

## University of Groningen

### **Intra-arterial thrombolytics during endovascular thrombectomy for acute ischaemic stroke in the MR CLEAN Registry**

MR CLEAN Registry Investigators; Collette, Sabine L; Bokkers, Reinoud P H; Mazuri, Aryan; Lycklama À Nijeholt, Geert J; van Oostenbrugge, Robert J; LeCouffe, Natalie E; Benali, Faysal; Majoie, Charles B L M; de Groot, Jan Cees

*Published in:*  
Stroke and vascular neurology

*DOI:*  
[10.1136/svn-2022-001677](https://doi.org/10.1136/svn-2022-001677)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2023

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

MR CLEAN Registry Investigators, Collette, S. L., Bokkers, R. P. H., Mazuri, A., Lycklama À Nijeholt, G. J., van Oostenbrugge, R. J., LeCouffe, N. E., Benali, F., Majoie, C. B. L. M., de Groot, J. C., Luijckx, G. J. R., & Uyttenboogaart, M. (2023). Intra-arterial thrombolytics during endovascular thrombectomy for acute ischaemic stroke in the MR CLEAN Registry. *Stroke and vascular neurology*, 8, 17-25. Advance online publication. <https://doi.org/10.1136/svn-2022-001677>

**Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

**Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



# Developmental monitoring: benefits of a preventive health care system

Meinou H. C. Theunissen<sup>1</sup> · Janine Bezem<sup>1,2</sup> · Sijmen A. Reijneveld<sup>1,3</sup> · Mariska Klein Velderman<sup>1</sup>

Received: 29 March 2022 / Revised: 19 July 2022 / Accepted: 21 July 2022

© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

## Abstract

This study aims to assess the identification rates in a developmental monitoring system (i.e., preventive child healthcare, PCH system) regarding identification of emotional, behavioral (EB) problems, cognitive developmental and family problems in children, and the contribution of such a system to referral to (specialized) mental health and social care services. Over a predetermined period of 6 months, we retrieved data from a random sample of 1370 children aged 0 to 18 years from the registries of two PCH organizations in the Netherlands. We assessed the degree to which PCH professionals identify EB and cognitive developmental and family problems and invite children with these problems for follow-up PCH assessments or refer them to (specialized) mental health and social care services. Among preschool-aged children, we identified 22% with EB problems, cognitive developmental and/or family problems (mainly EB and family problems). Among school-aged children, numbers varied from 10 to 14% (mainly EB). PCH invited 3 to 10%, varying in proportions of child age, for a follow-up assessment, and referred 0 to 4% of the children to external services.

**Conclusion:** A developmental monitoring system with only preventive tasks may help to identify children with EB, cognitive developmental, and/or family problems. This can lead to early support for most of these children, with low referral rates to (more specialized) mental health and social care services. Our findings deserve validation in comparable settings and in other countries.

## What is Known:

- Well-child care requires monitoring of the health and development of children for timely identification of problems and subsequent intervention.
- The Dutch Preventive Child Healthcare system is an example of a developmental monitoring system with only preventive tasks.

## What is New:

- A developmental monitoring system with only preventive tasks may help to identify children with problems, resulting in early support for the majority.
- This may reduce referral rates to (more specialized) mental/social health services.

**Keywords** Screening · Referral · Well-child care · Children · Emotional behavioral problems · Family problems

## Abbreviations

EB Emotional behavioral  
CHP Child healthcare professional

KIVPA Short Indicative Questionnaire for Psychosocial problems among Adolescents  
PCH Preventive child healthcare  
SDQ Strengths and Difficulties Questionnaire  
SES Socioeconomic status

Communicated by Gregorio Paolo Milani

✉ Meinou H. C. Theunissen  
Meinou.Theunissen@tno.nl

Janine Bezem  
Janine.bezem@vggm.nl

Sijmen A. Reijneveld  
s.a.reijneveld@umcg.nl

Mariska Klein Velderman  
Mariska.Kleinvelderman@tno.nl

<sup>1</sup> TNO Child Health, P. O. Box 3005, 2301 DA Leiden, Netherlands

<sup>2</sup> Department Preventive Youth Health Care, Municipal Health Service Gelderland-Midden, Gelderland-Midden, Netherlands

<sup>3</sup> University Medical Center Groningen, Department of Health Sciences, University of Groningen, Groningen, Netherlands

## Introduction

Many children suffer from emotional and behavioral (EB) problems, [1, 2] or cognitive developmental problems, or grow up in unfavorable family settings. Unfavorable family settings regard limited parental skills or inadequate parenting styles, and/or insecure parent–child relationships (hereafter referred to as “family problems”). Children with EB problems, cognitive developmental problems, and/or family problems may, in various aspects of their daily functioning, experience difficulties which may be severe and persistent [3] and, in combination, be even more detrimental than any separate condition [3].

Identifying children who need support and treatment for EB or cognitive developmental and/or family problems is a crucial aspect of a developmental monitoring system. In a developmental monitoring system, the physical, psychosocial, and cognitive development of children is monitored to identify problems early and offer timely interventions. Follow-up visits are planned if needed to further diagnosis or advice, and on top visits can be planned at the request of parents or teachers, i.e., “assessments on indication”. Such early detection and treatment can improve the prognoses of these children. This preventive task of monitoring the growth and development of children is often performed by a family doctor or pediatrician (as in the USA or Germany) but is lacking in many EU countries [4].

In the Netherlands, the monitoring of child development is a routine task of the preventive child healthcare system (PCH). In this system, child health professionals (CHP, doctors and nurses working in preventive child healthcare) offer routine well-child assessments. PCH services are mainly preventive, i.e., focus on primary prevention such as vaccinations, and on early detection of developmental and health problems. PCH does not provide treatments, except for short-term support of parents or youth themselves [5]. As part of the PCH system, almost all Dutch children undergo several routine assessments by a CHP at preschool age (0–4 years) and during their school careers, to monitor their physical, social, psychological, and cognitive development. These assessments include a standardized screening procedure (including the use of the “Van Wiechenschema,” the Dutch equivalent of the Bayley scales [6] to measure development in children) and the use of questionnaires and/or a physical assessment, as well as a health interview by a CHP. The CHP subsequently decides whether there is a need for a follow-up PCH assessment, or a referral to another service such as family practice, youth care, (specialized) mental healthcare, or social care services. PCH (including follow-up assessments) and the external services such as youth care and mental healthcare are all provided free of charge, with costs covered by the municipal authorities.

The PCH system in the Netherlands is an example of a developmental monitoring system. This system provides a standardized package of preventive services to all children from birth to age 18 years [5]. Services to be provided are described in national protocols managed by the National Center of Child health ([www.ncj.nl](http://www.ncj.nl)). Regarding developmental monitoring, standardized instruments and procedures are used such as the Van Wiechen assessment system and validated questionnaires on psychosocial problem [7, 8]. Such a system may be beneficial for identification of problems and referral to (specialized) external services [4]. Our article focuses on EB and cognitive developmental and family problems in children. Evidence regarding the added value of the PCH system is scattered regarding age groups, and limited to only EB problems. For example, the CHP identification rate for EB problems among toddlers (14 months–4 years) varies between 7 and 9% [2, 9], and among children aged 5–15 years, between 15 and 26% [1, 10, 11]. Related to cognitive developmental and family problems, no evidence has as yet been reported regarding identification and referral rates.

The aim of the present study was, therefore, to assess the identification rates of a developmental monitoring system (i.e., PCH system), regarding identification of EB and cognitive developmental and family problems in children, and what such a system contributes to referral to (specialized) mental health and social care services. We first assessed the degree to which CHP identify EB, cognitive developmental, and/or family problems among children aged 0–18 years. We then assessed the degree to which CHP invite children with EB, cognitive developmental, and/or family problems for a follow-up PCH assessment or refer them to family practice, freely accessible youth care, or (specialized) mental health and social care services.

## Methods

### Study sample

We selected a random sample of children aged 0–18 years from the registries of two PCH organizations (out of 45 for the entire Netherlands) and stratified the sample to include families covering the full range of socioeconomic status (SES). From the first organization, we included 300 children of preschool age (0–4 years), undergoing a PCH assessment between September 2017 and June 2018. From the second organization, we included 1070 children of school-age (4–18 years) undergoing a PCH assessment between October 2017 and March 2018. We included all assessments that occurred in these age-groups: routine well-child assessments, follow-up assessments in case

of diagnostic uncertainty during a previous contact, and assessments at the request of parents or teachers, further called “assessment on indication.” Participation rate is approximately 91.3%. This percentage is derived from the national vaccination rate where 91.3% of all children received in 2018 all vaccines before the age of 2 years [12].

## Procedure and measures

We obtained data in the setting of the Dutch PCH system. In this system, almost all Dutch children undergo more than 10 routine well-child assessments at preschool-age (0–4 years, mainly during the first 14 months), and four assessments during their school careers at ages 5–6, 10–11, 13–14, and 15–16 years. At preschool-age, assessments include a standardized screening procedure (including the use of the “Van Wiechenschema,” the Dutch equivalent of the Bayley scales) [6] to measure development in children, a physical assessment, and a health interview (or home visit) with parents and child by a PCH professional. The professional also provides vaccinations, in line with the national protocol [13]. At school age, there is a standardized two-steps screening procedure, with as first step a pre-assessments of all children (including a questionnaire, parent form or > 12 self-report form) carried out by a PCH assistant and as second step only inviting children at risk of health or developmental problems based on findings of the first step (< 12 years with parents) for a physical assessment and/or health interview by a CHP [11, 14].

Outcomes of standardized PCH screening procedures are based on an inventory of health questionnaires, registry data, and concerns of teachers. The health questionnaires include a questionnaire to detect EB problems, such as the Strengths and Difficulties Questionnaire Parent Form (SDQ) for children aged 4–12 years [7, 15], or the Short Indicative Questionnaire for Psychosocial problems among Adolescent (abbreviated in Dutch as KIVPA) (self-report) for children aged 12–18 years [16]. At preschool-age, cognitive developmental problems are measured using the “Van Wiechenschema” [6], and at school-age, these problems are assessed based on registry data, and concerns of teachers. Family problems are established during the assessment by the PCH professional. The CHP decides whether there is a need for follow-up PCH assessment or referral to an external service. Sometimes children receive a PCH assessment at the request of parents or teachers (“assessment on indication”).

From PCH records, we retrieved data on PCH identification, follow-up, and referral regarding the indicators EB, and cognitive developmental and/or family problems. Data on each indicator in the PCH records were based on the findings of the CHP.

We also retrieved registry data about each child’s age and gender, type of PCH assessment (routine well-child assessment, follow-up assessment, assessment on indication), SDQ [7, 15] or KIVPA scores [16], and type of external service referred to regarding EB and cognitive developmental and/or family problems, such as (specialized) mental healthcare and social care.

## Analyses

We first assessed the background characteristics of the samples, including the scores on the SDQ and KIVPA questionnaires and the type of PCH assessment. Second, we computed PCH identification rates regarding EB and cognitive developmental and/or family problems. Third, we assessed PCH follow-up and referral rates regarding EB and cognitive developmental and/or family problems. Referral rates were determined per type of service provided (family practice, freely accessible youth care, or (specialized) mental healthcare and social care). We performed analyses separately for preschool- (0–4 years), primary school- (5–8 and 9–11 years), and secondary school-aged children (12–14 and 15–18 years).

## Results

### Sample characteristics

Table 1 presents the sample characteristics by age group. Rates of PCH follow-up assessments performed after a routine well-child assessment or an assessment on indication upon request of parents/teachers (regardless of indication, e.g., physical problems) were highest among preschool-aged children (64%). These rates decreased by ages 5–8 years (51%), and 9–18 years (39–42%). Prevalences of an elevated SDQ or KIVPA score varied from 5 to 12%.

Table 2 shows the identification rates of EB and cognitive developmental and/or family problems by CHPs in each age group during PCH assessments. The combined rate of all identifications among preschool-aged children with EB and cognitive developmental and/or family problems (top row) was 22%; half of the identified problems were family problems (11%). The combined rate of all identifications among school-aged children with EB and/or cognitive developmental and/or family problems (top row) varied between 10 and 14% (5–18 years); in this age group, the problems identified were mainly EB problems (8–12%).

The proportions of school-aged children invited for PCH follow-up assessments varied from 3 to 10%; EB problems were the most frequent reason (Table 3). The proportions of children (0–18 years) referred by PCH to other services varied from 0 to 4%. These children were referred mainly to general or specialized mental health/social care.

**Table 1** Sample characteristics by age group (*N* = 1370)

	Preschool	Primary school		Secondary school	
	0–4 years <i>N</i> = 300	5–8 years <i>N</i> = 329	9–11 years <i>N</i> = 299	12–14 years <i>N</i> = 222	15–18 years <i>N</i> = 220
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Gender					
Boy	156 (52.0)	171 (52.0)	160 (53.5)	124 (55.9)	112 (50.9)
Girl	144 (48.0)	158 (48.0)	139 (46.5)	98 (44.1)	108 (49.1)
Type of PCH assessment					
Routine well-child assessment	108 (36.0)	162 (49.2)	182 (60.9)	131 (59.0)	128 (58.2)
Follow-up/assessment on indication	192 (64.0)	167 (50.8)	117 (39.1)	91 (41.0)	92 (41.8)
Screening instrument (SDQ or KIVPA)					
Completed	-	197	233	150	-
Elevated score	-	10 (5.1)	28 (12.0)	12 (5.4)	-

## Discussion

This study examined identification rates in a developmental monitoring system (PCH system) regarding identification of EB and/or cognitive developmental and family problems in children, and the contribution of such a system to referral to (specialized) mental health and social care services. We found that the proportion of children identified by CHP with EB and/or cognitive developmental and/or family problems was 22% (half EB, half family problems) for preschool-aged children and varied between 10 and 14% (mainly EB problems) for school-aged children. The proportions of school-aged children invited for a PCH follow-up assessment varied from 3 to 10%. For children aged 0–18 years, referral rates to other services varied from 0 to 4%; referrals were mainly to general or specialized mental health/social care.

## Interpretation of findings

The rates of identification of EB, cognitive developmental, and/or family problems were higher for preschool (22%) than for school-aged children (10–14%). This difference is due mainly to a lower proportion of identified family problems among school-aged children. An explanation may be that most identification by PCH regards new (incident) cases

of these problems. The recorded data of PCH assessments during the research period was used. At school-age, many children with problems may have already been identified by PCH and are therefore not registered (again) in the PCH records, or these problems may have been solved by previous PCH contacts and subsequent care. Another explanation may be that PCH uses a different approach with preschool- than with school-aged children. School-aged children have far fewer routine well-child assessments (4 during their school career vs. 10 during preschool), and PCH for them has less contact with the parents, which may lead to less identification of (family) problems and a stronger focus on children's behavior and problems. Alternatively, identification of EB problems at school ages may also be more effective, thus comprising fewer false positives, because of better use of validated screening tools for EB problems (such as the SDQ and KIVPA). In any case, this national system identifies more cases at preschool than at school ages.

The proportions of children with a follow-up/assessment on indication (regardless of which indication, including physical problems) were higher among preschool-aged children (64%) than among primary school- (39–51%) and secondary school-aged children (41–42%). This suggests that preschool-aged children receive more extra care from PCH. An explanation may be that extra care from PCH can easily be embedded

**Table 2** Identification rates of emotional and behavior problems (EB) and cognitive developmental and family problems by CHPs by age group (*N* = 1370)\*

	Preschool	Primary school		Secondary school	
	0–4 years <i>N</i> = 300	5–8 years <i>N</i> = 329	9–11 years <i>N</i> = 299	12–14 years <i>N</i> = 222	15–18 years <i>N</i> = 220
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Any of these problems	66 (22.0)	39 (11.9)	33 (11.0)	22 (9.9)	30 (13.6)
EB problems	37 (12.3)	30 (9.1)	28 (9.4)	18 (8.1)	26 (11.8)
Cognitive developmental problems	8 (2.7)	15 (4.6)	17 (5.7)	15 (5.4)	7 (3.2)
Family problems	32 (10.7)	8 (2.4)	15 (5.0)	8 (3.6)	8 (3.6)

\*A child may have multiple problems

**Table 3** Proportion of children invited for a PCH follow-up assessment, and referral rates to other services by age group (N = 1370)

	Preschool <sup>^^</sup>	Primary school		Secondary school	
	0–4 years N = 300	5–8 years N = 329	9–11 years N = 299	12–14 years N = 222	15–18 years N = 220
	n (%)	n (%)	n (%)	n (%)	n (%)
PCH Follow-up assessment	-	31 (9.4)	9 (3.0)	6 (2.7)	22 (10.0)
EB problems	-	20 (6.1)	6 (2.0)	4 (1.8)	18 (8.2)
Cognitive developmental problems	-	7 (2.1)	2 (0.7)	2 (0.9)	0 (0.0)
Family problems	-	7 (2.1)	1 (0.3)	1 (0.5)	4 (1.8)
Referral to other services	3 (1.0)	12 (3.6)	6 (2.0)	0 (0.0)	2 (0.9)
EB problems	0 (0.0)	12 (3.6)	6 (2.0)	0 (0.0)	2 (0.9)
Cognitive developmental problems	2 (0.7)	4 (1.2)	1 (0.3)	0 (0.0)	1 (0.5)
Family problems	1 (0.3)	0 (0.0)	2 (0.7)	0 (0.0)	0 (0.0)
Other type of service #					
Specialized mental health/social care	0 (0.0)	7 (2.1)	3 (1.0)	0 (0.0)	0 (0.0)
General mental health/social care	3 (1.0)	5 (1.5)	1 (0.3)	0 (0.0)	0 (0.0)

<sup>^^</sup>Data not available regarding proportion of children with indicated PCH follow-up assessment.

#Referral to freely accessible youth care regarded two children aged 9–11 years. No children with EB, cognitive developmental, or family problems were referred to family practice.

in the more frequent routine well-child assessments. Furthermore, these routine well-child assessments for preschool children may lead to more parental questions, resulting in more follow-up/assessments on indication. Finally, identifying medical or EB problems at early ages may be more difficult [17], requiring more follow-up/assessment on indication. This higher frequency requires further study.

Our findings show that children identified by PCH as having EB, cognitive developmental, and/or family problems are invited mainly for follow-up PCH assessments, but not referred to external services such as (specialized) mental healthcare and social care. This suggests that a developmental monitoring system such as PCH, providing only preventive services, some short-term support of and advice to parents or youth themselves but no further treatment, may support early identification of children with these problems. This results in low referral rates to more specialized mental health and social services. However, our study did not assess the quality of identification by PCH: children could be incorrectly identified, or children with problems could be missed. Furthermore, low referral rates may be due to barriers (e.g., waiting-lists) in the access to youth care and (specialized) child mental healthcare. Further research is needed to confirm our findings.

We assessed rates of identification across a wide age range (0–18 years). Regarding EB problems for preschool-aged children, these rates were similar to those in previous research [2, 9]. However, we found relatively low EB problem identification rates for primary school-aged children (9%). Previous Dutch studies on this age group showed rates of 15–17% in 2012 [11] and of 21–26% in 1997–2003 [1, 10]. That the EB problem identification rate in our study was

lower than in older studies could be due to better early detection and subsequent treatment of psychosocial problems thanks to the use of validated tools like SDQ and KIVPA. This use of validated screening tools may lead to fewer false positives than screening for EB problems based only on clinical assessment. The lower EB problem identification rates in the current study may also be due to restriction to only new cases, facilitated by the use of electronic record systems, whereas in older studies, professionals included all existing cases.

The two selected PCH organizations in this study are representative for the entire Dutch population, because former research indicated that PCH organizations are homogeneous in the methods that they apply regarding identification of problems [1, 2, 10]. Furthermore, we expect that PCH professionals assess EB, cognitive developmental, and family problems in children in a standardized way, but that variation in identification rates between PCH professionals will exist. Previous research has shown this variation to occur mostly at professionals' level regardless of the organization [18, 19]. Although we expect that both PCH organizations are homogeneous in their work methods, the population of children that they serve may differ, for instance due to differences in SES, and this may in turn influence prevalence and referral rates. However, we expect that our findings reflect the national setting reasonably, because we stratified the sample to include families covering the full range of SES.

### Strengths and limitations

Our study has a number of strengths, such as its large sample size and its collection of data on routine care from PCH



records, limiting the likelihood of selective response. An important limitation may be that we collected data from the PCH records over a predetermined period of 6–10 months; this may have led to underestimations of referral rates, as we missed a part of the longer-term care. Furthermore, we did not take into account whether children already received treatment or support by general or specialized care, which may have influenced our identification rates, i.e., the number of incident cases will be somewhat lower. Moreover, we did not use a gold standard such as the Child Behavior Checklist [20], which may imply that we included some false positives. However, our data do represent routine care in this matter.

## Implications

A developmental monitoring system (PCH system) with only preventive tasks seems to lead to considerable early identification of children with EB, cognitive developmental, and/or family problems, with relatively low referral rates to more specialized mental health services. The outcomes of this developmental monitoring system suggest its implementation to have value for other countries and settings. Some other countries, such as Belgium and the Scandinavian countries, have a similar PCH system in operation [4]. However, in most other countries (such as the USA and Germany), family doctors or pediatricians monitor child development alongside their curative tasks. The Dutch PCH system may thus be a valuable example of a developmental monitoring system for other countries. Such an example is especially needed, since the pediatric primary care system in many European countries is suboptimal due to 1) a relatively poor use of guidelines for mental health assessment [21], 2) limited availability of strategies securing access to various primary mental health care for adolescents [22], and 3) a shortage of school health professionals, who if available also frequently lack specific training in prevention [4]. Given this variation across Europe in pediatric primary care systems [21], our findings can in particular be considered benchmark data if assessing other pediatric primary care systems.

Our findings, given their promising nature, deserve confirmation in other settings. In such studies, the quality of identification could be assessed as well, with use of golden standards for the various outcomes. Furthermore comparison of our Dutch data with findings on other European countries is recommended, regarding identification and referral rates in pediatric primary care systems.

## Conclusion

A developmental monitoring system with only preventive tasks may help to identify children with EB and cognitive developmental and/or family problems, leading to early

support for the majority, and low referral rates to (more specialized) mental/social health services. Our findings deserve further validation in comparable settings and in other countries, including the degree to which the system contributes to low referral rates.

**Authors' contributions** All the authors (MT, JB, SR, MKV) contributed substantially to the conception and design of the study, and to the writing of the paper. All the authors approved the final manuscript and accept full responsibility for the design and the conduct of the study, and all had access to the data. All the authors approved the decision to publish.

**Funding** The original research received financial support from the Netherlands Organization for Health Research and Development (ZonMw). No honorarium, grant, or other form of payment was given to anyone to produce the manuscript.

**Availability of data and material** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Code availability** N/A.

## Declarations

**Ethics approval** Ethical approval for this study was granted by the Medical Research Ethics Committee (METC) of Leiden University Medical Center.

**Consent to participate** Informed consent was not deemed necessary by the METC concerned.

**Consent for publication** N/A.

**Conflict of interest** The authors declare no competing interests.

## References

1. Brugman E, Reijneveld SA, Verhulst FC, Verloove-Vanhorick SP (2001) Identification and management of psychosocial problems by preventive child health care. *Arch Pediatr Adolesc Med* 04;155(4):462–469
2. Reijneveld SA, Brugman E, Verhulst FC, Verloove-Vanhorick SP (2004) Identification and management of psychosocial problems among toddlers in Dutch preventive child health care. *Arch Pediatr Adolesc Med* 08;158(8):811–817
3. Ormel J, Raven D, van Oort F, Hartman CA, Reijneveld SA, Veenstra R et al (2015) Mental health in Dutch adolescents: a TRAILS report on prevalence, severity, age of onset, continuity and co-morbidity of DSM disorders. *Psychol Med* 45(2):345–360
4. Michaud PA, Vervoort JPM, Visser A, Baltag V, Reijneveld SA, Kocken PL et al (2021) Organization and activities of school health services among EU countries. *Eur J Public Health*
5. Reijneveld M, Feron F (2021) Jeugdgezondheidszorg [Preventive Child Healthcare]. In: Stronks K, Burdorf A, editors. *Leerboek volksgezondheid en gezondheidszorg* [Textbook public health and healthcare]. 9th ed.: Bohn Stafleu van Loghum

6. Jacobusse G, van Buuren S, Verkerk PH (2006) An interval scale for development of children aged 0–2 years. *Stat Med* 25(13):2272–2283
7. Vogels AG, Crone MR, Hoekstra F, Reijneveld SA (2009) Comparing three short questionnaires to detect psychosocial dysfunction among primary school children: a randomized method. *BMC Public Health* 12/28;9(1):489
8. Theunissen MHC, Vogels AGC, de Wolff MS, Reijneveld SA (2013) Characteristics of the strengths and difficulties questionnaire in preschool children. *Pediatrics* Feb 131(2):e446–e454
9. Klein Velderman M, Crone MR, Wiefferink CH, Reijneveld SA (2010) Identification and management of psychosocial problems among toddlers by preventive child health care professionals. *Eur J Public Health* 20(3):332–338
10. Theunissen MH, Vogels AG, Reijneveld SA (2012) Early detection of psychosocial problems in children aged 5 to 6 years by preventive child healthcare: has it improved? *J Pediatr* 160(3):500–504
11. Bezem J, Theunissen M, Kamphuis M, Numans ME, Buitendijk SE, Kocken P (2016) A novel triage approach to identifying health concerns. *Pediatrics* 137(3):e20150814–e20160814 (Epub 2016 Feb 8)
12. Rijksinstituut voor Volksgezondheid en Milieu (RIVM) (2021) Vaccinatiegraad en jaarverslag Rijksvaccinatieprogramma Nederland 2020 [Vaccine coverage and annual report national vaccination program Netherlands 2020]. Bilthoven: RIVM. <https://rijksvaccinatieprogramma.nl/english>. Retrieved at 10 January 2022
13. <https://rijksvaccinatieprogramma.nl/english>
14. Bezem J, Kocken PL, Kamphuis M, Theunissen MHC, Buitendijk SE, Numans ME (2017) Triage in preventive child healthcare: a prospective cohort study of care use and referral rates for children at risk. *BMJ Open* 30;7(10):e016423–2017–016423
15. Goodman R (1997) The Strengths and difficulties questionnaire: a research note. *J Child Psychol Psychiatry* 38:581–586
16. Reijneveld SA, Vogels AG, Brugman E, van Ede J, Verhulst FC, Verloove-Vanhorick SP (2003) Early detection of psychosocial problems in adolescents: how useful is the Dutch short indicative questionnaire (KIVPA)? *Eur J Public Health* 06;13(2):152–159
17. de Wolff MS, Theunissen MH, Vogels AG, Reijneveld SA (2013) Three questionnaires to detect psychosocial problems in toddlers: a comparison of the BITSEA, ASQ:SE, and KIPPP. *Acad Pediatr* 13(6):587–592
18. Vogels AG, Jacobusse GW, Hoekstra F, Brugman E, Crone M, Reijneveld SA (2008) Identification of children with psychosocial problems differed between preventive child health care professionals. *J Clin Epidemiol* 2008 11;61(11):1144–1151
19. Theunissen MH, Vogels AG, Reijneveld SA (2012) Work experience and style explain variation among pediatricians in the detection of children with psychosocial problems. *Acad Pediatr* 12(6):495–501
20. Achenbach T, Rescorla L (2001) Manual for the ASEBA School-age forms & profiles. University of Vermont, Burlington
21. Blair M, Rigby M, Alexander D (2019) Issues and opportunities in primary health care for children in Europe: the final summarised results of the Models of Child Health Appraised (MOCHA) project. *Emerald*. <https://doi.org/10.1108/9781789733518>
22. Michaud PA, Visser A, Vervoort JPM, Kocken P, Reijneveld SA, Jansen DEMC (2020) Availability and accessibility of primary mental health services for adolescents: an overview of national recommendations and services in EU. *Eur J Public Health* 30(6):1127–1133

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.