Systematic Review of Screening Instruments for Psychosocial Problems in Children and Adolescents With Long-Term Physical Conditions

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Abstract
Children and adolescents with long-term physical conditions (LTPCs) are at greater risk of developing psychosocial problems. Screening for such problems may be undertaken using validated psychometric instruments to facilitate early intervention. A systematic review was undertaken to identify clinically utilized and psychometrically validated instruments for identifying depression, anxiety, behavior problems, substance use problems, family problems, and multiple problems in children and adolescents with LTPCs. Comprehensive searches of articles published in English between 1994 and 2014 were completed via Medline, Embase, PsycINFO, CINAHL, and Cochrane CENTRAL databases, and by examining reference lists of identified articles and previous related reviews. Forty-four potential screening instruments were identified, described, and evaluated against predetermined clinical and psychometric criteria. Despite limitations in the evidence regarding their clinical and psychometric validity in this population, a handful of instruments, available at varying cost, in multiple languages and formats, were identified to support targeted, but not universal, screening for psychosocial problems in children and adolescents with LTPCs.

Keywords
screening, depression, anxiety, children, adolescents, chronic illness

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Introduction
More than 10% of children and adolescents worldwide are affected by long-term physical conditions (LTPCs), including asthma, diabetes, and epilepsy.¹ These individuals are more prone to a range of psychosocial problems including depression, anxiety disorders, behavior disorders, and posttraumatic disorder.¹⁻⁹ The prevalence of formal psychiatric disorder in children with LTPCs is estimated at between 29% and 34%,¹⁰ and pediatricians often lack the confidence to identify such disorders.¹¹ Medical complications of psychiatric problems include poorer treatment adherence, increased hospitalization, and the development of long-term complications.¹²,¹³ Although some studies have shown that children with LTPCs such as cancer can cope well,¹⁴,¹⁵ others have shown they experience more emotional and behavioral problems, even following the completion of treatment.¹⁶

Children with LTPCs often minimize distress when asked directly, and parental depression, which is more common in such families, can contribute to the under-reporting of children’s mental health symptoms by caregivers.¹⁷⁻²⁰ Symptoms of psychological problems in these children are likely to overlap not just with each other but also with those of their physical conditions.²¹,²² For instance, somatic symptoms such as low energy, loss of appetite, and difficulty getting to sleep can be both features of depression and side-effects of chemotherapy. Even subclinical psychological symptoms in children

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with LTPCs can be associated with significant emotional and relational problems. Early intervention requires the timely identification of psychosocial problems. Despite World Health Organization criteria being fulfilled for the screening of many such problems in this population, there are no well-known formal screening programs for identifying psychosocial difficulties in children and adolescents with LTPCs. Currently, psychosocial screening is often undertaken in pediatric settings using nonvalidated techniques such as HEEADSSS assessment. Over the past few decades, a number of psychometric instruments have been developed to identify problems in single or multiple psychosocial domains. Many of these have been used in children with LTPCs, but their psychometric properties with this group have not formally been evaluated.

Previous reviews of psychometric instruments for identifying psychosocial problems in children and adolescents have focused on the clinical utility and psychometric properties of such instruments in the general population. Given that children and adolescents with LTPCs are a higher risk group and that cutoff scores designed for use with the general population may lead to an over- or underestimation of true rates of problems in this cohort, this systematic review was undertaken to identify psychometric instruments that have been used in studies of children and adolescents with LTPCs and to assess their utility as screening tools from both clinical and psychometric viewpoints. Specifically, this review was designed to identify suitable instruments for identifying (a) depression, (b) anxiety, (c) behavior problems, (d) substance use problems, (e) family problems, and (f) multiple problems in this clinical population.

Methods

Literature Search Strategy

Articles detailing the use of psychometric instruments for either identifying or measuring change in one or more of the 6 types of psychosocial problems mentioned above, that had been published in English between 1994 and 2014, were sourced via Medline, Embase, PsycINFO, CINAHL, and Cochrane CENTRAL databases accessed between December 20 and 31, 2014 (see the appendix); from reference lists of articles identified from the database searches; and from previous reviews of psychometric instruments for use with children and adolescents. Abstracts were reviewed by 2 authors (HT and HM), and complete articles were reviewed and a subset identified for data extraction and analysis by all 4 authors (HT, HM, KM, and KG). The study protocol was registered with PROSPERO on January 19, 2015 (Registration Number: CRD42015016021).

Evaluation of Instruments

Psychometric instruments were compared on the basis of clinical properties, including the type of LTPCs with which they had been tested, the time required for completion, available formats, and cost for their use. In addition, they were compared according to their psychometric properties within the child and adolescent LTPC population. Based on the recommendations of previous studies, the “ideal screening instrument” for each condition was expected to have been tested against a gold standard for screening or identifying cases of psychological disorder in one or more populations of children and adolescents with LTPCs (either an in-depth sophisticated clinical interview with an empathic and experienced interviewer or a scale that had been demonstrated to be as good as such an interview). It was also expected to possess good sensitivity (the probability of having a positive test result among those patients who have a positive diagnosis), specificity (the probability of having a negative test result among those patients who have a negative diagnosis), positive predictive value (the probability of having a positive diagnosis among those patients having a positive test result), and negative predictive value (the probability of having a negative diagnosis among those patients having a negative test result). Finally, it was expected to have good validity (eg, internal consistency Cronbach’s α > 0.8 or reliability (eg, interrater reliability > 0.4) and clear cut points for case identification in children and adolescents with LTPCs. As a meta-analysis was not planned, no formal assessment of risk of bias was undertaken.

Results

Results are presented in accordance with PRISMA guidelines. A total of 4105 abstracts were extracted and reviewed using the search strategy described above, and 57 potential screening instruments were identified (Figure 1). Of these, 13 instruments were subsequently excluded as they were found to either have been used only in children without LTPCs or adult populations, or because they only included quality of life measures. Forty-four suitable scales were evaluated as outlined in Table 1. Further details regarding these scales can be found via the manuals and websites listed in Table 2.

Depression

Twenty-eight instruments for identifying depression in children and adolescents with LTPCs were found by our search (Table 1). These included the BASC-2, BDI-II,
Records identified through database searching (n=6938)

Additional records identified through other sources (n=10)

Records after duplicates removed (n=4109)

Records screened (n=4109)

Records excluded (n=3981)

Full-text articles assessed for eligibility (n=128)

Studies included in qualitative synthesis (n=108, 44 instruments)

Studies included in qualitative synthesis (meta-analysis) (n=0)

Figure 1. PRISMA flow chart.

BDI-FS,34 BSI 18,35 BYI-II,36 CBCL,37 CCSRC-R1,38 CDI,39 CDRS-R,40 CESD,41 CPMS,42 DAWBA,43 DICA,44 DISC-IV,45 DI,46 GHQ-28,47 HADS,48 HSCL 25,49 K-SADS-PL,50 MFQ,51 PAT,52 PSC,53 SAFA,54 SCICA,55 SCL-90-R,56 SDQ,57 VPHQ,58 and YSR.59 Of these, the only instruments to have been psychometrically investigated by Canning10 in a single sample of 112 children and adolescents with multiple LTPCs, aged 9 to 18 years from a tertiary care medical center in the United States, were the CBCL, CDI, and PSC, all of which were compared with the DISC-IV intensive structured clinical interview as a gold standard. In this study, all 3 instruments demonstrated low sensitivity, positive predictive value, and negative predictive value, but high specificity.

Anxiety

Twenty-eight instruments for identifying anxiety in children and adolescents with LTPCs were identified by our search (Table 1). These included the BAI,60 BASC-2,32 BYI-II,36 CBCL,37 CPMS,42 DAWBA,43 DICA,44 DISC-IV,45 DI,46 GHQ-28,47 HADS,48 K-SADS-PL,50 MASC,61 PAT,52 PSC,53 PTSD RI,62 RCMAS,63 SAFA,54 SCARED,64 SCICA,55 SCL-90-R,56 SDQ,57 STAI-C,65 TMAS,66 VPHQ,58 YASAS,67 and YSR.59 None of these instruments had been validated as a screening tool for anxiety in the target population, either against a gold standard or other instrument. Nor had any sensitivity, specificity, positive predictive values, or negative predictive values been reported by any of the authors of these studies.

Behavior Problems

Eighteen instruments for identifying behavior problems in children and adolescents with LTPCs were found by our search (Table 1). These included the BASC-2,32 BYI-II,36 CBCL,37 CBQ,68 Conners,69 CPMS,42 DAWBA,43 DICA,44 DISC-IV,45 DI,36 GHQ-28,47 K-SADS-PL,50 PSC,53 RBPC,70 SCICA,55 SDQ,57 VPHQ,58 and YSR.59 Of these, the CBCL, SDQ, and YSR were the most commonly used, and only the CBCL had specifically been validated with this population.10
Table 1. Clinical and Psychometric Properties of Identified Instruments.

| Name: Author, Year | Anxiety | Depression | Behavior | Substance | Family | Clinical Properties: (a) Age Range (years); (b) Time to Complete (Minutes); (c) Cost per Use | Psychometric Properties in Children and Adolescents With LTPCs: (a) Sens/Spec/PPV/NPV/Validity (ρ > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Use With Children and Adolescents With LTPCs: (a) Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
|-------------------|---------|------------|----------|-----------|--------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Beck Anxiety Inventory (BAI); Beck, Epstein, Brown, Steer, Kazdin (1998)6 | (a) 21 (0) | (b) C, TA | (c) Eng, Spa | (d) C, W | (e) 34 506 | (a) 17-80 | (a) N/A | (b) 16-21 |
| | | | | | | (b) 5-10 | (b) No | (b) 16-21 |
| | | | | | | (c) US$3.88 | (c) No | (c) ID |
| Behavior Assessment System for Children, Second Edition (BASC-2); Reynolds, Kamphaus (2004)3 | (a) TRS = 105-165 items, PRS = 139-175 items, self-report = 30 minutes (5s) | (a) 2.5; 6-11; 12-21 | (b) 10-20 | (c) US$3.97 | 3113 | (a) N/A | (b) No | (b) 2-21 |
| | | | | | | (c) No | (c) ID |
| Beck Depression Inventory–Revision (BDI-II); Beck, Steer, Brown (1996)10 | (a) 21 (0) | (b) C, TA | (c) Eng, Spa | (d) C, W | (e) 1569 | (a) 13-80 | (a) N/A | (a) Acute lymphoblastic leukaemia,121 beta-thalassemia,125 cancer,126 primary dysmenorrhea,127 polycystic ovarian syndrome,128 various (asthma, diabetes, epilepsy)129 | (b) 8-21 | (b) ID |
| | | | | | | (b) 5 | (b) No | (c) Cancer130 |
| | | | | | | (c) US$2.08 | (c) No | (c) 16-30 |
| Beck Depression Inventory–Fast Screen (BDI-FS); Beck, Steer, Brown (2000)14 | (a) 7 (0) | (b) 13-80 | (a) N/A | (a) N/A | (c) US$1.16 | (b) No | (a) Asthma121,122 beta-thalassemia,125 cancer,126 primary dysmenorrhea,127 polycystic ovarian syndrome,128 various (asthma, diabetes, epilepsy)129 |
| | | | | | | (b) No | (b) ID |
| | | | | | | (c) No | (c) ID |
| Brief Symptom Inventory–18 (BSI-18); Derogatis (2001)15 | (a) 18 (B) | (b) 18 | (a) N/A | (a) N/A | (b) 4 | (a) N/A | (a) Asthma121,122 cancer,131 cancer,132 irritable bowel syndrome133 | (b) 14-39 | (b) ID + C |
| | | | | | | (b) No | (b) No |
| Beck Youth Inventories (BYI-II); Beck, Beck, Jolly (2001)16 | (a) 20 (B) | (a) 7-18 | (a) N/A | (a) N/A | (b) 5-10 per scale (×5) | (a) N/A | (a) Asthma121,124 brain tumours135 |
| | | | | | | (b) No | (b) No |
| | | | | | | (c) US$9.14 (for all 5) | (c) No | (c) ID + C |

(continued)
| Name: Author, Year | Description: (a) Number of Items (Subscales); (b) Completed by C/PT/CL/TA; (c) Languages -Eng/Span/Fre/Ger/Other (Number); (d) Electronic Version—C/W/Nil; (e) Google Scholar Citations | Conditions Identified | Psychometric Properties in Children and Adolescents With LTPCs: (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Use With Children and Adolescents With LTPCs: (a) Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
|-------------------|-------------------------------------------------|--------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|
| **Child Behavior Checklist (CBCL); Achenbach (1991)** | (a) 100 (1.5-5 y/o = 75 empirical, 5s DSM-related; 6-18 y/o = 8s empirical, 6s DSM-related) | X X X | (a) Sens = 36, Spec = 91, PPV = 80, NPV = 58, Val = N/A, Rel = N/A | (a) 22q11.2 deletion syndrome, 1 acute leukemia, 137 acute lymphoblastic leukemia, 138 asthma, 139 asthma, 140 asthma, 141 asthma, 142 bladder exstrophy and epispadias, 143 brain tumours, 144 cancer, 145 cancer, 146 cerebellar astrocytoma, 147 cloacal exstrophy, 148 congenital heart disease, 149 congenital heart disease, 150 congenital heart disease, 151 congenital heart disease, 152 diabetes, 153 diabetes, 154 encopresis, 155 encopresis, 156 epilepsy, 157 epilepsy, 158 epilepsy, 159 juvenile idiopathic arthritis, 160 Kawasaki disease, 161 kidney disease, 162 kidney disease, 163 liver transplant patients, 164 liver transplant patients, 165 liver transplant patients, 166 lung transplant patients, 167 phenylketonuria, 168 port wine stains, 169 Prader-Willi syndrome, 170 various (asthma, allergic rhinitis, and atopic dermatitis), 171 various (asthma, cystic fibrosis, hematological/oncological conditions), 172 various (asthma, diabetes, epilepsy), 173 various (diabetes, epilepsy), 174 various (asthma, coeliac disease, cystic fibrosis, diabetes, Friedreich’s ataxia, arthrogryposis/visual impairment, lymphedema), 175 Sickle cell disease | (a) ID + C | (b) 0-20 | (c) ID + C |
| **Children’s Behavior Questionnaire (CBQ); Rothbart, Ahadi, Hershey (1994)** | (a) 191 (15s) | X | (a) 3-7 | (a) No | (b) No | (b) 7-14 | (c) ID |
| **Children’s Coping Strategies Checklist-Revision I (CCSC-R1); Ayers, Sandler (1999)** | (a) 54 (13s) | X | (a) N/A | (a) N/A | (a) N/A | (a) Various (asthma, coeliac disease, cystic fibrosis, diabetes, Friedreich’s ataxia, arthrogryposis/visual impairment, lymphedema) | (b) 10-14 | (c) ID + C | (continued) |
| Name: Author, Year | Conditions Identified | Clinical Properties | Psychometric Properties in Children and Adolescents With LTPCs | Use With Children and Adolescents With LTPCs |
|-------------------|----------------------|---------------------|---------------------------------------------------------------|-----------------------------------------------|
| Children's Depression Inventory 2 (CDI, now CDI-2); Kovacs (1980)<sup>39,85</sup> | (a) 28 (4s) (b) C, P, T (c) Eng, Spa (d) C, W (e) 2161 | X | (a) 7-17 (b) 5-15 (c) US$660 | (a) Sens = 27. Spec = 95. PPV = 84, NPV = 57. Val = N/A, Rel = N/A |
| Children's Depression Rating Scale-Revised (CDRS-R); Poznanski, Cook, Carroll (1979)<sup>40</sup> | (a) 17 (8) (b) CL (c) Eng, Ger, Other (1) (d) Nil (e) 442 | X | (a) 6-12 (b) 15-20 (c) US$2.00 | (a) N/A (b) No (c) No |
| The Center for Epidemiologic Studies Depression Scale (CES-D, now CESD-R); Radloff (1979)<sup>41</sup> | (a) 20 (8g) (b) C, CL (c) Eng (d) Nil (e) 355 | X | (a) Able to read/use a computer (b) 5-10 (c) Available free of charge online | (a) N/A (b) No (c) No |
| Conners (now Conners 3); (a) 324 (99 (C), 110 (P), Conners, Wells, Parker, 115 (T) (17s) (b) C, P, T, CL (c) Eng, Spa (d) C, W (e) 2188 | X | | | |
| Childhood Psychopathology Measurement Schedule (CPMS); Malhotra, Varma, Verma, Malhotra (1998)<sup>42</sup> | (a) 75 (8g) (b) C, CL (c) Eng, Other (1) (d) Nil (e) 58 | X | X | (a) N/A (b) N/A (c) N/A | (b) No (c) No (d) N/A |
| The Development and Well-Being Assessment (DAWBA); Goodman, Ford, Richards, Gatward, Meltzer (2000)<sup>43</sup> | (a) 118 sides of paper (0) (b) C, P, T, TA (c) Eng, Fre, Ger, Other (d) W (e) 818 | X | X | (a) 5-16 (b) 90 (c) Paper version downloadable free of charge (for noncommercial purposes) | (a) N/A (b) No (c) No |

(continued)
### Table 1. (continued)

| Description | Conditions Identified | Psychometric Properties in Children and Adolescents | Use With Children and Adolescents With LTPCs |
|-------------|----------------------|-----------------------------------------------------|---------------------------------------------|
| Name: Author, Year | (a) Number of Items (Subscales); (b) Completed by C/PT/CL/TA; (c) Languages -Eng/Spa/Fre/Ger/Other (Number); (d) Electronic Version—C/W/Nil; (e) Google Scholar Citations | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
| Diagnostic Interview for Children and Adolescents (DICA); Herjanic, Reich (1982)44 | (a) Variable, >1600 (18g) | (a) N/A | (a) 22q11.2 deletion syndrome166 |
| | (b) CL, TA | (b) No | (b) 12 (M) |
| | (c) Eng | (c) No | (c) ID |
| | (d) C | (d) 993 | (d) 993 |
| Diagnostic Interview Schedule for Children (DISC-IV); Shaffer, Fisher, Lucas, et al | (a) ~3000 (6d) | (a) N/A | (a) Psychosis |
| | (b) C, CL, TA | (b) No | (b) Yes |
| | (c) Eng, Spa | (c) No | (c) Use |
| | (d) C | (d) 2407 | (d) 2407 |
| Dominic Interactive (DI); Valla, Bergeron, Berube, Gaudet, St-Georges (1994)46 | (a) 91 (7g) | (a) N/A | (a) 22q11.2 deletion syndrome166 |
| | (b) C | (b) 91 (7g) | (b) ID |
| | (c) Eng | (c) 1993 | (c) 1993 |
| | (d) C | (d) 1993 | (d) 1993 |
| | (e) 38 | (e) 38 | (e) 38 |
| Family Adaptation and Cohesion Scales (FACES III, now FACES IV); Olson, Portner, Lavee (1985)72 | (a) 62 (6s) | (a) ≥12 | (a) Diabetes195 |
| | (b) C, P | (b) N/A | (b) 1-14 |
| | (c) Eng, Fre, Gre, Spa, Other (4) | (c) No | (c) ID + C |
| | (d) Nil | (d) Nil | (d) Nil |
| | (e) 206 | (e) 206 | (e) 206 |
| McMaster Family Assessment Device (FAD); Epstein, Baldwin, Bishop (1983)73 | (a) 60 (7s) | (a) ≥13 | (a) Acute lymphoblastic leukaemia122 |
| | (b) C, P | (b) N/A | (b) 2-10 |
| | (c) Eng, Fre, Spa | (c) No | (c) ID |
| | (d) Nil | (d) Nil | (d) Nil |
| | (e) 2476 | (e) 2476 | (e) 2476 |
| Family Environment Scale (FES); Moos (1975)74 | (a) 90 (10s) | (a) ≥11 | (a) Chronic encopresis,156 kidney disease,162 various (asthma, diabetes, cystic fibrosis, colic disease, Friedrich's ataxia, arthrogryposis/visual impairment, lymphedema)174 |
| | (b) C, P | (b) N/A | (b) 2-18 |
| | (c) Eng, Fre, Ger, Spa, Other (18) | (c) No | (c) ID + C |
| | (d) WVN | (d) ≥11 | (d) ≥11 |
| | (e) 4228 | (e) 4228 | (e) 4228 |
| Feetham's Family Functioning Survey (FFS); Roberts, Feetham (1982)75 | (a) 26 (8s) | (a) >18 (parents only) | (a) Various (asthma, leukemia, cardiac conditions, others)160 |
| | (b) P | (b) N/A | (b) 1-17 |
| | (c) Eng, Other (2) | (c) No | (c) ID + C |
| | (d) Nil | (d) Nil | (d) Nil |
| | (e) 122 | (e) 122 | (e) 122 |
| General Health Questionnaire-28 (GHQ-28); Goldberg (1972)76 | (a) 28 (4s) | (a) ≥18 | (a) Diabetes,195 various (asthma, epilepsy)207 |
| | (b) C | (b) N/A | (b) 1-25 |
| | (c) Eng, Other (38) | (c) No | (c) ID + C |
| | (d) Nil | (d) No | (d) No |
| | (e) 4130 | (e) No | (e) No |

(continued)
| Name: Author, Year                                      | Description: (a) Number of items (Subscales); (b) Completed by C/PT/CL/TA; (c) Languages -Eng/Spa/Fre/Ger/Other (Number); (d) Electronic Version—C/V/W/Nil; (e) Google Scholar Citations* | Conditions Identified | Anxiety | Depression | Behavior | Substance | Family | Psychometric Properties in Children and Adolescents With LTPCs: (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Use With Children and Adolescents With LTPCs: (a) Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------|---------|-----------|----------|----------|--------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Hospital Anxiety and Depression Scale (a) 14 (2s)     | (b) C (HA-DS); Zigmond, Snith (1983)38                                                     | X                    | X       | X         |          |          |        | (a) ≥17                                                                                                        | (a) Cystic fibrosis208                                                              |
| The Hopkins Symptom Checklist 25 (HSCL25); Derogatis, Lipman, Rickets, Uhlenhuth, Covi (1984)39 | (a) 25 (5g) (b) CL                                                                         | X                    |         |           |          |          |        | (a) N/A                                                                                                        | (a) Diabetes209                                                                    |
| The Kiddie Schedule for Affective Disorders and Schizophrenia–Present and Lifetime (K-SADS-PL); Kaufman, Birmaher, Brent et al (1996)40 | (a) 82 + 5 diagnostic supplement modules (b) CL                                               | X                    | X       | X         |          |          |        | (a) 6-18                                                                                                        | (a) 22q11.2 deletion syndrome,136 cerebral palsy,139 epilepsy,140 epilepsy,141 recurrent abdominal pain,142 various (chronic fatigue syndrome, juvenile idiopathic arthritis)143 |
| Multidimensional Anxiety Scale for Children (MASC, now MASC-2*); March, Parker, Sullivan, Stallings, Comer (1997)41 | (a) 100 (7s) (b) C, P                                                                       | X                    |         |           |          |          |        | (a) 8-19                                                                                                        | (a) Epilepsy,156 systemic lupus erythematosus189                                   |
| The Mood and Feelings Questionnaire (MFQ); Angold, Costello, Messer, Pickles, Winder (1995)42 | (a) 33 (9) (b) C                                                                            | X                    |         |           |          |          |        | (a) 8-18                                                                                                        | (a) Heartlung transplant patients,213 heartlung transplant patients137            |
| Psychosocial Assessment Tool (PAT, now PAT 2.0); Kazak, Prusak, McSherry, Simms, Beale, Rourke, Alderfer, Lange (2001)43 | (a) 69 (7s) (b) P                                                                           | X                    | X       | X         |          |          |        | (a) <18                                                                                                        | (a) Cancer,107 survivors of childhood cancer,108 congenital heart disease,109 inflammatory bowel disease,110 kidney transplant patients,111 sickle cell disease112 |
| Pediatric Symptom Checklist (PSC); Jellinek, Murphy (1988)44 | (a) 35 (9s) (b) C, P                                                                       | X                    | X       | X         |          |          |        | (a) 4-16                                                                                                        | (a) Various (unspecified)215                                                       |

(continued)
| Name: Author, Year | Conditions Identified | Psychometric Properties in Children and Adolescents With LTPCs | Use With Children and Adolescents With LTPCs |
|-------------------|----------------------|----------------------------------------------------------|------------------------------------------|
| **UCLA Posttraumatic Stress Disorder Reaction Index for DSM-IV (PTSD RI); Steinberg, Brymer, Decker, Pynoos (2004)**<sup>142</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Traumatic physical injury<sup>116</sup> |
| **Revised Behavior Problem Checklist (BBPC); Quay, Peterson (1987)**<sup>70</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Duchenne's muscular dystrophy<sup>217</sup> |
| **Revised Children’s Manifest Anxiety Scale, Second Edition (RCMAS-2); Reynolds, Richmond (1985)**<sup>55</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) 22q11.2 deletion syndrome<sup>176</sup>, asthma<sup>141</sup>, various (asthma, diabetes, cystic fibrosis, coeliac disease, Friedrich's ataxia, arthrogryposis, visual impairment, lymphedema)<sup>174</sup> |
| **Self-administered Psychiatric Scales for Children and Adolescents (SAFA); Cianchetti, Fascello (2001)**<sup>54</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Childhood obesity<sup>186</sup> |
| **Screen for Child Anxiety Related Disorders (SCARED); Birmaher, Khetarpal, Brent et al (1997)**<sup>36</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Asthma<sup>60</sup>, polycystic ovarian syndrome<sup>128</sup>, recurrent abdominal pain<sup>124</sup> |
| **Semistructured Clinical Interview for Children and Adolescents (SCI/CA); Achenbach, McConaughy (1994)**<sup>15</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Asthma<sup>140</sup>, chronic kidney disease<sup>162</sup> |
| **Symptom Checklist-90-Revised (SCL-90-R); Derogatis (1992)**<sup>55</sup> | Anxiety: X Depression: X Behaviour: X Substance: X Family: X | (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | (a) Central adrenal insufficiency<sup>193</sup>, lung transplant patients<sup>119</sup>, recurrent abdominal pain<sup>124</sup> |
### Table 1. (continued)

| Name: Author, Year | Description: (a) Number of Items (Subscales); (b) Completed by C/P/T/CL/TA; (c) Languages -Eng/Fre/Ger/Spa/Other (Number); (d) Electronic Version—C/W/Nil; (e) Google Scholar Citations | Conditions Identified | Psychometric Properties in Children and Adolescents With LTPCs: (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Use With Children and Adolescents With LTPCs: (a) Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
|---|---|---|---|---|
| Strengths and Difficulties Questionnaire (SDQ); Goodman (1997)\textsuperscript{17} | (a) 25 (5s) (b) C, P, T (c) Eng, Fre, Ger, Spa, Other (77) (d) C, W (e) 6196 | X X X X | (a) N/A (b) No (c) Available free of charge online | (a) Adenotonsillar hypertrophy,\textsuperscript{128} asthma,\textsuperscript{129} asthma,\textsuperscript{130} cerebral palsy,\textsuperscript{131} epilepsy,\textsuperscript{132} Kawasaki disease,\textsuperscript{162} kidney transplant patients,\textsuperscript{223} nephrotic syndrome,\textsuperscript{223} polycystic ovarian syndrome,\textsuperscript{15} recurrent headache and abdominal pain,\textsuperscript{160} various (asthma, cerebral palsy, diabetes, epilepsy, obesity)\textsuperscript{124} (b) 3-18 (c) ID |
| State Trait Anxiety Inventory—Children (STAI-C); Spielberger, Edwards (1973)\textsuperscript{65} | (a) 40 (2s) (b) C, TA (c) Eng, Fre, Ger, Spa, Other (23) (d) C (e) 891 | X | (a) ≥9 (b) 20 (c) US$2.00 (minimum purchase 50) | (a) Cancer,\textsuperscript{179} cancer,\textsuperscript{126} encephalitis,\textsuperscript{152} epilepsy,\textsuperscript{182} heart disease,\textsuperscript{194} hepatitis B,\textsuperscript{183} kidney disease,\textsuperscript{225} psoriasis,\textsuperscript{187} vitiligo,\textsuperscript{190} various (asthma, diabetes, spina bifida),\textsuperscript{226} various (asthma, heart disease, muscular dystrophy, others),\textsuperscript{205} various (alopecia areata, epilepsy),\textsuperscript{177} various (cancer, cystic fibrosis, sickle cell disease, others)\textsuperscript{191} (b) 1-20 (c) ID + C |
| Taylor Manifest Anxiety Scale (TMAS); Taylor (1953)\textsuperscript{66} | (a) 38 (0) (b) C (c) Eng (d) W (e) 3313 | X | (a) N/A (b) 10-15 (c) Available free of charge online | (a) Dysmenorrhea\textsuperscript{127} (b) 14-20 (c) ID |
| The Vernon Post Hospital Behavior Questionnaire (VPHQ); Vernon, Schulman, Foley (1966)\textsuperscript{58} | (a) 25 (6s) (b) P (c) Eng (d) Nil (e) 313 | X X X | (a) N/A (b) N/A (c) N/A | (a) Various (asthma, heart disease, muscular dystrophy, others)\textsuperscript{305} (b) 1-17 (c) ID + C |

(continued)
| Name: Author, Year | Description: (a) Number of Items (Subscales)\(^a\); (b) Completed by C/P/T/CL/TA\(^b\); (c) Languages -Eng/Spa/Fre/Ger/Other (Number)\(^c\); (d) Electronic Version—C/W Nil\(^d\); (e) Google Scholar Citations\(^e\) | Anxiety | Depression | Behavior | Substance | Family | Conditions Identified: (a) Age Range (years); (b) Time to Complete (Minutes); (c) Cost per Use | Psychometric Properties in Children and Adolescents With LTPCs: (a) Sens/Spec/PPV/NPV/Validity (α > 0.8)/Reliability (IRR > 0.4); (b) Validated Against Gold Standard—Yes/No; (c) Clear Cut Point for Case Identification—Yes/No | Use With Children and Adolescents With LTPCs: (a) Conditions; (b) Ages of Participants (Range or Mean in Years); (c) Used for Identification (ID) or Measuring Change (C) |
|-----------------|-------------------------------------------------|--------|----------|----------|-----------|--------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Youth Asthma-Related Anxiety Scale (YAAS); Bruzzese, Unikel, Shrou, et al (2011)\(^67\) | (a) 9 (2s) (b) C, P (c) Eng, Spa (d) Nil (e) S | X | | | | | (a) N/A (b) N/A (c) N/A | (a) N/A (b) No (c) No | (a) Asthma\(^3\) (b) 10-16 (c) ID |
| Youth Self-Report (YSR); Achenbach (1987)\(^59\) | (a) 112 (14s) (b) C (c) Eng, Fre, Ger, spa, Other (70) (d) C, W (e) 169 | X | X | X | | | (a) 11-18 (b) 15 (c) US$60 (minimum purchase 50) | (a) N/A (b) No (c) No | (a) Bladder extrophy and epispadias, congenital heart disease, congenital heart disease, chronic headache, lung transplant patients, various (asthma, cancer, diabetes, others), various (asthma, cystic fibrosis, hematologic/oncological conditions), various (asthma, diabetes, epilepsy)\(^129\) (b) 5-20 (c) ID |

**Abbreviations:** C, change; ID, identification; IRR, interrater reliability; M, mean; N/A, not applicable; NPV, negative predictive value; N/S, not stated; PPV, positive predictive value; Sens, sensitivity; Spec, specificity.

\(^a\)Newer version available.

\(^b\)Subscales: s, subscale; d, domain; g, symptom group.

\(^c\)Completion of instrument: C, child/adolescent/patient; P, parent/caregiver (may include family members ≥12 years of age); T, teacher/childcare provider; CL, clinician; TA, trained administrator (may or may not be a clinician, teacher).

\(^d\)Languages: Eng, English; Fre, French; Ger, German; Spa, Spanish; Other, other languages (details available via authors).

\(^e\)Online completion: C, computer-based scoring available; W, website-based scoring available; Nil, not available.

\(^*\)Citation numbers: Relate to the version used in the identified studies, not previous or subsequent versions.
Table 2. Key Websites or References for Identified Instruments.

| Instrument       | Website or Reference                                                                 |
|------------------|---------------------------------------------------------------------------------------|
| BAI              | Beck Anxiety Inventory [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 13, 2015]. Available from: http://www.pearsonclinical.com/psychology/products/100000251/beck-anxiety-inventory-bai.html#tab-training |
| BASC-2*          | Behavior Assessment System for Children, Third Edition (BASC-3) [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 13, 2015]. Available from: https://www.pearsonclinical.com.au/products/view/566#pricing=&tabs=0 |
| BDI-II           | Beck Depression Inventory [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 13, 2015]. Available from: http://www.pearsonclinical.com/psychology/products/100000159/beck-depression-inventory-ii-bdi-ii.html |
| BDI-FS           | Beck AT, Steer RA, Brown GK. BDI-Fast Screen for Medical Patients: Manual. San Antonio, TX: Psychological Corporation; 2003 |
| BSI 18           | Brief Symptom Inventory 18 [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 13, 2015]. Available from: http://www.pearsonclinical.com/psychology/products/100000638/brief-symptom-inventory-18-bsi-18.html |
| BYI-II           | Beck Youth Inventories—Second Edition (BYI-II) [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 13, 2015]. Available from: http://www.pearsonclinical.com/psychology/products/100000153/beck-youth-inventories-second-edition-byi-ii.html# |
| CBCL             | Child Behavior Checklist [Internet]. Burlington, VT: ASEBA; ©2015 [Cited December 14, 2015]. Available from: http://www.aseba.org/ |
| CBQ              | Rothbart MK, Ahadi SA, Hershey KL, Fisher P. Investigations of temperament at three to seven years: the Children’s Behavior Questionnaire. Child Dev. 2001;72(5):1394-1408. |
| CCSC-R1          | Camisasca E, Caravita SCS, Milan L, et al. The Children’s Coping Strategies Checklist–Revision 1: a validation study in the Italian population. TPM Test Psychom Methodol Appl Psychol. 2012;19(3):197-218. |
| CDI 2            | Kovacs M. [Internet]. Cheektowaga, NY: Multi-Health Systems; ©2004-2015 [Cited December 14, 2015]. Available from: http://www.mhs.com/product.aspx?gr=edu&id=overview&prod=cdi2 |
| CES-D*           | Poznanski EO, Mokros HB. [Internet]. Torrance, CA: WPS; ©2015 [Cited December 14, 2015]. Available from: http://www.wpspublish.com/store/p/2703/childrens-depression-rating-scale-revised-cd-r#purchase-product |
| CDRS-R           | The Center for Epidemiologic Studies Depression Scale. [Internet]. San Clemente, CA: Center for Innovative Public Health Research; ©2015 [Cited December 14, 2015]. Available from: http://cesd-r.com/cesdr/ |
| Connors*         | Conners 3 [Internet]. San Antonio, TX: Pearson Clinical; ©2015 [Cited December 14, 2015]. Available from: https://www.pearsonclinical.com.au/products/view/92#tabs=0 |
| CPMS             | Malhotra S, Varma VK, Verma SK, et al. Childhood psychopathology measurement schedule: development and standardization. Indian J. Psychiatry. 1998;30(4):325-331. |
| DAWBA            | DAWBA [Internet]. London, England: youthinmind; ©2009 [Cited December 14, 2015]. Available from: http://www.dawba.info/a0.html |
| DICA             | Reich W, Welner Z, Herjanic B. [Internet]. Melbourne, Australia: Psych Press; ©2016 [Cited January 8, 2016]. Available from: http://www.psychpress.com.au/Psychometric/product-page.asp?ProductID=886#expand |
| DISC-IV          | Fisher P, Lucas L, Lucas C, Sarsfield, Shaffer D. [Internet]. Atlanta, GA: Center for Disease Control and Prevention; ©2006 [Cited December 14, 2015]. Available from: http://www.cdc.gov/nchs/data/nhanes/limited_access/interviewer_manual.pdf |
| DI               | Dominic Interactive [Internet]. Westmount, Canada: Dominic Interactive; ©2009 [Cited December 14, 2015]. Available from: http://www.dominic-interactive.com/index_en.jsp |
| FACES III        | FACES IV [Internet]. Minneapolis, MN: Life Innovations, Inc; ©2006 [Cited December 15, 2015]. Available from: http://www.facesiv.com/ |
| FAD              | Family Assessment Device [Internet]. Los Angeles, CA: The National Center for Child Traumatic Stress; ©2013 [Cited December 15, 2015]. Available from: http://www.nctsn.org/content/family-adaptability-and-cohesion-scale |
| FES              | Moos BS, Moos RH [Internet]. Menlo Park, CA: Mind Garden Inc; ©2002 [Cited December 15, 2015]. Available from: http://www.mindgarden.com/96-family-environment-scale#horizontalTab1 |
| FFFS             | Roberts CS, Feetham SL. Assessing family functioning across three areas of relationships. Nurs Res. 1982;31(4):231-235. |
| Family Nursing   | [Internet]. Kobe, Japan: Family Health Care Nursing; ©2013 [Cited December 16, 2015]. Available from: http://www.familynursing.org/fffs/ |

(continued)
| Instrument | Website or Reference |
|------------|----------------------|
| GHQ-28 | General Health Questionnaire [Internet]. London, England: GL-Assessment; ©2015 [Cited December 16, 2015]. Available from: http://www.gl-assessment.co.uk/products/general-health-questionnaire/general-health-questionnaire-FAQs |
| HADS | Hospital Anxiety and Depression Scale [Internet]. London, England: GL-Assessment; ©2015 [Cited December 16, 2015]. Available from: http://www.gl-assessment.co.uk/products/hospital-anxiety-and-depression-scale-0 |
| HSCL25 | Derogatis LR, Lipman RS, Rickels K, et al. The Hopkins Symptom Checklist (HSCL): a self-report inventory. *Behav Sci.* 1974;19:1-15 |
| K-SADS-PL | Diagnostic Interview Kiddie-SADS-Present and Lifetime Version (K-SADS-PL) [Internet]. Pittsburgh, PA: University of Pittsburgh; ©1996 [Cited December 18, 2015]. Available from: http://www.psychiatry.pitt.edu/sites/default/files/Documents/assessments/ksads-pl.pdf |
| MASC | Multidimensional Anxiety Scale for Children–2nd Edition [Internet]. Cheektowaga, NY: Multi-Health Systems; ©2015. [Cited December 20, 2015]. Available from: https://ecom.mhs.com/(S(4uxe4l553naha2zh4z0tjv55))/product.aspx?gr=cli&prod=masc2&id=overview |
| MFQ | The MFQ [Internet]. Durham, NC: Duke University; ©2008 [Cited December 20, 2015]. Available from: http://devepi.duhs.duke.edu/instruments.html |
| PAT | The Psychosocial Assessment Tool [Internet]. Washington, DC: American Psychological Association; ©2015 [Cited December 20, 2015]. Available from: http://www.apa.org/pi/about/publications/caregivers/practice-settings/assessment/tools/psychosocial-assessment.aspx |
| PSC | Pediatric Symptom Checklist [Internet]. Boston, MA: Massachusetts General Hospital Department of Psychiatry; ©2015 [Cited December 20, 2015]. Available from: http://www.massgeneral.org/psychiatry/services/psc_about.aspx |
| PTSD RI | UCLA Posttraumatic Stress Disorder Reaction Index for DSM IV [Internet]. Los Angeles, CA: UCLA; ©2012 [Cited December 20, 2015]. Available from: http://www.nctsn.org/content/ucla-posttraumatic-stress-disorder-reaction-index-dsm-iv |
| RBPC | Revised Behavior Problem Checklist (RBPC)–PAR Edition [Internet]. Lutz, FL: PAR; ©2012 [Cited December 20, 2015]. Available from: http://www4.parinc.com/Products/Product.aspx?ProductID=RBPC |
| RCMAS | RCMAS-2 [Internet]. Cheektowaga, NY: Multi-Health Systems; ©2015 [Cited December 20, 2015]. Available from: http://www.mhs.com/product.aspx?gr=edu&prod=rcmas2&id=overview |
| SAFA | Franzoni M, Monti M, Pellicciari A, et al. SAFA: a new measure to evaluate psychiatric symptoms detected in a sample of children and adolescents affected by eating disorders. Correlations with risk factors. *Neuropsychiatr Dis Treat.* 2009;5:207-214 |
| SCARED | Screen for Childhood Anxiety Related Emotional Disorders (SCARED) [Internet]. San Diego, CA: The California Evidence Based Clearinghouse for Child Welfare; ©2015 [Cited December 20, 2015]. Available from: http://www.cebc4cw.org/assessment-tool/screen-for-childhood-anxiety-related-emotional-disorders-scared/ |
| SCICA | ASEBA Semistructured Clinical Interview for Children & Adolescents (SCICA 6/18) [Internet]. Lutz, FL: PAR; ©2012 [Cited December 20, 2015]. Available from: http://www4.parinc.com/Products/Product.aspx?ProductID=SCICA |
| SCL-90-R | Symptom Checklist-90-Revised [Internet]. San Antonio, TX: Pearson Clinical; ©2015. [Cited December 20, 2015]. Available from: http://www4.parinc.com/Products/Product.aspx?ProductID=SCICA |
| SDQ | SDQ [Internet]. London, England: youthinmind; ©2009 [Cited December 22, 2015]. Available from: http://www.sdqinfo.com/ |
| STAI-C | State-Trait Anxiety Inventory for Children [Internet]. Menlo Park, CA: Mind Garden Inc; ©2002 [Cited December 23, 2015]. Available from: http://www.mindgarden.com/146-state-trait-anxiety-inventory-for-children |
| TMAS | Taylor Manifest Anxiety Scale [Internet]. Reading, MA: Psychology Tools; ©2015 [Cited December 23, 2015]. Available from: https://psychology-tools.com/taylor-manifest-anxiety-scale/ |
| VPHQ | Karling M, Hägglöf B. Child behaviour after anaesthesia: association of socioeconomic factors and child behaviour checklist to the Post-Hospital Behaviour Questionnaire. *Acta Paediatr.* 2007;96(3):418-423 |
| YAAS | Bruzzese J, Unikel L, Shrouet PE, et al. Youth and Parent Versions of the Asthma-Related Anxiety Scale: development and initial testing. *Pediatr Allergy Immunol Pulmonol.* 2011;24(2):95-105 |
| YSR | Youth Self-Report 11-18 [Internet]. Los Angeles, CA: The National Center for Child Traumatic Stress; ©2012 [Cited December 28, 2015]. Available from: http://www.nctsn.org/content/youth-self-report-11-18 |

*Newer version available.*
Substance Use Problems

Only 2 instruments for identifying substance use problems in children and adolescents with LTPCs were found by our search, namely, the DICA and DISC-IV (Table 1). Neither of these instruments was purpose-designed as an instrument for rating substance use problems and both identified these issues as part of a broader DSM-IV aligned assessment process in research settings. Neither instrument had been validated as a screening tool for substance use problems in the target population, either against a gold standard or other instrument, and no sensitivity, specificity, positive predictive values, or negative predictive values have been reported by any of the authors of these studies.

Family Problems

Seven instruments for assessing family problems were identified by our search, namely, the DICA, FACES III, FAD, FES, FFFS, PAT, and SDQ (Table 1). None of these instruments had been validated as a screening tool for family problems in the target population, either against a gold standard or other instrument. Nor had any sensitivity, specificity, positive predictive values, or negative predictive values been reported by any of the authors of these studies.

Multiple Problems

Of the instruments we found, the DICA was the only one that identified all 5 types of problem, namely, depression, anxiety, behavior, substance use problems, and family issues. The DISC, GHQ-28, and SDQ being broad screening instruments identified 4 of these problems (the first two excluding family issues, the third excluding substance use problems). The combination of depression, anxiety, and behavior problems was identified by the BASC-2, BYI-II, CBCL, CPMS, DAWBA, DI, K-SADS-PL, SCICA, VHPQ, and YSR. The combination of depression, anxiety, and family problems was identified by the PAT. Overall, none of our identified instruments proved to be a clinically viable instrument for easily identifying all of these problem areas in children and adolescents with LTPCs.

Discussion

Children and adolescents with LTPCs remain at greater risk of developing psychosocial problems. Despite enthusiasm from public health and funding bodies to routinely identify and address common childhood mental health problems as early as possible in high-risk groups, there is inadequate evidence to recommend doing so using currently available psychometric instruments. Targeted screening using some of these tools is probably more valid. Of the 44 potential instruments evaluated by us, none met the criteria for an “ideal screening instrument” outlined prior to the commencement of the review and most had only had confirmation of their psychometric properties within the general population.

Previous reviewers of psychometric instruments for children and adolescents have had varying views, as outlined below, partly due to differences in focus and partly due to when their reviews were undertaken. Myers, Brookes, Stocking, and Quittner have conducted the most comprehensive reviews of instruments for identifying depression and anxiety. Myers recommended the Reynolds Adolescent Depression Scale (RADS) and Reynolds Child Depression Scale (RCDS) for the identification of depression in the general population, and a combination of the clinician-rated CDRS-R and patient-rated CDI-2 for identifying depression in clinical populations, the latter instruments being more sensitive to clinical change. Both Brookes and Stocking identified significant limitations in the KSADS, DISC, DICA, BDI, Hamilton Depression Rating Scale (HDRS), and Montgomery Asberg Depression Rating Scale (MADRS) for identifying depressive symptoms, and the BDI-II, CDI-2, CES-D, and RADS in identifying “caseness.” A recent consensus statement on the identification of anxiety and depression in children and adolescents with cystic fibrosis recommended that the Patient Health Questionnaire (PHQ-9) should be routinely used to screen children with the condition over the age of 12 years as it is brief, reliable, has valid optimal cutoff scores for detecting psychological symptoms that map onto DSM-5 criteria, and is free and available in all major languages. Unfortunately, no studies of children and adolescents with LTPCs using the PHQ-9 were identified by our search, leaving us unable to comment on this recommendation. The BDI-FS was designed for “evaluating symptoms of depression in patients reporting somatic and behavioral symptoms that may be attributable to biological, medical, alcohol, and/or substance abuse” and has been shown to be better than the PHQ-9 at discriminating between depressive and somatic symptoms. Although most studies have focused on its use in primary care and only one study in children with LTPCs was identified by us, it shows some promise.

Myers and Brookes favored the MASC and SCARED for identifying anxiety, due to their clear constructs, adequate internal psychometric properties, ability to discriminate between anxiety and depression, response formats that should detect treatment effect, short screening
forms, and parallel parent-report forms. Myers and Brookes disagreed on the value of the RCMAS and STAI C, with the latter favoring these instruments. Brooks and Kutcher additionally identified the CBCL, K-SADS-PL, and ADIS-C/P as viable instruments for detecting anxiety. Quittner recommended the GAD7 for identifying anxiety in children over the age of 12 years with cystic fibrosis.

Comprehensive reviews of instruments for identifying behavior disorders in children and adolescents have previously recommended the Conners, Swanson Nolan and Pelham IV Questionnaire (SNAP-IV), Attention Deficit Disorder Disorder Evaluation Scale (ADDES-2), and ADHD Symptom Rating Scale (ADHD-SRS) for identifying combined/hyperactive symptoms of ADHD; the Brown Attention Deficit Disorder Scale (BADDSS) for identifying inattention; the Eyberg Child Behavior Inventory (ECBI), the Sutter-Eyberg Student Behavior Inventory–Revised (SESBI-R), and the New York Teacher Rating Scale for Disruptive and Antisocial Behavior (NYTRS) for assessing broad constructs of disruptive behavior disorder; and the Antisocial Process Screening Device (APSD) for evaluating youth with conduct disorder.

A number of well-validated, specific, and brief instruments exist for identifying substance use problems in young people including the CRAFFT substance abuse screening test, recommended by Pilowsky following a recent review of screening instruments for adolescent substance abuse in primary care settings; the Personal Experience Short Questionnaire (PESQ), recommended by Farrow during a similar review for the Washington State Division of Alcohol and Substance Abuse; and newer instruments such as the Substances and Choices Scale (SACS) and the Teen Addiction Severity Index (T-ASI). Despite their lack of use and psychometric validation with children and adolescents with LTPCs, their specific design for identifying substance use problems, cost, and ease of use probably make them better choices for the targeted identification of such problems in clinical settings compared with the DICA or DISC-IV.

The FACES III, FAD, FES, and FFFS were exclusively designed to assess family functioning, and despite lack of psychometric validation in children and adolescents with LTPCs, they had all been shown to be of some clinical use in this population. Out of the identified instruments, the PAT 2.0 is the most extensively researched and promising screening instrument for systemic issues within families of children and adolescents with LTPCs. It is linked to a triaging system, based on the Pediatric Psychology Preventative Health (PPPH) model to ensure appropriate referrals are made, and information provided to the treating team. It has been researched in families of children with conditions such as cancer, congenital heart disease, inflammatory bowel disease, and kidney transplants. While it has shown good discrimination in terms of family and parental psychosocial difficulties and behavior problems, it has not specifically been researched as a screener for childhood or adolescent anxiety or depression.

This review provides a snapshot of instruments that have been used in children and adolescents with LTPCs and some information regarding their nature. There are a number of other considerations to be factored in when deciding which screening instruments to use for identifying psychosocial problems in this population, when to use such instruments, and how to do so. All scales are not built equal. Briefer scales such as the MFQ designed for quick identification of conditions are less comprehensive, but more practical to use in clinical settings than comprehensive assessment questionnaires such as the DISC-IV. Although clinician-rated scales have been shown to be more accurately predict outcomes than self-report scales, the former are more commonly used, are more relevant to patient-centered care, and the 2 scales are best used in combination for optimum result. Newer scales are more accurate than older scales, particularly in discriminating between overlapping constructs such as anxiety and depression. However, the former have a longer track record and clinicians may be more familiar with them. If identification of “cases” rather than symptoms is important, checklists that are aligned with diagnostic manuals such as the DSM-5 are probably more useful than those that rate symptoms continuously using different paradigms. Online or electronically available scales allow for efficient data analysis, but can be costly and off-putting for those with less familiarity with technology. Finally, acceptability and validity of scales in different languages and cultures is important to establish as some instruments such as the GAD7 have been shown to be less accurate in some groups (eg African Americans) than others.

Limitations of this review include the fact that only instruments used in studies of children and adolescents with LTPCs were included in the main analysis and other newer and potentially useful scales that have been not similarly researched may have been excluded. In addition, few instruments had psychometric data pertaining to the target population and assumptions of efficacy had to be made for most instruments based on their properties within the general population. Strengths of the review include the wide range of LTPCs with which identified instruments had been used and the correlation of our findings with those of key reviews of these instruments in the wider population to enable recommendations for clinicians and researchers that are based on the most up-to-date evidence.
Overall, in our opinion, the best instruments identified by us for targeted screening for psychosocial problems in children and adolescents with LTPCs are as follows. For depression, the clinician-rated CDRS-R40 and patient-rated CDI-2,37 BDI,32 and PHQ-931 are the easiest to use and best regarded instruments, with the BDI-FS34 showing promise. For anxiety, the self/parent-rated MASC-2,61 SCARED,64 and GAD-794 all have satisfactory appeal. Behavior problems are best identified using the parent-rated SDQ57 and CBCL,37 and ADHD is best identified using the self/parent/teacher-rated Conners-3.69 Substance use problems are best screened for using the well-established self-rated CRAFFT105 and PESQ107 or newer but easier to use scales such as the SACS109 and T-ASI.110 Family problems are best identified using the parent-rated PAT 2.0,52 and finally, depending on their combination, multiple problems may be screened for using a limited range of instruments including the parent-rated BASC-3,32 SDQ,57 and PAT 2.0.52

Just as important as screening is what comes after it. Care pathways and provision of high-quality care should be in place before the implementation of any targeted or universal screening programme.120 Future research should include more in-depth evaluation of existing instruments in children and adolescents with LTPCs and the development of more specific instruments for identifying psychosocial problems in this population.

Conclusions
For now, clinicians should continue to be vigilant regarding the greater likelihood of psychosocial problems in children and adolescents with LTPCs and should only use recommended instruments in a targeted manner to support clinical judgment within an established continuum of care.

Appendix

Keywords Used for Ovid Medline Database
Search on December 30, 2014

1. Mass Screening/
2. screen$.tw.
3. identif$.tw.
4. detect$.tw.
5. (routine$ adj3 (ask$ or question$)).tw.
6. assess*.mp. [mp = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
7. risk.mp. [mp = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. psychological problem*.tw.
10. exp stress, psychological/
11. ((emotion* or psycholog* or mental or mental health) adj3 (stress* or problem* or disturb* or aspect* or state* or ill*)).tw.
12. child psychology/
13. adolescent psychology/
14. psychosocial.mp. [mp = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
15. 9 or 10 or 11 or 12 or 13 or 14
16. ANXIETY DISORDERS/ or AGORAPHOBIA/ or NEUROCIRCULATORY ASTHENIA/ or OBESSIVE-COMPULSIVE DISORDER/ or PANIC DISORDER/ or PHOBIC DISORDERS/ or STRESS DISORDERS, TRAUMATIC/ or STRESS DISORDERS, POST-TRAUMATIC/ or anxiety, separation/ or neurotic disorders/
17. (anxi* or generali* anxiety disorder* or GAD or obsessive compulsive or OCD or phobi* or obsess* or compulsi* or panic or phobi* or ptsd or posttrauma* or post trauma* or social phobia or panic attack* or neurotic or neurosis).tw.
18. ((procedur* or treat* or manage*) adj3 anxiety).tw.
19. ((hospi* or clinic*) adj3 anxiety).tw.
20. 16 or 17 or 18 or 19
21. MOOD DISORDERS/ or AFFECTIVE DISORDERS, PSYCHOTIC/ or BIPOLAR DISORDER/ or CYCLOTHYMIC DISORDER/ or DEPRESSIVE DISORDER/ or DEPRESSION, POSTPARTUM/ or DEPRESSIVE DISORDER, MAJOR/ or DEPRESSIVE DISORDER, TREATMENT-RESISTANT/ or DYSTHYMIC DISORDER/ or SEASONAL AFFECTIVE DISORDER/ or AFFECTIVE SYMPTOMS.mp. [mp = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
22. (mood disorder* or affective disorder* or bipolar i or bipolar ii or (bipolar and (affective or disorder*)) or mania or manic or cyclothymic* or depression or depressive or depressed or dysthymi* or anhedoni* or affective symptoms).tw.
23. 21 or 22
24. 15 or 20 or 23
25. infant*.tw.
26. child*.tw.
27. adolesc*.tw.
28. (baby or babies or newborn* or new-born* or neonat* or neo-nat* or toddler* or preschool* or pre-school* or schoolchild* or school-child* or boy* or girl* or teen* or preteen* or pre-teen* or youth* or young* person* or young people* or pediatr* or paediatr* or juveni* or minors).tw.
29. 25 or 26 or 27 or 28
30. exp pain/
31. exp complex regional pain syndromes/
32. exp rheumatic diseases/
33. exp neoplasms/
34. exp diabetes mellitus/
35. exp asthma/
36. exp brain injuries/
37. exp brain damage, chronic/
38. exp inflammatory bowel diseases/
39. exp anemia, sickle cell/
40. exp skin diseases/
41. Chronic Disease/
42. Cystic Fibrosis/
43. Bronchopulmonary Dysplasia/
44. respiratory tract disease/ or exp bronchiectasis/
45. Kidney Failure, Chronic/
46. heart diseases/ or exp heart defects, congenital/
47. exp liver diseases/
48. ((chronic* or longterm* or long-term*) adj5 (condition* or ill* or disease*)).tw.
49. (kidney* or renal or cystic or heart or cardiac or colon or lung or lungs or asthma* or diabet* or rheumat* or arthrit* or fibromyalg* or cancer* or neoplas* or tumor* or tumour* or malignan* or carcinom* or respirat* or bronchi* or epi-lep* or eczema or dermati* or leuk* or liver).tw.
50. ((brain or head) adj5 (trauma* or injur*)).tw.
51. (bowel* adj5 (condition* or disease* or illness* or inflam*)).tw.
52. brain diseases/ or brain abscess/ or brain dis-eases, metabolic/ or brain neoplasms/ or cerebrovascular disorders/ or encephalitis/ or epilepsy/ or hydrocephalus/ or hypoxia, brain/
53. 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52
54. 8 and 24 and 29 and 53
55. limit 54 to (english language and yr = “1994 -Current”)
56. randomized controlled trial/
57. controlled clinical trial.pt.

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Author Contributions
HT: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
HM: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted the manuscript; critically revised the manuscript.
KG: Contributed to analysis and interpretation; drafted the manuscript; critically revised the manuscript.
KM: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted the manuscript.

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