| 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 testA: 10/32 for age 3 years, 10/20 for age 4 and 5 yearsB: 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 conditionA: 0.61 (0.56 to 0.66)B: 0.49 (0.44 to 0.54)“Very important to detect and treat early” conditionsA: 0.77 (0.69 to 0.84)B: 0.65 (0.56 to 0.73) | Any conditionA: 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 conditionA: 0.43 (0.38 to 0.50)B: 0.54 (0.49 to 0.60) | Fair |
| Vision in PreschoolersStudy Group (Phase I), 200465 | Crowded linear HOTV visual acuity testA: 10/25 for age 3 and 4 years, 10/20 for age 5 yearsB: 10/32 for age 3 and 4 years, 10/25 for age 5 years\* (comprehensive eye exam with cycloplegic refraction) | Any conditionA: 0.54 (0.49 to 0.59)B: 0.36 (0.31 to 0.41)“Very important to detect and treat early” conditionsA: 0.72 (0.64 to 0.79)B: 0.48 (0.40 to 0.57) | Any conditionA: 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 conditionA: 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-strabismus120: 83%(62 to 104)240: 50% (22 to 78)480: 50% (22 to 78)SSST-anisometropia120: 33% (7 to 60)240: 17% (-4 to 38)480: 17% (-4 to 38)SSST-amblyopia120: 50% (1 to 99)240: 50% (1 to 99)480: 50% (1 to 99)RPST-strabismus200: 48% (31 to 66)400: 36% (20 to 53)800: 27% (12 to 42)RPST-anisometropia200: 35% (15 to 54)400: 30% (12 to 49)800: 9% (-3 to 20)RPST-amblyopia200: 53% (25 to 77)400: 47% (23 to 71)800: 24% (3 to 44) | SSST-strabismus120: 60% (56 to 65)240: 87% (83 to 90)480: 96% (94 to 98)SSST-anisometropia120: 59% (54 to 64)240: 85% (82 to 89)480: 95% (93 to 97)SSST-amblyopia120: 59% (55 to 64)240: 86% (82 to 89)480: 95% (93 to 97)RPST-strabismus200: 93% (92 to 95)400: 97% (96 to 98)800: 99% (98 to 99)RPST-anisometropia200: 93% (91 to 94)400: 96% (95 to 97)800: 98% (97 to 99)RPST-amblyopia200: 93% (91 to 94)400: 96% (95 to 97)800: 98% (97 to 99) | SSST-strabismus120: 2.08240: 3.85480: 12.5SSST-anisometropia120: 0.81240: 1.13480: 3.40SSST-amblyopia120: 1.22240: 3.57480: 10RPST-strabismus200: 6.86400: 12.00800: 27.0RPST-anisometropia200: 5.0400: 7.50800: 4.50RPST-amblyopia200: 7.57400: 11.75800: 12.00 | SSST-strabismus120: 0.28240: 0.57480: 0.52SSST-anisometropia120: 1.14240: 0.97480: 0.87SSST-amblyopia120: 0.84240: 0.58480: 0.53RPST-strabismus200: 0.56400: 0.66800: 0.74RPST-anisometropia200: 0.70400: 0.73800: 0.93RPST-amblyopia200: 0.51400: 0.55800: 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 testA: 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 conditionA: 0.42 (0.37 to 0.47)B: 0.22 (0.18 to 0.27)“Very important to detect and treat early” conditionsA: 0.59 (0.50 to 0.67)B: 0.30 (0.22 to 0.38) | Any conditionA: 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 conditionA: 0.65 (0.59 to 0.71)B: 0.85 (0.80 to 0.90) | Fair |
| Vision in PreschoolersStudy Group (Phase I), 200465 | Stereo Smile II Stereoacuity TestA: 240-arc sec card for age 3 and 4 years, 120-arc sec card for age 5 yearsB: 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 conditionA: 0.44 (0.39 to 0.49)B: 0.33 (0.28 to 0.38)“Very important to detect and treat early” conditionsA: 0.72 (0.65 to 0.79)B: 0.57 (0.50 to 0.64) | Any conditionA: 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 conditionA: 0.62 (0.56 to 0.67)B: 0.71 (0.66 to 0.76) | Fair |
| VIP Study Group, 2010107Phase I, year 1 | A. LEA SymbolsB. 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, 2005108Phase 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)cB: 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)cB: 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)cB: 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)cB: 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)cB: 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)cB: 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)cB: 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)cB: 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)dB: 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)dB: 8.7 (7.0 to 10.7)*Group 2**Nurse*A: NAB: 3.8 (2.9 to 5.0)*Lay Screener*A: 1.9 (1.3 to 2.9)dB: 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)dB: 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)dB: 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)dB: 0.24 (0.19 to 0.31)*Group 2**Nurse*A: NAB: 0.69 (0.60 to 0.78)*Lay Screener*A: 0.90 (0.82 to 0.98)dB: 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)dB: 0.66 (0.57 to 0.77) | Fair |
| VIP Study Group, 2005108Phase II | Stereo Smile IIStereo 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.