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Predicting Initial Specialist Mental Health Care Use in Adolescence Using Self-, Parent-, and Teacher-Reported Problem Behavior: A Prospective Community-Based Record-Linkage Study

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ABSTRACT

Objective: The aim of this study was to determine the relative importance of self-, parent-, and teacher-reported problem behavior for initial specialist mental health care use in adolescence and the extent to which the relative importance of each informant changes over time.

Methods: Data from the Dutch community-based cohort study TRacking Adolescents' Individual Lives Survey (TRAILS) were linked to administrative records of specialist mental health care organizations. Self-, parent-, and teacher-reported internalizing and externalizing problems were assessed at ages 11, 13, and 16 years, with self-reported problems also assessed at age 19 years. The study included 1,478 adolescents, of whom 19.8% had administrative records between January 2000 (age 9 years) and December 2011 (age 21 years).

Results: After effects of internalizing and externalizing problems were adjusted for each other and for sociodemographic correlates, internalizing problems, but not externalizing problems, predicted initial specialist mental health care use. Teacher reports mainly predicted initial specialist care between the ages of 11 and 13 years (hazard ratio [HR] = 1.57; 95% confidence interval [CI], 1.22–2.02; $P < .001$), parent reports mainly predicted initial specialist care between the ages of 13 and 16 years (HR = 1.47; 95% CI, = 1.13–1.91; $P = .004$), and self-reports mainly predicted initial specialist care between the ages of 16 and 19 years (HR = 1.61; 95% CI, = 1.25–2.08; $P < .001$) and between the ages 19 and 21 years (HR = 1.50; 95% CI, 1.10–2.05; $P = .011$).

Conclusions: Teachers, parents, and adolescents are the driving force behind initial specialist care at consecutive phases in adolescence. Future research should assess whether improving the problem recognition of teachers in secondary education and educating young adults about mental health problems are effective ways of reducing the treatment gap.

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Many mental disorders have an onset in childhood or adolescence.¹ Their prevalence^{2,3} and burden⁴ are very high in adolescence, and their adverse effects last well into adulthood.^{5–9} Many adolescents with mental disorders do not receive specialist treatment,^{10,11} however, and for those who do the time to treatment is often many years.¹² This lack of or delay in treatment has sparked interest in the factors that may influence help-seeking, as these may be targeted in programs aimed at promoting access to mental health care.¹³

Help-seeking in adolescence is affected by many actors. Next to the adolescents, parents and teachers play very important roles in the help-seeking process.^{14,15} Each actor's influence on help-seeking is likely to differ because the reporting of adolescent mental health problems, often used as a proxy of the central concept of "need for care,"¹³ is known to differ by informant. Parents play an important role in the help-seeking process,^{14,15} not only because of parents' legal responsibilities toward their child, but also because adolescents generally remain dependent on their parents for material support. At a young age, children play a very limited role in the help-seeking process; their ability to recognize mental health problems and a need for care have been found to be unrelated to service use.¹⁴ As adolescents strive for more autonomy as part of maturation and increasingly turn to their peers rather than their parents for support,¹⁵ adolescents' own role in the help-seeking process increases. Teachers are likely to play an important role in the help-seeking process in childhood and early adolescence because they generally have close contact with the children in their class in primary education.¹⁶ Their role decreases in secondary education because they have to divide their attention over many more adolescents as they teach multiple classes.¹⁷

To date, most studies in which adolescent mental health care use was predicted using problem reports from multiple informants included only 2 of the 3 possible informants,^{18,19} combined measures from multiple informants,²⁰ or both.^{21,22} Only a few studies have included assessments from all 3 informants simultaneously,^{17,20,23} thereby leaving unknown the relative importance of each of these informants for mental health care use in adolescence.

- Adolescents are dependent on others for access to specialist mental health care, but it is unclear which individuals are most influential at different stages of adolescence.
- Teachers, parents, and adolescents themselves are the driving force behind initial specialist care at consecutive phases in adolescence.
- In addition to addressing the problems that drive help-seeking, clinicians should be aware of other problems that may arise in other settings.

The influence of adolescents, parents, and teachers in the help-seeking process may vary over time, but studies that examined help-seeking longitudinally are scarce.^{19,23,24} Laitinen-Krispijn et al²⁴ showed that parent-reported mental health problems at ages 10–12 years consistently predicted initial specialist care up to the age of 16. They assessed mental health problems only at baseline, however. Similarly, Zwaanswijk et al found that teacher-reported mental health problems were related to a need for care in childhood,¹⁶ but not in adolescence.¹⁷ However, since these conclusions were based on 2 cross-sectional studies, each with a wide age range, precisely how the role of teachers develops through adolescence remains uncertain. In conclusion, the currently available studies leave obscure the relative importance of adolescents, parents, and teachers in the help-seeking process and how this relative importance changes over time.

The aim of this study was to assess the relative importance of adolescents, parents, and teachers for help-seeking in adolescence and the extent to which the relative importance of each informant changes over time. Our study covered initial specialist mental health care use, hereafter referred to as specialist care, from preadolescence (age 9 years) to early adulthood (age 21 years). Specialist mental health care includes any kind of child, adolescent, and adult mental health care for which a referral is required. In The Netherlands, the general practitioner, preventive child health care, and the Office for Youth Care are primary care providers who can refer adolescents to specialist care.¹⁹ Register-based specialist care was predicted using up to 4 assessments of adolescents' mental health. We differentiated between internalizing and externalizing problems²⁵ because of their distinct differences with regard to development²⁶ and recognition.²⁷

METHODS

Sample

The data used in this study were from the TRacking Adolescents' Individual Lives Survey (TRAILS),²⁸ a prospective population-based cohort study aimed at explaining the development of mental health from early adolescence into adulthood. The TRAILS sample, response rates, and study contents have been described in detail elsewhere.^{28–31} In short, after exclusion of children whose schools refused participation ($n = 338$) and children with

serious mental or physical health problems or language difficulties ($n = 210$), informed consent to participate in the study was obtained for 2,230 children (76.0%; 51% girls). Nonresponse was related to being male, poor school performance, and low socioeconomic background, but not to teacher-reported levels of psychopathology.³¹

We used data from 4 consecutive assessment waves, which ran from March 2001 to July 2002 (T1; $N = 2,230$; 10–12 years), from September 2003 to December 2004 (T2; $n = 2,149$; 12–15 years), from September 2005 to August 2007 (T3; $n = 1,816$; 15–17 years), and from October 2008 to September 2010 (T4; $n = 1,881$; 18–20 years), respectively. Dropout was related to having a parent born in a nondeveloped country, low parental socioeconomic position, and parent-reported externalizing problems.²⁹

The TRAILS data were linked to the Psychiatric Case Register North Netherlands (PCRNN; hereafter referred to as the register),³² which covered use of specialist child, adolescent, and adult mental health care organizations from January 2000 through December 2011. The catchment area of the register overlaps with the geographic area from which TRAILS participants were recruited. The register did not include primary (youth) mental health care, private practices, and commercial mental health care organizations. A comparison of register data with data from Statistics Netherlands³³ showed that the register included 75% of all of child and adolescent mental health treatment trajectories in the north of The Netherlands.¹⁰ Consent to link the TRAILS database to the register was obtained from 1,698 adolescents and their parents (76.1%). A 95% likelihood matching procedure uniquely identified 447 adolescents with 1 record or more in the register (26.3%). One twin pair was excluded because data from the register could not be uniquely matched. Furthermore, the register contained only empty records from 48 matches.

We excluded a further 170 adolescents, of whom 62.4% had records in the register, because of parent-reported contact with specialist care before January 2000. The final sample hence contained 1,478 adolescents, of whom 293 (19.8%) had records in the register.

Adolescents who could not be included due to any cause of missing register data ($n = 582$) differed from included adolescents on variables that are traditionally associated with attrition (see Supplementary Table 1); they were more often male, of an ethnic minority, and attending special education; had a lower socioeconomic background; and had higher levels of parent- and teacher-reported problem behavior. By definition, adolescents with parent-reported specialist care before 2000 differed distinctly from those without it (see Supplementary Table 1); they were more often male, attending special education, and suffering from disadvantageous family characteristics and had higher levels of reported problem behavior. Furthermore, when only adolescents with records in the register were compared, adolescents with parent-reported specialist care before 2000 had their first record in the register much earlier than adolescents without it.

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The study was approved by the Dutch Central Committee on Research Involving Human Subjects (CCMO) and was conducted according to the principles of the Declaration of Helsinki.

Measures

The outcome variable was initial contact with specialist care, indicated by the date of first entry in the register.

The predictor variables were internalizing and externalizing problems. At T1, T2, and T3, these problems were measured using the Youth Self-Report (YSR),³⁴ Child Behavior Checklist (CBCL),³⁴ and Teacher Checklist of Psychopathology (TCP).³¹ At T4, only the Adult Self-Report (ASR)³⁵ was available. The YSR, CBCL, and ASR broadband scales of internalizing and externalizing problems included the withdrawn/depressed, anxious/depressed, and somatic complaints subscales and the aggressive behavior and delinquent behavior subscales, respectively. The TCP, which places a lower burden on teachers compared to the Teacher's Report Form (TRF),³⁴ consists of vignettes with descriptions of the problem behaviors of the subscales covered by the TRF.

We included a number of covariates that have been related to help-seeking in prior TRAILS studies and that either could be assumed constant throughout adolescence or were measured consistently over time: sex, age at parental separation, lifetime parental internalizing and externalizing problems at T1, and parental socioeconomic position at T1.^{12,19,36-38} Parental internalizing (depression and anxiety) and externalizing (substance abuse and antisocial behavior) problems were assessed using the Brief TRAILS Family History Interview, administered as part of the parent interview at baseline.^{37,39} Each syndrome was assessed using a vignette describing its main *DSM-IV* characteristics, followed by questions regarding occurrence, treatment, and medication (or, in case of antisocial behavior, police arrest and criminal record). For each syndrome, each parent was assigned to 1 of the following categories: "No" (0); "Yes" (1); or "Yes, and treatment and/or medication or police arrest and/or criminal record" (2). Syndromes were combined into measures of familial vulnerability for internalizing and externalizing problems separately using a weighted sum score. Weights were based on path coefficients for genetic risk factors found by Kendler et al.⁴⁰ Following Veenstra et al,³⁷ we calculated familial vulnerability for internalizing problems as $0.54 \times (\text{depression mother} + \text{depression father}) + 0.43 \times (\text{anxiety mother} + \text{anxiety father})$ and familial vulnerability for externalizing problems as $0.61 \times (\text{substance abuse mother} + \text{substance abuse father}) + 0.47 \times (\text{antisocial behavior mother} + \text{antisocial behavior father})$. We also included a dummy variable for being 18 to 21 years old as a proxy for the transition from child and adolescent to adult mental health care.⁴¹ Parental separation and being 18 to 21 years old were included as time-dependent covariates. We limited the number of covariates in our study because the evidence for many possible predictors of help-seeking is very inconsistent.⁴²⁻⁴⁴

Analyses

Complete data were available from 25.7% of the included adolescents. The proportion of missing values ranged from 0% to 59% per variable, with variables from later waves typically having higher proportions of missing values (see Supplementary Table 2). Overall, 10.7% of all data points were missing. We used multiple imputation⁴⁵ to generate 50 complete datasets using predictive mean matching. The imputation model contained the exposures and covariates from the analyses in addition to various auxiliary variables assessed at T1 (see Supplementary Table 1).

We used Cox regression analyses⁴⁶ to test the relations between self-, parent-, and teacher-reported internalizing and externalizing problems and initial specialist care. First, we estimated the unadjusted effects for each predictor with a Cox regression analysis. All reports of problem behavior from the same type were entered into the Cox regression analysis simultaneously for each informant separately (eg, self-reported internalizing problems at ages 11, 13, 16, and 19 years), as reports from different waves never predicted specialist care at the same time point. Thereafter, we estimated fully adjusted effects by including the sociodemographic covariates and all reports of internalizing and externalizing problems in one Cox regression analysis. In general, problems reported at wave T were modeled as predictors of initial specialist care between waves T and T + 1. Initial specialist care between T4 and December 31, 2011, was predicted only by self-reported problems at T4. Data were censored if participants had moved out of the area covered by the register or if they had had no contact with specialist care by December 31, 2011. Continuous measures were standardized to mean = 0 and SD = 1. We used Kaplan-Meier plots⁴⁷ to illustrate the relationship between internalizing and externalizing problems and initial specialist care for each informant. The analyses were conducted using SPSS version 23.0.⁴⁸

RESULTS

The annual incidence of specialist care fluctuated around 1.5% from ages 10 to 14 years, increased to around 2.3% from ages 14 to 17 years, and varied between 1.3% and 2.2% from ages 17 to 21 years.

Results from the Cox regression analyses are shown in Table 1. Unadjusted, all but 2 measures of self-, parent-, and teacher-reported problems were associated with initial specialist care. These unadjusted associations are illustrated in Figure 1 (internalizing problems) and Figure 2 (externalizing problems). Hazard ratios for internalizing problems were typically larger than for externalizing problems. In the fully adjusted model, all effects for externalizing problems lost significance. Regarding internalizing problems, the informant who best predicted initial specialist care shifted over time. Teacher reports predicted initial specialist care mainly from ages 11 to 13 years and to a lesser extent from ages 13 to 16 years. Parent reports predicted initial specialist care mainly from ages

Table 1. Cox Regression Analyses Predicting the Effects of Standardized Self-, Parent-, and Teacher-Reported Internalizing and Externalizing Problems on Initial Specialist Mental Health Care Use From Late Childhood^a Through Early Adulthood^b

Variable	Unadjusted Effects HR (95% CI), <i>P</i>	Adjusted Effects ^c HR (95% CI), <i>P</i>
Sociodemographic covariates		
Male	3.12 (1.75–5.54), <.001	2.64 (1.46–4.76), .001
Male × time ^d	0.80 (0.74–0.88), <.001	0.85 (0.78–0.93), <.001
Separated parents ^d	2.14 (1.68–2.72), <.001	1.44 (1.10–1.88), .008
Parental internalizing problems (z score)	1.32 (1.19–1.46), <.001	1.19 (1.06–1.33), .002
Parental externalizing problems (z score)	1.18 (1.09–1.27), <.001	1.03 (0.93–1.14), .579
Low parental SEP	2.24 (1.57–3.21), <.001	1.48 (1.01–2.19), .045
Middle parental SEP	1.71 (1.24–2.36), .001	1.40 (1.01–1.95), .043
Aged 18–21 years ^d	0.47 (0.24–0.91), .026	0.49 (0.25–0.97), .040
Self-reported problem behavior (YSR/ASR; z score)^a		
Internalizing age 11 → Specialist care age 11–13 ^e	1.10 (0.84–1.44), .486	1.00 (0.71–1.39), .984
Internalizing age 13 → Specialist care age 13–16 ^f	1.60 (1.34–1.91), <.001	1.05 (0.81–1.36), .715
Internalizing age 16 → Specialist care age 16–19 ^g	1.95 (1.64–2.33), <.001	1.61 (1.25–2.08), <.001
Internalizing age 19 → Specialist care age 19–21 ^h	1.96 (1.58–2.44), <.001	1.50 (1.10–2.05), .011
Externalizing age 11 → Specialist care age 11–13 ^e	1.34 (1.06–1.71), .015	1.18 (0.86–1.62), .300
Externalizing age 13 → Specialist care age 13–16 ^f	1.61 (1.35–1.92), <.001	1.27 (0.98–1.65), .074
Externalizing age 16 → Specialist care age 16–19 ^g	1.48 (1.23–1.79), <.001	1.00 (0.75–1.32), .991
Externalizing age 19 → Specialist care age 19–21 ^h	1.78 (1.41–2.23), <.001	1.39 (0.99–1.95), .055
Parent-reported problem behavior (CBCL; z score)^{a,b}		
Internalizing age 11 → Specialist care age 11–13 ^e	1.11 (0.85–1.45), .432	0.77 (0.54–1.07), .123
Internalizing age 13 → Specialist care age 13–16 ^f	1.89 (1.64–2.19), <.001	1.47 (1.13–1.91), .004
Internalizing age 16 → Specialist care age 16–19 ^g	1.92 (1.61–2.28), <.001	1.05 (0.74–1.49), .774
Externalizing age 11 → Specialist care age 11–13 ^h	1.50 (1.21–1.86), <.001	1.31 (0.96–1.78), .087
Externalizing age 13 → Specialist care age 13–16 ^f	1.69 (1.46–1.95), <.001	1.06 (0.80–1.39), .693
Externalizing age 16 → Specialist care age 16–19 ^g	1.77 (1.50–2.10), <.001	1.41 (0.98–2.02), .064
Teacher-reported problem behavior (TCP; z score)^{a,b}		
Internalizing age 11 → Specialist care age 11–13 ^e	1.59 (1.28–1.97), <.001	1.57 (1.22–2.02), <.001
Internalizing age 13 → Specialist care age 13–16 ^f	1.74 (1.46–2.09), <.001	1.36 (1.08–1.70), .008
Internalizing age 16 → Specialist care age 16–19 ^g	1.58 (1.30–1.94), <.001	1.26 (0.98–1.62), .074
Externalizing age 11 → Specialist care age 11–13 ^h	1.45 (1.20–1.73), <.001	1.09 (0.86–1.39), .460
Externalizing age 13 → Specialist care age 13–16 ^f	1.38 (1.17–1.62), <.001	1.14 (0.92–1.40), .227
Externalizing age 16 → Specialist care age 16–19 ^g	1.32 (1.08–1.61), .006	1.10 (0.83–1.44), .512

^aMean (SD) age = 9.4 (0.6) years for late childhood. Specialist care prior to age 11 not predicted by problem behavior.
^bMean (SD) age = 21.4 (0.6) years for early adulthood. Specialist care after age 19 not predicted by parent- and teacher-reported problem behavior.
^cEffects adjusted for both sociodemographic covariates and (other) internalizing and externalizing problems at the same time point.
^dTime-dependent predictors.
^eAge 11 represents T1 (mean [SD] age = 11.1 (0.6) years; range, 10–12 years).
^fAge 13 represents T2 (mean [SD] age = 13.6 [0.5] years; range, 12–15 years).
^gAge 16 represents T3 (mean [SD] age = 16.3 [0.7] years; range, 15–17 years).
^hAge 19 represents T4 (mean [SD] age = 19.1 [0.6] years; range, 18–20 years).
Abbreviations: ASR = Adult Self-Report, CBCL = Child Behavior Checklist, CI = confidence interval, HR = hazard ratio, SEP = socioeconomic position, TCP = Teacher Checklist of Psychopathology, YSR = Youth Self-Report.

13 to 16 years. Self-reports predicted initial specialist care mainly from ages 16 to 19 years and from ages 19 to 21 years.

Boys were more likely than girls to enter into specialist care around the age of 10 years, but this relation reversed over time. Experiencing a parental separation and coming from a low or middle socioeconomic background increased the risk of entering into specialist care, as did internalizing problems of the parents. Finally, the hazard of entering into specialist care between the ages of 18 to 21 years was halved compared to between the ages of 9 to 17 years.

Post hoc Analyses

To better understand our findings, we re-estimated the effects for each informant separately while simultaneously

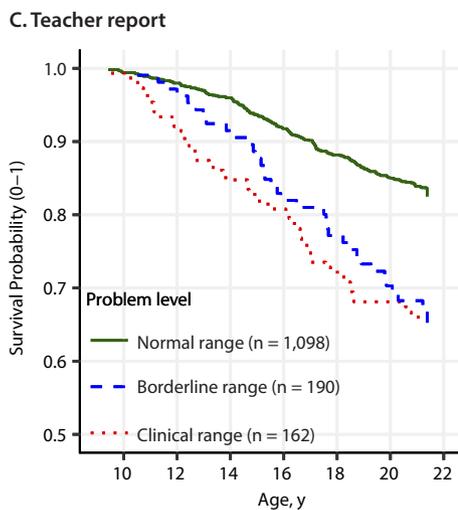
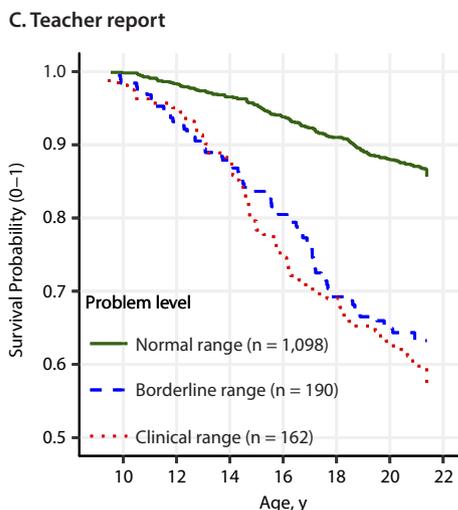
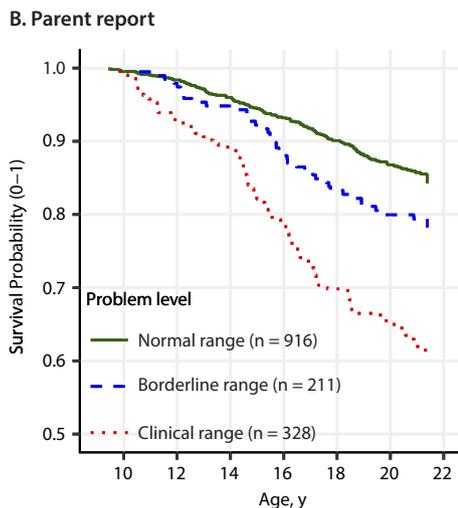
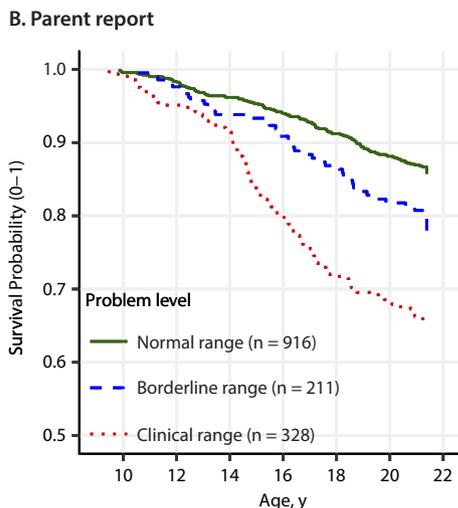
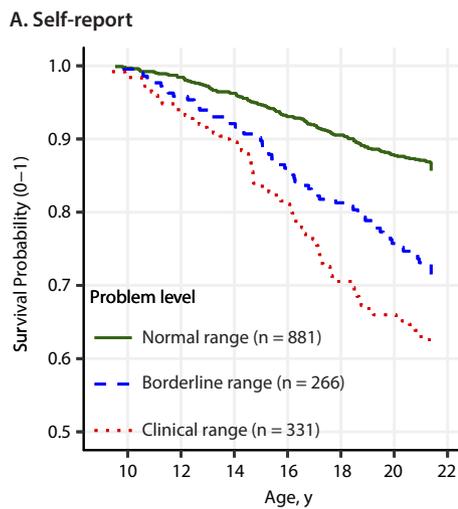
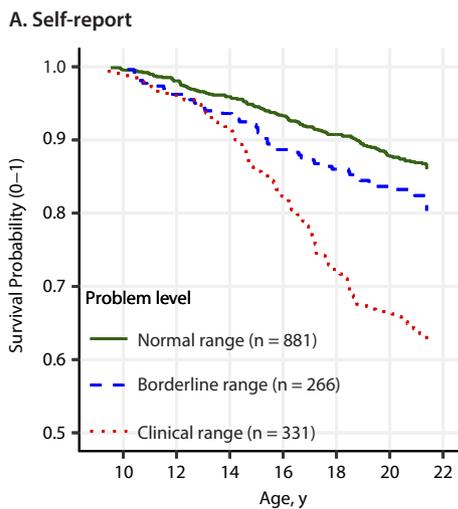
including internalizing and externalizing problems as well as the effects for internalizing and externalizing problems separately while simultaneously including all 3 informants (see Supplementary Table 3). All effects were adjusted for sociodemographic covariates. The analyses for each informant separately showed that although the effects of externalizing problems often remained statistically significant, these were considerably weaker than the effects of internalizing problems. The analyses for internalizing and externalizing problems separately both showed the same temporal pattern as was found in the full model.

In a second post hoc analysis, we included the 170 children with parent-reported specialist care before 2000 (see Supplementary Table 4). Differences were negligible compared to the effects reported in Table 1. Most notably,

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Figure 1. Internalizing Problem Behaviors in Adolescents as Noted by (A) Self-Report, (B) Parent Report, and (C) Teacher Report

Figure 2. Externalizing Problem Behaviors in Adolescents as Noted by (A) Self-Report, (B) Parent Report, and (C) Teacher Report



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externalizing problems remained unassociated with initial specialist care in the fully adjusted model.

To account for the possibility that specialist care was initiated for attention problems rather than externalizing problems, we added self-, parent-, and teacher-reported attention problems in a third post hoc analysis (see Supplementary Table 5). Attention problems did not predict initial specialist care, and the hazard rates of internalizing and externalizing problems were only fractionally lower compared to those reported in Table 1.

Overall, the post hoc analyses support the substantive conclusions.

DISCUSSION

This study contributes to the literature on determinants of help-seeking in adolescence because of 2 unique features: (1) it combined assessments of mental health from the perspectives of adolescents themselves, their parents, and their teachers, and (2) it used successive measurements of mental health at ages 11, 13, 16, and 19 years. The data were linked to administrative records of specialist care. Initial specialist care at ages 11 to 13, 13 to 16, and 16 to 19 years was predicted best by teacher-reported internalizing problems at age 11 years, parent-reported internalizing problems at age 13 years, and self-reported internalizing problems at age 16 years, respectively. Furthermore, externalizing problems no longer predicted initial specialist care at any age once we adjusted for internalizing problems.

When interpreting these findings, one must take 3 important limitations into consideration. First, parent and teacher ratings of problem behavior were not available at age 19. The effects of self-reported problem behavior at age 19 on initial specialist care at ages 19–21 may therefore have been overestimated. Second, almost a quarter of TRAILS participants did not consent to link their data to the case register, partially due to attrition. Although attrition is typically higher in vulnerable participants, TRAILS has been successful in retaining many vulnerable participants.²⁹ Furthermore, the absence of consent was not related to the presence of *DSM-IV* disorders.¹⁰ Nevertheless, the predictive value of problem behavior on initial specialist care may have been underestimated. Third, not all providers of specialist care were covered by the PCRNN. While covered services probably provided all the care that noncovered services provided, we expect that covered services additionally provided care for more severe and rare conditions. As adolescents may have used a noncovered service prior to being referred to a covered service, the recorded date of initial contact may have been too late. This would have led to conservative effect estimates overall, but not to systematic biases in the effect estimates of any informant or problem type in particular. With regard to care that is provided by both covered and noncovered services, we expect that the choice for a particular provider is mostly affected by factors that are unlikely to be associated with coverage by the PCRNN, such as proximity.⁴⁹ Specific

information regarding these factors was not available in our data.

Internalizing and externalizing problem behavior reported by adolescents, parents, and teachers independently predicted initial specialist care from preadolescence through late adolescence. Once the effects of internalizing and externalizing problems were adjusted for each other and for sociodemographic correlates, 2 important patterns emerged.

First, externalizing problems no longer predicted initial specialist care for any of the informants at any age. In childhood, help-seeking is more often initiated for externalizing than for internalizing problems because the most incident externalizing problems, such as oppositional defiant disorder and conduct disorder, are more disturbing to and therefore easier to recognize by the social environment⁵⁰ than the most incident internalizing problems, such as separation anxiety disorder and phobias. In adolescence, conversely, help-seeking is probably more often initiated for internalizing than for externalizing problems. The type of externalizing problems that may develop changes over time, from disruptive behavior in childhood to delinquency and substance use in adolescence.⁵¹ Behavior problems in childhood are often a precursor for externalizing problems in adolescence,³ and thus many adolescents with externalizing problems may have entered into specialist care already in childhood. If not, they are unlikely to enter into specialist care in adolescence, because delinquency may lead to police contact rather than specialist care. This is illustrated by a study by Farmer et al,⁵² who showed that, after school-based services, specialist mental health care was the second most common entry into mental health care for youth up to age 13, whereas juvenile justice was the second most common entry into mental health care for youth between the ages of 14 and 16. In a Finnish register-based study,⁵³ youth crime was found to be predominantly associated with antisocial personality disorder (for which evidence of conduct disorder before the age of 15 is a prerequisite according to the *DSM-IV*⁵⁴) and substance use disorders. Help-seeking for substance use is uncommon in adolescence.^{11,12,41,55} More generally, denial of externalizing problems has been shown to be a major barrier to care among young adults.⁵⁶

Internalizing problems that are highly incident in adolescence include depression and generalized anxiety disorder, for which the proportions treated are higher and the time to treatment is shorter than for other common anxiety and behavior disorders.¹² In adolescence, incident specialist care is therefore most likely due to internalizing problems. Externalizing problems very likely predicted initial specialist care when adjustment was not made for internalizing problems because both are moderately correlated²⁵ and because behavior disorders often precede mood and anxiety disorders.³

An alternative explanation for our findings could be that adolescents enter into specialist care for attention problems. However, post hoc analyses showed that when attention problems were added, the patterns we found for

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internalizing and externalizing problems did not change. This result confirms the robustness of our findings. Furthermore, attention problems did not predict specialist care when adjustment was made for internalizing and externalizing problems. A likely explanation for these findings is that in The Netherlands, adolescents with attention problems are often treated by the general practitioner instead of being referred to specialist care.⁵⁷

The second pattern that emerged from the analyses was that the relative importance of informants for best predicting initial specialist care shifted over time, from the teacher at the ages 11 to 13 years, to the parents at the ages 13 to 16 years, and to the adolescents at the ages 16 to 19 years. One should not conclude, however, that these informants do not influence the help-seeking process during the other stages in adolescence, but rather that each of these informants is the driving force behind initial specialist care at a particular stage. In early adolescence, teachers usually have close contact with the adolescents and their parents in primary education.¹⁷ Whereas parents may view certain symptoms of problem behavior as being part of their child's nature and develop coping strategies that mitigate the need for treatment, teachers may recognize such symptoms as being deviant and requiring professional help. The school network is an important support system for preadolescents,¹⁴ which, apart from providing care itself, has also been shown to play an important role in the pathway to specialist care.¹⁶ Between the ages 13 to 16 years, the incidence of specialist care was best predicted by the parents. During this stage, the teachers' influence may have declined because in secondary education adolescents typically have multiple teachers versus one main teacher in primary education.^{14,17} Concurrently, adolescents increasingly strive for autonomy, which is a major barrier to help-seeking.⁵⁸ Even if adolescents are willing to seek treatment, they still need their parents' compliance.¹⁴ Therefore, the parents remain as the most important actors for help-seeking. As the process of maturation continues, responsibilities continue to shift from parents to adolescents, thereby effectively leaving adolescents as the driving force

behind entry into specialist care from the age of 16 years to the age of 21 years.

Regarding the sociodemographic covariates, one finding worth mentioning is that from the age of 18 years to the age of 21 years, the risk of entering into specialist care is halved compared to that from the age of 9 years to the age of 17 years. Although we cannot rule out the possibility that this decrease is partially caused by the availability of only self-reported problems at age 19, this finding may point to a lower overall inclination to seek help in early adulthood compared to adolescence.⁴¹

Our study contributes to the growing body of literature that addresses the wide treatment gap in mental health care.^{10–12,59} Internalizing problems are of particular interest due to their steep increase in incidence in adolescence.^{1,3} Teachers and parents are important for recognizing and seeking help for internalizing problems in early and middle adolescence despite the fact that internalizing problems are typically more difficult to recognize than externalizing problems.²⁷ Given the importance of school-based services for entry into specialist care,^{14,16,60} the decreasing influence of teachers in middle adolescence is worrying. Strengthening the ties between teachers, parents, and adolescents may improve recognition in secondary education, thereby reducing the treatment gap in middle adolescence. The treatment gap is largest after the transition from late adolescence into early adulthood,⁴¹ most likely because during this transition young adults are switching between supportive networks by finishing education and leaving the parental home, but have not yet settled with a partner. A cost-effective means of enhancing problem recognition and help-seeking in youths, and thus reducing the treatment gap, could be provided by E-mental health.^{61,62} *E-mental health* refers to the use of information and communication technology for, among other activities, screening, health promotion, prevention, early intervention, and treatment in mental health care⁶³ and is particularly suited for reaching young people, as the internet has become an integral part of their daily lives.⁶⁴

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Supplementary Material

Article Title: Predicting Initial Specialist Mental Health Care Use in Adolescence Using Self-, Parent-, and Teacher-Reported Problem Behavior: A Prospective Community-Based Record-Linkage Study

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Supplementary Table 1. Descriptive statistics of study variables for three groups of participants: those without case register data, those who did not meet the inclusion criteria, and those who were included in the study.

	No register data (1) ^a	Excluded participants (2) ^b	Included participants (3) ^c	Group differences (<i>p</i> <.05) ^d
	Mean (SD) or %	Mean (SD) or %	Mean (SD) or %	
Sociodemographic covariates				
Male	51.9	64.1	46.5	1,2,3
Separated parents	32.5	54.7	29.0	1,3
Parental internalizing problems (Z score)	0.55 (0.83)	0.79 (0.86)	0.53 (0.77)	1,3
Parental externalizing problems (Z score)	0.20 (0.51)	0.34 (0.61)	0.10 (0.35)	1,2,3
Parental SEP (Z score)	-0.28 (0.80)	-0.25 (0.76)	0.06 (0.78)	2,3
Variables used for imputation (assessed at age 11)				
Ethnic minority	16.7	7.6	8.6	1,2
Attending special education	8.1	20.0	2.9	1,2,3
Intelligence	93.16 (14.80)	95.72 (16.18)	98.95 (14.61)	2,3
Antisocial behavior	0.36 (0.41)	0.40 (0.41)	0.29 (0.31)	2,3
Family functioning	1.80 (0.37)	1.87 (0.35)	1.75 (0.35)	1,2,3
Social behavior	14.00 (12.21)	25.41 (15.87)	10.75 (9.15)	1,2,3
Affiliation	3.85 (0.59)	3.76 (0.63)	3.90 (0.54)	3
Fear	2.47 (0.77)	2.56 (0.73)	2.39 (0.71)	2,3
Surgency	3.27 (0.98)	3.21 (1.02)	3.34 (0.89)	
Shyness	2.54 (0.90)	2.44 (0.96)	2.51 (0.87)	
Effortful control	3.16 (0.66)	2.80 (0.73)	3.30 (0.67)	1,2,3
Academic performance	3.37 (0.93)	3.28 (0.95)	3.76 (0.84)	2,3
Specialist care				
Parent-reported specialist care before 2000	12.5	100.0	–	1

Moved out of the region between T1 and 2012	8.2	8.2	8.3	
Years between 2000 and specialist care	–	3.03 (3.14)	6.52 (3.21)	3
Self-reported problems (YSR/ASR)				
Internalizing age 11	0.36 (0.26)	0.39 (0.26)	0.36 (0.23)	
Internalizing age 13	0.32 (0.25)	0.37 (0.25)	0.33 (0.24)	1,3
Internalizing age 16	0.29 (0.24)	0.40 (0.29)	0.31 (0.24)	1,3
Internalizing age 19	0.24 (0.25)	0.34 (0.29)	0.24 (0.24)	1,3
Externalizing age 11	0.27 (0.20)	0.31 (0.21)	0.27 (0.19)	1,3
Externalizing age 13	0.29 (0.22)	0.31 (0.19)	0.28 (0.19)	3
Externalizing age 16	0.32 (0.20)	0.38 (0.23)	0.31 (0.21)	1,3
Externalizing age 19	0.22 (0.21)	0.32 (0.24)	0.22 (0.20)	1,3
Parent-reported problems (CBCL)				
Internalizing age 11	0.24 (0.19)	0.35 (0.24)	0.23 (0.19)	1,3
Internalizing age 13	0.21 (0.18)	0.30 (0.22)	0.18 (0.18)	1,2,3
Internalizing age 16	0.20 (0.19)	0.30 (0.23)	0.18 (0.18)	1,3
Externalizing age 11	0.26 (0.21)	0.40 (0.27)	0.22 (0.18)	1,2,3
Externalizing age 13	0.20 (0.20)	0.30 (0.26)	0.15 (0.16)	1,2,3
Externalizing age 16	0.22 (0.23)	0.30 (0.27)	0.15 (0.17)	1,2,3
Teacher-reported problems (TCP)				
Internalizing age 11	0.40 (0.41)	0.49 (0.42)	0.28 (0.34)	1,2,3
Internalizing age 13	0.45 (0.43)	0.56 (0.49)	0.38 (0.39)	1,2,3
Internalizing age 16	0.49 (0.43)	0.55 (0.39)	0.40 (0.40)	3
Externalizing age 11	0.29 (0.44)	0.40 (0.49)	0.17 (0.33)	1,2,3
Externalizing age 13	0.28 (0.47)	0.36 (0.52)	0.21 (0.40)	2,3
Externalizing age 16	0.42 (0.57)	0.37 (0.50)	0.18 (0.35)	2,3

^aRespondents could not be included due to missing consent ($n=239$), refusal to give consent ($n=293$), no unique match ($n=2$) or missing records ($n=48$).

^bRespondents were excluded if parents reported secondary care before 2000 ($n=170$).

^c $n=1478$.

^d1: groups 1 and 2 differ; 2: groups 1 and 3 differ; 3 groups 2 and 3 differ.

^eAge 11 represents T1 represents age 11 (mean age 11.1; SD=0.6; age range 10-12 years).

^fAge 13 represents T2 (mean age 13.6; SD=0.5; age range 12-15 years).

^gAge 16 represents T3 (mean age 16.3; SD=0.7; age range 15-17 years).

^hAge 19 represents T4 (mean age 19.1; SD=0.6; age range 18-20 years).

Abbreviations: ASR=Adult Self-Report; CBCL=Child Behavior Checklist; SD=standard deviation; SEP=socio-economic position; TCP=Teacher Checklist of Psychopathology; YSR=Youth Self-Report.

Supplementary Table 2. Number and percentage of cases with missing values by variable in the raw data.

	Cases with missing values
	n (%)
Sociodemographic covariates	
Male	0 (0.0)
Separated parents	0 (0.0)
Parental internalizing problems (Z score)	71 (3.2)
Parental externalizing problems (Z score)	65 (2.9)
Lowest 25% parental SEP	42 (1.9)
Middle 50% parental SEP	42 (1.9)
Highest 25% parental SEP	42 (1.9)
Self-reported problems (YSR/ASR)	
T1 Internalizing	59 (2.6)
T2 Internalizing	155 (7.0)
T3 Internalizing	588 (26.4)
T4 Internalizing	539 (24.2)
T1 Externalizing	42 (1.9)
T2 Externalizing	138 (6.2)
T3 Externalizing	569 (25.5)
T4 Externalizing	538 (24.1)
Parent-reported problems (CBCL)	
T1 Internalizing	185 (8.3)
T2 Internalizing	328 (14.7)
T3 Internalizing	734 (32.9)
T1 Externalizing	175 (7.8)
T2 Externalizing	305 (13.7)
T3 Externalizing	723 (32.4)

Teacher-reported problems (TCP)

T1 Internalizing	306 (13.7)
T2 Internalizing	704 (31.6)
T3 Internalizing	1308 (58.7)
T1 Externalizing	305 (13.7)
T2 Externalizing	693 (31.1)
T3 Externalizing	1301 (58.3)

Abbreviations: ASR=Adult Self-Report; CBCL=Child Behavior Checklist; SEP=socio-economic position; TCP=Teacher Checklist of Psychopathology; YSR=Youth Self-Report.

Supplementary Table 3. Cox regression analyses predicting the effects of standardized self-, parent-, and teacher-reported internalizing and externalizing problems on initial specialist mental health care use from late childhood (mean age 9.4 years, SD=0.6)^a through early adulthood (mean age 21.4 years, SD=0.6)^b, for self-, parent-, and teacher-reported problems separately (left three columns), and for internalizing and externalizing problems separately (right two columns).

	Self-reported problems	Parent-reported problems	Teacher-reported problems	Internalizing problems	Externalizing problems
	HR (95%) <i>P</i>	HR (95%) <i>P</i>	HR (95%) <i>P</i>	HR (95%) <i>P</i>	HR (95%) <i>P</i>
Sociodemographic covariates					
Male	2.88 (1.60-5.19) <.001	2.91 (1.63-5.20) <.001	3.06 (1.71-5.47) <.001	3.09 (1.73-5.52) <.001	2.78 (1.55-4.97) <.001
Male × time ^c	0.84 (0.77-0.92) <.001	0.82 (0.75-0.89) <.001	0.81 (0.74-0.89) <.001	0.84 (0.77-0.92) <.001	0.81 (0.75-0.89) <.001
Separated parents ^c	1.56 (1.20-2.02) <.001	1.50 (1.15-1.95) .003	1.65 (1.27-2.14) <.001	1.51 (1.16-1.96) .002	1.46 (1.12-1.91) .005
Parental internalizing problems (Z score)	1.26 (1.13-1.40) <.001	1.17 (1.05-1.31) .005	1.23 (1.11-1.38) <.001	1.17 (1.05-1.31) .005	1.23 (1.10-1.37) <.001
Parental externalizing problems (Z score)	1.03 (0.94-1.14) .482	1.03 (0.93-1.13) .581	1.03 (0.93-1.13) .610	1.05 (0.95-1.16) .330	1.00 (0.91-1.10) .959
Low parental SEP	1.81 (1.25-2.63) .002	1.65 (1.13-2.40) .010	1.54 (1.05-2.25) .028	1.62 (1.11-2.36) .013	1.62 (1.11-2.38) .012
Middle parental SEP	1.48 (1.07-2.05) .019	1.43 (1.03-1.98) .032	1.41 (1.02-1.96) .039	1.45 (1.05-2.01) .025	1.43 (1.03-1.98) .033
Age 18-21 ^c	0.51 (0.26-0.99) .045	0.47 (0.24-0.92) .028	0.44 (0.23-0.86) .017	0.46 (0.23-0.91) .025	0.48 (0.25-0.94) .031
Self-reported problems (YSR/ASR)					
Internalizing age 11 → Specialist care age 11-13 ^d	0.97 (0.71-1.31) .828			1.09 (0.82-1.44) .563	
Internalizing age 13 → Specialist care age 13-16 ^e	1.35 (1.10-1.67) .004			1.13 (0.90-1.41) .308	
Internalizing age 16 → Specialist care age 16-19 ^f	1.68 (1.37-2.07) <.001			1.54 (1.24-1.91) <.001	

Internalizing age 19 → Specialist care age 19-21 ^g	1.48 (1.09-2.02) .013	1.82 (1.46-2.28) <.001
Externalizing age 11 → Specialist care age 11-13 ^d	1.29 (0.97-1.71) .075	1.13 (0.87-1.47) .353
Externalizing age 13 → Specialist care age 13-16 ^e	1.38 (1.12-1.71) .003	1.26 (1.01-1.59) .044
Externalizing age 16 → Specialist care age 16-19 ^f	1.22 (0.97-1.53) .089	1.21 (0.96-1.52) .107
Externalizing age 19 → Specialist care age 19-21 ^g	1.38 (0.99-1.93) .058	1.83 (1.44-2.33) <.001
Parent-reported problems (CBCL)		
Internalizing age 11 → Specialist care age 11-13 ^d	0.82 (0.60-1.13) .228	0.89 (0.67-1.18) .428
Internalizing age 13 → Specialist care age 13-16 ^e	1.62 (1.33-1.97) <.001	1.54 (1.26-1.87) <.001
Internalizing age 16 → Specialist care age 16-19 ^f	1.39 (1.06-1.83) .019	1.38 (1.10-1.73) .006
Externalizing age 11 → Specialist care age 11-13 ^d	1.48 (1.14-1.92) .004	1.18 (0.92-1.51) .203
Externalizing age 13 → Specialist care age 13-16 ^e	1.21 (0.98-1.49) .071	1.37 (1.14-1.64) <.001
Externalizing age 16 → Specialist care age 16-19 ^f	1.35 (1.04-1.75) .026	1.52 (1.21-1.92) <.001
Teacher-reported problems (TCP)		
Internalizing age 11 → Specialist care age 11-13 ^d	1.46 (1.15-1.85) .002	1.59 (1.26-2.01) <.001
Internalizing age 13 → Specialist care age 13-16 ^e	1.65 (1.37-1.99) <.001	1.37 (1.10-1.70) .005
Internalizing age 16 → Specialist care age 16-19 ^f	1.45 (1.17-1.79) <.001	1.26 (0.99-1.60) .063
Externalizing age 11 → Specialist care age 11-13 ^d	1.23 (1.00-1.51) .053	1.26 (1.02-1.56) .033
Externalizing age 13 → Specialist care age 13-16 ^e	1.24 (1.04-1.49) .016	1.11 (0.90-1.35) .334
Externalizing age 16 → Specialist care age 16-19 ^f	1.23 (0.99-1.52) .064	1.03 (0.81-1.30) .805

^aSpecialist care prior to age 11 not predicted by problem behavior.

^bSpecialist care after age 19 not predicted by parent- and teacher reported problem behavior.

^cTime-dependent predictors.

^dAge 11 represents T1 (mean age 11.1; SD=0.6; age range 10-12 years).

^eAge 13 represents T2 (mean age 13.6; SD=0.5; age range 12-15 years).

^fAge 16 represents T3 (mean age 16.3; SD=0.7; age range 15-17 years).

^gAge 19 represents T4 (mean age 19.1; SD=0.6; age range 18-20 years).

Abbreviations: ASR=Adult Self-Report; CBCL=Child Behavior Checklist; CI=confidence interval; HR=Hazard Ratio; SD=standard deviation; SEP=socio-economic position; TCP=Teacher Checklist of Psychopathology; YSR=Youth Self-Report.

Supplementary Table 4. Cox regression analyses including children with parent-reported secondary care before 2000, predicting the effects of standardized self-, parent-, and teacher-reported internalizing and externalizing problems on initial specialist mental health care use from late childhood (mean age 9.4 years, SD=0.6)^a through early adulthood (mean age 21.4 years, SD=0.6)^b, unadjusted (left column) and adjusted for both sociodemographic covariates and (other) internalizing and externalizing problems at the same time point (right column).

	Unadjusted effects	Effects adjusted for sociodemographic covariates and (other) internalizing and externalizing problems at the same time point
	HR (95% CI)	HR (95% CI)
Sociodemographic covariates		
Male	3.63 (2.39-5.50) <.001	2.64 (1.46-4.76) .001
Male × time ^c	0.80 (0.75-0.85) <.001	0.85 (0.78-0.93) <.001
Separated parents ^c	2.12 (1.73-2.60) <.001	1.44 (1.10-1.88) .008
Parental internalizing problems (Z score)	1.32 (1.19-1.46) <.001	1.19 (1.06-1.33) .002
Parental externalizing problems (Z score)	1.18 (1.09-1.27) <.001	1.03 (0.93-1.14) .578
Low parental SEP	2.41 (1.77-3.29) <.001	1.48 (1.01-2.19) .045
Middle parental SEP	1.78 (1.35-2.37) <.001	1.40 (1.01-1.95) .043
Age 18-21 ^c	0.54 (0.29-0.99) .047	0.49 (0.25-0.96) .039
Self-reported problem behavior (YSR/ASR; Z score)		
Internalizing age 11 → Specialist care age 11-13 ^d	1.10 (0.87-1.38) .433	1.00 (0.71-1.40) .983
Internalizing age 13 → Specialist care age 13-16 ^e	1.52 (1.28-1.79) <.001	1.05 (0.81-1.36) .714
Internalizing age 16 → Specialist care age 16-19 ^f	1.82 (1.53-2.16) <.001	1.63 (1.26-2.11) <.001
Internalizing age 19 → Specialist care age 19-21 ^g	1.96 (1.59-2.43) <.001	1.52 (1.10-2.09) .011
Externalizing age 11 → Specialist care age 11-13 ^d	1.32 (1.08-1.63) .008	1.19 (0.86-1.64) .299
Externalizing age 13 → Specialist care age 13-16 ^e	1.63 (1.39-1.90) <.001	1.27 (0.98-1.65) .075

Externalizing age 16 → Specialist care age 16-19 ^f	1.51 (1.26-1.80) <.001	1.00 (0.75-1.33) .990
Externalizing age 19 → Specialist care age 19-21 ^g	1.75 (1.38-2.20) <.001	1.40 (0.99-1.99) .055
Parent-reported problem behavior (CBCL; Z score)		
Internalizing age 11 → Specialist care age 11-13 ^d	1.26 (1.02-1.56) .033	0.75 (0.53-1.08) .122
Internalizing age 13 → Specialist care age 13-16 ^e	1.82 (1.59-2.09) <.001	1.50 (1.13-1.97) .004
Internalizing age 16 → Specialist care age 16-19 ^f	1.89 (1.59-2.26) <.001	1.06 (0.73-1.52) .773
Externalizing age 11 → Specialist care age 11-13 ^d	1.79 (1.51-2.13) <.001	1.35 (0.96-1.90) .089
Externalizing age 13 → Specialist care age 13-16 ^e	1.75 (1.52-2.02) <.001	1.06 (0.79-1.44) .689
Externalizing age 16 → Specialist care age 16-19 ^f	1.82 (1.54-2.16) <.001	1.46 (0.98-2.17) .064
Teacher-reported problem behavior (TCP; Z score)		
Internalizing age 11 → Specialist care age 11-13 ^d	1.62 (1.34-1.95) <.001	1.60 (1.23-2.08) <.001
Internalizing age 13 → Specialist care age 13-16 ^e	1.72 (1.46-2.02) <.001	1.37 (1.09-1.73) .008
Internalizing age 16 → Specialist care age 16-19 ^f	1.54 (1.26-1.89) <.001	1.27 (0.98-1.64) .074
Externalizing age 11 → Specialist care age 11-13 ^d	1.55 (1.32-1.81) <.001	1.10 (0.85-1.43) .459
Externalizing age 13 → Specialist care age 13-16 ^e	1.45 (1.24-1.68) <.001	1.14 (0.92-1.42) .228
Externalizing age 16 → Specialist care age 16-19 ^f	1.31 (1.07-1.61) .009	1.10 (0.82-1.48) .511

^aSpecialist care prior to age 11 not predicted by problem behavior.

^bSpecialist care after age 19 not predicted by parent- and teacher reported problem behavior.

^cTime-dependent predictors.

^dAge 11 represents T1 (mean age 11.1; SD=0.6; age range 10-12 years).

^eAge 13 represents T2 (mean age 13.6; SD=0.5; age range 12-15 years).

^fAge 16 represents T3 (mean age 16.3; SD=0.7; age range 15-17 years).

^gAge 19 represents T4 (mean age 19.1; SD=0.6; age range 18-20 years).

Abbreviations: ASR=Adult Self-Report; CBCL=Child Behavior Checklist; CI=confidence interval; HR=Hazard Ratio; SD=standard deviation; SEP=socio-economic position; TCP=Teacher Checklist of Psychopathology; YSR=Youth Self-Report.

Supplementary Table 5. Cox regression analyses predicting the effects of standardized self-, parent-, and teacher-reported attention problems, internalizing and externalizing problems on initial specialist mental health care use from late childhood (mean age 9.4 years, SD=0.6)^a through early adulthood (mean age 21.4 years, SD=0.6)^b, with attention problems only adjusted for sociodemographic covariates (left column) and problem scores adjusted for sociodemographic covariates, attention problems, and (other) internalizing and externalizing problems at the same time point (right column).

	Attention problems adjusted for sociodemographic covariates	Attention problems adjusted for internalizing and externalizing problems, and sociodemographic covariates
	HR (95% CI) P	HR (95% CI) P
Sociodemographic covariates		
Male	2.64 (1.48-4.71) .001	2.55 (1.41-4.62) .002
Male × time ^c	0.81 (0.74-0.89) <.001	0.85 (0.77-0.92) <.001
Separated parents ^c	1.48 (1.14-1.92) .003	1.41 (1.08-1.85) .011
Parental internalizing problems (Z score)	1.21 (1.09-1.35) <.001	1.19 (1.06-1.33) .003
Parental externalizing problems (Z score)	1.01 (0.92-1.12) .789	1.03 (0.93-1.14) .584
Low parental SEP	1.68 (1.15-2.44) .007	1.47 (1.00-2.16) .049
Middle parental SEP	1.40 (1.01-1.94) .043	1.37 (0.99-1.91) .059
Age 18-21 ^c	0.46 (0.24-0.91) .024	0.49 (0.25-0.96) .038
Self- (YSR/ASR), parent- (CBCL), and teacher- reported (TCP) attention problems		
YSR attention age 11 -> Specialist care age 11-13 ^d	1.17 (0.89-1.54) .266	1.14 (0.80-1.64) .472
YSR attention age 13 -> Specialist care age 13-16 ^e	1.17 (0.92-1.49) .192	0.93 (0.67-1.29) .655
YSR attention age 16 -> Specialist care age 16-19 ^f	1.56 (1.22-1.99) <.001	1.28 (0.91-1.81) .153

ASR attention age 19 -> Specialist care age 19-21 ^g	1.76 (1.31-2.36) <.001	0.97 (0.61-1.55) .913
CBCL attention age 11 -> Specialist care age 11-13 ^d	1.32 (0.99-1.75) .057	1.30 (0.92-1.84) .137
CBCL attention age 13 -> Specialist care age 13-16 ^e	1.46 (1.18-1.81) <.001	1.07 (0.78-1.45) .681
CBCL attention age 16 -> Specialist care age 16-19 ^f	1.47 (1.16-1.85) .001	1.22 (0.86-1.74) .259
TCP attention age 11 -> Specialist care age 11-13 ^d	1.25 (0.94-1.65) .123	1.02 (0.72-1.45) .903
TCP attention age 13 -> Specialist care age 13-16 ^e	1.28 (1.01-1.62) .045	1.10 (0.82-1.47) .519
TCP attention age 16 -> Specialist care age 16-19 ^f	1.11 (0.85-1.45) .452	1.00 (0.71-1.40) .996
Self-reported problems (YSR/ASR)		
Internalizing age 11 → Specialist care age 11-13 ^d		0.95 (0.65-1.37) .769
Internalizing age 13 → Specialist care age 13-16 ^e		1.07 (0.79-1.46) .649
Internalizing age 16 → Specialist care age 16-19 ^f		1.48 (1.12-1.97) .007
Internalizing age 19 → Specialist care age 19-21 ^g		1.49 (1.06-2.10) .021
Externalizing age 11 → Specialist care age 11-13 ^d		1.13 (0.81-1.58) .463
Externalizing age 13 → Specialist care age 13-16 ^e		1.28 (0.96-1.71) .093
Externalizing age 16 → Specialist care age 16-19 ^f		0.91 (0.66-1.24) .543
Externalizing age 19 → Specialist care age 19-21 ^g		1.43 (0.97-2.11) .074
Parent-reported problem behavior (CBCL; Z score)		
Internalizing age 11 → Specialist care age 11-13 ^d		0.73 (0.52-1.03) .076
Internalizing age 13 → Specialist care age 13-16 ^e		1.48 (1.12-1.96) .006
Internalizing age 16 → Specialist care age 16-19 ^f		1.05 (0.75-1.46) .781
Externalizing age 11 → Specialist care age 11-13 ^d		1.22 (0.87-1.72) .255
Externalizing age 13 → Specialist care age 13-16 ^e		1.03 (0.77-1.39) .847
Externalizing age 16 → Specialist care age 16-19 ^f		1.23 (0.84-1.79) .283
Teacher-reported problem behavior (TCP; Z score)		
Internalizing age 11 → Specialist care age 11-13 ^d		1.55 (1.19-2.02) .001
Internalizing age 13 → Specialist care age 13-16 ^e		1.30 (1.00-1.68) .048
Internalizing age 16 → Specialist care age 16-19 ^f		1.25 (0.97-1.61) .079
Externalizing age 11 → Specialist care age 11-13 ^d		1.03 (0.78-1.36) .842
Externalizing age 13 → Specialist care age 13-16 ^e		1.13 (0.89-1.43) .322
Externalizing age 16 → Specialist care age 16-19 ^f		1.10 (0.81-1.48) .537

^aSpecialist care prior to age 11 not predicted by problem behavior.

^bSpecialist care after age 19 not predicted by parent- and teacher reported problem behavior.

^cTime-dependent predictors.

^dAge 11 represents T1 (mean age 11.1; SD=0.6; age range 10-12 years).

^eAge 13 represents T2 (mean age 13.6; SD=0.5; age range 12-15 years).

^fAge 16 represents T3 (mean age 16.3; SD=0.7; age range 15-17 years).

^gAge 19 represents T4 (mean age 19.1; SD=0.6; age range 18-20 years).

Abbreviations: ASR=Adult Self-Report; CBCL=Child Behavior Checklist; CI=confidence interval; HR=Hazard Ratio; SD=standard deviation; SEP=socio-economic position; TCP=Teacher Checklist of Psychopathology; YSR=Youth Self-Report.