Online supplementary materials

Impact of changed use of greenspace during COVID-19 pandemic on depression and anxiety

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Supplementary Table S1. Results of bivariate analysis for potential factors and changes in visits to greenspace during the pandemic.

|  |  |  |
| --- | --- | --- |
| Variable | Number of participants (%) | p-value |
| Decreased visits to greenspace after COVID-19 outbreak |
| No | Yes |
| Age |  |  |  |
|  19-29 years | 50 (43.48) | 65 (56.52) | 0.001 |
|  30-49 | 39 (25.16) | 116 (74.84) |  |
|  ≥ 50 | 24 (46.15) | 28 (63.85) |  |
| Gender |  |  |  |
|  Men | 25 (32.89) | 51 (67.11) | 0.745 |
|  Women | 87 (35.80) | 156 (64.20) |  |
| Education |  |  |  |
|  ≤ Elementary school | 2 (66.67) | 1 (33.33) | 0.568a |
|  Middle – high school | 29 (35.80) | 52 (64.20) |  |
|  ≥ Graduate school | 78 (34.82) | 146 (65.18) |  |
| Annual Income |  |  |  |
|  6 – 24 million KRW | 26 (46.43) | 30 (53.57) | 0.046 |
|  24 – 48 million KRW | 18 (24.32) | 56 (75.68) |  |
|  48 – 72 million KRW | 19 (30.16) | 44 (69.84) |  |
|  ≥ 72 million KRW | 19 (39.58) | 29 (60.42) |  |
| Marital status |  |  |  |
|  Married | 40 (29.41) | 96 (70.59) | 0.159a |
|  Single | 65 (39.88) | 98 (60.12) |  |
|  Widowed/divorced/separated | 5 (38.46) | 8 (61.54) |  |
| Urbanicity |  |  |  |
|  Urban | 58 (33.0) | 118 (67.0) | 0.399 |
|  Rural | 49 (37.70) | 81 (62.3) |  |
| Perceived safety in neighborhood greenspace  |  |  |  |
|  Not safe | 5 (41.67) | 7 (58.33) | 0.762a |
|  Moderate | 20 (30.30) | 46 (69.70) |  |
|  Safe | 45 (35.16) | 83 (64.84) |  |
|  Very safe  | 43 (37.07) | 73 (62.93) |  |
| Importance of using greenspace in life (0: least important, 10: most important) |  |  |  |
|  Score 1 – 3  | 3 (50.5) | 3 (50.5) | 0.800a |
|  Score 4 – 5  | 16 (31.4) | 35 (68.6) |  |
|  Score 6 – 7  | 39 (34.8) | 73 (65.2) |  |
|  Score 8 – 10  | 55 (35.9) | 98 (64.1) |  |
| Using greenspace for any psychological purposes |  |  |  |
|  Yes | 95 (33.57) | 188 (66.43) | 0.172 |
|  No | 18 (46.15) | 21 (53.85) |  |
| Using greenspace for any physical activities  |  |  |  |
|  Yes | 73 (36.87) | 125 (63.13) | 0.469 |
|  No | 40 (32.26) | 84 (67.74) |  |
| Using greenspace for any social interactions |  |  |  |
|  Yes | 61 (29.19) | 148 (70.81) | 0.004 |
|  No | 52 (46.02) | 61 (53.98) |  |
| Forest being generally visited greenspace in 2019 |  |  |  |
|  Yes | 62 (31.31) | 136 (68.69) | 0.094 |
|  No | 51 (41.13) | 73 (58.87) |  |
| Parks being generally visited greenspace in 2019 |  |  |  |
|  Yes | 93 (33.94) | 181 (66.06) | 0.384 |
|  No | 20 (41.67) | 181 (58.33) |  |
| Playground being generally visited greenspace in 2019 |  |  |  |
|  Yes | 40 (31.01) | 89 (68.99) | 0.226 |
|  No | 73 (37.82) | 120 (62.18) |  |
| Beach, lake, and river being generally visited greenspace in 2019 |  |  |  |
|  Yes | 73 (32.16) | 154 (67.84) | 0.115 |
|  No | 40 (42.11) | 55 (57.89) |  |
| Outdoor sports field and campus yard being generally visited greenspace in 2019 |  |  |  |
|  Yes | 47 (31.33) | 103 (68.67) | 0.229 |
|  No | 66 (38.37) | 106 (61.63) |  |

Notes. a Fisher test was used.

Supplementary Table S2. Prevalence of self-reported biggest concern in life at the time of survey, based on responses to open-ended question (n=286).

|  |  |
| --- | --- |
| Category of concern | N (%) |
| No concern | 9 (3.2) |
| Life- or future-related concerns | 77 (26.9) |
| Health-related concerns (including general health and COVID-19) | 45 (16.0) |
| Job-related or financial concerns  | 103 (36.0) |
| Family-related concerns (regarding health, future, well-being) | 33 (11.5) |
| Concerns for environment and society | 19 (6.6) |
| Total | 286 (100) |

Note: Some participants’ responses noted more than one of the listed concerns.

Supplementary Table S3. Prevalence of probable major depression (MD) and generalized anxiety disorder (GAD) by self-reported biggest concern in life at the time of survey (n=277).

|  |  |  |
| --- | --- | --- |
| Category | Major Depression | Generalized Anxiety Disorder |
| Yes | No | Yes | No |
| Life- or future-related concerns | 11 (14.3) | 66 (85.7) | 12 (15.6) | 65 (84.4) |
| Health-related concerns (including general health and COVID-19) | 9 (20.0) | 36 (80.0) | 8 (17.8) | 37 (82.2) |
| Job-related or financial concerns  | 24 (23.3) | 79 (76.7) | 20 (19.4) | 83 (80.6) |
| Family-related concerns (regarding health, future, well-being) | 7 (21.2) | 26 (78.8) | 3 (9.1) | 30 (90.9) |
| Concerns for environment and society | 4 (21.1) | 15 (78.9) | 2 (10.5) | 17 (89.5) |
| Total | 55 (19.9) | 222 (80.1) | 45 (16.2) | 232 (83.8) |

Supplementary Table S4. Odds ratio (OR) of major depression (MD) and generalized anxiety disorder (GAD) in relation to potential confounders.

|  |  |  |
| --- | --- | --- |
| Variable | Major Depression | Generalized Anxiety Disorder |
| OR | 95% CI | OR | 95% CI |
| Age (years) |  |  |  |  |
|  19-29 | 1.00 |  | 1.00 |  |
|  30-49 | 0.86 | (0.34, 2.21) | 0.77 | (0.29, 2.04) |
|  ≥ 50 | 0.89 | (0.21, 3.80) | 0.67 | (0.13, 3.32) |
| Gender  |  |  |  |  |
|  Men | 1.00 |  | 1.00 |  |
|  Women | 1.99 | (0.65, 6.06) | 1.79 | (0.58, 5.49) |
| Smoking  |  |  |  |  |
|  Current smoker  | 1.00 |  | 1.00 |  |
|  Former smoker  | 0.56 | (0.12, 2.55) | 0.24 | (0.04, 1.32)† |
|  Never smoker | 0.55 | (0.14, 2.14) | 0.61 | (0.16, 2.35) |
| BMI | 1.09 | (1.00, 1.19)\* | 1.15 | (1.06, 1.25)\* |
| Education  |  |  |  |  |
|  ≤ Elementary school | 1.00 |  | - |  |
|  Middle-high school | 0.40 | (0.02, 6.83) |  |  |
|  ≥ Undergraduate school | 0.22 | (0.01, 3.71) |  |  |
| Marital status  |  |  |  |  |
|  Married | 1.00 |  | 1.00 |  |
|  Single | 1.52 | (0.58, 4.01) | 1.82 | (0.65, 5.10) |
|  Widowed/divorced/separated | 4.38 | (0.92, 20.8)† | 2.93 | (0.56, 15.48) |
| Experience of depression (anxiety) in last year  |  |  |  |  |
|  No | 1.00 |  | 1.00 |  |
|  Yes | 7.01 | (3.20, 15.37)\* | 5.69 | (2.5, 12.83)\* |
|  Not sure | 3.86 | (1.06, 14.01)\* | 1.06 | (0.20, 5.60) |
| Having health-related concerns  |  |  |  |  |
|  No | 1.00 |  | 1.00 |  |
|  Yes | 1.28 | (0.46, 3.58) | 2.28 | (0.80, 6.52) |
| Having job-related or financial concerns  |  |  |  |  |
|  No | 1.00 |  | 1.00 |  |
|  Yes | 1.62 | (0.76, 3.42) | 1.85 | (0.84, 4.11) |

Notes. \*Significant at a significance level of 0.05. † Significant at a significance level of 0.10. Education was not adjusted in the model for anxiety due to over-fitting and convergence issues.

Supplementary Figure S1. Percentage of major depression (MD) and generalized anxiety disorder (GAD) cases among those who self-reported biggest concerns by type of concern. Each participant’s response could include multiple types of concerns.



Supplementary Figure S2. Effect modification for the impact of decreased visits to greenspace on major depression (MD) by purposes of using greenspace, safety in neighborhood greenspace, and urbanicity.