**Supplementary Material A1.** The first language represented in the data

|  |  |  |  |
| --- | --- | --- | --- |
| First Language | Frequency | First Language | Frequency |
| English | 3,048 | Danish | 2 |
| Spanish (all varieties) | 199 | Indonesian | 2 |
| Chinese (all varieties) | 64 | Kazakh | 2 |
| French | 46 | Serbian | 2 |
| Russian | 24 | Thai | 2 |
| Arabic (all varieties) | 23 | Yoruba | 2 |
| Portuguese (all varieties) | 22 | Akan | 1 |
| Persian/Farsi | 16 | Alaska | 1 |
| German | 15 | Azari | 1 |
| Japanese | 14 | Bangladesh | 1 |
| Polish | 14 | Bisaya | 1 |
| Korean | 13 | Burmese | 1 |
| Vietnamese | 13 | Cebuano | 1 |
| Filipino/Tagalog | 11 | Chavacano | 1 |
| Hindi | 11 | Chichewa | 1 |
| Italian | 9 | Icelandic | 1 |
| Tamil | 9 | Igbo | 1 |
| Malayalam | 6 | Kannada | 1 |
| Urdu | 6 | Kapampangan | 1 |
| Bengali | 5 | Kutchi | 1 |
| Bulgarian | 5 | Khmer | 1 |
| Haitian Creole | 5 | Kikuyu | 1 |
| Hebrew | 5 | Konkani | 1 |
| Marathi | 5 | Laos | 1 |
| Turkish | 5 | Lithuanian | 1 |
| Greek | 4 | Malay | 1 |
| Gujrati | 4 | Mixtec | 1 |
| Swedish | 4 | Mongolian | 1 |
| Ukrainian | 4 | Nepal Bahasa | 1 |
| Croatian | 3 | Punjabi | 1 |
| Dutch | 3 | Sindhi | 1 |
| Nepali | 3 | Telugu | 1 |
| Romanian | 3 | Tibetan | 1 |
| Slovak | 3 | Yiddish | 1 |
| (Ki)swahili | 3 | Missing data | 1 |
| Armenian | 2 | Total | 3,670 |

**Supplementary Material A2.** Countries represented in the data outside of the U.S.

|  |  |  |  |
| --- | --- | --- | --- |
| Country | Frequency | Country | Frequency |
| Canada | 376 | Hong Kong | 2 |
| Australia | 98 | India | 2 |
| Germany | 32 | Malaysia | 2 |
| United Kingdom | 31 | Nepal | 2 |
| Mexico | 20 | Panama | 2 |
| New Zealand | 19 | Saudi Arabia | 2 |
| France | 16 | South Africa | 2 |
| Japan | 15 | Tanzania | 2 |
| Nigeria | 11 | Ukraine | 2 |
| Italy | 8 | Uzbekistan | 2 |
| Ireland | 7 | Angola | 1 |
| Egypt | 5 | Bulgaria | 1 |
| Netherlands | 5 | Cameroon | 1 |
| South Korea | 5 | Costa Rica | 1 |
| Thailand | 5 | Indonesia | 1 |
| Chile | 4 | Iraq | 1 |
| Dominican Republic | 4 | Kazakhstan | 1 |
| Peru | 4 | Lebanon | 1 |
| Philippines | 4 | Montenegro | 1 |
| Switzerland | 4 | Morocco | 1 |
| Brazil | 3 | Myanmar | 1 |
| Colombia | 3 | Norway | 1 |
| Jordan | 3 | Palestine | 1 |
| Spain | 3 | Poland | 1 |
| Taiwan | 3 | Sweden | 1 |
| Argentina | 2 | Turkey | 1 |
| Austria | 2 | United Arab Emirates | 1 |
| Ecuador | 2 | Venezuela | 1 |
| Greece | 2 | Vietnam | 1 |
| Guatemala | 2 | Zambia | 1 |

**Supplementary Material B.** Results of the clustering validation indices using *NbClust* package

도표, 스크린샷, 디자인이(가) 표시된 사진

자동 생성된 설명

라인, 도표, 그래프, 경사이(가) 표시된 사진

자동 생성된 설명

라인, 도표, 그래프, 경사이(가) 표시된 사진

자동 생성된 설명

**Supplementary Material C.** Results of principal component analysis

[Eigenvalues of Principal Component Analysis]

|  |  |  |  |
| --- | --- | --- | --- |
|  | Eigenvalue | Percentage of the variance explained | Cumulative percentage of the variance explained |
| Component 1 | 2.4691169 | 49.382338 | 49.38234 |
| Component 2 | 0.9912536 | 19.825072 | 69.20741 |
| Component 3 | 0.9348608 | 18.697216 | 87.90463 |
| Component 4 | 0.3748043 | 7.496086 | 95.40071 |
| Component 5 | 0.2299644 | 4.599288 | 100.00000 |

[Correlations (Contributions)]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Component 1 | Component 2 | Component 3 | Component 4 | Component 5 |
| Performance Expectancy | 0.87 (30.88%) | -0.04 (0.16%) | -0.16 (2.77%) | -0.38 (39.85%) | -0.24 (26.32%) |
| Effort Expectancy | 0.86 (30.04%) | -0.13 (1.89%) | 0.01 (0.02%) | 0.46 (57.11%) | -0.15 (10.91%) |
| Facilitating Conditions | 0.32 (4.37%) | 0.28 (8.46%) | 0.89 (85.97%) | -0.06 (1.08%) | 0.01 (0.09%) |
| Social Influence | 0.18 (1.45%) | 0.93 (87.75%) | -0.30 (9.63%) | 0.06 (1.06%) | 0.01 (0.09%) |
| MALL Attitude | 0.90 (33.24%) | -0.13 (1.72%) | -0.12 (1.58%) | -0.05 (0.87%) | 0.37 (62.56%) |

**Supplementary Material D.** Descriptive statistics of UTAUT determinants

[Performance expectancy]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,620 | 4.55 | 4.53 | 4.58 | 0.50 | 4.67 | 2.67 | 5 | 0.01 |
| Cluster 2 | 1,276 | 4.39 | 4.37 | 4.43 | 0.54 | 4.33 | 2.67 | 5 | 0.02 |
| Cluster 3 | 768 | 3.15 | 3.10 | 3.20 | 0.75 | 3.33 | 1 | 5 | 0.03 |

[Effort expectancy]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,620 | 4.73 | 4.71 | 4.76 | 0.42 | 5 | 3 | 5 | 0.01 |
| Cluster 2 | 1,276 | 4.72 | 4.70 | 4.74 | 0.42 | 5 | 3 | 5 | 0.01 |
| Cluster 3 | 768 | 3.46 | 3.40 | 3.52 | 0.86 | 3.5 | 1 | 5 | 0.03 |

[Social influence]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,620 | 3.47 | 3.44 | 3.50 | 0.63 | 3.25 | 2.75 | 5 | 0.02 |
| Cluster 2 | 1,276 | 1.84 | 1.82 | 1.88 | 0.53 | 2 | 1 | 2.75 | 0.01 |
| Cluster 3 | 768 | 2.59 | 2.54 | 2.65 | 0.75 | 2.75 | 1 | 5 | 0.03 |

[Facilitating conditions]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,620 | 4.75 | 4.72 | 4.77 | 0.47 | 5 | 1 | 5 | 0.01 |
| Cluster 2 | 1,276 | 4.70 | 4.67 | 4.73 | 0.55 | 4.8 | 1 | 5 | 0.02 |
| Cluster 3 | 768 | 4.48 | 4.44 | 4.53 | 0.68 | 5 | 1 | 5 | 0.02 |

[MALL attitude]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,620 | 4.82 | 4.81 | 4.84 | 0.34 | 5 | 3.33 | 5 | 0.01 |
| Cluster 2 | 1,276 | 4.77 | 4.76 | 4.80 | 0.37 | 5 | 3.33 | 5 | 0.01 |
| Cluster 3 | 768 | 3.52 | 3.47 | 3.58 | 0.78 | 3.67 | 1 | 5 | 0.03 |

**Supplementary Material E.** Descriptive statistics of the survey questionnaire (frequency distribution)

[MALL acceptance level]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Scale | Continuous MALL engagement | Recommendation of MALL | More investment into MALL | Learning extra language using MALL |
| Cluster 1 | 1 | 3 | 3 | 9 | 57 |
| (*n* = 1,620) | 2 | 16 | 6 | 33 | 66 |
|  | 3 | 34 | 39 | 139 | 230 |
|  | 4 | 242 | 272 | 249 | 391 |
|  | 5 | 1,325 | 1,300 | 1,190 | 876 |
| Cluster 2 | 1 | 8 | 2 | 20 | 73 |
| (*n* = 1,276) | 2 | 12 | 3 | 47 | 69 |
|  | 3 | 27 | 67 | 126 | 262 |
|  | 4 | 259 | 310 | 281 | 317 |
|  | 5 | 970 | 894 | 802 | 555 |
| Cluster 3 | 1 | 46 | 36 | 48 | 87 |
| (*n* = 768) | 2 | 83 | 81 | 72 | 92 |
|  | 3 | 139 | 215 | 123 | 222 |
|  | 4 | 375 | 336 | 304 | 275 |
|  | 5 | 125 | 100 | 221 | 92 |

*Note*. 1: Strongly disagree, 5: Strongly agree.

[Age]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *n* | 20s and below | 30s | 40s | 50s | 60s+ |
| Cluster 1 | 1,620 | 457 | 448 | 253 | 159 | 303 |
| Cluster 2 | 1,276 | 238 | 239 | 193 | 193 | 413 |
| Cluster 3 | 768 | 202 | 198 | 128 | 100 | 140 |

[Reasons for L2 learning]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Scale | Self-satisfaction | Learning cultures | Communication | Job requirement | Academic requirement |
| Cluster 1 | 1 | 54 | 57 | 151 | 952 | 1,107 |
| (*n* = 1,620) | 2 | 27 | 60 | 90 | 125 | 126 |
|  | 3 | 53 | 154 | 167 | 196 | 173 |
|  | 4 | 475 | 607 | 477 | 206 | 104 |
|  | 5 | 1,011 | 742 | 735 | 141 | 110 |
| Cluster 2 | 1 | 43 | 94 | 265 | 988 | 1,085 |
| (*n* = 1,276) | 2 | 22 | 53 | 97 | 74 | 59 |
|  | 3 | 37 | 187 | 147 | 99 | 69 |
|  | 4 | 330 | 489 | 394 | 75 | 31 |
|  | 5 | 844 | 453 | 373 | 40 | 32 |
| Cluster 3 | 1 | 39 | 50 | 92 | 482 | 565 |
| (*n* = 768) | 2 | 25 | 43 | 69 | 65 | 55 |
|  | 3 | 56 | 117 | 112 | 100 | 74 |
|  | 4 | 303 | 339 | 269 | 83 | 48 |
|  | 5 | 345 | 219 | 226 | 38 | 26 |

*Note*. 1: Strongly disagree, 5: Strongly agree.

[L2 learning environments]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Scale | Social situation | Current living | Relocation planning | Professional position |
| Cluster 1 | No | 987 | 1,170 | 1,194 | 1,380 |
| (*n* = 1,620) | Yes | 633 | 450 | 426 | 240 |
| Cluster 2 | No | 1,014 | 1,052 | 1,098 | 1,196 |
| (*n* = 1,276) | Yes | 262 | 224 | 178 | 80 |
| Cluster 3 | No | 524 | 592 | 593 | 680 |
| (*n* = 768) | Yes | 244 | 176 | 175 | 88 |

[L2 skill practice on the app]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Scale | Listening | Speaking | Pronunciation | Vocabulary | Grammar | Reading |
| Cluster 1 | 1 | 4 | 26 | 35 | 20 | 37 | 103 |
| (*n* = 1,620) | 2 | 80 | 121 | 124 | 114 | 175 | 252 |
|  | 3 | 305 | 314 | 326 | 338 | 420 | 453 |
|  | 4 | 562 | 494 | 522 | 563 | 504 | 422 |
|  | 5 | 669 | 665 | 613 | 585 | 484 | 390 |
| Cluster 2 | 1 | 8 | 30 | 26 | 10 | 32 | 123 |
| (*n* = 1,276) | 2 | 67 | 94 | 96 | 84 | 152 | 195 |
|  | 3 | 231 | 217 | 252 | 273 | 324 | 357 |
|  | 4 | 402 | 363 | 382 | 403 | 353 | 275 |
|  | 5 | 568 | 572 | 520 | 506 | 415 | 326 |
| Cluster 3 | 1 | 47 | 89 | 86 | 60 | 88 | 140 |
| (*n* = 768) | 2 | 181 | 193 | 200 | 209 | 251 | 266 |
|  | 3 | 266 | 235 | 240 | 261 | 267 | 215 |
|  | 4 | 175 | 161 | 161 | 168 | 106 | 97 |
|  | 5 | 99 | 90 | 81 | 70 | 56 | 50 |

*Note*. 1: Never, 5: Always.

[Satisfaction on L2 skill practice on the app]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Scale | Listening | Speaking | Pronunciation | Vocabulary | Grammar | Reading |
| Cluster 1 | 1 | 9 | 6 | 9 | 7 | 13 | 25 |
| (*n* = 1,620) | 2 | 27 | 58 | 56 | 49 | 85 | 67 |
|  | 3 | 61 | 148 | 148 | 143 | 227 | 291 |
|  | 4 | 522 | 552 | 518 | 656 | 624 | 639 |
|  | 5 | 1,001 | 856 | 889 | 765 | 671 | 598 |
| Cluster 2 | 1 | 8 | 9 | 9 | 11 | 16 | 16 |
| (*n* = 1,276) | 2 | 22 | 44 | 37 | 45 | 99 | 76 |
|  | 3 | 70 | 154 | 146 | 149 | 236 | 260 |
|  | 4 | 435 | 395 | 407 | 520 | 466 | 486 |
|  | 5 | 741 | 674 | 677 | 551 | 459 | 438 |
| Cluster 3 | 1 | 27 | 44 | 38 | 28 | 49 | 43 |
| (*n* = 768) | 2 | 89 | 118 | 99 | 123 | 137 | 147 |
|  | 3 | 200 | 251 | 242 | 257 | 290 | 293 |
|  | 4 | 359 | 276 | 300 | 307 | 244 | 260 |
|  | 5 | 93 | 79 | 89 | 53 | 48 | 25 |

*Note*. 1: Strongly disagree, 5: Strongly agree.

**Supplementary Material F1.** Descriptive statistics and regression analysis of intensity, frequency, and duration (winsorization)

[Intensity: winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,482 | 338.20 | 331.84 | 344.57 | 124.91 | 320.39 | 148.92 | 614.35 | 3.24 |
| Cluster 2 | 1,168 | 357.43 | 349.80 | 365.07 | 133.04 | 340.85 | 148.92 | 614.35 | 3.89 |
| Cluster 3 | 669 | 311.61 | 302.19 | 321.02 | 124.03 | 287.81 | 148.92 | 614.35 | 4.80 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 311.606 | 301.92888 | 321.28289 | 4.936 | 63.135\*\*\* | < 2e-1 |
| Cluster 1 | 26.598 | 14.93965 | 38.25635 | 5.946 | 4.473\*\*\* | 7.96e-06 |
| Cluster 2 | 45.829 | 33.69309 | 57.96501 | 6.190 | 7.404\*\*\* | 1.67e-13 |

*Notes. F*(2, 3316) = 27.57; \*\*\**p* < .001; *R*2 = 0.01636; Adjusted *R*2 = 0.01576; *r* = .13; Cluster 3 as a reference group.

[Frequency: winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,466 | 4.81 | 4.65 | 4.96 | 3.02 | 3.90 | 1.5 | 12.83 | 0.08 |
| Cluster 2 | 1,164 | 5.19 | 5.00 | 5.37 | 3.21 | 4.21 | 1.5 | 12.83 | 0.09 |
| Cluster 3 | 660 | 4.11 | 3.90 | 4.32 | 2.70 | 3.24 | 1.5 | 12.83 | 0.11 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 4.1098 | 3.8787170 | 4.3408789 | 0.1179 | 34.871\*\*\* | < 2e-16 |
| Cluster 1 | 0.6955 | 0.4172385 | 0.9737945 | 0.1419 | 4.900\*\*\* | 1.00e-06 |
| Cluster 2 | 1.0796 | 0.7902914 | 1.3688271 | 0.1475 | 7.317\*\*\* | 3.16e-13 |

*Notes. F*(2, 3287) = 26.77; \*\*\**p* < .001; *R*2 = 0.01603; Adjusted *R*2 = 0.01543; *r* = .13; Cluster 3 as a reference group.

[Duration: winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,294 | 7.28 | 6.79 | 7.77 | 8.96 | 4 | 1 | 36 | 0.25 |
| Cluster 2 | 1,050 | 9.32 | 8.69 | 9.95 | 10.44 | 5 | 1 | 36 | 0.32 |
| Cluster 3 | 518 | 5.46 | 4.80 | 6.12 | 7.65 | 2 | 1 | 36 | 0.34 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 5.4614 | 4.6584618 | 6.264318 | 0.4095 | 13.337\*\*\* | < 2e-16 |
| Cluster 1 | 1.8191 | 0.8689932 | 2.769278 | 0.4846 | 3.754\*\*\* | 0.000177 |
| Cluster 2 | 3.8586 | 2.8774156 | 4.839804 | 0.5004 | 7.711\*\*\* | 1.71e-14 |

*Notes. F*(2, 2859) = 32.12; \*\*\**p* < .001; *R*2 = 0.02197; Adjusted *R*2 = 0.02129; *r* = .15; Cluster 3 as a reference group.

**Supplementary Material F2.** Descriptive statistics and regression analysis of intensity, frequency, and duration (no winsorization)

[Intensity: no winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,482 | 341.91 | 334.50 | 349.33 | 145.50 | 320.39 | 3.74 | 1170.9 | 3.78 |
| Cluster 2 | 1,168 | 365.00 | 355.84 | 374.17 | 159.67 | 340.85 | 35.68 | 1259.66 | 4.67 |
| Cluster 3 | 669 | 313.75 | 302.72 | 324.78 | 145.30 | 287.81 | 26.11 | 1800.91 | 5.62 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 313.749 | 302.33297 | 325.16529 | 5.823 | 53.885\*\*\* | < 2e-16 |
| Cluster 1 | 28.164 | 14.41066 | 41.91784 | 7.015 | 4.015\*\*\* | 6.08e-05 |
| Cluster 2 | 51.253 | 36.93628 | 65.57036 | 7.302 | 7.019\*\*\* | 2.70e-12 |

*Notes. F*(2, 3316) = 24.99; \*\*\**p* < .001; *R*2 = 0.01485; Adjusted *R*2 = 0.01425; *r* = .12; Cluster 3 as a reference group.

[Frequency: no winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,466 | 5.08 | 4.87 | 5.30 | 4.16 | 3.90 | 1 | 38.26 | 0.11 |
| Cluster 2 | 1,164 | 5.56 | 5.29 | 5.82 | 4.58 | 4.21 | 1 | 41.21 | 0.13 |
| Cluster 3 | 660 | 4.19 | 3.94 | 4.44 | 3.29 | 3.24 | 1 | 32.85 | 0.13 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 4.1882 | 3.8705493 | 4.505751 | 0.1620 | 25.855\*\*\* | < 2e-16 |
| Cluster 1 | 0.8966 | 0.5141256 | 1.279064 | 0.1951 | 4.596\*\*\* | 4.46e-06 |
| Cluster 2 | 1.3679 | 0.9703359 | 1.765484 | 0.2028 | 6.746\*\*\* | 1.79e-11 |

*Notes. F*(2, 3287) = 22.77; \*\*\**p* < .001; *R*2 = 0.01366; Adjusted *R*2 = 0.01306; *r* = .12; Cluster 3 as a reference group.

[Duration: no winsorization]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,294 | 8.50 | 7.70 | 9.30 | 14.66 | 4 | 1 | 169 | 0.41 |
| Cluster 2 | 1,050 | 11.07 | 10.00 | 12.10 | 17.17 | 5 | 1 | 193 | 0.53 |
| Cluster 3 | 518 | 5.77 | 4.98 | 6.56 | 9.12 | 2 | 1 | 71 | 0.40 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Estimate | 95% CIs | | *SE* | *t* | *p* |
| LCI | UCI |
| Intercept | 5.7683 | 4.489291 | 7.047389 | 0.6523 | 8.843\*\*\* | < 2e-16 |
| Cluster 1 | 2.7355 | 1.221966 | 4.249082 | 0.7719 | 3.544\*\*\* | 0.000401 |
| Cluster 2 | 5.2983 | 3.735303 | 6.861351 | 0.7971 | 6.647\*\*\* | 3.58e-11 |

*Notes. F*(2, 2859) = 23.15; \*\*\**p* < .001; *R*2 = 0.01594; Adjusted *R*2 = 0.01525; *r* = .13; Cluster 3 as a reference group.

**Supplementary Material G1.** App usage starting year by cluster

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster | Year | Frequency | Percentage | Cluster | Year | Frequency | Percentage |
| 1 | 2023 | 121 | 0.09805511 | 1 | 2015 | 52 | 0.04213938 |
| 2 | 2023 | 103 | 0.10019455 | 2 | 2015 | 37 | 0.03599222 |
| 3 | 2023 | 48 | 0.10322581 | 3 | 2015 | 17 | 0.03655914 |
| 1 | 2022 | 301 | 0.2439222 | 1 | 2014 | 35 | 0.02836305 |
| 2 | 2022 | 217 | 0.21108949 | 2 | 2014 | 30 | 0.02918288 |
| 3 | 2022 | 105 | 0.22580645 | 3 | 2014 | 16 | 0.0344086 |
| 1 | 2021 | 127 | 0.10291734 | 1 | 2013 | 25 | 0.02025932 |
| 2 | 2021 | 88 | 0.08560311 | 2 | 2013 | 27 | 0.02626459 |
| 3 | 2021 | 46 | 0.09892473 | 3 | 2013 | 14 | 0.03010753 |
| 1 | 2020 | 149 | 0.12074554 | 1 | 2012 | 16 | 0.01296596 |
| 2 | 2020 | 150 | 0.1459144 | 2 | 2012 | 28 | 0.02723735 |
| 3 | 2020 | 56 | 0.12043011 | 3 | 2012 | 4 | 0.00860215 |
| 1 | 2019 | 114 | 0.0923825 | 1 | 2011 | 24 | 0.01944895 |
| 2 | 2019 | 106 | 0.10311284 | 2 | 2011 | 27 | 0.02626459 |
| 3 | 2019 | 54 | 0.11612903 | 3 | 2011 | 7 | 0.01505376 |
| 1 | 2018 | 94 | 0.07617504 | 1 | 2010 | 8 | 0.00648298 |
| 2 | 2018 | 78 | 0.07587549 | 2 | 2010 | 16 | 0.0155642 |
| 3 | 2018 | 36 | 0.07741936 | 3 | 2010 | 9 | 0.01935484 |
| 1 | 2017 | 94 | 0.07617504 | 1 | 2009 | 6 | 0.00486224 |
| 2 | 2017 | 68 | 0.06614786 | 2 | 2009 | 4 | 0.00389105 |
| 3 | 2017 | 31 | 0.06666667 |  |  |  |  |
| 1 | 2016 | 68 | 0.05510535 |  |  |  |  |
| 2 | 2016 | 49 | 0.04766537 |  |  |  |  |
| 3 | 2016 | 22 | 0.04731183 |  |  |  |  |

**Supplementary Material G2.** Descriptive statistics of the recurrent event analysis

[The number of pauses observed]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 785 | 3.28 | 3.08 | 3.49 | 2.97 | 2 | 1 | 19 | 0.11 |
| Cluster 2 | 643 | 3.53 | 3.30 | 3.77 | 3.06 | 2 | 1 | 23 | 0.12 |
| Cluster 3 | 253 | 2.74 | 2.45 | 3.03 | 2.34 | 2 | 1 | 12 | 0.15 |

*Note*. *n* only includes the individuals who experienced a pause event at least once (*N* = 1,681).

[Active engagement streak (months)]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,234 | 3.80 | 3.50 | 4.11 | 5.49 | 2 | 1 | 50 | 0.16 |
| Cluster 2 | 1,028 | 4.77 | 4.32 | 5.22 | 7.36 | 2.5 | 1 | 82 | 0.23 |
| Cluster 3 | 465 | 3.00 | 2.59 | 3.42 | 4.53 | 1.75 | 1 | 52 | 0.21 |

[Length of dormancy period (months)]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 785 | 11.41 | 10.24 | 12.58 | 16.68 | 5 | 1 | 127 | 0.60 |
| Cluster 2 | 643 | 11.31 | 9.98 | 12.64 | 17.15 | 5.33 | 1 | 155 | 0.68 |
| Cluster 3 | 253 | 13.38 | 11.19 | 15.59 | 17.77 | 6.86 | 1 | 146 | 1.12 |

*Note*. *n* only includes the individuals who experienced dormancy period at least once (*N* = 1,681).

[Time between the first and last active engagement (months)]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 1,234 | 28.34 | 26.49 | 30.20 | 33.18 | 14 | 1 | 169 | 0.94 |
| Cluster 2 | 1,028 | 30.96 | 28.87 | 33.04 | 34.07 | 18 | 1 | 164 | 1.06 |
| Cluster 3 | 465 | 22.95 | 20.13 | 25.78 | 31.00 | 9 | 1 | 152 | 1.44 |

[Time leading up to a drop-out (months)]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *n* | *Mean* | 95% CI | | *SD* | *Median* | *Min.* | *Max.* | *SE* |
| LCI | UCI |
| Cluster 1 | 317 | 22.73 | 19.48 | 25.98 | 29.41 | 7 | 1 | 137 | 1.65 |
| Cluster 2 | 274 | 24.75 | 20.86 | 28.65 | 32.74 | 9 | 1 | 159 | 1.98 |
| Cluster 3 | 206 | 20.78 | 16.63 | 24.93 | 30.22 | 5 | 1 | 148 | 2.11 |

*Note*. *n* only includes the individuals who dropped out (*N* = 797).

**Supplementary Material G3.** Drop-out frequency over time (*N* = 797)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | Frequency | Percentage | Month | Frequency | Percentage | Month | Frequency | Percentage |
| 1 | 255 | 31.99 | 41 | 5 | 0.63 | 82 | 3 | 0.38 |
| 2 | 52 | 6.52 | 42 | 5 | 0.63 | 83 | 2 | 0.25 |
| 3 | 37 | 4.64 | 43 | 7 | 0.88 | 84 | 2 | 0.25 |
| 4 | 19 | 2.38 | 44 | 1 | 0.13 | 85 | 2 | 0.25 |
| 5 | 22 | 2.76 | 45 | 5 | 0.63 | 86 | 3 | 0.38 |
| 6 | 14 | 1.76 | 46 | 6 | 0.75 | 87 | 2 | 0.25 |
| 7 | 8 | 1.00 | 47 | 4 | 0.50 | 88 | 2 | 0.25 |
| 8 | 4 | 0.50 | 48 | 3 | 0.38 | 89 | 1 | 0.13 |
| 9 | 11 | 1.38 | 49 | 2 | 0.25 | 93 | 2 | 0.25 |
| 10 | 4 | 0.50 | 50 | 6 | 0.75 | 94 | 1 | 0.13 |
| 11 | 9 | 1.13 | 51 | 5 | 0.63 | 95 | 1 | 0.13 |
| 12 | 11 | 1.38 | 52 | 3 | 0.38 | 97 | 1 | 0.13 |
| 13 | 8 | 1.00 | 53 | 3 | 0.38 | 98 | 2 | 0.25 |
| 14 | 6 | 0.75 | 54 | 3 | 0.38 | 100 | 1 | 0.13 |
| 15 | 9 | 1.13 | 55 | 1 | 0.13 | 101 | 1 | 0.13 |
| 16 | 9 | 1.13 | 56 | 3 | 0.38 | 105 | 2 | 0.25 |
| 17 | 9 | 1.13 | 57 | 2 | 0.25 | 106 | 1 | 0.13 |
| 18 | 9 | 1.13 | 58 | 10 | 1.25 | 110 | 2 | 0.25 |
| 19 | 8 | 1.00 | 59 | 1 | 0.13 | 114 | 1 | 0.13 |
| 20 | 10 | 1.25 | 61 | 1 | 0.13 | 116 | 1 | 0.13 |
| 21 | 5 | 0.63 | 62 | 4 | 0.50 | 117 | 1 | 0.13 |
| 22 | 6 | 0.75 | 63 | 4 | 0.50 | 118 | 1 | 0.13 |
| 23 | 5 | 0.63 | 64 | 1 | 0.13 | 119 | 2 | 0.25 |
| 24 | 4 | 0.50 | 65 | 3 | 0.38 | 121 | 2 | 0.25 |
| 25 | 6 | 0.75 | 66 | 1 | 0.13 | 124 | 1 | 0.13 |
| 26 | 7 | 0.88 | 67 | 1 | 0.13 | 126 | 1 | 0.13 |
| 27 | 9 | 1.13 | 68 | 1 | 0.13 | 128 | 1 | 0.13 |
| 28 | 4 | 0.50 | 69 | 4 | 0.50 | 129 | 1 | 0.13 |
| 29 | 6 | 0.75 | 70 | 7 | 0.88 | 130 | 2 | 0.25 |
| 30 | 5 | 0.63 | 71 | 5 | 0.63 | 132 | 1 | 0.13 |
| 31 | 4 | 0.50 | 72 | 2 | 0.25 | 136 | 1 | 0.13 |
| 32 | 8 | 1.00 | 73 | 1 | 0.13 | 137 | 1 | 0.13 |
| 33 | 9 | 1.13 | 74 | 5 | 0.63 | 140 | 1 | 0.13 |
| 34 | 5 | 0.63 | 75 | 1 | 0.13 | 148 | 2 | 0.25 |
| 35 | 3 | 0.38 | 76 | 2 | 0.25 | 159 | 1 | 0.13 |
| 36 | 5 | 0.63 | 77 | 2 | 0.25 |  |  |  |
| 37 | 4 | 0.50 | 78 | 1 | 0.13 |  |  |  |
| 38 | 5 | 0.63 | 79 | 1 | 0.13 |  |  |  |
| 39 | 4 | 0.50 | 80 | 2 | 0.25 |  |  |  |
| 40 | 2 | 0.25 | 81 | 1 | 0.13 |  |  |  |

**Supplementary Material G4.** Drop-out frequency over time (Cluster 1, *n* = 317)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | Frequency | Percentage | Month | Frequency | Percentage | Month | Frequency | Percentage |
| 1 | 99 | 31.200 | 45 | 4 | 1.260 | 119 | 1 | 0.315 |
| 2 | 20 | 6.310 | 46 | 4 | 1.260 | 126 | 1 | 0.315 |
| 3 | 15 | 4.730 | 47 | 1 | 0.315 | 136 | 1 | 0.315 |
| 4 | 7 | 2.210 | 48 | 1 | 0.315 | 137 | 1 | 0.315 |
| 5 | 9 | 2.840 | 50 | 3 | 0.946 |  |  |  |
| 6 | 6 | 1.890 | 51 | 1 | 0.315 |  |  |  |
| 7 | 4 | 1.260 | 52 | 1 | 0.315 |  |  |  |
| 9 | 3 | 0.946 | 53 | 1 | 0.315 |  |  |  |
| 10 | 1 | 0.315 | 55 | 1 | 0.315 |  |  |  |
| 11 | 6 | 1.890 | 56 | 1 | 0.315 |  |  |  |
| 12 | 3 | 0.946 | 57 | 2 | 0.631 |  |  |  |
| 13 | 5 | 1.580 | 58 | 5 | 1.580 |  |  |  |
| 14 | 4 | 1.260 | 61 | 1 | 0.315 |  |  |  |
| 15 | 4 | 1.260 | 62 | 1 | 0.315 |  |  |  |
| 16 | 4 | 1.260 | 64 | 1 | 0.315 |  |  |  |
| 17 | 2 | 0.631 | 65 | 2 | 0.631 |  |  |  |
| 18 | 3 | 0.946 | 67 | 1 | 0.315 |  |  |  |
| 19 | 5 | 1.580 | 68 | 1 | 0.315 |  |  |  |
| 20 | 5 | 1.580 | 69 | 1 | 0.315 |  |  |  |
| 21 | 1 | 0.315 | 70 | 4 | 1.260 |  |  |  |
| 22 | 1 | 0.315 | 71 | 2 | 0.631 |  |  |  |
| 23 | 5 | 1.580 | 72 | 1 | 0.315 |  |  |  |
| 24 | 2 | 0.631 | 73 | 1 | 0.315 |  |  |  |
| 25 | 1 | 0.315 | 74 | 3 | 0.946 |  |  |  |
| 26 | 2 | 0.631 | 76 | 1 | 0.315 |  |  |  |
| 27 | 5 | 1.580 | 77 | 2 | 0.631 |  |  |  |
| 28 | 2 | 0.631 | 78 | 1 | 0.315 |  |  |  |
| 29 | 5 | 1.580 | 79 | 1 | 0.315 |  |  |  |
| 30 | 1 | 0.315 | 81 | 1 | 0.315 |  |  |  |
| 31 | 2 | 0.631 | 82 | 3 | 0.946 |  |  |  |
| 32 | 3 | 0.946 | 83 | 1 | 0.315 |  |  |  |
| 33 | 3 | 0.946 | 84 | 2 | 0.631 |  |  |  |
| 36 | 3 | 0.946 | 86 | 1 | 0.315 |  |  |  |
| 38 | 1 | 0.315 | 87 | 1 | 0.315 |  |  |  |
| 39 | 1 | 0.315 | 93 | 1 | 0.315 |  |  |  |
| 40 | 1 | 0.315 | 97 | 1 | 0.315 |  |  |  |
| 41 | 1 | 0.315 | 98 | 1 | 0.315 |  |  |  |
| 42 | 1 | 0.315 | 105 | 1 | 0.315 |  |  |  |
| 43 | 2 | 0.631 | 116 | 1 | 0.315 |  |  |  |
| 44 | 1 | 0.315 | 118 | 1 | 0.315 |  |  |  |

**Supplementary Material G5.** Drop-out frequency over time (Cluster 2, *n* = 274)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Month | Frequency | Percentage | Month | Frequency | Percentage | Month | Frequency | Percentage |
| 1 | 79 | 28.800 | 45 | 1 | 0.365 | 132 | 1 | 0.365 |
| 2 | 15 | 5.470 | 46 | 2 | 0.730 | 159 | 1 | 0.365 |
| 3 | 18 | 6.570 | 47 | 2 | 0.730 |  |  |  |
| 4 | 8 | 2.920 | 48 | 1 | 0.365 |  |  |  |
| 5 | 7 | 2.550 | 49 | 1 | 0.365 |  |  |  |
| 6 | 4 | 1.460 | 50 | 3 | 1.090 |  |  |  |
| 7 | 2 | 0.730 | 51 | 2 | 0.730 |  |  |  |
| 8 | 3 | 1.090 | 52 | 1 | 0.365 |  |  |  |
| 9 | 6 | 2.190 | 53 | 1 | 0.365 |  |  |  |
| 10 | 1 | 0.365 | 54 | 1 | 0.365 |  |  |  |
| 11 | 2 | 0.730 | 56 | 1 | 0.365 |  |  |  |
| 12 | 3 | 1.090 | 58 | 3 | 1.090 |  |  |  |
| 13 | 2 | 0.730 | 59 | 1 | 0.365 |  |  |  |
| 15 | 3 | 1.090 | 62 | 1 | 0.365 |  |  |  |
| 16 | 3 | 1.090 | 63 | 2 | 0.730 |  |  |  |
| 17 | 6 | 2.190 | 65 | 1 | 0.365 |  |  |  |
| 18 | 3 | 1.090 | 66 | 1 | 0.365 |  |  |  |
| 19 | 1 | 0.365 | 69 | 1 | 0.365 |  |  |  |
| 20 | 2 | 0.730 | 71 | 2 | 0.730 |  |  |  |
| 21 | 2 | 0.730 | 72 | 1 | 0.365 |  |  |  |
| 22 | 4 | 1.460 | 74 | 2 | 0.730 |  |  |  |
| 24 | 1 | 0.365 | 75 | 1 | 0.365 |  |  |  |
| 25 | 2 | 0.730 | 83 | 1 | 0.365 |  |  |  |
| 26 | 3 | 1.090 | 85 | 1 | 0.365 |  |  |  |
| 27 | 4 | 1.460 | 86 | 2 | 0.730 |  |  |  |
| 28 | 2 | 0.730 | 87 | 1 | 0.365 |  |  |  |
| 29 | 1 | 0.365 | 88 | 2 | 0.730 |  |  |  |
| 30 | 3 | 1.090 | 89 | 1 | 0.365 |  |  |  |
| 31 | 2 | 0.730 | 93 | 1 | 0.365 |  |  |  |
| 32 | 3 | 1.090 | 95 | 1 | 0.365 |  |  |  |
| 33 | 2 | 0.730 | 101 | 1 | 0.365 |  |  |  |
| 34 | 5 | 1.820 | 106 | 1 | 0.365 |  |  |  |
| 35 | 3 | 1.090 | 110 | 2 | 0.730 |  |  |  |
| 37 | 2 | 0.730 | 114 | 1 | 0.365 |  |  |  |
| 38 | 2 | 0.730 | 119 | 1 | 0.365 |  |  |  |
| 39 | 1 | 0.365 | 121 | 1 | 0.365 |  |  |  |
| 40 | 1 | 0.365 | 124 | 1 | 0.365 |  |  |  |
| 41 | 1 | 0.365 | 128 | 1 | 0.365 |  |  |  |
| 42 | 4 | 1.460 | 129 | 1 | 0.365 |  |  |  |
| 43 | 2 | 0.730 | 130 | 2 | 0.730 |  |  |  |

**Supplementary Material G6.** Drop-out frequency over time (Cluster 3, *n* = 206)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Month | Frequency | Percentage | Month | Frequency | Percentage |
| 1 | 77 | 37.400 | 54 | 2 | 0.971 |
| 2 | 17 | 8.250 | 56 | 1 | 0.485 |
| 3 | 4 | 1.940 | 58 | 2 | 0.971 |
| 4 | 4 | 1.940 | 62 | 2 | 0.971 |
| 5 | 6 | 2.910 | 63 | 2 | 0.971 |
| 6 | 4 | 1.940 | 69 | 2 | 0.971 |
| 7 | 2 | 0.971 | 70 | 3 | 1.460 |
| 8 | 1 | 0.485 | 71 | 1 | 0.485 |
| 9 | 2 | 0.971 | 76 | 1 | 0.485 |
| 10 | 2 | 0.971 | 80 | 2 | 0.971 |
| 11 | 1 | 0.485 | 85 | 1 | 0.485 |
| 12 | 5 | 2.430 | 94 | 1 | 0.485 |
| 13 | 1 | 0.485 | 98 | 1 | 0.485 |
| 14 | 2 | 0.971 | 100 | 1 | 0.485 |
| 15 | 2 | 0.971 | 105 | 1 | 0.485 |
| 16 | 2 | 0.971 | 117 | 1 | 0.485 |
| 17 | 1 | 0.485 | 121 | 1 | 0.485 |
| 18 | 3 | 1.460 | 140 | 1 | 0.485 |
| 19 | 2 | 0.971 | 148 | 2 | 0.971 |
| 20 | 3 | 1.460 |  |  |  |
| 21 | 2 | 0.971 |  |  |  |
| 22 | 1 | 0.485 |  |  |  |
| 24 | 1 | 0.485 |  |  |  |
| 25 | 3 | 1.460 |  |  |  |
| 26 | 2 | 0.971 |  |  |  |
| 30 | 1 | 0.485 |  |  |  |
| 32 | 2 | 0.971 |  |  |  |
| 33 | 4 | 1.940 |  |  |  |
| 36 | 2 | 0.971 |  |  |  |
| 37 | 2 | 0.971 |  |  |  |
| 38 | 2 | 0.971 |  |  |  |
| 39 | 2 | 0.971 |  |  |  |
| 41 | 3 | 1.460 |  |  |  |
| 43 | 3 | 1.460 |  |  |  |
| 47 | 1 | 0.485 |  |  |  |
| 48 | 1 | 0.485 |  |  |  |
| 49 | 1 | 0.485 |  |  |  |
| 51 | 2 | 0.971 |  |  |  |
| 52 | 1 | 0.485 |  |  |  |
| 53 | 1 | 0.485 |  |  |  |