident in the older age group. The effect of other predictor variables did not vary substantially between the two age groups. Thus, the findings support only in part using the age range of 'youth' rather than more traditionally defined age groups as a research focus.

Implications

The low recovery rates underline that improving mental health of young people in low-income urban areas is indeed a major challenge and should warrant societal attention, funding and specific interventions. Some of the risk factors identified in this study, i.e. low levels of resilience and social media engagement, may be amenable to change. Programmes should be developed and tested to increase the resilience of young people – possibly through education and support from community organisations – and to reduce the engagement with social media. Whatever such programmes may entail, implementing them in low-income urban areas will be an additional challenge and is likely to require significant resources.

Future research should assess to what extent the findings also apply in low-income areas in world regions other than South America and identify the psychological and social processes behind the identified predictive associations.

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Author contributions SP and VB acquired the funding and conceptualised the design of the programme. SP and CF developed and wrote the paper, all authors reviewed and approved the manuscript. DN-T accessed, verified, cleaned and formatted the data. PB analysed the data as described in this paper. JK and CM advised on the analytical approach for this paper. JK devised the strategy for identifying the eligible neighbourhoods for recruiting participants. RA advised on matters relating to the Latin American context; LIB, FLC, CG-R, JMU-R and FD-C led the adaptation of the design to the national contexts in Argentina, Colombia and Peru and the execution of the study. NG-C, NO and MT coordinated the recruitment of participants and follow-up data collection in Bogotá, Buenos Aires and Lima; and accessed and verified the data collected in each city. ALV-E conducted data collection in Lima and assisted with its coordination. CF and DS organised the management of the programme.

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Data availability The dataset analysed during the current study will be available beginning 9 months and ending 36 months following article publication to researchers on reasonable request from Professor Victoria Bird.

Declarations

Competing interests Dr Araya reported receiving personal fees from the Inter-American Development Bank and Otsuka separate to the submitted work. Professor Morgan was the Editor-in-Chief of the Social Psychiatry and Psychiatric Epidemiology journal. No further interests were declared relevant to the content of this article.

Ethical approvals The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant institutional, national and international committees on human experimentation and with the Helsinki Declaration of 1964 and its later amendments. The original study protocol and the additional 24-month follow-up were approved by the Institutional Review Boards (IRB) of Universidad de Buenos Aires (dated 2 October 2020; ref. EX-2023-01047044), Pontificia Universidad Javeriana (ref. FM-CIE-1138-20; ref. FM-CIE-0612-23), Universidad Peruana Cayetano Heredia (Certificate

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Consent to participate Written informed consent was obtained from participants aged 18 years and older, or assent from 15 to 16 years olds with written informed consent from their parent or legal guardian.

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