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Research Article

Trajectories of change in general psychopathology levels among depressed adolescents in short-term psychotherapies

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Abstract
Objective to identify and describe trajectories of change in general psychopathology (*p*) levels among depressed adolescents who received one of three types of short-term therapies (namely Cognitive–Behavioural Therapy, Short-Term Psychoanalytic Psychotherapy, and a Brief Psychosocial Intervention).
Method Participants were 465 adolescents with MDD who participated in an RCT comparing three treatments for depression. Narrow-band measures of depression, anxiety, obsessions-compulsions, and conduct problems were assessed at six-time points, and bifactor analysis was performed to extract *p* factor scores. These scores were submitted to Latent Class Growth Analyses to identify patterns of change over time.
Results Three different trajectories of change in *p* were identified. Two trajectories displayed reductions in *p* across time-points: one a rapid decrease, and the other slower but steady improvement. The third trajectory indicated a limited decrease in *p* up until the 12th week after baseline but no further improvement at subsequent time-points. Patients' baseline *p* significantly predicted their outcome trajectories.
Conclusion Exploring change in *p* seemed to describe more parsimoniously the patients' outcomes than the narrow-band assessment of depressive symptoms. Patients with high baseline *p* were more likely to have poorer outcomes, potentially indicating a need to develop more intensive and tailored treatments for this population.

Keywords: depression; psychotherapy; adolescent; psychopathology; latent class growth analysis

Clinical and methodological significance of this article: this study addresses how adolescents diagnosed with major depressive disorder (MDD) might respond to short-term therapies in terms of general psychopathology (*p*) levels. Through computational analysis, we identified that 12.3% of teenagers were fast responders, 69.2% were slow responders and 18.5% were limited responders. Patients with more severe mental impairment at baseline were more likely to achieve poorer outcomes at follow-up. Our findings also suggest that assessing patients through a general indicator of impairment, such as the *p* factor, might be more parsimonious than only examining narrow-band symptom domains.

Despite the increasing appreciation of the effectiveness of talking therapies as a treatment of choice for adolescents with depression (Cuijpers et al., 2020; National Institute for Health and Care Excellence [NICE], 2019), we still do not understand enough about differential response, and in particular how different sub-groups of young people respond to psychotherapy. Psychological therapies,

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even those with the best evidence base, are not always beneficial and up to a third of individuals offered treatment show either no benefit or even symptom deterioration (Cuijpers et al., 2019). Thus, identifying clusters of individuals who can be predicted to benefit from a talking therapy based on information gathered at baseline could help promote better evidence-based clinical and policy decisions in relation to a precious and limited commodity such as psychotherapy (Saunders et al., 2019).

In this context, investigating trajectories of change – i.e., detecting different patterns of change among patients in symptoms and/or functioning over time – can offer a range of clinical and research contributions. While some investigations focus on the description of mean intervention outcomes, trajectory analysis throws light onto heterogeneity in symptom course, identifying possible group trends and allowing for, in subsequent analyses, the identification of common trajectories that reveal how early-stage factors can predict final outcomes (Brière et al., 2016; Saunders et al., 2019). Furthermore, this approach provides an additional dimension in the understanding of what constitutes good or poor outcomes, which is often treated in a rather arbitrary way, using *a priori* cut-off points for clinical and non-clinical classifications (Davies et al., 2019).

Previous studies drawn from randomised controlled trials have unveiled trajectories of change in depressive symptoms among adolescents with major depressive disorder (MDD) who received different psychotherapeutic treatments. According to their findings, between 13-23.9% of adolescents end up in "unsuccessful" trajectories, reflecting poorer outcomes at the latest assessments (Brière et al., 2016; Davies et al., 2019; Maalouf et al., 2012; Scott et al., 2019). These studies also indicated that whilst some teenagers show improvements up to 26 weeks after baseline, these benefits are not sustained in subsequent follow-up periods (Brière et al., 2016; Davies et al., 2019). By examining longer-term outcomes, these findings highlight that initial improvement does not necessarily result in maintained therapeutic success.

Despite these studies' valuable contributions to the understanding of change in adolescents with MDD, a common limitation among them is measuring outcomes only by depressive symptoms, a narrow-band indicator. Considering MDD is frequently associated with other conditions, especially anxiety and behavioural disorders (Avenevoli et al., 2015), paying attention solely to depressive symptoms may not provide the full picture. Thus, considering change from a multidimensional perspective might offer more clinically meaningful information on treatments' outcomes (Aitken et al., 2020; Caspi et al., 2014).

Recently, researchers have challenged the traditional diagnostic categorisations by studying general psychopathology. General psychopathology – also called the *p* factor – is a concept popularised by Caspi et al. (2014) that captures one's general proneness to suffer from mental disorders. *P* is a robust construct that has been extensively studied in adolescent samples (Castellanos-Ryan et al., 2016; Snyder et al., 2017) and is based on empirical data suggesting psychopathology is a continuum rather than an assembly of pre-set categories (Smith et al., 2020). It addresses mental suffering as a developmental phenomenon, providing a more holistic, naturalistic, and reliable view than the narrow-band perspectives (Aitken et al., 2020; Smith et al., 2020). In clinical contexts, high *p* individuals tend to have more life impairments, regulation and control difficulties relating with others, the environment, and the self, and worse developmental histories (Caspi et al., 2014).

General psychopathology might also be the factor that responds best to psychotherapy. Aitken et al. (2020) examined 465 adolescents with MDD who received three different psychological treatments in terms of their change in *p* and lower-level symptoms factors. Through a multilevel confirmatory factor analysis (CFA) using a set of narrow-band instruments, the authors found that the best model explaining the patients' symptoms consisted of a six-dimensions orthogonal bi-factor. These dimensions were one general *p* factor which all items contributed to, and five lower-level factors, encompassing symptoms domains from which *p*'s variance was taken. While the lower-level factors (namely melancholic features, depressive cognitions, anxiety, obsessions-compulsions and conduct problems) presented inconsistent change over time, *p* levels decreased constantly, even in follow-up assessments. These findings suggested that *p* was the factor that responded most to psychotherapy across all treatment approaches and that improvements in individual levels (such as in depression and anxiety) might be best explained by the reduction in *p* itself, rather than in the supposed discrete focus of therapy (Aitken et al., 2020).

In this context, while previous research has investigated (a) trajectories of change in depressive symptoms and (b) average change in *p* among depressed adolescents, no studies have explored the potential existence of different trajectories of change *defined* by general psychopathology. If our assumption is correct that psychological therapies have their impact mainly via general psychopathology, then the understanding of change in psychotherapy may also be more effectively scrutinised in terms of patterns of change in *p* rather than pre-defined narrow-band symptoms.

Objective

This study aimed to identify and describe trajectories of change in *p* and lower-level factors among depressed adolescents who received one of three types of short-term therapies offered (namely Short-term Psychoanalytic Psychotherapy, Cognitive–behavioural Therapy, and a Brief Psychosocial Intervention) in the Improving Mood with Psychoanalytic and Cognitive Therapies (IMPACT) trial (Goodyer et al., 2017b). The IMPACT Trial was a multicentre, pragmatic, randomised controlled trial that took place in England evaluating the medium-term effects of three therapeutic interventions in the treatment of adolescent depression (Goodyer et al., 2011, 2017a). It identified an average reduction of 49-52% in depressive symptoms in the patients by the end of the study, with all three treatments promoting equivalent outcomes (Goodyer et al., 2017b).

Our analysis encompassed a third secondary data analysis on the same dataset examined by Davies et al. (2019) and Aitken et al. (2020), aiming to identify (a) whether different treatment arms (Short-term psychoanalytic psychotherapy, Cognitive–behavioural therapy, and a Brief Psychosocial Intervention) are associated with specific trajectories of change; and (b) if demographic or baseline clinical characteristics, including levels of general psychopathology, depressive symptoms, anxiety, obsessions-compulsions and behaviour problems, predict membership of a specific trajectory group.

Method

Study Design

The present study is based on secondary data analysis on the Improving Mood with Psychoanalytic and Cognitive Therapies (IMPACT) trial (ISRCTN83033550)(Goodyer et al., 2017b). This trial evaluated the treatment and relapse prevention of depression in adolescents, offering three types of manualised short-term therapies for adolescents diagnosed with MDD. The patients were randomised into the following treatments: Short-term Psychoanalytic Psychotherapy (STPP), Cognitive–behavioural therapy (CBT), and a Brief Psychosocial Intervention (BPI). For further information on the design of the trial, see Goodyer et al. (2017b).

Participants

465 adolescents aged between 11 and 17 years (M = 15.6, SD = 1.4) who met diagnostic criteria for MDD (American Psychiatric Association, 2000) were included in this investigation. Participants presenting generalised learning difficulties, pervasive developmental disorder, pregnancy, current use of another medication that could interact with an SSRI, current substance alcohol abuse disorders, previous completion of one of the study treatments (described below), and a primary diagnosis of bipolar disorder, schizophrenia, or eating disorders were excluded from an initial screening.

348 individuals (75%) were female and 82% of the sample was white. After an initial assessment, the participants were randomised to one of three treatments. All patients and parents provided informed consent to participate in the trial.

Treatments

- Short-term psychoanalytic psychotherapy (STPP; Cregeen et al., 2017): an intervention aimed at helping the patients to give meaning to their emotional experiences, attachment patterns, and developmental tasks. These treatments were designed to include up to 28 individual sessions plus seven parent/guardian sessions to be delivered within 30 weeks. All therapists were accredited by the Association of Child Psychotherapists.
- Cognitive–behavioural therapy (CBT; IMPACT Study CBT Sub-Group, 2010): an intervention focused on behavioural activation (i.e., helping the patient to engage in activities they no longer do) and in the identification and modification of dysfunctional thoughts processes. Treatments were designed to include up to 20 individual sessions plus four family/parent/guardian sessions to be delivered within 30 weeks. CBT therapists were staff from the National Health System (NHS) from different professional backgrounds, including clinical and counselling psychology, nursing, and occupational therapy. All of them had received specialist training in CBT.
- Brief psychosocial intervention (BPI; Kelvin et al., 2010): a generic action-oriented, goal-focused psychoeducational programme on depression, delivered in this study as the control intervention. These treatments were designed to offer up to 12 sessions, delivered within 20 weeks. BPI therapists were intended to be drawn from different backgrounds (e.g., mental health nursing, clinical psychology, psychiatry and mental health social work), however, more than 80% were psychiatrists. All therapists were experienced mental health professionals and received training on the manual for BPI.

All interventions were offered in 15 Children and Adolescent Mental Health Services (CAMHS), located in London, Northwest England and East Anglia, and in practice the median length of treatments was shorter than planned, with no statistical difference in treatment duration between the three groups (Goodyer et al., 2017b). The treatments were found to be empirically distinguishable (Calderon et al., 2017; Midgley et al., 2018)

Instruments

To determine the general and specific symptoms trajectories, we used the following self-report Likert-scale questionnaires, administered at six time-points: baseline, 6, 12, 36, 52, and 86-weeks post-randomisation. (1) the Mood and Feelings Questionnaire (MFQ; Wood et al., 1995): a 33-item measure of depressive symptoms (test-retest reliability, r = .78; Wood et al., 1995) and Cronbach's α of .82 (Kent et al., 1997)); (2) the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1985): a 28-item measure for general anxiety (Cronbach's α = .80; Goodyer et al., 2017b); (3) the short Leyton Obsessional Inventory (LOI; Bamber et al., 2002): an 11-item measure for obsessive-compulsive symptoms (Cronbach's α = .86; Goodyer et al., 2017b); and (4) a Behaviours checklist (BC; Goodyer et al., 2011): an 11-item measure based on DSM-IV criteria for conduct and oppositional disorders. In the present study, the BC presented an internal consistency of α = .972. In all scales, higher scores reflected higher symptom levels.

Furthermore, other baseline characteristics were examined in terms of their potential predictive value for class membership. They were gender, age, serotonin reuptake inhibitors (SSRI) prescription, treatment modality, and comorbidity – the latter assessed by the Kiddie-Schedule for Affective Disorder and Schizophrenia (K-SADS; Kaufman et al., 1997), a semi-structured diagnostic interview. The K-SADS was used to establish the presence of DSM-IV diagnoses, being each one of them rated on a scale where 1 = non-clinical symptoms, 2 = sub-threshold, and 3 = clinical. In the current study, sub-threshold scores were merged with clinical scores.

Statistical Methods

Confirmatory factor analysis (CFA). In order to extract the patients' general psychopathology and lower-level factor scores at each time point, we used the aforementioned narrow-band instruments to replicate Aitken et al.'s (2020) CFA. Since this step was a replication of these previous findings, we specified an orthogonal bi-factor model, comprised of a general *p* factor and five lower-level factors: melancholic features, depressive cognitions, anxiety, obsessions-compulsions and conduct problems. The final model showed good convergent validity with the Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA; Gowers et al., 1999), a global functioning scale. For further information on this model, see Aitken et al. (2020). As done by Aitken et al. (2020) and Goodyer et al. (2017b), "mostly" and "almost always' responses in the RCMAS, LOI and BC were collapsed.

Latent growth curve analysis. After extracting the factor loadings, we submitted the general psychopathology and specific factor scores to latent growth curve (LGC) analysis to investigate how each factor changed over time. In our analysis, we started with a linear modelling, which was compared to a quadratic model subsequently in terms of their model fit indices. The best fit solution informed the analyses of trajectories of change.

The model fit indices used to compare the different growth curves were the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TFI). Values above .95 on both would suggest good model fit (Schermelleh-Engel et al., 2003). In addition, we examined the root mean square of error approximation (RMSEA) and the standardised root mean square residual (SRMS). For these metrics, values below .05 would indicate good fit (Hu & Bentler, 1999).

Trajectories of change. To determine the trajectories of change in *p* and specific symptom factors, we used the factor scores for each patient at each time point to perform a Latent Class Growth Analysis (LCGA). LCGA is a type of Growth Mixture Modelling (GMM) used to identify latent subgroups of patients that share similar trajectories in a determined variable over time (Andruff et al., 2009; Lutz et al., 2014). By fixing the slope and intercept among participants in each class to zero, it differentiates itself from traditional GMM (Berlin et al., 2014), allowing for clearer class identifications (Jung & Wickrama, 2008).

For comparing the models, we examined their values for the Vuong-Lo-Medell-Rubin Likelihood Ratio test (VLMR-LRT; Lo et al., 2001), the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC) and entropy. The VLMR-LRT is a comparison between the current K model (a model with K number of classes) and the K-1 model (i.e., the model with one less class). A *p*-value <.05 indicates that the current model is a

better fit than the K-1 model, whereas *p*-values ≥.05 suggest that the K-1 model should be preferred over the K model. Lower AIC and BIC of one model compared to another also indicates better fit, while higher entropy levels suggest best model fit. Furthermore, it is common practice that all classes should contain at least 5% of the sample for them to be considered numerically stable and clinically meaningful (Gueorguieva et al., 2011; Saunders et al., 2019).

After determining the best fitting solution for the data, we used Chi-square and one-way ANOVA tests to investigate if there were any significant differences between groups concerning their demographic characteristics, treatment arms and baseline symptoms.

Predictors of class membership. We constructed regression models to identify potential predictors of trajectory membership. The specific model would be dependent on the number and type of classes identified - i.e., binary, ordered or multinomial logistic.

Software. The CFA, the latent growth curve analysis and the LCGA were performed using M*plus* 8.4 (Muthén & Muthén, 2017). The analyses exploring demographic differences between groups and predictors of class membership were performed using IBM SPSS v26. To handle missing data, we used Bayesian methods equivalent to full information maximum likelihood (FIML) for the CFA, LGCA and LCGA and Multiple Imputation for the regression analyses.

Results

As expected, the CFA generated the same model fit indices as described by Aitken et al. (2020) (F*P* = 148, χ^2 = 3,13.42, RMSEA = .045, CFI = .979) and the same factor loadings, as presented in Supplementary Table 1.

Regarding the latent growth curve analysis for the general psychopathology model, our findings indicated that a linear LGC offered a poor fit, with CFI and TLI scores <.90 (CFI = .839, TLI = .849) and RMSEA and SRMR > .05 (RMSEA = .088, SRMR = .065). Adding a quadratic curve showed improvement in the model fit, with an excellent CFI (.973), good TLI (.967) and both RMSEA and SRMR below .05 (.041 and .003, respectively).

Concerning the specific factors, linear models presented excellent fit for Conduct Problems (CFI = .97, TFI = .97, RMSEA = .03, SRMR = .04), Depressive Cognitions and Obsessions-compulsions. For the two latter, however, a quadratic model showed a slightly improved fit (CFI = 1, TLI = 1, RMSEA = .0, SRMR = .02 for both factors). The factors of melancholic features and anxiety did not present good model fit in the LGCAs, presenting CFI and TLI indices below the .95 threshold (CFI = .904 and .852, and TLI = .880 and .815, respectively) and non-significant RMSEA (RMSEA = .063 and .060, respectively), indicating that it was not possible to identify clear patterns of change in those lower-level factors in this sample. The model fit stats for the LGCAs are presented in Supplementary Table 2.

Where the LGCA indicated that a quadratic curve explained the best the change in that specific factor, we ran LCGAs specifying quadratic curves to identify the trajectories of change in those factors over time. Likewise, where the LGCA indicated linear curves, the following analyses would match the same specification. As we did not have any *a priori* hypotheses concerning the number of latent classes, we performed LCGAs from two classes upwards, comparing VLMR-LRT values until they became non-significant, whilst also considering the AIC and BIC values.

Concerning the *p* factor, the VLMR-LRT was statistically significant until the 4-class model (*p* = .117), with lower AIC and BIC values for the 3-class model compared to the 2-class model. Therefore the 3-class solution was selected (Table I).

The first trajectory of change in *p* encompassed a group of 57 (12.3%) adolescents who had a sharp and fast decrease in their *p* levels over time ("GO"), which was sustained in subsequent assessments. The second class was formed by a group of

Table I. Latent class growth analysis for general psychopathology.

classes	AIC	BIC	Adj-BIC	VLMR-LRT (*p*=)	Entropy	% individuals/class
2	7535.85	7589.70	7548.44	0.002	0.76	78/22
3	**7445.55**	**7515.97**	**7462.01**	**0.016**	**0.73**	**12/19/69**
4	7420.07	7507.06	7440.41	0.117	0.77	67/5/10/17
5	7402.60	7506.15	7426.80	0.248	0.72	10/23/9/4/54

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; VLMR-LRT = Vuong-Lo-Medell-Rubin Likelihood Ratio test.

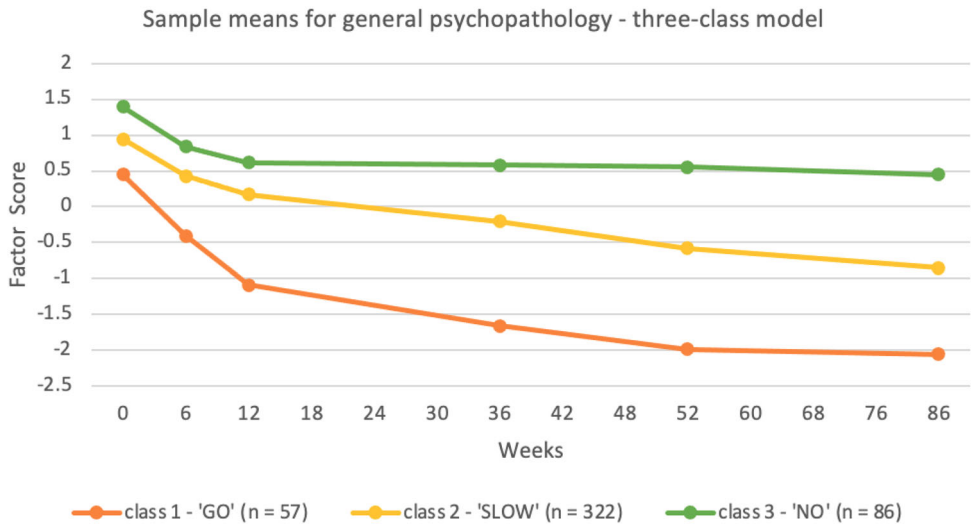

Figure 1. Latent class growth analysis for general psychopathology.

322 (69.2%) young people who had a significant and steady decrease in *p* across the study assessments ("SLOW"). The remaining patients (n = 86, 18.5%) encompassed a group whose *p* did not decrease significantly after the 12th week ("NO")(Figure 1). The class names were paraphrased from Maalouf et al. (2012), who found similar trajectories of change in depressive symptoms among

Table II. Characteristics of patients in each latent trajectory of change in general psychopathology.

	Class 1: GO (*n* = 57)		Class 2: SLOW (*n* = 322)		Class 3: NO (*n* = 86)		Comparison	
	Mean (*n*)	SD (%)	Mean (*n*)	SD (%)	Mean (*n*)	SD (%)	c^2/F	*p*
Demographics								
Female	35	61.4%	242	75.2%	71	82.6%	8.203	.017
Age	15.46	1.33	15.63	1.42	15.64	1.33	.364	.695
Ethnicity							.548	.760
White	48	84.2%	265	82.3%	69	80.2%		
Asian	1	1.7%	7	2.2%	1	1.2%		
Black	1	1.7%	14	4.3%	1	1.2%		
Mixed	3	5.3%	21	6.5%	8	9.3%		
Other	2	3.5%	4	1.2%	5	5.8%		
Missing	2	3.5%	11	3.4%	2	2.3%		
Treatment arm							.658	.956
BPI	17	29.8%	111	34.5%	27	31.4%		
CBT	20	35.1%	105	32.6%	29	33.7%		
STPP	20	35.1%	106	32.9%	30	34.9%		
Baseline symptoms								
MFQ	38.11	12.13	45.51	9.82	52.83	7.71	39.893	.000
RCMAS	37.33	10.35	40.82	6.66	43.73	5.72	14.209	.000
LOI	7.72	5	9.73	5.09	12.52	5.14	16.730	.000
BC	2.70	2.89	3.17	2.96	4.25	3.87	5.159	.006
Comorbidity							5.385	.005
0	35	61.4%	156	48.4%	32	37.2%		
1	18	31.6%	85	26.4%	32	37.2%		
2	1	1.7%	45	14%	15	17.4%		
3	3	5.3%	23	7.1%	8	9.3%		
Baseline SSRI prescription	11	19.3%	62	19.3%	16	18.6%	1.309	.860

Note. BPI = Brief Psychosocial Intervention; CBT = Cognitive-Behavioural Therapy; STP*P* = Short-term Psychoanalytic Psychotherapy; MFQ = Mood and Feelings Questionnaire; RCMAS = Revised Children's Manifest Anxiety Scale; LOI = Leyton Obsessions Inventory; BC = Behaviour Checklist.

Table III. Baseline predictors of general psychopathology trajectory class membership: clinical characteristics.

	OR	95% CI
Gender	0.65	0.40—1.07
Age	1.02	0.88—1.18
SSRI	1.00	0.99—1.01
Treatment modality	0.98	0.77—1.26
P-factor	**0.41***	**0.19—0.88**
MFQ	0.97	0.93—1.02
RCMAS	1.02	0.98—1.06
LOI	0.97	0.93—1.02
BC	0.98	0.91—1.05
Comorbidity	0.89	0.74—1.06

*$p < 0.05$

Note. OR = Odds Ratio, CI = Confidence Interval, SSRI = baseline intake of selective serotonin reuptake inhibitors, MFQ = Mood and Feelings Questionnaire, RCMAS = Revised Children's Manifest Anxiety Scale; LOI = Leyton Obsessions Inventory; BC = Behaviour Checklist.

adolescents. A summary of the baseline demographic and diagnostic information for each group is presented in Table II. The groups were equivalent in their age, ethnicity, treatment modality and SSRI baseline prescription. However, the groups differed concerning sex, baseline symptoms and comorbidity. The "NO" group included proportionately more females than the overall sample, while the "GO" group was more male ($F = 8.203$, $p = .017$). Consistent with the overall concept of *p*, the "NO" group also had higher levels of baseline symptoms of depression ($F = 39.893$, $p < .001$), anxiety ($F = 14.209$, $p < .001$), obsessions-compulsions ($F = 16.730$, $p < .001$), antisocial behaviour ($F = 5.159$, $p = 006$), and comorbidity levels than the "GO" and "SLOW" groups ($\chi^2 = 5.385$, $p = .005$). Furthermore, the groups' *p* scores were significantly different at the one-year follow-up ($F = 181.37$, $p < .001$). In *post hoc* analyses both the differences between the "NO" and "SLOW" ($t(406) = 14.543$, $p < .001$) and "SLOW" and "GO" groups ($t(377) = 9.301$, $p < .001$) were significantly different for the one-year follow-up.

Regarding the lower-level factors, a two-class solution presented the best fit for obsessions-compulsions ($p = .006$), whereas three-class solutions were the best fit for depressive cognitions ($p = .020$) and conduct problems ($p < .001$). The full model fit information for all lower-level factors' LCGAs is presented in Supplementary Table 3. The baseline characteristics for each lower-level factors' trajectories are presented in Supplementary Tables 4-6. The factors of melancholic features and anxiety did not present significant values for the two-class models ($p = .438$ and .349, respectively). Hence, we also ran free loadings on the LCGAs for the melancholic features and anxiety factors, but they also led to non-significant results. Taken altogether, this indicates that it was not possible to identify significant trajectories of change for these two specific symptoms factors after extracting *p*'s variance from them.

The LCGA for depressive cognitions and obsessions-compulsions evidenced different trajectories where symptom levels were constant throughout all time points. In the conduct problems trajectories, however, we identified three trajectories of decreasing symptoms. Although two of those groups presented marginal symptom decrease over time, a small one ($n = 38$, 8.2%, class 3) showed a more accentuated lowering in their behaviour problems. Figure 2 contains the graphs on specific factors' trajectories.

Since the *p* trajectories ranged from better-to-worse outcomes, ordered logistic regression was chosen to identify potential predictors of trajectory membership. When controlling for gender, age, SSRI prescription, treatment arm, comorbidity, *p*, MFQ, RCMAS, LOI, and BC scores, only baseline *p* significantly predicted class membership (Table III). Higher *p* levels at the beginning of treatment increased the odds (Odds ratio [OR] = 0.41, 95% confidence interval [95%CI] = .19 to .88) of a patient belonging to unsuccessful trajectories. Surprisingly, when controlling for other variables, treatment arm did not predict trajectory of *p*. Predictors for lower-level factors trajectories are presented in Supplementary Table 7.

Discussion

The present study aimed to identify and describe patterns of change in general psychopathology and lower-level factors among depressed adolescents who received one of three types of short-term talking therapies, as well as exploring potential predictors of membership to the different trajectories. To address these questions, we built on findings of a primary study on *p* in depressed adolescents, running computational analyses to identify trajectories of change in their *p* levels.

Concerning the first and main aim of the present study, the best fitting model revealed three distinct trajectories, which we named "GO" (12.3%), "SLOW" (69.2%), and "NO" (18.5%), paraphrasing Maalouf et al. (2012). As found in previous research (Davies et al., 2019; Maalouf et al., 2012; Scott et al., 2019), we identified one group (18.5% of the sample) scoring in clinical range at the last assessment, encompassing limited responders, non-responders and patients who deteriorated in their *p*

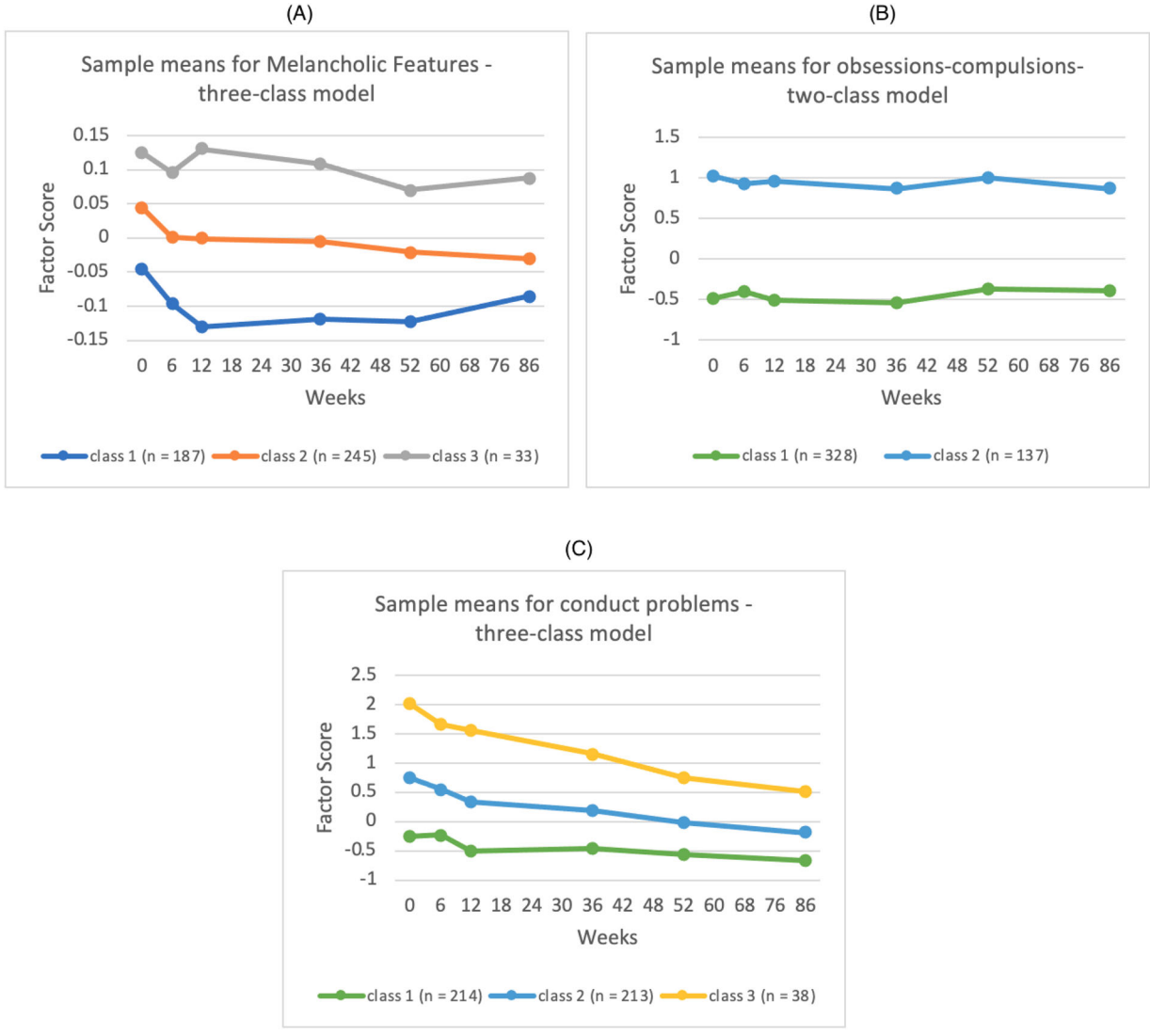

Figure 2. Latent class growth analysis for (A) Depressive cognitions, (B) Obsessions-compulsions, and (C) Conduct problems.

levels. In our analyses, the three groups showed decrease in *p* up until the 12th week, however, this was not maintained for the "NO" group in the subsequent evaluations.

The change patterns identified for *p* appear similar to those examined in narrow-band depressive symptoms (using the symptom measure, not the lower-level factors presented in the current study). As in previous literature, our results support the idea that it is only possible to predict a patient's outcome from at least 6–12 weeks after baseline (Davies et al., 2019; Maalouf et al., 2012; Scott et al., 2019).

We also noted that the "GO" and "SLOW" groups had significantly different *p* levels at the last assessment (week 86), suggesting that some patients (in this study, 12.3% of the sample) may have a significantly higher improvement at follow-up when compared to other improvers. This contrasts with previous studies examining depressive symptoms' trajectories: even when a "fast improvement" and a "steady improvement" trajectory were found, the groups' outcomes at the last assessment were equivalent (Maalouf et al., 2012; Scott et al., 2019). Our findings thus indicate that *p* offers a new layer in the understanding of patients' response to psychotherapy: when taking a more holistic look at the patients, some seemed to achieve a "higher" or more global improvement.

Concerning the lower-level factors, we have found that most trajectories demonstrated stable symptom levels across all assessment points. These findings suggest that the psychotherapies offered may not have promoted significant change in the specific features of depressive cognitions, obsessions-compulsions, and behaviour problems when *p*'s variance was removed. One possible conclusion that could

be drawn is that the factors that are not part of the overall *p* factor may encompass the patients' trait-like characteristics or features that are less responsive to psychotherapies, as pointed out by Aitken et al. (2020). However, is it worth noting that the discussion of what psychopathology factors *mean* when *p* is taken from them is still being broadly discussed in the literature (Smith et al., 2020). One exception among the patterns was the decreasing-symptom trajectory on the behaviour problems factor, being the only factor where symptoms significantly declined throughout the study's assessments. This finding indicates that the patients who presented antisocial behaviour levels over and beyond what is included in *p* in this sample had a decrease in this factor, even though these problems were not the primary focus of any of the interventions offered.

A curious finding is that we were unable to identify patterns of change in the melancholic features and anxiety lower-level factors. These findings may indicate that there were no typical patterns of change within these features, or that our sample size was not big enough to model them. Further investigation is advised for understanding how the multiple lower-level factors of psychopathology, beyond what is included in general psychopathology, respond to psychotherapy.

After identifying the trajectories of change, we addressed our two other additional aims, both concerning predictors of class membership. The first step was defining how each treatment arm was associated with the different trajectories of change. According to our findings, receiving a particular type of intervention did not predict class membership in terms of change in *p* nor lower-level factors. Considering that STPP is a more general therapeutical approach in comparison to CBT and BPI – which are more explicitly focused on depression-, the insignificant differences between them is particularly interesting. This indicates that, besides promoting comparable outcomes for the treatment of depression (Goodyer et al., 2017b), STPP, CBT and BPI did not differ in terms of promoting faster, slower, or limited change in *p* and lower-level factors.

Finally, concerning our third aim, we analysed which baseline indicators could predict trajectory class membership. In this analysis, only baseline *p* predicted class membership when controlling for the other variables. This finding suggests that patients with lower baseline *p* are more likely to be fast responders ("GO" group), whilst higher *p* young people are more prone to present with poorer outcomes ("NO" group). Similarly, a previous study examining a youth sample participating in a trial on the treatment of anxiety disorders found equivalent results, with *p* consistently predicting long-term outcomes (Cervin et al., 2021). Since *p* is a construct that reflects global impairment and proneness to mental suffering, it is expected that high *p* patients would face difficulties in multiple domains, thus increasing their overall mental health burden (Caspi et al., 2014; Smith et al., 2020).

These findings, concerning *p* as a predictor of outcomes, seem to go against previous research pointing that more impaired adolescents would benefit more from psychological treatments (e.g., Tonge et al., 2009) due to "floor effects' (i.e., less impaired patients would have a smaller range to improve in their symptoms). Hence, further studies exploring the association between baseline *p* and outcomes could be valuable in treatment planning, since teenagers with high *p* levels might be less responsive to traditional talking therapies and may require more targeted treatment strategies, including more intensive or multidisciplinary support.

Limitations

Because this study was based in UK NHS clinics, our findings may not be generalisable to populations from differing contexts, especially the ones who are disadvantaged and/or discriminated against when attempting to access mental health services. Also, being 82% of our sample white, the findings presented here do not necessarily apply to ethnic-minority youth. We also did not control for any therapist factors in this study. Further investigations in this paradigm could address therapists' characteristics that may impact the patient" trajectories of change.

Furthermore, the *p* and specific factors values used in this study were drawn from a CFA based on self-report narrow-band measures for depression, anxiety, obsessions-compulsions, and behaviour problems. With this framework, we acknowledge that the present model is skewed towards internalising symptoms in comparison to previous studies examining the *p* factor. Future studies including the perspectives of multiple informants and other symptoms dimensions of *p* into the analysis – such as substance use – could make the model more reliable. Only initial *p* scores were associated with trajectory membership from the available participant characteristics. Future analyses might consider additional characteristics which might have more predictive value, and therefore further increase the utility of these trajectories in clinical practice. Additionally, clinicians cannot easily identify the patients' *p* scores from the measures alone, as they were based on computational analysis, so transpositions of these findings to a clinically trained population are needed.

Conclusions

The present study identified different patterns of change in general psychopathology and lower-level factors among depressed adolescents who received one of three types of short-term psychotherapy. By converting narrow-band scores into a general index of psychopathology, we could find two trajectories of treatment response characterised by positive outcomes and one trajectory with limited response. By looking at differences between class membership in depressive symptoms and general psychopathology, we propose that *p* might be a more parsimonious indicator for understanding patients' change. Furthermore, the lower-level factors fit into globally stable trajectories, indicating some trait-like characteristics that did not change significantly with psychotherapy.

This study's findings still raise questions about why the patients in the "NO" group did not respond to psychotherapy as expected, and how clinicians and researchers could help them to benefit from these treatments. Further research addressing these treatment processes could contribute to the understanding of these phenomena.

Declarations and Ethics Statements

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