Review

Clinical Practice Guidelines About Screening for Disruptive Behavior Problems at Well-Child Visits: A Rapid Review of the Literature on the Accuracy of Parents' Behavioral Concerns

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Abstract

The current recommendations of the Canadian Paediatric Society about monitoring children's disruptive behaviors at well-child visits call for screening if behavioral concerns are being raised by parents. But do parents' concerns about their child's behavior constitute a reliable means for primary care providers (PCPs) to decide either in favor or against screening? We conducted a rapid systematic review of the literature by identifying documents that cited the landmark study by Glascoe and her colleagues (1991) on the accuracy of behavioral concerns at identifying children with a disruptive behavior problem. Citation tracking was done using Web of Science (Core Collection; 17 October 2018) and SCOPUS (19 October 2018). Only one recent published study was identified. The calibration of concerns' specificity (and other indices alike) yielded, at best, a fair value of the weighted kappa coefficient $\kappa(0,0)$ (i.e., 0.255

and 0.094). Also, the calibration of concerns' sensitivity (and other indices alike) yielded, at best, a moderate value of the weighted kappa coefficient $\kappa(1,0)$ (i.e., 0.533 and 0.392). Overall, the results do not support the current recommendations. In fact, behavioral concerns do not provide PCPs with enough information to reach a decision about screening. We discuss different ways of gathering the necessary information.

Keywords

Infant health; practice guidelines; problem behavior; clinical decision-making; primary health care; preventive medicine; systematic review

1. Introduction

There is a consensus about the importance of monitoring children's behavioral development during regularly scheduled well-baby/child visits with a primary care provider (PCP)--pediatrician, family physician, and nurse practitioner among others [1, 2]. An integral part of the standard pediatric practice consists of routinely eliciting and attending to parents' concerns about their child's behavior. In many developed countries, attending to parents' behavioral concerns involve the use of screening.

In 2017, in a joint statement with the Canadian Academy of Child and Adolescent Psychiatry (CACAP), the Canadian Paediatric Society (CPS) published clinical practice guidelines for PCPs about screening for disruptive behavior problems (DBPs) in 2-5 year-old children at regularly scheduled well-child visits [3]. According to these recommendations, PCPs should elicit parents' concerns about their child's behavior and perform behavioral screening whenever one or more concerns are being raised.

However, the mere presence of parents' behavioral concerns may not constitute a reliable means for PCPs to rule <u>in</u> the presence of a DBP in children. PCPs may need more information before deciding <u>in favor</u> of screening. Indeed, many parents may be excessively worried about their children's disruptive behavior. Also, the mere absence of parents' behavioral concerns may not constitute a reliable means for PCPs to rule <u>out</u> the presence of a DBP in children. PCPs may need more information before deciding <u>against</u> screening. In fact, many parents may not fully appreciate the problematic nature of one aspect or another--e.g., frequency--of their children's disruptive behavior. Overall, the information obtained by eliciting behavioral concerns in parents may be only marginally useful for PCPs to decide on the most appropriate course of action.

In their joint statement, the CPS/CACAP did not present evidence about the accuracy of parents' behavioral concerns to support their recommendations. To our knowledge, there is at least one study that investigated the accuracy of parents' concerns about their 24-77 month-old children's behavior [4]. In that landmark study by Glascoe and her colleagues [4] (*n* = 95), 58.8% (i.e., 20/34) of parents who raised behavioral concerns had children without a clinically significant DBP. Also, the authors reported that 9.8% (i.e., 6/61) of parents who did not raise concerns had children with a clinically significant DBP. In practical terms, PCPs relying on behavioral concerns to decide whether or not to screen would be mistaken 27.4% (i.e., 26/95) of the time.

1.1 Objective

The first goal of this study is to conduct a rapid review of the literature for more recent evidence about the accuracy of parents' behavioral concerns at distinguishing between children with a DBP and those without. To our knowledge, there has not yet been a systematic, either conventional or rapid, review of this literature published. The second goal of this study is to determine, based on the available evidence, whether: a) the mere presence of behavioral concerns provides PCPs with a reliable means to rule in the presence of a DBP; and b) the mere absence of behavioral concerns provides PCPs with a reliable means to rule out the presence of a DBP. If not, PCPs may need more information before they can decide in favor/against screening. Together, these two goals represent the main contribution of this study; namely, determine if the current CPS/CACAP's recommendations are supported by the available evidence. Finally, options will be discussed on how to improve these recommendations.

2. Materials and Methods

2.1 Rapid Review of the Literature

Rapid reviews differ from standard systematic reviews over their use of 'abbreviated' methods at one or more stages of the literature review process [5-7]. For instance, they may use less comprehensive search strategies (e.g., searching fewer bibliographic databases) in the interest of expedience. This may be particularly important in the context where new clinical practice guidelines are being produced. PCPs need to make a decision about implementing the guidelines' recommendations in their daily practice. Hence, the need for timely evidence to support the implementation of the CPS/CACAP's recommendations. This is especially important given that the CPS/CACAP's recommendations are due for a periodic review every year.

For this rapid review, we conducted a search of the literature on the accuracy of parents' behavioral concerns by identifying documents that cited the study by Glascoe and her colleagues [4] (i.e., 'forward' citation tacking). Citation tracking was done using Web of Science (Core Collection; 17 October 2018) and SCOPUS (19 October 2018). In both databases, all document types were considered including article, review, letter, proceeding/conference paper, discussion (Web of Science only), book chapter (SCOPUS only), editorial material, short survey (SCOPUS only) and note. (Google Scholar is another electronic database used for 'forward' citation tracking, but it is not recommended [8].) Also, we searched the Cochrane Database of Systematic Reviews (19 February 2019) and PROSPERO (22 February 2019) for published systematic reviews on the accuracy of parents' behavioral concerns. We adopted this streamlined approach as an alternative to a more comprehensive search of the literature given the narrow scope of this review. Otherwise, we conducted the review according to the guidelines developed by the Cochrane Screening and Diagnostic Tests Methods Group [9]. Also, we used the PRISMA-DTA guidelines for reporting the results of the review [10].

Among the documents identified by the search, we selected original studies that met the inclusion criteria (see below). We proceeded in two steps. In the first step, study selection was based on abstract and title alone. This step was carried out independently by all review authors (i.e., RHB, MC and FT). If a study was selected by at least one review author it was retained for the next selection step. In the second step, full-text selection was done independently by the three review

authors. Any disagreement among review authors was resolved through discussion. Also, the reference lists of the selected studies were used for identifying other potentially relevant studies, and so on and so forth (i.e., 'backward' citation tracking).

To be selected, a study had to meet the following inclusion criteria: 1. Participants had to be primary-school children or younger. 2. Parents' concerns had to be specific to behavior and systematically elicited. 3. The problem of interest had to be specific to behavior. 4. The target condition had to be disruptive/behavior problem in children. 5. The study design had to be naturalistic, with at least 10 children being identified as having a disruptive/behavior problem and at least 10 parents having behavioral concerns. 6. The four possible outcomes of interest (i.e., numbers of true positive, false negative, true negative and false positive outcomes) or their equivalents had to be given or at least deducible from the data.

For each study meeting these inclusion criteria (including the study by Glascoe and her colleagues [4]), data on the outcomes of interest were extracted for further analyses (see below).

2.2 Measuring the Accuracy of Parents' Behavioral Concerns

One way to appreciate the efficiency of parents' behavioral concerns at ruling <u>in</u> the presence of a DBP is to consider their predictive value positive (PVP) and specificity (SP) (see Results section for formulae). Another, though less familiar index can also be used for that purpose; namely, the risk ratio RR1 (see Results section for formula) [11]. It is the ratio of the posterior odds in favor of a DBP when concerns are being raised over the prior odds in favor of a DBP. (The value of RR1 expected by chance alone is equal to 1.) The PVP, SP and RR1 indices are expressed on different scales. For instance, the minimum value PVP can take (i.e., its value expected by chance alone) is equal to the proportion of children with a DBP. In comparison, the minimum value SP can take is different and is equal to 1 minus the proportion of non-concerned parents. (Note that PVP and SP share the same maximum value, namely 1.) For ease of interpretation, it is useful to calibrate or re-scale all indices on a common scale with values ranging from 0 to 1. Following Kraemer [11], these indices can be calibrated using the weighted kappa coefficient $\kappa(0,0)$ (see Results section for formulae). It measures the extent to which the observed value of PVP/SP/RR1 exceeds that expected by chance alone. Once calibrated, PVP, SP and RR1 yield the same value of $\kappa(0,0)$. For parents' behavioral concerns to constitute a reliable means to rule <u>in</u> the presence of a DBP, the value of $\kappa(0,0)$ needs to be at least substantial (i.e., $0.6 < \kappa \leq 0.8$) [12]. Otherwise, with poor/slight (i.e., $\kappa \leq 0.2$), fair (i.e., $0.2 < \kappa \leq 0.4$) or even moderate (i.e., $0.4 < \kappa \leq 0.6$) values of $\kappa(0,0)$, PCPs may need more information before making a decision <u>in favor</u> of screening.

Similarly, one way to appreciate the efficiency of parents' behavioral concerns at ruling <u>out</u> the presence of a DBP is to consider their predictive value negative (PVN), sensitivity (SE) and risk ratio RR3 (see Results section for formulae) [11]. RR3 is the ratio of the posterior odds against a DBP when concerns are being raised over the prior odds against a DBP. Its value expected by chance alone is equal to 1. Because PVN, SE and RR3 are expressed on different scales, it is useful to re-scale them on a common scale with values ranging from 0 to 1. Following Kraemer [11], these indices can be calibrated using the weighted kappa coefficient $\kappa(1,0)$ (see Results section for formulae). It measures the extent to which the observed value of PVN/SE/RR3 exceeds that expected by chance alone. Once calibrated, all three indices yield the same value of $\kappa(1,0)$. The value of $\kappa(1,0)$ needs to be at least substantial for parents' behavioral concerns to constitute a reliable means to rule <u>out</u>

the presence of a DBP. Otherwise, PCPs may need more information before making a decision <u>against</u> screening.

Finally, the overall efficiency (EFF) of parents' behavioral concerns at distinguishing between children with a DBP and those without can be estimated as the sum of two proportions; namely, the proportions of true positive and true negative outcomes. Following Kraemer [11], this measure can be calibrated using the weighted kappa coefficient *κ(0.5,0)* (see Results section for formula). It measures the extent to which the observed value of EFF exceeds that expected by chance alone.

3. Results

3.1 Rapid Review on the Accuracy of Parents' Behavioral Concerns

Before proceeding with our review, we consulted two international registries of systematic reviews to check for published systematic reviews on the accuracy of parents' behavioral concerns. The Cochrane Database of Systematic Reviews was searched (19 February 2019) under the following types/topics: "Mental health" (585 reviews); "Developmental, psychosocial & learning problems" (179 reviews); "Diagnostic"/"Diagnosis"/"Diagnostic test accuracy" (112 reviews). One of the review author (RHB) checked for relevant published systematic reviews, and found none. Also, we searched PROSPERO (22 February 2019) using the following search words: "Population" (64 reviews); "Diagnostic" (40 reviews); "Test" (38 reviews); "Prevalence (25 reviews); "Concerns" (6 reviews); "Diagnostic accuracy" (5 reviews); "Test accuracy" (1 review). We used the following filters: Health area of review ("Mental health and behavioural conditions"); Type and method of the review ("Systematic review"); Source of the review ("Exclude animal"); Status of the review ("Published"). Once again, no relevant published systematic reviews were found. These results suggest that a systematic review on the accuracy of parents' behavioral concerns has yet to be published.

Figure 1 (a flow diagram) presents the main stages of our rapid review of the literature. First, we proceeded with tracking citations for the study by Glascoe and her colleagues [4] (see Figure 1). Using Web of science (17 October 2018) and SCOPUS (19 October 2018), we identified 80 and 86 documents, respectively, with 69 documents identified by both databases.
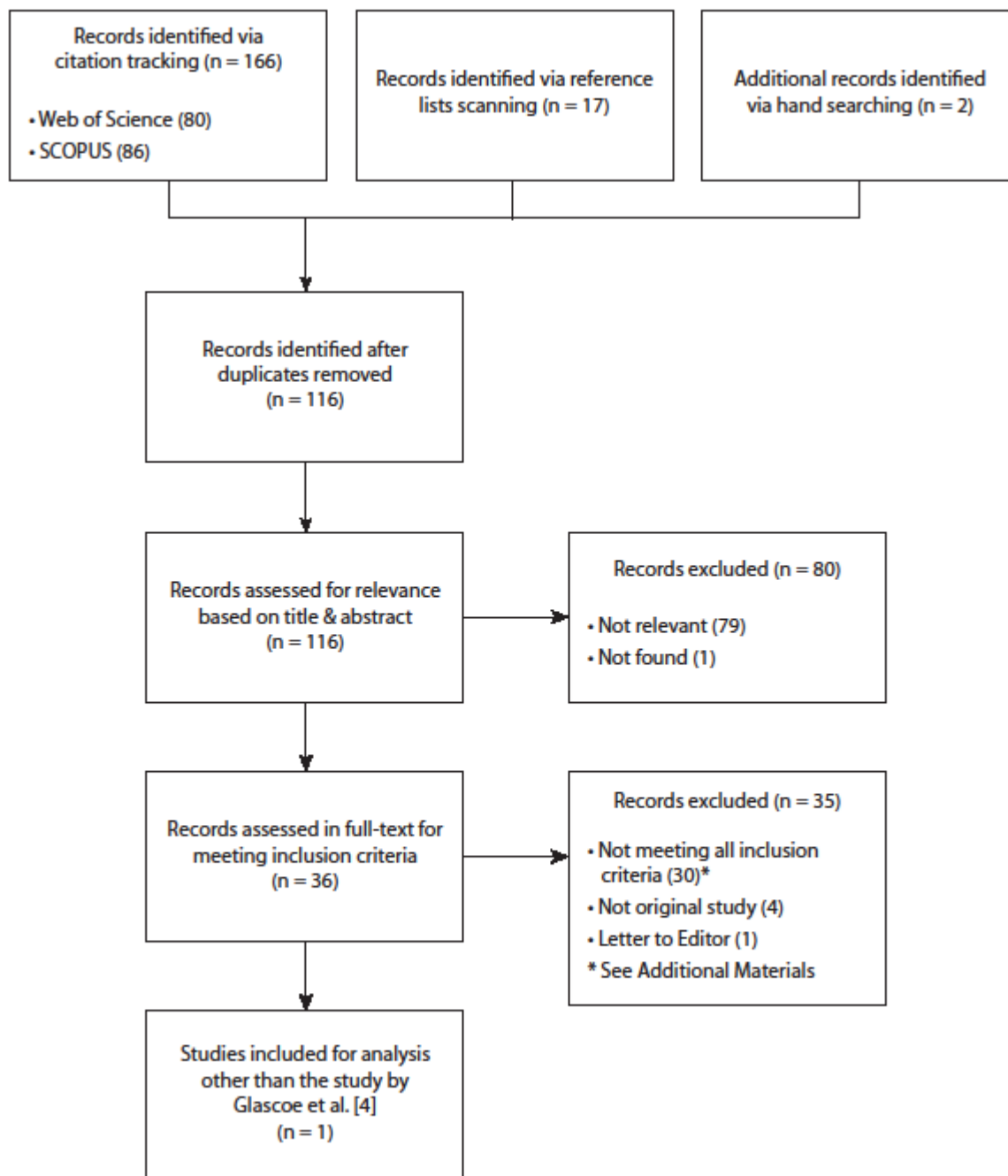
Figure 1 PRISMA flow diagram for a rapid review on the accuracy of parents' behavioral concerns. Adapted from Moher et al. [13].

All in all, 97 (i.e., 69 + 17 + 11) unique documents were identified via citation tracking. Each document was reviewed by the review authors based on title and abstract, except for 8 documents with no abstract (i.e., four letters, two chapters, one note and one editorial). The latter were reviewed based on full-text. From among the 97 documents, 22 studies were selected by at least one review author [14-35] (see Table S1). These studies were then reviewed for meeting the inclusion criteria by the review authors based on full-text. Of the 22 studies, 5 were excluded (4 were not original studies--and more like scoping reviews--and one was a letter) [26-28, 31, 33]. Of the remaining 17 studies, none met all six inclusion criteria (see Table S1). Many studies had either

an index test for parents' behavioral concerns (criterion #6) or a reference standard for disruptive/behavior problem with or without the corresponding target condition (criterion #4), but only one study by Mulhern and his colleagues [32] met these three criteria (see Table S1). However, it did not have a naturalistic study design. In fact, it was conducted with a sample of children referred to a pediatric clinic for 'school-related learning and/or behavior problems'. [The target condition, ADHD (DSM-III-R)/ADD (DSM-III), was diagnosed in 38% of the children (i.e., 93/152). Particularly problematic is that a previous diagnosis of ADHD/ADD (mentioned by 7% of the parents) was included in the operational definition of 'any parental concerns']. At the end, none of the selected studies identified using citation tracking provided satisfactory evidence about the accuracy of parents' behavioral concerns.

Second, 13 articles were identified as containing potentially relevant information about the accuracy of behavioral concerns by scanning the reference lists of the 22 studies mentioned above. Each cited article was reviewed by the review authors based on title and abstract, except for one article that could not be found. From among the 12 articles, 8 articles were selected by at least one review author [36-43]. They were then reviewed based on full-text. In the process, another article was identified as potentially relevant by reference lists scanning [44]. This article was then reviewed based on full-text. And, one more article was identified by scanning its reference list [45], and then reviewed based on full-text. Altogether, 10 articles were reviewed based on full-text, but none of the studies met all the inclusion criteria (see Table S2). In fact, not one study had both an index test for parents' behavioral concerns and a reference standard for disruptive/behavior problem with the corresponding target condition (see Table S2).

Third, one article was identified by hand searching [46]. This article was reviewed by the review authors based on full-text. In the process, another article was identified as potentially relevant by reference lists scanning [47]. This article was then reviewed based on full-text. A third article was identified by scanning its reference list [48]. Finally, one more article was identified as it reported on the data from a more recent version of the survey on which the previous two articles were based [49]. Altogether, 4 articles were identified and reviewed based on full-text. One study by Reijneveld and his collaborators [46] met all the inclusion criteria (see below for more details), while the others met all inclusion criteria but the sixth (i.e., the authors did not provide their results separately for children and adolescents) (see Table S3). Overall, these results suggest that the study by Reijneveld and his collaborators [46] is the only published study since the landmark study by Glascoe and her colleagues [4] to provide direct evidence about the accuracy of parents' concerns about their child's behavior.

3.2 The Accuracy of Parents' Behavioral Concerns

In the study by Glascoe and her colleagues [4] (n = 95), behavioral concerns were elicited using the Parents' Evaluation of Developmental Status (PEDS) [50]. The PEDS is a widely used instrument for eliciting parents' concerns in the primary care setting [51]. The proportion of concerned parents was estimated at 0.358 (i.e., 34/95; se = 0.049; 95% CI = 0.262-0.454). Also, DBPs were assessed using a screener for disruptive behavior in children as young as two years of age, namely the Eyberg Child Behavior Inventory (ECBI) [52]. The ECBI is recommended for use in pediatric care settings as a screening instrument for behavioral problems in children [3, 53]. The proportion of children with a DBP was estimated at 0.211 (i.e., 20/95; se = 0.042; 95% CI = 0.129-0.293).

In the study by Reijneveld and his colleagues [46] (n = 4054), parents' concerns about their 14-144 month-old children were elicited via a questionnaire using a question about the occurrence of behavioral concerns in the past 12 months for which parents felt they needed assistance/advice. The proportion of concerned parents was estimated at 0.247 (i.e., 1002/4054; se = 0.007; 95% CI = 0.234-0.260). Also, DBPs were assessed using two screeners for externalizing behavior problems, namely, the Dutch versions of the Child Behavior Checklist (CBCL) [54, 55] and the Infant-Toddler Social and Emotional Assessment (ITSEA) for 14-month-old children [56]. The proportion of children with a DBP was estimated at 0.073 (i.e., 295/4054; se = 0.004; 95% CI = 0.065-0.081).

Table 1 presents the estimates for the four outcomes of interest and their standard errors (and 95% CI). For instance, in the study by Glascoe and her colleagues [4], the proportion of true positive outcomes was estimated at 0.147 (i.e., 14/95). Other estimates were obtained in the same way.

Table 1 Efficiency of parents' behavioral concerns at distinguishing between children with a DBP and those without.

	Outcome				Index	
	TP #/proportion (se) [95% CI]	FN #/proportion (se) [95% CI]	TN #/proportion (se) [95% CI]	FP #/proportion (se) [95% CI]	EFF (se) [95% CI]	κ(0.5,0)* (se) [95% CI]
Study						
Glascoe et al. [4]	14/0.147 (0.036) [0.076-0.219]	6/0.063 (0.025) [0.014-0.112]	55/0.579 (0.051) [0.480-0.678]	20/0.211 (0.042) [0.129-0.293]	0.726 (0.046) [0.637-0.816]	0.345 (0.010) [0.324-0.365]
Reijneveld et al. [46]	160/0.039 (0.003) [0.034-0.046]	135/0.033 (0.003) [0.028-0.039]	2917/0.720 (0.007) [0.706-0.733]	842/0.208 (0.006) [0.195-0.220]	0.759 (0.007) [0.746-0.772]	0.151 (0.000) [0.151-0.152]

Note. TP, FN, TN and FP refer to the true positive, false negative, true negative and false positive outcomes, respectively. Overall efficiency EFF = (proportion of TP + proportion of TN); weighted kappa *κ(0.5,0)* = EFF - ((P*Q) + (P'*Q'))/[1 - ((P*Q) + (P'*Q'))]. P refers to the proportion of children with a disruptive behavior problem [and P' = (1 - P)]. Also, Q refers to the proportion of children of concerned parents [and Q' = (1 - Q)].

* Jackknife estimate.

Table 2 presents indices measuring the efficiency of parents' behavioral concerns at ruling <u>in</u> the presence of a DBP. As expected, estimated values of PVP, SP and RR1 did differ as these indices are expressed on different scales (e.g., 0.211-1.0 for PVP vs. 0.642-1.0 for SP in the study by Glascoe and her colleagues [4]). For instance, in the study by Glascoe and her colleagues [4], concerns' PVP and SP were estimated at 0.412 (i.e., 0.147/0.358) and 0.733 (i.e., 0.579/0.790), respectively. Also, RR1 was estimated at 2.63 (i.e., 0.700/0.267); hence, in the study by Glascoe and her colleagues [4], the odds in favor of a DBP when a concern is being raised (i.e., 0.147/0.211 or 0.700) were 2.63 times higher than a priori (i.e., 0.211/0.790 or 0.267). To what extent did the estimated value of PVP/SP/RR1 exceed that expected by chance alone? The calibration of these indices yielded fair and poor/slight values of *κ(0,0)*, with estimates of 0.255 and 0.094 in the studies by Glascoe and her colleagues [4], and Reijneveld and his colleagues [46], respectively. For instance, in the study by Glascoe and her colleagues [4], the difference between the estimated value of PVP/SP/RR1 and that expected by chance alone represented about one fourth of the maximum value this difference could actually take. Together, these results suggest that the mere presence of behavioral concerns does <u>not</u> provide PCPs with a reliable means to rule <u>in</u> the presence of a DBP in children.

Table 2 Efficiency of parents' behavioral concerns at ruling in the presence of a DBP.

	Index			
	PVP (se) [95% CI]	SP (se) [95% CI]	RR1* (se) [95% CI]	κ(0,0)* (se) [95% CI]
Study				
Glascoe et al. [4]	0.412 (0.084) [0.246-0.577]	0.733 (0.051) [0.633-0.833]	2.626 (0.068) [2.493-2.760]	0.255 (0.009) [0.238-0.272]
Reijneveld et al. [46]	0.160 (0.012) [0.137-0.182]	0.776 (0.007) [0.763-0.789]	2.421 (0.002) [2.417-2.426]	0.094 (0.000) [0.093-0.094]

Note. PVP = TP/Q; SP = TN/P'; RR1 = SE/(1 - SP); weighted kappa κ(0,0) = (PVP - P)/P' or (SP - Q')/Q or (RR1 - 1)/[RR1 + (P'/P)]. P refers to the proportion of children with a disruptive behavior problem [and P' = (1 - P)] and Q refers to the proportion of children of concerned parents [and Q' = (1 - Q)]. Also, TP, FN, TN and FP refer to the proportions of true positive, false negative, true negative and false positive outcomes, respectively. And, SE = TP/P. Note that the size of these estimates (i.e., PVP and SP) should be fairly unbiased given that the size of the sample is large relative to the magnitude of P and Q [11]. Also, their standard errors should be rather accurate [11].

* Jackknife estimate.

Table 3 presents the indices measuring the efficiency of parents' behavioral concerns at ruling <u>out</u> the presence of a DBP. As expected, estimated values of PVN, SE and RR3 did differ as these indices are expressed on different scales (e.g., 0.790-1.0 for PVN vs. 0.358-1.0 for SE in the study by Glascoe and her colleagues [4]). For instance, in the study by Glascoe and her colleagues [4], concerns' PVN and SE were estimated at 0.902 (i.e., 0.579/0.642) and 0.700 (i.e., 0.147/0.211), respectively. Also, RR3 was estimated at 2.45 (i.e., 9.17/3.75); hence, in the study by Glascoe and her colleagues [4], the odds against a DBP when a concern is <u>not</u> being raised (i.e., 0.579/0.063 or 9.17) were 2.45 times higher than a priori (i.e., 0.790/0.211 or 3.75). To what extent did the

estimated value of PVN/SE/RR3 exceed that expected by chance alone? The calibration of these indices yielded moderate and fair values of $\kappa(1,0)$, with estimates of 0.533 and 0.392 in the studies by Glascoe and her colleagues [4], and Reijneveld and his colleagues [46], respectively. For instance, in the study by Glascoe and her colleagues [4], the difference between the estimated value of PVN/SE/RR3 and that expected by chance alone represented about half of the maximum value this difference could actually take. Together, these results suggest that the mere absence of behavioral concerns does not provide PCPs with a reliable means to rule out the presence of a DBP in children.

Table 3 Efficiency of parents' behavioral concerns at ruling out the presence of a DBP.

	Index			
	PVN (se) [95% CI]	SE (se) [95% CI]	RR3* (se) [95% CI]	$\kappa(1,0)$* (se) [95% CI]
Study				
Glascoe et al. [4]	0.902 (0.038) [0.827-0.976]	0.700 (0.102) [0.499-0.901]	2.448 (0.100) [2.252-2.644]	0.533 (0.016) [0.501-0.564]
Reijneveld et al. [46]	0.956 (0.004) [0.949-0.963]	0.542 (0.029) [0.486-0.599]	1.696 (0.002) [1.692-1.699]	0.392 (0.001) [0.391-0.393]

Note. PVN = TN/Q'; SE = TP/P; RR3 = SP/(1 - SE); weighted kappa $\kappa(1,0)$ = (PVN - P')/P or (SE - Q)/Q' or (RR3 - 1)/[RR3 + (P/P')]. P refers to the proportion of children with a disruptive behavior problem [and P' = (1 - P)] and Q refers to the proportion of children of concerned parents [and Q' = (1 - Q)]. Also, TP, FN, TN and FP refer to the proportions of true positive, false negative, true negative and false positive outcomes, respectively. And, SP = TN/P'. Note that the size of these estimates (i.e., PVN and SE) should be fairly unbiased given that the size of the sample is large relative to the magnitude of P and Q [11]. Also, their standard errors should be rather accurate [11].

* Jackknife estimate.

Finally, parents' behavioral concerns' overall efficiency, EFF, was estimated at 0.726 (i.e., 0.147 + 0.579) and 0.759 (i.e., 0.039 + 0.720) in the study by Glascoe and her colleagues [4], and Reijneveld and his colleagues [46], respectively (see Table 1). Note that the values of EFF expected by chance alone were 0.582 and 0.716, respectively. The calibration of EFF yielded fair and poor/slight values of $\kappa(0.5,0)$, with estimates of 0.345 and 0.151, respectively (see Table 1). All in all, these results suggest that behavioral concerns do not provide PCPs with an accurate means to distinguish between children with a DBP and those without.

4. Discussion

There is a consensus about the importance of preventing DBPs in children [57, 58]. Although regularly scheduled well-baby/child visits do represent an excellent opportunity to prevent DBPs via the monitoring children's behavioral development [51, 59, 60], the current CPS/CACAP's recommendations about screening for DBPs (i.e., screening if a behavioral concern is being raised by parents and otherwise not screening) appear to fall short in many respects.

First, evidence about the accuracy of parents' concerns about their child's behavior, although of good quality, appears rather limited. Our results suggest that the study by Glascoe and her

colleagues [4], and the one by Reijneveld and his colleagues [46] are the only source of direct evidence bearing on this issue. Note that studies based on the (1999 and 2004) surveys of the mental health of children and adolescents in Great Britain did address this issue [47-49], but they did not report their results separately for children and adolescents. One reason for the paucity of studies may be publication bias against replication studies (e.g., exact or literal replications) [61]. Comparing the quality of the two studies in question, the one by Glascoe and her colleagues [4] may be better because its index test, the PEDS [50], is a well-validated test for eliciting parents' concerns. That may explain, at least in part, why weighted kappa estimates were higher in the former than the latter. Otherwise, both studies suffer from what is a very common limitation of diagnostic test accuracy studies; namely, the absence of a 'gold standard' for the target condition (i.e., DBPs in children).

Second, parents' behavioral concerns do not appear to provide PCPs with enough information to decide on the most appropriate course of action. Our results suggest that the mere presence of behavioral concerns does <u>not</u> provide PCPs with enough information to decide <u>in favor</u> of screening. Also, our results suggest that the mere absence of behavioral concerns does <u>not</u> provide PCPs with enough information to decide <u>against</u> screening. Most preoccupying is the lack of efficiency of parents' behavioral concerns at ruling <u>in</u> the presence of a DBP in children. PCPs should be especially cautious when deciding <u>in favor</u> of screening given all the factors that might otherwise limit its usefulness (and, more generally, the one of secondary prevention of mental health problems in children) [62]. That puts the onus on the PCP to prove that screening is necessary. And, for that matter, the evidence in favor of ruling <u>in</u> the presence of a DBP needs to be strong, at least much stronger than the one provided by the mere presence of behavioral concerns. Hence, once behavioral concerns are being raised by parents, PCPs may need additional information before they can decide <u>in favor</u> of screening.

One way to gather the necessary information is to combine the eliciting of parents' behavioral concerns with parents' reports on their children's disruptive problem behaviors. The latter can be used to identify children who, compared to other children of the same age and sex in the general population, exhibit disruptive problem behaviors on a frequent/extreme basis [63, 64]. A modified algorithm for monitoring children's behavior at well-baby/child visits would be the following: First, elicit parents' behavioral concerns. If concerns are being raised, then proceed with obtaining parents' ratings on specific disruptive problem behaviors. Refer a child for screening if both concerns and ratings suggest the presence of a DBP. Otherwise, do not refer him/her for screening.

Another way to increase the efficiency of parents' behavioral concerns at ruling <u>in</u> the presence of a DBP in children is to combine the information gathered at two or more well-baby/child visits. A modified algorithm would be the following: First, elicit parents' behavioral concerns at each visit. Refer a child for screening if concerns are being raised at all visits. Otherwise, do not refer him/her for screening. Also, this strategy could be combined with the previous one, using both concerns and ratings to rule <u>in</u> the presence of a DBP in children at any given well-baby/child visit. In this way, the usefulness of screening could be improved as there is emerging epidemiological evidence that the continuity of a particular DBP (at least during late toddlerhood and early childhood) may be much greater for children who exhibited the DBP in question earlier in life [65]. Future research should systematically investigate and compare the effectiveness of different monitoring strategies using, for instance, medical decision analysis [66].

4.1 Limitations

The search strategy used in this study was less comprehensive than the one generally advocated for in a systematic review of diagnostic test accuracy studies [9]. The focus was on peer-reviewed journal articles and not on the so-called grey literature (e.g., dissertations), with the risk of missing, for instance, some yet unpublished material. But there is emerging evidence that abbreviated searches may not affect the accuracy of rapid reviews' conclusions [67]. At least, when, as in this study, researchers are combining the search of at least one database with references lists checking. Another limitation of this study is that it did not consider whether the CPS/CACAP's recommendations were produced according to established standards [68]. In fact, the authors of the CPS/CACAP's recommendations did not report on the methods used to develop their recommendations. In a recent review, Andrade and his collaborators [69] investigated clinical practice guidelines (published before June 2017) for disruptive behavior in children and youth. They found that relatively few guidelines met minimum quality standards for rigor of development (i.e., 9 out of 29; 5 out of 9 met high quality standards).

5. Conclusions

Regularly scheduled well-baby/child visits do represent an excellent opportunity to prevent DBPs via the monitoring children's behavioral development. However, clinical practice guidelines about behavioral screening are not always trustworthy and/or supported by the available evidence. The current recommendations of the CPS/CACAP are undermined by the lack of accuracy of parents' concerns about their child's behavior. PCPs should gather additional information before deciding <u>in favor</u> of screening.

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Author Contributions

RHB Conception, databases/registries searching, citations tracking, reference lists scanning, manual searching, title/abstract and full-text study selection, data extraction and analysis, drafting, editing, revising. MC Title/abstract and full-text study selection, data extraction, editing, revising. FT Title/abstract and full-text study selection, data extraction, revising. KPB Editing, revising.

Competing Interests

The authors have no conflict of interest to declare.

Additional Materials

The following additional tables are uploaded at the page of this paper.

1. Table S1: Articles identified by citations tracking and selected by at least one review author.

2. Table S2: Articles identified by reference lists scanning and selected by at least one review author based on title and abstract.

3. Table S3: Articles identified via manual searching.

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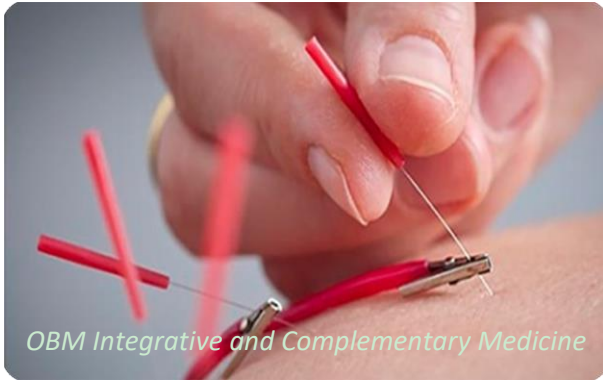
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