| Study, Year | Screening Test  (Reference Standard) | Sensitivity  (95% CI) | Specificity  (95% CI) | Positive Likelihood Ratio (95% CI) | Negative Likelihood Ratio (95% CI) | Quality |
| --- | --- | --- | --- | --- | --- | --- |
| **Visual Acuity Tests** | | | | | | |
| Bertuzzi et al, 200681 | LEA Symbols visual acuity test (comprehensive eye exam with cycloplegic refraction) | A: 0.96 (0.78 to 1.0)  B: 0.78 (0.56 to 0.92) | A: 0.83 (0.75 to 0.90)  B: 0.93 (0.87 to 0.97) | A: 5.7 (3.8 to 8.6)  B: 12 (5.8 to 24) | A: 0.05 (0.01 to 0.36)  B: 0.23 (0.11 to 0.51) | Fair |
| Miller et al, 199997 | LEA Symbols visual acuity test (cycloplegic refraction and retinoscopy) | 0.91 (0.82 to 0.96) | 0.44 (0.37 to 0.52) | 1.6 (1.4 to 1.9) | 0.21 (0.10 to 0.43) | Fair |
| Miller et al, 200198 | LEA Symbols visual acuity test (cycloplegic refraction) | 0.93 (0.87 to 0.97) | 0.51 (0.44 to 0.57) | 1.9 (1.6 to 2.2) | 0.14 (0.08 to 0.27) | Fair |
| Vision in Preschoolers Study Group  (Phase I), 200465 | Crowded linear LEA Symbols visual acuity test  A: 10/32 for age 3 years, 10/20 for age 4 and 5 years  B: 10/32 for age 3 years, 10/25 for age 4 years, 10/20 for age 5 years\* (comprehensive eye exam with cycloplegic refraction) | Any condition  A: 0.61 (0.56 to 0.66)  B: 0.49 (0.44 to 0.54)  “Very important to detect and treat early” conditions  A: 0.77 (0.69 to 0.84)  B: 0.65 (0.56 to 0.73) | Any condition  A: 0.90 (0.88 to 0.92)  B: 0.94 (0.92 to 0.96) | Any condition A: 6.1 (4.8 to 7.6)  B: 8.2 (6.1 to 11) | Any condition  A: 0.43 (0.38 to 0.50)  B: 0.54 (0.49 to 0.60) | Fair |
| Vision in Preschoolers  Study Group (Phase I), 200465 | Crowded linear HOTV visual acuity test  A: 10/25 for age 3 and 4 years, 10/20 for age 5 years  B: 10/32 for age 3 and 4 years, 10/25 for age 5 years\* (comprehensive eye exam with cycloplegic refraction) | Any condition  A: 0.54 (0.49 to 0.59)  B: 0.36 (0.31 to 0.41)  “Very important to detect and treat early” conditions  A: 0.72 (0.64 to 0.79)  B: 0.48 (0.40 to 0.57) | Any condition  A: 0.89 (0.87 to 0.91)  B: 0.93 (0.91 to 0.95) | Any condition A: 4.9 (3.9 to 6.1)  B: 5.1 (3.8 to 6.8) | Any condition  A: 0.52 (0.46 to 0.58)  B: 0.69 (0.63 to 0.74) | Fair |
| **Stereoacuity Tests** | | | | | | |
| Afsari et al, 201377  Sydney Paediatric Eye Disease Study | Stereoacuity:  All: Lang-Stereotest II  <30 mo and older that could not do RPST-Stereo Smile Stereoacuity II Test  >/30 mo-Randot Preschool Stereoacuity Test  (Comprehensive exam [per Multi-ethnic Pediatric Eye Disease Study and Baltimore Pediatric Eye Disease Study protocol] and autorefraction) | SSST-strabismus  120: 83%(62 to 104)  240: 50% (22 to 78)  480: 50% (22 to 78)  SSST-anisometropia  120: 33% (7 to 60)  240: 17% (-4 to 38)  480: 17% (-4 to 38)  SSST-amblyopia  120: 50% (1 to 99)  240: 50% (1 to 99)  480: 50% (1 to 99)  RPST-strabismus  200: 48% (31 to 66)  400: 36% (20 to 53)  800: 27% (12 to 42)  RPST-anisometropia  200: 35% (15 to 54)  400: 30% (12 to 49)  800: 9% (-3 to 20)  RPST-amblyopia  200: 53% (25 to 77)  400: 47% (23 to 71)  800: 24% (3 to 44) | SSST-strabismus  120: 60% (56 to 65)  240: 87% (83 to 90)  480: 96% (94 to 98)  SSST-anisometropia  120: 59% (54 to 64)  240: 85% (82 to 89)  480: 95% (93 to 97)  SSST-amblyopia  120: 59% (55 to 64)  240: 86% (82 to 89)  480: 95% (93 to 97)  RPST-strabismus  200: 93% (92 to 95)  400: 97% (96 to 98)  800: 99% (98 to 99)  RPST-anisometropia  200: 93% (91 to 94)  400: 96% (95 to 97)  800: 98% (97 to 99)  RPST-amblyopia  200: 93% (91 to 94)  400: 96% (95 to 97)  800: 98% (97 to 99) | SSST-strabismus  120: 2.08  240: 3.85  480: 12.5  SSST-anisometropia  120: 0.81  240: 1.13  480: 3.40  SSST-amblyopia  120: 1.22  240: 3.57  480: 10  RPST-strabismus  200: 6.86  400: 12.00  800: 27.0  RPST-anisometropia  200: 5.0  400: 7.50  800: 4.50  RPST-amblyopia  200: 7.57  400: 11.75  800: 12.00 | SSST-strabismus  120: 0.28  240: 0.57  480: 0.52  SSST-anisometropia  120: 1.14  240: 0.97  480: 0.87  SSST-amblyopia  120: 0.84  240: 0.58  480: 0.53  RPST-strabismus  200: 0.56  400: 0.66  800: 0.74  RPST-anisometropia  200: 0.70  400: 0.73  800: 0.93  RPST-amblyopia  200: 0.51  400: 0.55  800: 0.78 | Fair |
| Hope et al, 199087 | Random Dot E stereogram (comprehensive eye exam with cycloplegic refraction for abnormal Random Dot E stereogram, visual acuity test, or near cover test; otherwise visual acuity screening or near cover test) | 0.89 (0.52 to 1.0) | 0.76 (0.68 to 0.82) | 3.6 (2.5 to 5.2) | 0.15 (0.02 to 0.94) | Fair |
| Vision in Preschoolers Study Group  (Phase I), 200465 | Random Dot E stereoacuity test  A: Nonstereo card for age 3 years, stereo card at 50 cm for age 4 years, stereo card at 100 cm for age 5 years  B: Nonstereo card for age 3 and 4 years, stereo card at 50 cm for age 5 years (comprehensive eye exam with cycloplegic refraction) | Any condition  A: 0.42 (0.37 to 0.47)  B: 0.22 (0.18 to 0.27)  “Very important to detect and treat early” conditions  A: 0.59 (0.50 to 0.67)  B: 0.30 (0.22 to 0.38) | Any condition  A: 0.90 (0.88 to 0.92)  B: 0.92 (0.90 to 0.94) | Any condition  A: 4.2 (3.3 to 5.3)  B: 2.7 (2.0 to 3.7) | Any condition  A: 0.65 (0.59 to 0.71)  B: 0.85 (0.80 to 0.90) | Fair |
| Vision in Preschoolers  Study Group (Phase I), 200465 | Stereo Smile II Stereoacuity Test  A: 240-arc sec card for age 3 and 4 years, 120-arc sec card for age 5 years  B: 480-arc sec card for age 3 and 4 years, 240-arc sec card for age 5 years† (comprehensive eye exam with cycloplegic refraction) | Any condition  A: 0.44 (0.39 to 0.49)  B: 0.33 (0.28 to 0.38)  “Very important to detect and treat early” conditions  A: 0.72 (0.65 to 0.79)  B: 0.57 (0.50 to 0.64) | Any condition  A: 0.91 (0.89 to 0.93)  B: 0.94 (0.92 to 0.95) | Any condition A: 4.9 (3.9 to 6.1)  B: 5.5 (4.2 to 7.3) | Any condition  A: 0.62 (0.56 to 0.67)  B: 0.71 (0.66 to 0.76) | Fair |
| VIP Study Group, 2010107  Phase I, year 1 | A. LEA Symbols  B. HOTV Symbols  (comprehensive eye exam including monocular threshold visual acuity using electronic visual acuity tester, distance and near cover test, and cycloplegic retinoscopy) | For 90% specificity  *To detect >1 condition*  *3 years*  A: 0.61 (0.47 to 0.73)  B: 0.46 (0.33 to 0.59)  *4 years-young*  A: 0.57 (0.46 to 0.67)  B: 0.57 (0.46 to 0.67)  *4 years-old*  A: 0.65 (0.54 to 0.75)  B: 0.57 (0.45 to 0.67)  *5 years*  A: 0.60 (0.51 to 0.70)  B: 0.56 (0.46 to 0.65)  *To detect a group 1 condition*  *3 years*  A: 0.83 (0.61 to 0.95)  B: 0.57 (0.34 to 0.77)  *4 years-young*  A: 0.73 (0.56 to 0.86)  B: 0.65 (0.47 to 0.80)  *4 years-old*  A: 0.83 (0.65 to 0.94)  B: 0.80 (0.61 to 0.92)  *5 years*  A: 0.78 (0.63 to 0.88)  B: 0.82 (0.68 to 0.91) | Specificity set at 90% or closest to 90% achievable  *To detect >1 condition*  *3 years*  A: 0.90 (0.84 to 0.94)  B: 0.88 (0.82 to 0.93)  *4 years-young*  A: 0.91 (0.86 to 0.94)  B: 0.91 (0.86 to 0.94)  *4 years-old*  A: 0.90 (0.85 to 0.94)  B: 0.87 (0.82 to 0.91)  *5 years*  A: 0.92 (0.87 to 0.95)  B: 0.92 (0.87 to 0.95)  *To detect a group 1 condition*  *3 years*  A: 0.90 (0.85 to 0.94)  B: 0.88 (0.83 to 0.92)  *4 years-young*  A: 0.91 (0.87 to 0.94)  B: 0.91 (0.87 to 0.94)  *4 years-old*  A: 0.90 (0.86 to 0.93)  B: 0.87 (0.82 to 0.91)  *5 years*  A: 0.92 (0.88 to 0.95)  B: 0.92 (0.88 to 0.95) | *>1 Condition*  *3 years*  A: 5.95 (3.58 to 9.88)  B: 3.76 (2.27 to 6.22)  *4 years-young*  A: 6.21 (3.95 to 9.78)  B: 6.21 (3.95 to 9.78)  *4 years-old*  A: 6.63 (4.29 to 10.25)  B: 4.33 (2.92 to 6.41)  *5 years*  A: 7.39 (4.57 to 11.93)  B: 6.83 (4.21 to 11.10)  *Group 1 Condition*  *3 years*  A: 8.35 (5.24 to 13.31)  B: 4.72 (2.79 to 7.98)  *4 years-young*  A: 8.00 (5.24 to 12.20)  B: 7.11 (4.57 to 11.07)  *4 years-old*  A: 8.24 (5.57 to 12.19)  B: 6.10 (4.27 to 8.72)  *5 years*  A: 9.52 (6.20 to 14.60)  B: 10.02 (6.57 to 15.28) | *>1 Condition*  *3 years*  A: 0.43 (0.31 to 0.60)  B: 0.62 (0.49 to 0.79)  *4 years-young*  A: 0.47 (0.37 to 0.60)  B: 0.47 (0.37 to 0.60)  *4 years-old*  A: 0.39 (0.29 to 0.52)  B: 0.50 (0.39 to 0.64)  *5 years*  A: 0.43 (0.34 to 0.55)  B: 0.48 (0.39 to 0.59)  *Group 1 Condition*  *3 years*  A: 0.19 (0.08 to 0.47)  B: 0.49 (0.31 to 0.79)  *4 years-young*  A: 0.30 (0.17 to 0.51)  B: 0.39 (0.25 to 0.60)  *4 years-old*  A: 0.19 (0.08 to 0.41)  B: 0.23 (0.11 to 0.47)  *5 years*  A: 0.24 (0.15 to 0.41)  B: 0.20 (0.11 to 0.36) | Fair |
| VIP Study Group, 2005108  Phase II | Linear LEA Symbols  Single LEA Symbols  (comprehensive eye exam including monocular distance visual acuity, cover testing, cycloplegic retinoscopy) | By severity  *Any condition*  *Nurse*  A: 0.49 (0.44 to 0.54)  B: NA  *Lay Screener*  A: 0.37 (0.32 to 0.42)c  B: 0.61 (0.56 to 0.66)  *Group1*  *Nurse*  A: 0.60 (0.53 to 0.67)  B: NA  *Lay Screener*  A: 0.50 (0.42 to 0.58)c  B: 0.78 (0.72 to 0.83)  *Group 2*  *Nurse*  A: 0.38 (0.30 to 0.47)  B: NA  *Lay Screener*  A: 0.19 (0.12 to 0.27)c  B: 0.51 (0.42 to 0.59)  *Group 3*  *Nurse*  A: 0.42 (0.32 to 0.52)  B: NA  *Lay Screener*  A: 0.35 (0.25 to 0.45)c  B: 0.40 (0.31 to 0.50) | By severity  *Any condition*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)c  B: 0.91 (0.89 to 0.93)  *Group1*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)c  B: 0.91 (0.89 to 0.93)  *Group 2*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)c  B: 0.91 (0.89 to 0.93)  *Group 3*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)c  B: 0.91 (0.89 to 0.93) | By severity  *Any condition*  *Nurse*  A: 4.9 (4.0 to 6.0)  B: NA  *Lay Screener*  A: 3.7 (3.0 to 4.7)d  B: 6.8 (5.5 to 8.4)  *Group1*  *Nurse*  A: 6.0 (4.8 to 7.4)  B: NA  *Lay Screener*  A: 5.0 (4.0 to 6.4)d  B: 8.7 (7.0 to 10.7)  *Group 2*  *Nurse*  A: NA  B: 3.8 (2.9 to 5.0)  *Lay Screener*  A: 1.9 (1.3 to 2.9)d  B: 5.6 (4.4 to 7.3)  *Group 3*  *Nurse*  A: 4.2 (3.1 to 5.6)  B: NA  *Lay Screener*  A: 3.5 (2.5 to 4.8)d  B: 4.4 (3.3 to 6.0) | By severity  *Any condition*  *Nurse*  A: 0.57 (0.52 to 0.62)  B: NA  *Lay Screener*  A: 0.70 (0.65 to 0.76)d  B: 0.43 (0.38 to 0.48)  *Group1*  *Nurse*  B: 0.44 (0.38 to 0.53)  C: NA  *Lay Screener*  A: 0.56 (0.48 to 0.65)d  B: 0.24 (0.19 to 0.31)  *Group 2*  *Nurse*  A: NA  B: 0.69 (0.60 to 0.78)  *Lay Screener*  A: 0.90 (0.82 to 0.98)d  B: 0.54 (0.46 to 0.64)  *Group 3*  *Nurse*  A: 0.65 (0.55 to 0.76)  B: NA  *Lay Screener*  A: 0.73 (0.63 to 0.84)d  B: 0.66 (0.57 to 0.77) | Fair |
| VIP Study Group, 2005108  Phase II | Stereo Smile II  Stereo Smile IIA  (comprehensive eye exam including monocular distance visual acuity, cover testing, cycloplegic retinoscopy) | By severity  *Any condition*  *Nurse*  A: 0.45 (0.40 to 0.50)  B: NA  *Lay Screener*  A: 0.40 (0.36 to 0.45)  B: 0.47 (0.42 to 0.52)c  *Group1*  *Nurse*  A: 0.58 (0.51 to 0.65)  B: NA  *Lay Screener*  A: 0.56 (0.49 to 0.63)  B: 0.70 (0.62 to 0.77)c  *Group 2*  *Nurse*  A: 0.37 (0.29 to 0.45)  B: NA  *Lay Screener*  A: 0.31 (0.24 to 0.40)  B: 0.31 (0.23 to 0.40)c  *Group 3*  *Nurse*  A: 0.30 (0.21 to 0.39)  B: NA  *Lay Screener*  A: 0.23 (0.16 to 0.32)  B: 0.26 (0.17 to 0.35)c | By severity  *Any condition*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)  B: 0.90 (0.88 to 0.92)c  *Group1*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)  B: 0.90 (0.88 to 0.92)c  *Group 2*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)  B: 0.90 (0.88 to 0.92)c  *Group 3*  *Nurse*  A: 0.90 (0.88 to 0.92)  B: NA  *Lay Screener*  A: 0.90 (0.88 to 0.92)  B: 0.90 (0.88 to 0.92)c | By severity  *Any condition*  *Nurse*  A: 4.5 (3.6 to 5.6)  B: NA  *Lay Screener*  A: 4.0 (3.2 to 5.0)  B: 4.7 (3.8 to 5.8)d  *Group1*  *Nurse*  A: 5.8 (4.7 to 7.2)  B: NA  *Lay Screener*  A: 5.6 (4.5 to 7.0)  B: 7.0 (5.7 to 8.6)d  *Group 2*  *Nurse*  A: 3.7 (2.8 to 4.9)  B: NA  *Lay Screener*  A: 3.1 (2.3 to 4.2)  B: 3.2 (2.3 to 4.3)d  *Group 3*  *Nurse*  A: 3.0 (2.1 to 4.2)  B: NA  *Lay Screener*  A: 2.3 (1.6 to 3.4)  B: 2.6 (1.8 to 3.8)d | By severity  *Any condition*  *Nurse*  A: 0.61 (0.56 to 0.67)  B: NA  *Lay Screener*  A: 0.67 (0.62 to 0.72)  B: 0.59 (0.53 to 0.65)d  *Group1*  *Nurse*  A: 0.47 (0.40 to 0.55)  B: NA  *Lay Screener*  A: 0.49 (0.42 to 0.57)  B: 0.34 (0.27 to 0.42)d  *Group 2*  *Nurse*  A: 0.70 (0.62 to 0.80)  B: NA  *Lay Screener*  A: 0.76 (0.68 to 0.85)  B: 0.76 (0.67 to 0.86)d  *Group 3*  *Nurse*  A: 0.78 (0.69 to 0.89)  B: NA  *Lay Screener*  A: 0.85 (0.77 to 0.95)  B: 0.83 (0.74 to 0.93)a | Fair |
| **Cover-Uncover Test** | | | | | | |
| Vision in Preschoolers Study Group  (Phase I), 200465 | Cover-uncover test  (comprehensive eye exam with cycloplegic refraction) | Any condition 0.16 (0.12 to 0.20)  “Very important to detect and treat early” conditions 0.24 (0.17 to 0.32) | Any condition 0.98 (0.97 to 0.99) | Any condition 7.9 (4.6 to 14) | Any condition 0.86 (0.82 to 0.90) | Fair |
| **Combined Clinical Examination Screening Tests** | | | | | | |
| Barry et al, 200379 | Visual inspection, cover-uncover test, eye motility and head posture exam, LEA Symbols visual acuity test (second orthoptic exam using more stringent criteria, followed by ophthalmological exam for abnormal, missing, or inconsistent results) | 0.91 (0.71 to 0.99) | 0.94 (0.92 to 0.95) | 15 (11 to 19) | 0.10 (0.03 to 0.36) | Fair |
| Chui et al, 200482 | LEA Symbols visual acuity test, Frisby stereoacuity test, and external visual inspection  (comprehensive eye exam with cycloplegic refraction) | 0.67 (0.41 to 0.87)  <41 months:  0.75 (0.43 to 0.94)  ≥41 months: 0.50 (0.12 to 0.88) | 0.86 (0.79 to 0.92)  <41 months:  0.90 (0.52 to 0.82)  ≥41 months: 0.95 (0.88 to 0.99) | 4.8 (2.8 to 8.4)  <41 months:  2.4 (1.4 to 4.1)  ≥41 months: 10 (3.0 to 36) | 0.39 (0.20 to 0.75)  <41 months:  0.37 (0.13 to 1.0)  >41 months:  0.53 (0.24 to 1.2) | Fair |
| Kennedy et al, 199592 | Snellen E or Stycar-graded balls visual acuity test and Titmus stereotest (comprehensive eye exam without cycloplegic refraction) | 0.09 (0.04 to 0.20) ‡ | 1.0 (0.99 to 1.0) ‡ | 17 (5.5 to 54) ‡ | 0.91 (0.84 to 0.99)‡ | Fair |
| Shallo-Hoffmann et al, 2004103 | LEA Symbols and HOTV chart and Random Dot E stereoacuity test (comprehensive eye exam with cycloplegic refraction) | 0.73 (0.13 to 0.98) § | 0.94 (0.90 to 0.96) § | 12 (4.7 to 28) § | 0.28 (0.03 to 2.4)§ | Fair |

\*Determined by cutoff to achieve specificity of 0.95.

† Raw data not provided, unable to calculate confidence intervals.

‡Adjusted for verification bias based on a 20% sample of negative screens.

§ Adjusted for verification bias based on a 25% sample of negative screens.

Abbreviations: CI=confidence interval; cm=centimeters; NA=not available; VIP=Vision in Preschoolers.