Supplementary Table S1. Prevalence and tetrachoric correlation coefficients among reasons for desired occupation (n = 12,184).

| | | Tetrachoric correlation coefficients | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Prevalence | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Income | 23.3% | 1.000 | | | | | | |
| 2. Reputation | 6.4% | 0.569* | 1.000 | | | | | |
| 3. Ability | 47.7% | −0.122* | 0.098* | 1.000 | | | | |
| 4. Interest | 78.3% | −0.400* | −0.083* | 0.289* | 1.000 | | | |
| 5. Altruistic | 41.8% | 0.232* | 0.184* | −0.006 | −0.227* | 1.000 | | |
| 6. Stability | 13.2% | 0.448* | 0.245* | −0.144* | −0.418* | 0.273* | 1.000 | |
| 7. Parents' work | 3.3% | 0.031 | 0.049 | −0.207* | −0.352* | −0.025 | 0.054 | 1.000 |

*: P <0.05

Supplementary Table S2. Association of the library density with the motivational orientation for the desired occupation; multilevel linear regression model (level 1, individual: n = 12184; level 2, municipality of residence wave 15: n = 1457; level 3, prefecture of residence wave 15: n = 47).

| | Null model | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|---|
| | Coef. (95% CI) | Coef. (95% CI) | Coef. (95% CI) | Coef. (95% CI) | Coef. (95% CI) |
| **Intrinsic motivation** | | | | | |
| Fixed effects | | | | | |
| Library density | | | | | |
| Low | | ref. | ref. | ref. | ref. |
| Middle | | 2.05 (−0.55, 4.66) | 1.84 (−0.74, 4.42) | 1.87 (−0.71, 4.45) | 1.60 (−1.00, 4.21) |
| High | | 3.93 (1.21, 6.64) | 3.21 (0.51, 5.92) | 3.24 (0.55, 5.93) | 3.10 (0.35, 5.85) |
| Random effects | | | | | |
| Prefecture-level variance | 0.06 (−0.01, 0.13) | 0.04 (−0.02, 0.10) | 0.04 (−0.02, 0.09) | 0.03 (−0.02, 0.09) | 0.03 (−0.02, 0.09) |
| City-level variance | 0.10 (−0.06, 0.26) | 0.08 (−0.08, 0.23) | 0.06 (−0.09, 0.21) | 0.06 (−0.09, 0.21) | 0.05 (−0.09, 0.20) |
| Individual-level variance | 23.98 (23.36, 24.60) | 23.99 (23.37, 24.61) | 23.89 (23.27, 24.50) | 23.83 (23.21, 24.44) | 23.82 (23.21, 24.44) |
| **Extrinsic motivation** | | | | | |
| Fixed effects | | | | | |
| Library density | | | | | |
| Low | | ref. | ref. | ref. | ref. |
| Middle | | 0.16 (−2.36, 2.67) | −0.30 (−2.80, 2.19) | −0.31 (−2.80, 2.19) | −0.31 (−2.82, 2.20) |
| High | | 1.06 (−1.53, 3.64) | 0.04 (−2.58, 2.66) | 0.02 (−2.59, 2.64) | −0.13 (−2.81, 2.56) |
| Random effects | | | | | |
| Prefecture-level variance | 0.02 (−0.02, 0.07) | 0.03 (−0.02, 0.07) | 0.04 (−0.01, 0.10) | 0.04 (−0.01, 0.09) | 0.05 (−0.01, 0.11) |
| City-level variance | 0.13 (−0.02, 0.28) | 0.13 (−0.02, 0.28) | 0.10 (−0.04, 0.25) | 0.10 (−0.04, 0.25) | 0.08 (−0.06, 0.22) |
| Individual-level variance | 21.56 (21.00, 22.11) | 21.55 (21.00, 22.11) | 21.33 (20.78, 21.88) | 21.33 (20.78, 21.88) | 21.27 (20.72, 21.82) |
| **Altruistic motivation** | | | | | |
| Fixed effects | | | | | |
| Library density | | | | | |
| Low | | ref. | ref. | ref. | ref. |
| Middle | | 2.54 (−0.11, 5.18) | 2.03 (−0.63, 4.69) | 2.02 (−0.63, 4.67) | 2.12 (−0.56, 4.81) |
| High | | 1.41 (−1.29, 4.11) | 0.20 (−2.56, 2.96) | −0.04 (−2.75, 2.67) | 0.08 (−2.72, 2.88) |
| Random effects | | | | | |
| Prefecture-level variance | 0.02 (−0.03, 0.07) | 0.02 (−0.03, 0.06) | 0.03 (−0.02, 0.09) | 0.02 (−0.03, 0.06) | 0.02 (−0.03, 0.06) |
| City-level variance | 0.14 (−0.02, 0.31) | 0.14 (−0.02, 0.31) | 0.15 (−0.01, 0.32) | 0.17 (−0.00, 0.34) | 0.17 (−0.00, 0.33) |
| Individual-level variance | 24.17 (23.54, 24.79) | 24.16 (23.54, 24.79) | 23.83 (23.22, 24.45) | 23.78 (23.17, 24.40) | 23.77 (23.15, 24.38) |

Abbreviations: coefficient, Coef; confidence interval, CI
Null model: intercept-only model
Model 1: library density was added
Model 2: model 1 + variables at age 7 except for the number of books reading (i.e., having older siblings, having younger siblings, and either self-employment)
Model 3: model 2 + the number of books reading at age 7
Model 4: model 3 + variables at age 15 (i.e., living with both parents, equivalent income, size of residential city)
Missing categories for covariates were included in the analysis but not reported to reduce the space

Supplementary Table S3. Association between libraries and motivational orientation for the desired occupation; multilevel linear regression model (level 1, individual: n = 12184; level 2, municipality of residence wave 15: n = 1457; level 3, prefecture of residence wave 15: n = 47).

| | Intrinsic motivation Coef. (95% CI) | Extrinsic motivation Coef. (95% CI) | Altruistic motivation Coef. (95% CI) |
|---|---|---|---|
| **Fixed effects** | | | |
| Library density at age 7 | | | |
| Low | ref. | ref. | ref. |
| Middle | 1.60 (−1.00, 4.21) | −0.31 (−2.82, 2.20) | 2.12 (−0.56, 4.81) |
| High | 3.10 (0.35, 5.85) | −0.13 (−2.81, 2.56) | 0.08 (−2.72, 2.88) |
| Gender | | | |
| Boys | ref. | ref. | ref. |
| Girls | 3.99 (2.23, 5.76) | −6.55 (−8.22, −4.88) | 8.05 (6.28, 9.81) |
| Mother's age | 0.19 (−0.11, 0.48) | 0.06 (−0.22, 0.34) | 0.09 (−0.21, 0.38) |
| Father's age | −0.05 (−0.27, 0.18) | 0.03 (−0.19, 0.24) | 0.18 (−0.05, 0.41) |
| Parents' education | | | |
| Neither college | ref. | ref. | ref. |
| Either college | 1.78 (−0.31, 3.86) | 3.55 (1.58, 5.53) | 3.61 (1.52, 5.70) |
| Both college | 3.56 (0.67, 6.45) | 5.47 (2.73, 8.20) | 5.21 (2.31, 8.10) |
| Having older siblings at age 7 | | | |
| Yes | −3.11 (−5.22, −0.99) | −3.32 (−5.32, −1.32) | −2.09 (−4.20, 0.03) |
| Having younger siblings at age 7 | | | |
| Yes | −0.15 (−2.35, 2.04) | 0.71 (−1.37, 2.78) | 1.55 (−0.65, 3.75) |
| Self-employed parent at age 7 | | | |
| Yes | 0.60 (−1.99, 3.19) | −0.58 (−3.03, 1.87) | −2.26 (−4.85, 0.34) |
| Number of reading books at age 7 | 0.62 (0.39, 0.84) | 0.16 (−0.05, 0.38) | 0.57 (0.35, 0.80) |
| Living with both parents at age 15 | | | |
| Yes | 3.46 (0.44, 6.49) | −0.41 (−3.27, 2.45) | −0.27 (−3.30, 2.75) |
| Equivalent income at age 15 | | | |
| Low | ref. | ref. | ref. |
| Lower | −0.30 (−2.84, 2.25) | 3.40 (0.99, 5.81) | 2.40 (−0.15, 4.95) |
| Higher | −0.23 (−2.83, 2.38) | 4.81 (2.34, 7.28) | 3.40 (0.79, 6.01) |
| Highest | −0.45 (−3.27, 2.38) | 6.79 (4.12, 9.47) | 2.90 (0.07, 5.73) |
| Size of residential city at age 15 | | | |
| Large city | ref. | ref. | ref. |
| Middle city | 0.36 (−2.46, 3.18) | −0.08 (−2.82, 2.66) | 0.56 (−2.36, 3.48) |
| Small city | −0.29 (−2.79, 2.21) | −1.45 (−3.88, 0.97) | −0.09 (−2.65, 2.46) |
| Town | −2.16 (−5.80, 1.48) | 0.10 (−3.39, 3.58) | 1.26 (−2.42, 4.93) |
| **Random effects** | | | |
| Prefecture-level variance | 0.03 (−0.02, 0.09) | 0.05 (−0.01, 0.11) | 0.02 (−0.03, 0.06) |
| City-level variance | 0.05 (−0.09, 0.20) | 0.08 (−0.06, 0.22) | 0.17 (−0.00, 0.33) |
| Individual-level variance | 23.82 (23.21, 24.44) | 21.27 (20.72, 21.82) | 23.77 (23.15, 24.38) |

All listed variables were simultaneously included in the models.
Missing categories for covariates were included in the analysis but not reported to reduce the space

Supplementary Table S4. Stratification analysis by equivalent income.

| | Equivalent income strata | | | |
|---|---|---|---|---|
| | Lowest | Lower | Higher | Highest |
| | Coef. (95% CI) | Coef. (95% CI) | Coef. (95% CI) | Coef. (95% CI) |
| **Intrinsic motivation** | | | | |
| Fixed effects | | | | |
| Library density | | | | |
| Low | ref. | ref. | ref. | ref. |
| Middle | 4.83 (0.05, 9.60) | −0.36 (−5.38, 4.67) | −0.49 (−5.55, 4.56) | 2.61 (−3.32, 8.54) |
| High | 8.60 (3.41, 13.78) | 2.45 (−2.88, 7.78) | 0.86 (−4.23, 5.95) | 2.39 (−3.46, 8.23) |
| Random effects | | | | |
| Prefecture-level variance | 0.04 (−0.11, 0.20) | 0.05 (−0.11, 0.21) | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) |
| City-level variance | 0.00 (0.00, 0.00) | 0.36 (−0.28, 1.00) | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) |
| Individual-level variance | 23.47 (22.27, 24.68) | 23.27 (21.95, 24.59) | 23.88 (22.69, 25.07) | 24.12 (22.86, 25.38) |
| **Extrinsic motivation** | | | | |
| Fixed effects | | | | |
| Library density | | | | |
| Low | ref. | ref. | ref. | ref. |
| Middle | 2.72 (−1.63, 7.08) | −1.17 (−5.74, 3.40) | −3.15 (−8.02, 1.71) | −1.83 (−7.64, 3.98) |
| High | 3.32 (−1.34, 7.98) | −4.12 (−8.90, 0.66) | 0.55 (−4.38, 5.49) | −3.47 (−9.20, 2.26) |
| Random effects | | | | |
| Prefecture-level variance | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) | 0.02 (−0.09, 0.13) | 0.00 (0.00, 0.00) |
| City-level variance | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) | 0.10 (−0.38, 0.58) |
| Individual-level variance | 19.74 (18.73, 20.75) | 21.26 (20.19, 22.34) | 21.89 (20.79, 22.98) | 22.58 (21.32, 23.85) |
| **Altruistic motivation** | | | | |
| Fixed effects | | | | |
| Library density | | | | |
| Low | ref. | ref. | ref. | ref. |
| Middle | 4.22 (−0.52, 8.95) | −2.47 (−7.34, 2.41) | 4.50 (−0.80, 9.81) | 1.09 (−4.94, 7.12) |
| High | 1.97 (−3.10, 7.04) | −3.15 (−8.34, 2.04) | 2.32 (−3.10, 7.73) | −2.50 (−8.44, 3.45) |
| Random effects | | | | |
| Prefecture-level variance | 0.00 (0.00, 0.00) | 0.05 (−0.10, 0.21) | 0.04 (−0.11, 0.19) | 0.00 (0.00, 0.00) |
| City-level variance | 0.00 (0.00, 0.00) | 0.00 (0.00, 0.00) | 0.41 (−0.19, 1.01) | 0.14 (−0.38, 0.66) |
| Individual-level variance | 23.34 (22.15, 24.53) | 23.79 (22.58, 25.00) | 23.45 (22.16, 24.73) | 24.09 (22.74, 25.45) |

Abbreviations: coefficient, Coef; confidence interval, CI

Models were adjusted for child's gender, mother's age, father's age, parents' education, having older siblings, having younger siblings, either self-employment, living with both parents, and size of municipality of residence.

Supplementary Table S5. Stratification analysis by size of municipality of residence at age 15.

| | Size of residential city at age 15 | |
|---|---|---|
| | Major/Middle city | Small city/Town |
| | Coef. (95% CI) | Coef. (95% CI) |
| **Intrinsic motivation** | | |
| Fixed effects | | |
| Library density | | |
| Low | ref. | ref. |
| Middle | 2.14 (−2.35, 6.63) | 1.63 (−1.60, 4.86) |
| High | 4.37 (−0.17, 8.91) | 2.67 (−0.74, 6.07) |
| Random effects | | |
| Prefecture-level variance | 0.07 (−0.04, 0.18) | 0.03 (−0.05, 0.11) |
| City-level variance | 0.06 (−0.13, 0.26) | 0.11 (−0.20, 0.42) |
| Individual-level variance | 23.82 (22.95, 24.69) | 23.63 (22.75, 24.51) |
| **Extrinsic motivation** | | |
| Fixed effects | | |
| Library density | | |
| Low | ref. | ref. |
| Middle | −1.08 (−5.33, 3.16) | −0.41 (−3.48, 2.67) |
| High | −2.07 (−6.35, 2.20) | 0.77 (−2.53, 4.07) |
| Random effects | | |
| Prefecture-level variance | 0.05 (−0.04, 0.14) | 0.06 (−0.03, 0.15) |
| City-level variance | 0.06 (−0.11, 0.24) | 0.12 (−0.16, 0.40) |
| Individual-level variance | 21.56 (20.77, 22.35) | 20.92 (20.14, 21.70) |
| **Altruistic motivation** | | |
| Fixed effects | | |
| Library density | | |
| Low | ref. | ref. |
| Middle | −0.39 (−5.02, 4.25) | 3.16 (−0.16, 6.48) |
| High | −2.77 (−7.36, 1.82) | 1.63 (−1.94, 5.20) |
| Random effects | | |
| Prefecture-level variance | 0.02 (−0.06, 0.10) | 0.07 (−0.03, 0.18) |
| City-level variance | 0.17 (−0.04, 0.38) | 0.22 (−0.11, 0.55) |
| Individual-level variance | 23.75 (22.88, 24.62) | 23.58 (22.70, 24.46) |

Abbreviations: coefficient, Coef; confidence interval, CI

Models were adjusted for child's gender, mother's age, father's age, parents' education, having older sibling, having younger sibling, either self-employment, living with both parents, and equivalent income.

Supplementary Figure S1. Flowchart for the study participants