

## ORIGINAL ARTICLE

## Self-reported mental health in adolescents attending school and its association with later school dropout: A prospective 2.5-year follow-up study

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### Abstract

**Aims:** Mental health problems in young people are associated with educational outcomes. There are persistent difficulties in screening for these problems and mapping the trajectories of mental health in relation to academic and work outcomes. We investigated whether Strength and Difficulties Questionnaire (SDQ) scores in adolescents attending school were associated with school dropout in upper secondary school, both in adolescents with already recognised mental disorders and adolescents without known mental disorders. **Methods:** The data consisted of a questionnaire targeting 13,100 adolescents attending the final year of compulsory school combined with data derived from a national register. SDQ scores were divided into normal, borderline and abnormal scores. School dropout in upper secondary school was identified during a 2.5-years follow-up period. We stratified the data by recognised mental disorders. Logistic regression was performed to examine the association between SDQ scores and later school dropout with adjustment for parents' mental disorders, parents' educational level, sex, suicidal thoughts, school absence and negative childhood events. **Results:** During follow-up, 18.5% of adolescents experienced school dropout. Adolescents with abnormally high SDQ scores and borderline SDQ scores had higher odds for school dropout than adolescents with SDQ scores in the normal range. The association remained in the adjusted analysis, although more covariates showed independent contributions in association with school dropout. **Conclusions: Self-reported SDQ scores in adolescents attending school were associated with later school dropout irrespective of recognised mental disorders, indicating that markers such as the SDQ might contribute to the identification of vulnerable adolescent groups, although the findings of multifactorial contributions suggest we should consider more indicators in a risk assessment for school dropout.**

**Keywords:** Adolescents, mental health, surveys and questionnaires, student dropouts, school dropout, SDQ, cohort study, education

### Background

School dropout in young people has consequences reaching into adulthood [1]. It is evident that childhood and adolescent mental disorders impact educational attainment [2]. Childhood and adolescent mental disorders increase both the risk of not completing the final examination in compulsory school

[3,4] and of dropout in upper secondary education [2,5].

Mental health problems in young people are considered to be a global public health challenge [6]. Independent of childhood and early adolescence events, concurrent and increasing mental health problems in young people have been suggested as

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risk factors for educational and vocational disengagement in young adulthood [7]. Adolescents seeking help from school health services drop out of school more frequently than their peers [8]. Evidence suggests that mental disorders in adolescence are under-diagnosed and under-treated and that emerging mental disorders in adolescence often present with a non-specific or sub-threshold psychopathology [9]. Accordingly, beyond the effect of already known mental disorders, the identification of emerging and unrecognised mental illness is important to guide interventions in adolescents to prevent progression to more severe stages of mental illness and to improve educational and social outcomes [9]. However, there are difficulties in screening for mental health problems and in mapping trajectories of mental health in relation to educational and work outcomes [10].

Among markers of child and adolescent mental health, the Strength and Difficulties Questionnaire (SDQ) is a widely used self-report general psychiatric assessment and screening tool, applied formerly in both community and clinical samples of adolescents [11–13]. In a Danish setting, the SDQ is considered valuable in the primary sector when screening for childhood and adolescent mental disorders [14]. In adolescents, SDQ scores are associated with symptoms of depression and anxiety [15]. The tool has been suggested to be valuable for screening purposes in general population samples [16].

The SDQ score level in adolescents is associated with later academic outcomes [17,18]. However, with our current knowledge, it is unknown whether high SDQ scores reflect already recognised childhood mental disorders in the association with educational outcomes, or if the SDQ score is associated with educational outcomes irrespective of already recognised and treated mental disorders. The identification of a group of adolescents vulnerable for academic decline and with potential for mental health interventions would contribute to guiding policy and practice interventions [10].

We investigated SDQ scores among Danish adolescents attending compulsory school and their possible association with later upper secondary school dropout in both adolescents with already recognised mental disorders and in adolescents without recognised mental disorders.

## Methods

### *Data and study population*

This cohort study was based on data from the Future Occupation of Children and Adolescents (FOCA) cohort. The FOCA cohort consists of a

population-based sample of 13,100 adolescents attending the graduating year in Danish compulsory school. The adolescents were included in the cohort by responding to an online questionnaire during the first months of 2017 [19]. The survey consisted of sociological, psychological and health-related questions. The mean age at the time of the survey was 15.85 years and 51.03% of the cohort were girls and 48.97% boys. A detailed description of the cohort has been reported previously [19]. All adolescents were linked to their unique personal identification number, enabling linkage to various registers through Statistics Denmark and therefore yielding a combination of self-reported data and objective data obtained through the registers.

The adolescents were included if they had responded to the SDQ questionnaire as part of the FOCA cohort and if information on educational attainment was available from the Student Register provided by Statistics Denmark [20]. Of the 13,100 adolescents from the FOCA cohort, 1903 (14.5%) had not answered the SDQ and 71 (0.5%) did not have a registration on entering upper secondary education. There was complete overlap between those not responding to the SDQ and those not registered to enter upper secondary education. This yielded a study population of 11,197 adolescents.

### *Measures*

*Exposure measures.* The mental health of the adolescents was assessed using the SDQ [11]. The SDQ is a 25-item questionnaire consisting of five domains: hyperactivity, emotional problems, peer problems, conduct problems and prosocial behaviour. Each item was marked as “not true”, “somewhat true” or “certainly true”, where “somewhat true” was scored 1 and “certainly true” and “not true” were scored either 0 or 2 depending on the wording of the statement [11]. A total difficulties score was calculated by summing the scores from four domains (hyperactivity, emotional symptoms, conduct problems and peer problems), giving a total difficulties sum score ranging from 0 to 40. The SDQ was used as a categorical variable divided into three groups based on the difficulties’ sum score: normal (score 1–14), borderline (score 15–17) and abnormal (score 18–40). The SDQ has been validated in a Danish general population sample to generate national norms and the SDQ scores were based on the Danish norms for the SDQ of 11–17-year-olds [21].

*Outcome measures.* Information on the adolescents’ educational pathways was obtained from the Student

Register and used to identify school dropout from upper secondary education [20]. The Student Register contains information at an individual level on enrolments in standard educational trajectories in Denmark, completion with and without achieved qualification, and termination prior to completion [20]. No enrolment data is registered if an adolescent does not enter any upper secondary education following compulsory school.

Dates of disconnection from the time the adolescents completed compulsory school in 2017, immediately after entering the FOCA cohort, and up until 2019 were used to identify school dropout, equalling 2.5 years of follow-up. School dropout was defined as at least one event of leaving any upper secondary education before completing a standard school year or a final exam in accordance with a previous Danish study [22]. An additional outcome measure of permanent school dropout was defined as only one event of leaving any upper secondary education before completing a standard school year or a final exam and not re-attending any upper secondary education during the study period.

*Covariates.* Sex, school absence, negative childhood events and suicidal thoughts were derived from self-reported data, where recognised mental disorders of the adolescents, mental disorders of their parents and their parents' educational level were obtained from registers.

The measure of school absence was derived from the response to two questions in the FOCA questionnaire: (translated from Danish): "Within the last month, how many full school days have you not attended due to sickness?" and "Within the last month, how many full school days/work days have you skipped?" Answers were combined into one measure determining the level of school absence and the measure was dichotomised into problematic and non-problematic absence defined as above or below 25% of the total school days during the past month due to sickness or skipping school [23].

Negative childhood events were measured by the self-report response to 10 questions of adverse childhood events (e.g. the death of a loved one) and were derived from the FOCA questionnaire. Response categories were "no", "yes, last year" or "yes, in my lifetime" and the items were scored "no" or "yes", respectively [24,25]. A missing answer was scored as "no" if the adolescent answered at least one of the other questions concerning negative childhood events [24]. Categorisations were used in accordance with previous studies as 0 events, 1–3 events, 4–7 events and 8–11 events [24]. Suicidal thoughts originated from the FOCA questionnaire. The adolescents

expressed whether they had ever thought of committing suicide by answering "yes" or "no".

Information on mental disorders was obtained from the Danish Psychiatric Central Research Register (PCRR) [26] and the Danish National Prescription Registry (DNPR) [27]. The PCRR contains information on medical diagnoses classified according to the International Classification of Diseases, 10th Revision [28], registered for all Danish inpatient admissions and outpatient contacts since 1995. Mental disorder was defined as a main diagnosis within DF00–DF99 registered during the five years before entering the FOCA cohort, corresponding to the age interval of early adolescence of the study population (10–15 years) [29].

In Denmark, outpatient secondary mental health services are divided into hospital services and private practitioners, both free of charge. The PCRR, however, captures only hospital diagnoses and for this reason data from the DNPR were added to identify mental disorders through medical prescriptions from private practitioners. The register contains individual level data on all redeemed prescriptions from Danish community pharmacies using the Anatomical Therapeutic Chemical (ATC) code [27]. At least two records of any included ATC classification code during the five-year period was defined as the presence of a mental disorder. This correlated to anxiolytics with ATC classification codes N03AE and N05B (clonazepam is traditionally used as an anxiolytic agent in Denmark), antipsychotics (ATC classification code N05A), antidepressants (ATC classification codes N06AA, N06AB and N06AX) and centrally acting sympathomimetics (ATC classification code N06BA).

A recognised mental disorder in the adolescents was identified from either the PCRR or DNPR in the five-year period and defined as a combined, dichotomous variable. Parents' mental disorders was defined in accordance with the variable of the recognised mental disorders of the adolescents based on the past five years of registrations in either PCRR or the DNPR.

The educational level of the parents was defined as the highest level of completed education and was categorised according to years in education: <10 years; 10–12 years; 13–15 years; and >15 years. Data were obtained from the Danish Education Register of Statistics Denmark [20] and the parents' educational levels were collapsed, thus only the highest educational level of one parent was applied.

### *Statistical analyses*

An initial descriptive analysis of characteristics of the 11,197 adolescents in the study population was

performed. A logistic regression analysis was used to examine the association between SDQ scores and later school dropout with stratification on recognised mental disorders. Two models were applied: model 1 consisted of a crude analysis testing the association between SDQ score and school dropout; model 2 was further adjusted for sex, school absence, negative childhood events, suicidal thoughts, parents' mental disorders and parents' educational level. If a required covariate was missing, then the case was excluded from the adjusted analyses and the total number included was presented in the table heading.

A sub-analysis was performed applying an outcome measure of school dropout restricted to the registration of leaving an upper secondary education before completion with no subsequent enrolment in any other education during the follow-up period to represent permanent school dropout. The results are presented as odds ratios (OR) with the corresponding 95% confidence interval (CI).

Spearman's rank correlation test was used to test for correlation of all variables to evaluate individual contributions. A non-respondent analysis was carried out to test for differences in the characteristics between the respondents and the non-respondents. All analyses were performed using STATA v. 15.1.

## Results

The characteristics of the study population are shown in Table I. The SDQ scores were distributed among the 11,197 adolescents, with 80.56% in the normal range, 8.98% in the borderline range and 10.46% in the abnormal range. School dropout was seen in 2074 (18.52%) adolescents during the follow-up period. Among the adolescents experiencing school dropout, 1444 (69.62%) had SDQ scores in the normal range, 259 (12.49%) had SDQ scores in the borderline range and 371 (17.89%) had SDQ scores in the abnormal range. The distribution of SDQ categories (normal versus borderline and abnormal) yielded a sensitivity of 0.30, a specificity of 0.83 and a positive predictive value of 0.29 for school dropout (Supplementary Table S1, available online).

The correlation analysis confirmed the individual contribution of the applied variables with no correlation higher than a Spearman's rho of 0.3. All Spearman rank-order correlations were significant with  $p < 0.05$ , except for the rank-order correlation between the covariates suicidal thoughts and parents' educational level (results not shown).

Among adolescents without recognised mental disorders, the unadjusted regression analysis yielded an OR of 2.26 (95% CI 1.93–2.65) for school dropout

among those with abnormal SDQ score, with the corresponding OR of 1.60 (95% CI 1.34–1.91) for those with borderline range SDQ (Table II). In the adjusted analysis, the association remained significant for those with abnormal SDQ score yielding an OR of 1.64 (95% CI 1.34–1.99) and for borderline SDQ scores yielding an OR of 1.25 (95% CI 1.01–1.54).

For the adolescents without recognised mental disorders, the covariates of sex, school absence, suicidal thoughts, parents' educational level and parents' mental disorders were significantly associated with school dropout in the adjusted model. For those with recognised mental disorder, parental educational level was significantly associated with school dropout and school absence was borderline significantly associated with school dropout in the adjusted model.

In the sub-analysis considering the incidence of permanent dropout, in all 100 adolescents without recognised mental disorders (1.00%) and 68 adolescents with recognised mental disorders (5.48%), a statistically significant association was found between the SDQ scores and permanent dropout for adolescents without recognised mental disorders, yielding an OR of 2.93 (95% CI 1.77–4.85) for school dropout among those with abnormal SDQ scores and a corresponding OR of 2.17 (95% CI 1.22–3.89) among those with borderline SDQ scores. For adolescents with recognised mental disorders, a significant association was found for permanent dropout only among those with abnormal scores, yielding an OR of 2.43 (95% CI 1.42–4.19). In the fully adjusted analysis, no significant association was found between the SDQ score and permanent dropout in either those with or without recognised mental disorders (results not shown).

Compared with the respondents to the SDQ, non-respondents were more likely to be boys (58.59%), have parents with a lower educational level (7.93% <10 years), experience school dropout (22.60%) and experience permanent dropout during the follow-up period (2.79%) (Supplementary Table S2).

## Discussion

The SDQ scores among adolescents attending school were associated with dropout in upper secondary education across subgroups of already recognised mental disorders and considering other relevant psychosocial factors. This indicates that the self-assessed SDQ can predict upper secondary educational disconnection in adolescents with no recognised mental disorders. This suggests that the SDQ could be a potential marker for emerging or unrecognised mental health problems that may influence future educational trajectories.



Table I. Characteristics of the study population.

	Adolescents without mental disorders ( <i>N</i> = 9956)	Adolescents with mental disorders ( <i>N</i> = 1241) <sup>a</sup>	Total ( <i>N</i> = 11,197)
<b>Sex</b>			
Male	4709 (47.30)	591 (47.62)	5300 (47.33)
Female	5247 (52.70)	650 (52.38)	5897 (52.67)
<b>Age (years)</b>	15.82±0.41	15.95±0.49	15.83±0.42
<b>SDQ: Total difficulties sum score</b>			
Normal	8272 (83.09)	748 (60.27)	9020 (80.56)
Borderline	815 (8.19)	191 (15.39)	1006 (8.98)
Abnormal	869 (8.73)	302 (24.34)	1171 (10.46)
<b>School absence (%)<sup>b</sup></b>			
Non-problematic	8375 (84.12)	862 (69.46)	9237 (82.50)
Problematic	1007 (10.11)	243 (19.58)	1250 (11.16)
Missing	574 (5.77)	136 (10.96)	710 (6.34)
<b>No. of negative life events</b>			
0	1073 (10.78)	107 (8.62)	1180 (10.54)
1–3	6472 (65.01)	660 (53.18)	7132 (63.70)
4–7	1723 (17.31)	337 (27.16)	2060 (18.40)
8–11	244 (2.45)	68 (5.48)	312 (2.79)
Missing	444 (4.46)	69 (5.56)	513 (4.58)
<b>Suicidal thoughts<sup>c</sup></b>			
No	7663 (76.97)	669 (53.91)	8332 (74.41)
Yes	2207 (22.17)	554 (44.64)	2761 (24.66)
Missing	86 (0.86)	18 (1.45)	104 (0.93)
<b>Parents' educational level (years)<sup>d</sup></b>			
<10	464 (4.66)	106 (8.54)	570 (5.09)
10–12	4074 (40.92)	554 (44.64)	4628 (41.33)
13–15	3641 (36.57)	399 (32.15)	4040 (36.08)
>15	1611 (16.18)	170 (13.70)	1781 (15.91)
Missing	166 (1.67)	12 (0.97)	178 (1.59)
<b>Parents' mental disorders<sup>a</sup></b>			
No	7192 (72.24)	678 (54.63)	7870 (70.29)
Yes	2764 (27.76)	563 (45.37)	3327 (29.71)
<b>Event of school dropout during follow-up</b>			
No	8293 (83.30)	830 (66.88)	9123 (81.48)
Yes	1663 (16.70)	411 (33.12)	2074 (18.52)
<b>Permanent school dropout during follow-up</b>			
No	9856 (99.00)	1173 (94.52)	11,029 (98.50)
Yes	100 (1.00)	68 (5.48)	168 (1.50)

Data presented as mean±SD values or No. (%).

<sup>a</sup>Based on registrations in the PCRR and DNPR of diagnoses or medical prescriptions in the preceding five years.

<sup>b</sup>Problematic school absence is >25% in the preceding month, self-report.

<sup>c</sup>Lifetime presence, self-report.

<sup>d</sup>Based on the parent with the highest educational status.

The study findings of association between SDQ scores and school dropout are in line with a previous study [17], although these workers used SDQ scores divided into subscales of externalising and internalising mental health problems. We investigated the total difficulties SDQ scores with bandings in accordance with the original use of the instrument to detect broadband psychiatric diagnoses as presented by Goodman et al. [11]. This study adds to the evidence of the SDQ by showing that it was a marker related to educational outcomes irrespective of recognised mental disorders.

There is no literature-based golden standard for the measurement of school dropout [1,2,5,22]. The definition used in our study is in accordance with that applied

in another Danish study by Hjorth et al. [22] using the event of leaving education before completion, with the caveat that the disconnection could be due to transfer to another types of education. We therefore applied an additional outcome measure in the sub-analysis of permanent dropout. The sub-analysis showed that the SDQ scores were associated with permanent school dropout during the follow-up period in both strata of recognised mental disorders. However, in the adjusted analysis, the SDQ scores were not significantly associated with permanent dropout when stratified for recognised mental disorder. Because permanent school dropout was only found among a small proportion of the study population, these findings should be interpreted with caution. Nevertheless, our findings

Table II. Odds ratios for event of upper secondary school dropout in follow-up ( $N = 9847$ ).

	Adolescents without mental disorders		Adolescents with mental disorders <sup>a</sup>	
	Unadjusted ( $n = 9956$ )	Adjusted <sup>b</sup> ( $n = 8820$ )	Unadjusted ( $n = 1241$ )	Adjusted <sup>b</sup> ( $n = 1027$ )
<b>SDQ</b>				
Normal	1.00	1.00	1.00	1.00
Borderline	1.60 (1.34–1.91)	1.25 (1.01–1.54)	1.88 (1.36–2.62)	1.70 (1.16–2.49)
Abnormal	2.26 (1.93–2.65)	1.64 (1.34–1.99)	1.82 (1.38–2.41)	1.46 (1.02–2.09)
<b>Sex</b>				
Female		1.00		1.00
Male		1.32 (1.17–1.49)		1.22 (0.92–1.62)
<b>School absence<sup>c</sup></b>				
Non-problematic		1.00		1.00
Problematic		1.87 (1.59–2.21)		1.38 (1.00–1.92)
<b>No. of negative life events</b>				
0		1.00		1.00
1–3		0.92 (0.76–1.12)		0.62 (0.39–0.99)
4–7		1.33 (1.07–1.66)		0.78 (0.47–1.30)
8–11		1.25 (0.85–1.82)		0.80 (0.39–1.62)
<b>Suicidal thoughts<sup>d</sup></b>				
No		1.00		1.00
Yes		1.26 (1.09–1.45)		1.07 (0.80–1.44)
<b>Parents' educational level (years)<sup>e</sup></b>				
>15		1.00		1.00
13–15		1.08 (0.89–1.31)		1.60 (1.01–2.53)
10–12		1.49 (1.24–1.79)		1.46 (0.93–2.29)
<10		3.01 (2.29–3.95)		2.01 (1.09–3.71)
<b>Parents' mental disorders<sup>a</sup></b>				
No		1.00		1.00
Yes		1.27 (1.12–1.44)		1.19 (0.90–1.56)

Data presented as mean  $\pm$  SD values or No. (%).

<sup>a</sup>Based on registrations in the PCRR and DNPR of diagnoses or medical prescriptions in the preceding five years.

<sup>b</sup> $N = 9847$  due to missing data of applied covariates.

<sup>c</sup>Problematic school absence is more than 25% in the preceding month, self-report.

<sup>d</sup>Life time presence, self-report.

<sup>e</sup>Based on the parent with the highest educational status.

support the findings by Hjort et al. [22] that early school leavers have the highest self-rated poor mental health.

In addition to the primary outcome, an association among school absence, parental educational level and childhood negative events with later school dropout was identified for adolescents with and without recognised mental disorders. An association of sex, negative life events, suicidal thoughts and parents' mental disorders with school dropout was identified for those without a recognised mental disorder. This suggests a multifactorial vulnerability to school dropout in adolescence. The SDQ scores and the covariates had a low shared variance, thereby indicating independent contributions in the association with school dropout.

#### *Strengths and limitations*

Among the strengths of the study was the use of national register data with no loss to follow-up on school dropout.

The FOCA cohort has been found to be representative of the general Danish population of adolescents and the exposure measure SDQ is a validated instrument. The distribution of SDQ scores corresponded acceptably to reports in national norms [21].

A limitation of the study is the short follow-up period of 2.5 years after completion of compulsory school; as a consequence, information was unavailable regarding whether the adolescents who dropped out of school managed to complete upper secondary school. School dropout, as defined here, could be transient and followed by an on-track educational path. In addition, only those adolescents who entered secondary education after compulsory school were included in the study. A small proportion, even more severely disconnected from secondary educational institutions, was therefore not included in the study. However, only 0.5 % of the total cohort did not enter upper secondary education.

Adolescents from the FOCA cohort were excluded from the study if they did not respond to the SDQ,

possibly causing selection bias. The non-respondent analysis showed a difference in characteristics between the respondents and non-respondents. Non-respondents were more likely to experience school dropout and had parents with lower education levels. The available data from the non-respondents are in line with the findings of the respondents. However, there was a large difference in size between the groups of respondents and non-respondents, limiting the conclusions drawn from the analysis. In addition, the covariates derived from the questionnaire were not controlled for in the analysis of the non-respondents due to overlap with missing data on the SDQ.

The stratified analysis showed a consistent association between the SDQ scores and later dropout in both groups. By contrast, the correlation analysis indicated a low shared variance between the SDQ and recognised mental disorders. A reason for this discrepancy could be a reduced symptomatology in those with recognised mental disorders due to treatment interventions, although this remains unknown. It is equally unknown whether the adolescents with high SDQ scores in this study truly had current mental health problems. Measuring mental health problems with self-report as opposed to assessment by a mental health professional could differ in reaching a population eligible for mental health interventions, even though it is useful in detecting adolescents at risk of school dropout. In support of the use of the SDQ to detect current mental health problems are the findings of the scores to satisfactorily predict mental disorders [30]. Interpretation of the study findings is limited by its design to identify an association.

Further research investigating in-school interventions based on mental health markers such as the SDQ is needed to investigate the possible preventive effect on later educational disconnection. Further evaluation would be required for those with high SDQ scores to identify whether the SDQ did target a relevant population at risk of mental health problems given the moderate specificity of the instrument (0.83). Consequently, to prevent later educational outcomes, the use of markers such as the SDQ to screen young people in school settings would require referral protocols embedded in schools with the possibility of professional evaluation. Considering other contributing factors with the multifactorial vulnerability to school dropout in adolescents, in addition to the findings of the rather low sensitivity of the instrument (0.30) with a positive predictive value of 0.29, suggests the relevance of including more indicators to identify an at-risk group in terms of educational outcomes.

It will be valuable to follow more long-term educational outcomes and mental health trajectories in the cohort to disentangle the possible potential of the SDQ

and additional measures as indicators of educational outcomes. However, if screening with relatively simple questionnaires such as the SDQ can identify adolescents at risk of developing mental disorders, it has a great potential to address a severe public health problem.

## Conclusions

Among adolescents attending school, self-reported SDQ scores were associated with later school dropout in adolescents with and without recognised mental disorders. The findings indicate that the SDQ might contribute to the identification of a group with possible unmet mental health needs and vulnerable for future educational disconnection; however, a multifactorial vulnerability was identified and suggests the relevance of including more indicators in such early risk assessments.

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## Supplemental material

Supplemental material for this article is available online.

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