The prognosis of common mental disorders in adolescents: a 14-year prospective cohort study

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Summary

Background Most adults with common mental disorders report their first symptoms before 24 years of age. Although adolescent anxiety and depression are frequent, little clarity exists about which syndromes persist into adulthood or resolve before then. In this report, we aim to describe the patterns and predictors of persistence into adulthood.

Methods We recruited a stratified, random sample of 1943 adolescents from 44 secondary schools across the state of Victoria, Australia. Between August, 1992, and January, 2008, we assessed common mental disorder at five points in adolescence and three in young adulthood, commencing at a mean age of 15·5 years and ending at a mean age of 29·1 years. Adolescent disorders were defined on the Revised Clinical Interview Schedule (CIS-R) at five adolescent measurement points, with a primary cutoff score of 12 or higher representing a level at which a family doctor would be concerned. Secondary analyses addressed more severe disorders at a cutoff of 18 or higher.

Findings 236 of 821 (29%; 95% CI 25–32) male participants and 498 of 929 (54%; 51–57) female participants reported high symptoms on the CIS-R (≥12) at least once during adolescence. Almost 60% (434/734) went on to report a further episode as a young adult. However, for adolescents with one episode of less than 6 months duration, just over half had no further common mental health disorder as a young adult. Longer duration of mental health disorders in adolescence was the strongest predictor of clear-cut young adult disorder (odds ratio [OR] for persistent young adult disorder *vs* none 3·16, 95% CI 1·86–5·37). Girls (2·12, 1·29–3·48) and adolescents with a background of parental separation or divorce (1·62, 1·03–2·53) also had a greater likelihood of having ongoing disorder into young adulthood than did those without such a background. Rates of adolescent onset disorder dropped sharply by the late 20s (0·57, 0·45–0·73), suggesting a further resolution for many patients whose symptoms had persisted into the early 20s.

Interpretation Episodes of adolescent mental disorder often precede mental disorders in young adults. However, many such disorders, especially when brief in duration, are limited to the teenage years, with further symptom remission common in the late 20s. The resolution of many adolescent disorders gives reason for optimism that interventions that shorten the duration of episodes could prevent much morbidity later in life.

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Introduction

Adolescence has long been regarded as a time of heightened emotional reactions.[1,2] More than a century ago, Stanley Hall delineated adolescence as a distinct life phase, in which emotional turbulence (or "sturm und drang") was typical.[1] Early psychoanalysts also viewed emotional turmoil as a universal feature of adolescence but without major implications for later mental health.[3] These early views have been much debated in the past 40 years. The first systematic cross-sectional surveys of adolescents suggested that mood disturbances were neither inevitable nor universal.[4] Far from resolving spontaneously, they tended to predict further distress in the short term.[5] Moreover, studies in adults suggested that most functional mental disorders seem to begin before the age of 25 years, and often between 11 and 18 years of age.[6] Later research in young adults with mental disorders also showed high rates of antecedent adolescent depressive and anxiety symptoms.[7,8] Adolescence has therefore come to be seen as a time of vulnerability and the point at which much of the disease burden from mental disorders emerges.[9]

However, the longer term implications of adolescent syndromes remain uncertain. A recent prospective study of mental health and behavioural problems through adolescence showed very high cumulative rates, with more than 60% of participants fulfilling criteria for at least one well-specified disorder in the *Diagnostic and Statistical Manual of Mental Disorders* at some point between the ages of 9 and 21 years, rising to over 80% if "not otherwise specified" diagnoses were included.[10] Although the experience of a mental disorder seemed to be nearly universal at some point in adolescence, relatively few people were affected at any one point in time.[10] In view of the increasing emphasis on early clinical intervention, understanding of prognosis is central to service planning.[11] Similarly, an understanding of prognostic predictors has the potential to inform preventive and early intervention strategies. Some syndromes, such as deliberate self-harm and eating disorders, seem to be mainly limited to adolescence, with few persisting into adulthood.[12,13] So far, the prognosis of episodes of depression and anxiety in adolescents, the

largest single contributors to disease burden in this age group, has not been described.

In this report, we use data from the Victorian Adolescent Health Cohort study—a 14-year study of health from the mid-teenage years to the late 20s. Specifically, we address two questions: how often do common mental disorders persist from adolescence to young adulthood? And what are the demographic, behavioural, and disorder characteristics that predict the continuation of such disorders into young adulthood?

Methods

Study participants

Between August, 1992, and January, 2008, we undertook a nine-wave cohort study of health in young people in the state of Victoria, Australia. At baseline, we selected a representative sample of mid-secondary school adolescents (aged 14–15 years), using a two-stage cluster sampling procedure. At stage one, we chose 45 schools at random from a stratified frame of government, Catholic, and independent schools, with a probability proportional to the number of students in each educational sector (aged 14–15 years) in the schools in each stratum. At stage two, we used a random number table to randomly choose one intact class within the year level from each participating school. 6 months later, we randomly chose a second class from the same schools. One class entered the study in the latter part of the ninth school year (wave 1) and the second class 6 months later (wave two). School retention rates to year nine in Victoria in the year of initial sampling were 98%. One school did not continue beyond wave one, with a loss of 13 participants; thus, 44 schools remained in the study. Participants were subsequently reviewed at four 6-month intervals during the teenage years (waves three to six), with three follow-up waves in young adulthood at 20–21 years (wave seven), 24–25 years (wave eight), and 28–29 years (wave nine).

See Online for appendix

From a sample of 2032 students, 1943 (95·6%) participated at least once during the first six (adolescent) waves. Of these participants, 1761 (90·6%) took part at least once in the young adult phase. 15 participants had died by wave nine, 11 of whom were within this group and were excluded from the analysis, leaving a total sample of 1750. Of the total 15 deaths, six were from accidental injury, two from suicide, two from chronic illness, one from a drug overdose, and four from underdetermined causes.

In waves one to six, participants self-administered the questionnaire on laptop computers in the classroom, with telephone follow-up of those absent from school on the assessment days. The seventh to ninth waves were undertaken with computer-assisted telephone interviews. In general, we used the same measures across waves for time-varying outcomes and covariates. In wave nine, 1501 participants were interviewed, 1395 by telephone interview and 106 (willing to participate, but with little time available) by a partial survey including the General Health Questionnaire (GHQ). In this report, we used adolescent data from waves two to six, since because of the study design more than half of the participants did not participate in wave one.

All participants' parents or guardians provided written, informed consent. Before data collection, we provided the participants with details of the content of the assessment and we obtained verbal consent before completion. The data collection protocols were approved by the Human Research Ethics Committee of the Royal Children's Hospital (Victoria, Australia).

Procedures

Common mental disorders were assessed in waves two to seven with the revised Clinical Interview Schedule (CIS-R).[14] The CIS-R is a psychiatric interview designed to assess symptoms of depression and anxiety in non-clinical populations. The total scores were dichotomised at a threshold (score ≥12) to delineate common mental disorder at a level at which clinical intervention by a family doctor would be appropriate.[14] Persistence of common mental disorders in adolescence (waves two to six) was defined as: no waves, one wave, or two or more waves with CIS-R of 12 or higher. To test whether more severe mental disorders have a different prognosis, we also defined "caseness" at CIS-R of 18 or higher in supplementary analyses (appendix pp 1–4).

At waves eight and nine, symptoms of depression and anxiety were assessed with the 12-item GHQ (GHQ-12) dichotomised at the cut-off point of 2 or above.[15,16] At wave nine (age 29 years), we obtained an additional two measures of depression and anxiety from computer-assisted telephone interviews using the Composite International Diagnostic Interview (CIDI): major depressive disorder and anxiety disorder were both defined according to the International Classification of Diseases 10th revision, with major depressive disorder assessed with the CIDI-Auto[17] and anxiety disorder with the CIDI-Short Form.[18] Participants were classified with anxiety disorder if they were diagnosed with generalised anxiety disorder, social phobia, agoraphobia, or panic disorder. Persistence of disorder in young adults (waves seven to nine) was defined as no waves, one wave, two or more waves of depression, anxiety, or both, with three versions of this at wave nine depending on which of the three measures was used to identify depression or anxiety.

Summary adolescent measures were obtained for several measures in waves two to six. We assessed cannabis use as the reported frequency of use in the previous 6 months, with at least weekly cannabis use on one or more waves the indicator of a higher level of use. For cigarette smoking, participants who reported smoking daily in the week before survey at any one adolescent wave were classified as daily smokers. We assessed high-risk alcohol use with a beverage-specific and quantity-specific 1-week diary. We calculated high-risk alcohol use according to Australian guidelines[19] from

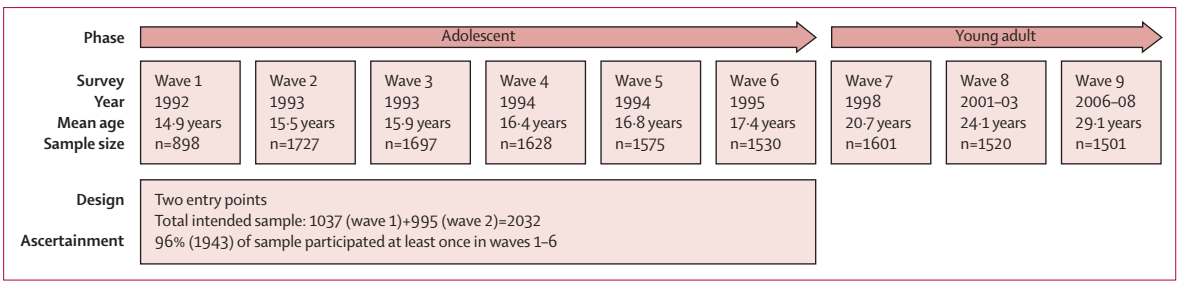

Figure 1: **Sampling and ascertainment in the Victorian Adolescent Health Cohort, 1992–2008**

the total alcohol consumed during the week before survey, and defined as 15 or more standard drinks (one standard drink=10 g alcohol) in the week before survey. We assessed antisocial behaviour using ten items covering property damage, theft, and interpersonal violence during the previous 6 months from the Moffitt and Silva self-report early delinquency scale.[20] Antisocial behaviour at any wave referred to endorsement of one behaviour more than once, or two different behaviours at least once. We defined persistence as two or more waves of antisocial behaviour.

Statistical analysis

We estimated rates of adolescent disorder and its persistence separately for male and female participants, along with the prevalence of adolescent prognosis factors. For adolescents with at least one measurement of CIS-R of 12 or higher, we explored the persistence of mental disorders in adolescence (two or more waves *vs* one wave), background factors (sex and parental divorce/separation), and adolescent risk behaviours as predictors of ongoing disorder into young adulthood. We used multinomial models to characterise predictive associations with young adult disorder, with "no waves of adult mental disorders" selected as the baseline category for the outcome. In the adjusted models, we used the Wald test (two-sided) to assess the interactions between sex and the other factors. We also used logistic generalised estimating equations[21] with robust standard errors to estimate the probability of young adult disorders in those with an adolescent disorder. The regression model included covariates representing wave, type of measure used at wave nine, demographic variables of interest, and adolescent risk behaviours. It was used to estimate probabilities of caseness at each adult wave, by sex and categories of adolescent disorder history. The probability estimates were adjusted for all other variables (eg, antisocial behaviour and high-risk alcohol use) included in the model. We recorded no evidence for interactions between either sex and wave and the adolescent predictors assessed. We used Stata version 12.1 for all data analysis.

Data collection was undertaken in a group that frequently moved their place of residence, which created difficulty in tracking of participants. The amounts of missing data on individual measures at any given wave were low. However, summary measures calculated from data subject to missing waves are potentially biased. To address this problem, we used multiple imputation.[22] We imputed 20 complete datasets, separately for male and female participants, under a multivariate normal model incorporating all analysis and auxiliary variables potentially associated with incomplete participation. Participants were included in the imputation if they had been seen at least once in adolescence (ie, waves two to six) and at least once in adulthood (waves seven to nine). The imputation dataset contained 1761 individuals. The imputation model incorporated 31 key variables used in the analysis and nine auxiliary variables. Of these 40 variables, nine had fewer than 10% missing values, 15 had 10–14·9% missing, and 16 had 15–23% missing. For the adolescent waves, 89% of individuals had complete data at wave two, 86% at wave three, 85% at wave four, 82% at wave five, and 81% at wave six. For the adult phase, 90% of the individuals had complete data at wave seven, 85% at wave eight, and 76% at wave nine. We transformed CIS-R scores before imputation using shifted logs, and imputed all other variables as binary variables. After imputation, we converted any transformed variables back to their original scale and categorised them for analysis, with adaptive rounding for binary measures.[23] We obtained all estimates by averaging results across the 20 imputed datasets with inferences under multiple imputation obtained using Rubin's rules.[22]

To exclude a possibility that measurement error might contribute to apparent discontinuities in caseness and

	Male participants (n=821)		Female participants (n=929)	
	n	% (95% CI)	n	% (95% CI)
Background factor				
Parental divorce/separation	184	22% (20–25)	203	22% (19–25)
Adolescent risk behaviours				
Repeated multiple antisocial behaviours	328	40% (36–43)	200	22% (19–24)
Any high-risk alcohol use	277	34% (30–37)	140	15% (13–17)
Any daily cigarette smoking	194	24% (21–27)	229	25% (22–27)
Any regular (weekly or more frequent) cannabis use	139	17% (14–20)	87	9% (7–11)

Table 1: **Summary of adolescent prognostic factors, by sex**

therefore apparent improvement, we fitted hidden Markov models using Mplus[24] (appendix pp 5–10). This further analysis studied transitions in latent caseness status from adolescence (waves two to six) to young adulthood (waves seven and eight), and from young adulthood to adulthood (wave nine).

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

	Index	Male participants (n=821)		Female participants (n=929)	
		n	% (95% CI)	n	% (95% CI)
Adolescent phase (waves 2–6)					
Mental disorder by wave (CIS-R ≥12)					
Wave 2 (mean age 15·5 years)	CIS-R	137	17% (14–19)	312	34% (30–37)
Wave 3 (mean age 15·9 years)	CIS-R	103	13% (10–15)	289	31% (28–34)
Wave 4 (mean age 16·4 years)	CIS-R	90	11% (9–13)	247	27% (24–30)
Wave 5 (mean age 16·8 years)	CIS-R	73	9% (7–11)	219	24% (21–26)
Wave 6 (mean age 17·4 years)	CIS-R	59	7% (5–9)	217	23% (20–26)
Persistence of disorder (CIS-R ≥12)					
Never	..	585	71% (68–75)	431	46% (43–50)
1 wave	..	117	14% (12–17)	156	17% (14–19)
≥2 waves	..	119	14% (12–17)	342	37% (34–40)
Young adult phase (waves 7–9)					
Mental disorder by wave					
Wave 7 (mean age 20·7 years)	CIS-R	80	10% (8–12)	201	22% (19–24)
Wave 8 (mean age 24·1 years)	GHQ	122	15% (12–18)	246	27% (24–29)
Wave 9 (mean age 29·1 years)	GHQ	80	10% (8–12)	162	17% (15–20)
Wave 9 (mean age 29·1 years)	CIDI MDD	47	6% (4–7)	128	14% (11–16)
Wave 9 (mean age 29·1 years)	CIDI AD	60	7% (5–9)	140	15% (13–18)
Persistence of disorder					
Never	..	563	69% (65–72)	446	48% (44–52)
1 wave	..	188	23% (20–26)	287	31% (27–34)
≥2 waves	..	70	9% (6–11)	196	21% (18–24)
Continuity and discontinuity from adolescence (waves 2–6) to young adulthood (waves 7–9)*					
No waves in adolescence					
No waves in young adulthood	..	438	75% (71–79)	271	63% (58–68)
1 wave in young adulthood	..	119	20% (17–24)	118	27% (22–32)
≥2 waves in young adulthood	..	28	5% (3–7)	42	10% (7–13)
1 wave in adolescence					
No waves in young adulthood	..	72	61% (50–73)	72	46% (37–55)
1 wave in young adulthood	..	29	25% (15–35)	59	38% (29–47)
≥2 waves in young adulthood	..	16	14% (6–22)	25	16% (9–23)
≥2 waves in adolescence					
No waves in young adulthood	..	53	45% (35–56)	103	30% (25–36)
1 wave in young adulthood	..	39	33% (23–44)	110	32% (26–38)
≥2 waves in young adulthood	..	25	22% (13–30)	129	38% (32–43)

CIS-R=Revised Clinical Interview Schedule. GHQ=General Health Questionnaire. CIDI MDD=Composite International Diagnostic Interview major depressive disorder. CIDI AD=Composite International Diagnostic Interview anxiety disorder. *Percentages relate to the six strata defined by three levels of adolescent caseness (no waves, one wave, and ≥two waves) and sex.

Table 2: **Prevalence and continuity of common mental disorders at 15–29 years of age**

Results

Figure 1 shows the flow of participants through the study. Table 1 shows estimates of the prevalence of adolescent prognostic factors and table 2 shows those for common mental disorders across adolescence and young adulthood. 236/821 boys (29%, 95% CI 25–32) and 498/929 girls (54%, 50–57) were cases (CIS-R ≥12) at least once during adolescence. Rates of persisting or recurrent adolescent disorder (two or more waves) were also higher in girls (342/929 [37%; 95% CI 34–40]) than in boys (119/821 [14%; 95% CI 12–17]). In young adulthood, 258 (31%; 95% CI 28–35) men and 483 (52%; 48–56) women fulfilled criteria at least once. 147 (18%; 95% CI 15–21) men and 160 (17%; 15–20) women were first identified as cases in young adulthood (waves seven to nine). This finding means that across the 14-year study period, 147 (38%; 95% CI 33–44) of male cases and 160 (24%; 21–28) female cases of common mental disorders were first identified in young adulthood.

109 (47%; 95% CI 40–54) of male participants with an adolescent disorder had at least one further episode in young adulthood. 323 (65%; 95% CI 60–69) of female participants with an adolescent disorder went on to have at least one further episode. 41 (18%; 95% CI 12–23) men and 154 (31%; 95% CI 27–35) women went on to report persisting young adult disorder (two or three waves). For boys with a single adolescent episode, 45/117 (39%; 95% CI 27–50) went on to have at least one further young adult episode compared with 84/156 (54%; 45–63) girls. For those with persistent adolescent disorder, the rate of disorder continuity to young adulthood was 55% (95% CI 44–65) in boys and 70% (95% CI 64–75) in girls.

Of the men with a disorder at any of the three young adult waves, 109/258 (42%; 95% CI 36–49) had been cases (CIS-R ≥12) as adolescents. In women, 323/483 (67%; 62–71) had been adolescent cases. Of the men with disorder at two or more young adult waves, 42/70 (60%; 95% CI 46–74) had been cases at least once in their teenage years; for women, the corresponding figure was 154/196 (79%; 95% CI 72–85).

In a supplementary analysis (appendix p 1), in which we used the higher threshold (CIS-R ≥18) to define more severe disorders, persistence rates from adolescence into young adulthood were slightly higher at 65/121 (54%; 95% CI 43–63%) in men and 229/334 (69%; 63–74%) in women. Of those with one episode of disorder at the higher threshold in adolescence, 35/73 (48%; 95% CI 33–63) men and 81/144 (56%; 47–66) of women had a further episode in young adulthood. Of those with two or more adolescent episodes of disorder, 30/49 (61%; 95% CI 44–78) of men and 148/190 (78%; 71–85) of women had a further episode in young adulthood.

Figure 2 shows the rates of continuing young adult disorder, with the sample stratified by sex and adolescent

persistence. Those with two or more waves of adolescent disorder tended to have a higher rate of young adult disorder than did those with one or no waves at each point of follow-up, with this trend strongest for women. For male participants with one episode of adolescent disorder, an increased risk for young adult disorder was clear only at wave seven. For male participants with persistent disorder, a raised risk continued to wave eight but again was greatly diminished by wave nine. For women, the continuity of adolescent disorder into young adulthood was stronger than for men, but generally followed a similar pattern as that for men, with risks for ongoing disorder falling substantially by wave nine. When adolescent caseness was defined at CIS-R of 18 or higher (appendix p 2), rates of ongoing disorder seemed to be somewhat greater but a lower rate of continuity to wave nine was still apparent.

Table 3 presents parameter estimates, fitted separately and jointly, for prediction of continuing disorder into young adulthood in people with at least one adolescent episode. Persistence of disorder across two or more adolescent waves was the clearest predictor, with the odds of persistent (two or more waves) young adult disorder more than three-times higher than in those who had a single adolescent episode. Female participants had higher risks for ongoing disorder than did men, with an even stronger association with persisting young adult disorder. Parental separation or divorce independently predicted persisting young adult disorder, whereas by contrast high-risk adolescent alcohol use was associated with lower odds. A supplementary analysis (appendix p 3) that used the higher threshold for defining adolescent cases (CIS-R ≥18) showed a similar pattern of association, although with a weaker effect of female sex.

Figure 3 shows the estimated (model-based) probability of young adult disorder in participants with a history of adolescent disorder (CIS-R ≥12). The odds of young adult disorder were higher in female than in male participants (OR 1·55, 95% CI 1·17–2·06) and in those who were cases at two or more waves as adolescents compared with those who were cases at one wave (OR 2·00, 95% CI 1·51–2·67). Odds were similar at waves seven and eight but fell to almost half at wave nine compared with wave seven (OR 0·57, 95% CI 0·45–0·73), irrespective of which measure was used (joint test of measurement effects at wave nine: χ^2=3·8, df=2, p=0·15). The highest overall probabilities of ongoing young adult disorder were in girls with persistent adolescent disorder at waves seven (estimated probability=0·35, 95% CI 0·30–0·40) and eight (p=0·36, 0·31–0·41). The lowest probability of ongoing young adult disorder was in male participants with one episode of adolescent caseness at wave nine (eg, GHQ probability=0·09, 95% CI 0·06–0·12). A supplementary analysis that used the higher threshold of 18 or higher for adolescent caseness shows a similar pattern of association, with the highest risks for young adult caseness in those with at least two adolescent episodes (OR 1·94, 95% CI 1·43–2·61), a less clear trend for women to have higher risks (1·38, 0·96–1·97), and again lower risks at wave 9 (0·50, 0·38–0·68).

Appendix pp 5–10 presents the findings from the three-phase hidden Markov model. Although no direct comparison with observed data is possible, the findings are consistent with the observed data in all respects. Specifically, rates of continuity were higher in girls than in boys, and levels of persistence of caseness in the transition from young adulthood (waves seven and eight) to adulthood (wave nine) were lower than between adolescence (waves two to six) and young adulthood (waves seven and eight). It suggests that, although

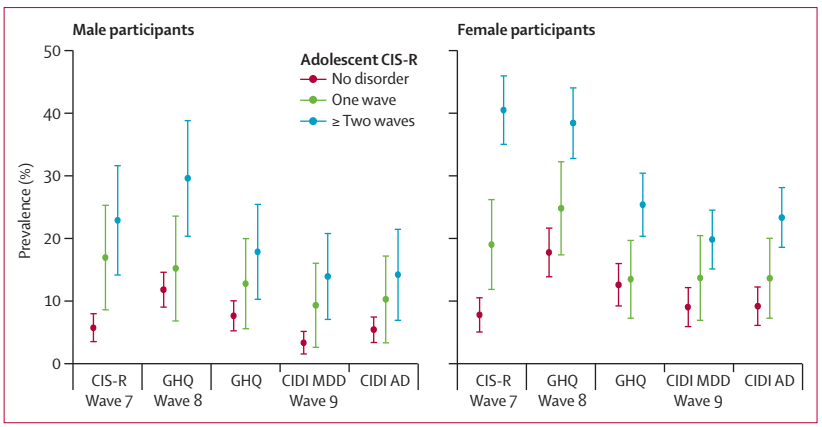

Figure 2: **Estimated prevalence of mental disorders in young adulthood, by sex and persistence of mental disorders in adolescence (CIS-R ≥12)**
Error bars are 95% CIs. CIS-R=Revised Clinical Interview Schedule. GHQ=General Health Questionnaire. CIDI MDD=Composite International Diagnostic Interview major depressive disorder. CIDI AD=Composite International Diagnostic Interview anxiety disorder.

	Fit separately		Fit jointly	
	1 wave, OR (95% CI)	≥2 waves, OR (95% CI)	1 wave, OR (95% CI)	≥2 waves, OR (95% CI)
Persistence of disorder (CIS-R ≥12)				
≥2 waves	1·55 (0·99–2·43)	3·45 (2·08–5·72)	1·47 (0·93–2·33)	3·16 (1·86–5·37)
Background factors				
Female	1·77 (1·19–2·64)	2·64 (1·67–4·17)	1·58 (1·03–2·44)	2·12 (1·29–3·48)
Parental divorce or separation	1·15 (0·75–1·77)	1·80 (1·19–2·72)	1·11 (0·71–1·73)	1·62 (1·03–2·53)
Adolescent risk behaviours				
Repeated multiple antisocial behaviours	0·75 (0·50–1·11)	1·02 (0·69–1·51)	0·76 (0·48–1·22)	1·23 (0·77–1·96)
Any high-risk alcohol use	0·87 (0·56–1·37)	0·49 (0·29–0·82)	0·95 (0·54–1·65)	0·45 (0·24–0·84)
Any daily cigarette smoking	1·08 (0·73–1·58)	0·97 (0·64–1·46)	1·04 (0·66–1·66)	0·83 (0·49–1·41)
Any regular (weekly or more frequent) cannabis use	1·06 (0·64–1·75)	1·09 (0·66–1·80)	1·28 (0·66–2·46)	1·59 (0·83–3·06)

OR=odds ratio. CIS-R=Revised Clinical Interview Schedule. *Multinomial logistic regression was used with those who did not fulfil a case criterion at any of the three young adult waves used as the reference group.

Table 3: **Adolescent predictors of persistence into young adulthood (waves 7–9) for 733 adolescents with at least one adolescent occurrence of common mental disorder (CIS-R ≥12),* by adolescent risk factor**

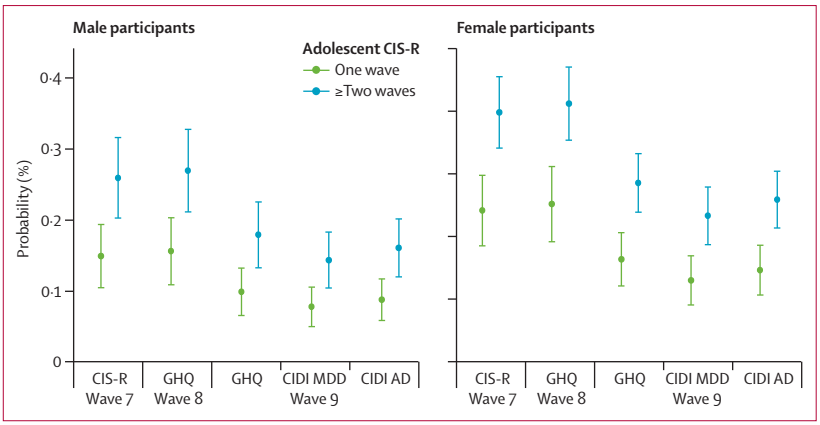

Figure 3: **Estimated probability of common mental disorders in young adulthood for 733 participants with a history of at least one episode of adolescent disorder (CIS-R ≥12)**

Error bars are 95% CIs. CIS-R= Revised Clinical Interview Schedule. GHQ=General Health Questionnaire. CIDI MD= Composite International Diagnostic Interview major depressive disorder. CIDI AD=Composite International Diagnostic Interview anxiety disorder.

previous caseness substantially increases the risk for later caseness, notable discontinuities are evident across both the young adult and adult transitions.

Discussion

Our study confirms the very high prevalence of common mental disorders across adolescence and young adulthood. Almost a third of men and more than half of women had an episode of prominent depressive and anxiety symptoms at least once during mid-to-late adolescence. This finding is consistent with adolescence being a high-risk phase for the onset of common mental disorders. Most of those people with young adult disorders had been adolescent cases, a finding that was especially clear for female participants and those with more persistent young adult disorders. Yet, almost one in five participants were first identified as cases in their 20s, which suggests that the high-risk period for onset extends into young adulthood. Around half of boys and two-thirds of girls with adolescent disorders went on to have at least one further episode in young adulthood. However, for those with a single adolescent episode of less than 6 months' duration, persistence into young adulthood was substantially lower than in those with longer lasting or recurrent episodes. Rates of ongoing disorder were higher for those with persistent adolescent disorder, in female participants, and in those with a background of parental separation or divorce. The level of continuity dropped sharply in the late 20s, raising the possibility of further resolution for many whose disorder had persisted into their early 20s.

The risks of common mental disorders at 21 years of age are similar to those reported in other population-based surveys.[25] Few previous data exist for the prognosis of such disorders in adolescents for comparison (panel). Patients with major depression from specialist psychiatry settings have generally had long-term recurrence rates of between 50% and 64%.[26] Studies from community settings have been limited to one initial assessment across a broad age range,[27] or have assessed continuity only up to the age of 21 years.[28] The latter study showed that more than 60% of participants assessed with major depressive disorder at 15–16 years of age had at least one episode in the next 5–6 years. Even though these studies differed in design and assessed disorder at a higher diagnostic threshold, they are broadly consistent with our study's findings of a raised risk for young adult disorder in those with an adolescent history.

Our study is noteworthy for its size, frequent measurement points, and high rates of participation. This design should have increased its sensitivity in detecting adolescent disorders. However, we still might have failed to identify some adolescent cases. Although we measured disorder at 6-month intervals during the teenage years, assessment focused on symptom intensity on the previous 7 days. This strategy optimised accuracy and reduced detection biases from better recall in girls and those who have received treatment, but also means that some adolescent cases will have been missed.[29] The mean duration of adolescent depressive episodes in community samples is about 26 weeks,[30] which suggests that we will have captured most disorders but will have missed brief episodes that occurred between waves. These brief episodes might have a better prognosis and so the estimates presented here might be best viewed as worst-case scenarios.

Measurement error needs to be considered. False-positive cases could arise when an adolescent participant without disorder falls above a threshold and is misclassified as a case. On follow-up, apparent resolution might lead to an incorrect inference of a lower degree of continuity. Conversely, false positives in young adulthood could lead to an overestimation of continuity. For these reasons, we ran supplementary analyses with a higher threshold to define adolescent cases (CIS-R ≥18) and hidden Markov models. Rates of persistence and resolution were similar at the higher threshold, which suggests that measurement error in adolescent case definition did not introduce any substantial underestimation of continuity into young adulthood. The hidden Markov models were also consistent in recording substantial discontinuities in caseness between adolescence and adulthood. Even so, we might have underestimated the caseness in the adult phases of data collection. These assessments also focused on the period immediately before interview, with the exception of the CIDI assessments at wave 9, which covered 12 months. Although we tried to optimise sensitivity in choice of case threshold and use of several measures, some transient episodes were probably missed, with this study picking up more persistent and recurrent young adult disorders. A further possible limitation was the use of different measures for depression and anxiety in young adulthood, with the GHQ and CIDI short form often viewed as screens rather than diagnostic measures. However, all measures have been used widely and

Panel: Research in context

Systematic review

The risk for first onset of common mental disorders during adolescence is high. To what extent these episodes represent a developmental disturbance limited to these years or a forerunner of later adult mental disorders is not clear. We searched Medline, PubMed, and Google Scholar for published articles, using combinations of terms that included "adolescent", "youth", "teen", "mental disorder", "depression", "emotional", "depressive", "anxiety", "prognosis", "natural history", and "outcome". We did not use any language or date restrictions. The review found that most previous community-based studies of the continuity of anxiety and depressive disorders between adolescence and young adulthood have been based on recall of adults diagnosed with a mental disorder. A few earlier population-based studies assessed the risks that adolescent disorders pose for young adult disorder but did not specifically assess the prognosis of adolescent disorders.[7,8] Some clinical cohorts have been used to report prognosis but are probably atypical in their disorder severity and associated impairments.[26]

Interpretation

Our study confirms that common mental disorders in adolescents are often forerunners of similar disorders in young adulthood, with most of those participants with young adult episodes having been cases during their teenage years. Even so, many adolescent episodes seem to be limited to the teenage years, with more than half of those with adolescent disorders reporting no episodes as young adults. Since persistence of an adolescent episode was a strong predictor of outcome, the findings raise the possibility that clinical and preventive responses that shorten the duration of adolescent episodes could prevent later life psychiatric morbidity arising from adolescent-onset disorders.

allowed us to test whether prognosis differed across different measures. The cross-lagged use of the GHQ in waves eight and nine also provides comparability of measurement between two of the young adult waves of data collection and suggests that the reduced likelihood of disorder in the late 20s is not an artefact of measurement. Although some participants missed some waves of data collection, the use of multiple imputation should have reduced biases arising in the adolescent waves. However, it might only partially address potential biases from differential attrition in young adulthood.

A finding that almost half of those with an adolescent disorder had no further episodes in young adulthood is striking. A further near-halving of risk for continuity in the late 20s suggests that many disorders resolve as people make the transition into adulthood. However, the continuity in common mental disorders is substantially greater than for adolescent eating disorders or self-harm in this sample.[12,13]

Adolescent syndromes of depression and anxiety are common and, for many people, especially girls, are a forerunner of young adult disorder where they are associated with lower workforce participation and income.[31] Yet, for many other people, these disorders are either limited to the teenage years or have a decreased risk of recurrence beyond the mid-20s. The lower continuity into the later 20s was not a result of higher spontaneous resolution of milder disorders, since the same pattern was noted at both lower and higher symptom cut-offs. It could explain why the prediction of mid-life anxiety and depressive disorders is substantially greater from the early 30s than from adolescence or the early 20s.[32]

The adolescent years bring an intensification in affective processing that might have adaptive value in responding to changing social contexts and greater engagement with the peer group.[33] However, this intensity of emotional reactions, recognised by many early writers in descriptions of emotional turmoil, seems likely to underlie a vulnerability for the adolescent onset of common mental disorders.[1,3] Given the extent of social influences on neural systems implicated in adolescent emotional development, the resolution of many disorders by the late 20s gives grounds for optimism about the scope for prevention of recurrence. Early clinical interventions that shorten the duration of episodes have the potential to reduce the later life disease burden from these disorders.[33] So too a persisting effect of parental separation and divorce on the course of disorder suggests the importance of a secure and stable social context in adolescence in recovery. The resolution in young adulthood might be the result of ongoing developmental processes, including the maturation of neural systems involved in social and emotional processing, the learning of new cognitive and emotional skills, or successful social role transitions in young adulthood.[34,35]

Contributors

GCP and CC conceptualised this Article. GCP, CC, JBC, AM, and HR undertook or advised on the data analysis and prepared the first draft of the report. Other authors were involved in reviewing analyses and revising the report.

Conflicts of interest

We declare that we have no conflicts of interest.

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