

**Supplementary Table 3 Statistical details of behavior studies of virus injection or drug treatment in KO mice**

| Test  | # of Animal   | Measurement                           | Treatment        | Note            | Average                            | s.e.m | P value   | Fig. |
|---|---|---------------------------------------|------------------|-----------------|------------------------------------|-------|---|------|
| <b>Three chamber (adeno-associated virus injection)</b> | Dock4 <sup>fl/fl</sup> +Vector =11<br>Dock4 <sup>fl/fl</sup> +Cre=8 | Distance traveled (m) - Habitation    | AAV-mCherry inj. | -               | 31.62                              | 1.631 | p=0.9544 (Unpaired <i>t</i> test)   | S8c  |
|   |   |                                       | AAV-Cre inj.     | -               | 31.75                              | 1.339 |   |      |
|   |   | Duration in chamber - Social approach | AAV-mCherry inj. | Mouse (S1)      | 286.1                              | 11.03 | p<0.0001 (One-way ANOVA + B <sup>1</sup> );<br>p=0.0014 (Two-way ANOVA + D <sup>2</sup> ) | S8d  |
|   |   |                                       |                  | Empty (E)       | 212.1                              | 10.21 |   |      |
|   |   |                                       |                  | Center (C)      | 101.8                              | 6.8   |   |      |
|   |   |                                       | AAV-Cre inj.     | Mouse (S1)      | 323.6                              | 26.28 | p<0.0001 (One-way ANOVA + B);<br>p<0.0001 (Two-way ANOVA + D)                             |      |
|   |   |                                       |                  | Empty (E)       | 167.4                              | 21.78 |   |      |
|   |   |                                       |                  | Center (C)      | 109.1                              | 12.86 |   |      |
|   |   | Duration in chamber - Social novelty  | AAV-mCherry inj. | Familial (S1)   | 209.1                              | 14.08 | p<0.0001 (One-way ANOVA + B);<br>p=0.0087 (Two-way ANOVA + D)                             | S8e  |
|   |   |                                       |                  | Unfamiliar (S2) | 287.1                              | 11.92 |   |      |
|   |   |                                       |                  | Center (C)      | 103.8                              | 3.632 |   |      |
|   |   |                                       | AAV-Cre inj.     | Familial (S1)   | 239.9                              | 33.47 | p=0.5896 (One-way ANOVA + B);<br>p>0.9999 (Two-way ANOVA + D)                             |      |
|   |   |                                       |                  | Unfamiliar (S2) | 261                                | 32.37 |   |      |
|   |   |                                       |                  | Center (C)      | 99.2                               | 7.729 |   |      |
|   |   | Sniffing time (s) - Social approach   | AAV-mCherry inj. | Mouse (S1)      | 94.74                              | 5.859 | p=0.0258 (Unpaired <i>t</i> test);<br>p=0.0467(Two-way ANOVA + B <sup>3</sup> )           | 3c   |
|   |   |                                       |                  | Empty (E)       | 70.09                              | 8.392 |   |      |
|   |   |                                       | AAV-Cre inj.     | Mouse (S1)      | 113.9                              | 9.465 | p=0.0006 (Unpaired <i>t</i> test);<br>p=0.0002(Two-way ANOVA + B)                         |      |
|   |   |                                       |                  | Empty (E)       | 59.3                               | 8.032 |   |      |
|   |   | Sniffing time (s) - Social novelty    | AAV-mCherry inj. | Familial (S1)   | 52.33                              | 6.37  | p=0.001 (Unpaired <i>t</i> test);<br>p=0.0061(Two-way ANOVA + B)                          | 3d   |
|   |   |                                       |                  | Unfamiliar (S2) | 86.27                              | 6.127 |   |      |
| AAV-Cre inj.  | Familial (S1)   |                                       | 64.28            | 13.22           | p=0.2508 (Unpaired <i>t</i> test); |       |   |      |

|   |                          |                                       |                |                 |   |       |   |      |
|---|--------------------------|---------------------------------------|----------------|-----------------|---|-------|---|------|
|   |                          |                                       |                | Unfamiliar (S2) | 84.14   | 7.031 | p=0.2409(Two-way ANOVA + B)                                       |      |
| <b>Open field</b>                           | KO+Vector=8<br>KO+Rac1=7 | Distance traveled<br>(m)              | LV-GFP inj.    | -               | 88.84   | 6.181 | p=0.4448 (Unpaired <i>t</i> test)                                 | S13a |
|   |                          |                                       | LV-Rac1 inj.   | -               | 95.47   | 5.543 |   |      |
| <b>Three chamber (lentivirus injection)</b> | KO+Vector=8<br>KO+Rac1=7 | Duration in chamber - Social approach | LV-GFP inj.    | Mouse (S1)      | 281.2   | 10.36 | p=0.0003 (One-way ANOVA + B);<br>p=0.0045 (Two-way ANOVA + B)     | S13b |
|   |                          |                                       |                | Empty (E)       | 226.7   | 10.06 |   |      |
|   |                          |                                       |                | Center (C)      | 92.1  | 5.896 | -   |      |
|   |                          |                                       | LV-Rac1 inj.   | Mouse (S1)      | 308.2   | 13.27 | p<0.0001 (One-way ANOVA + B);<br>p<0.0001 (Two-way ANOVA + B)     |      |
|   |                          |                                       |                | Empty (E)       | 206.3   | 16.6  |   |      |
|   |                          |                                       |                | Center (C)      | 85.3  | 10.63 | -   |      |
|   |                          | Duration in chamber - Social novelty  | LV-GFP inj.    | Familial (S1)   | 236.7   | 12.68 | p=0.1673 (One-way ANOVA + B);<br>p=0.7900 (Two-way ANOVA + B)     | S13c |
|   |                          |                                       |                | Unfamiliar (S2) | 264.8   | 17.43 |   |      |
|   |                          |                                       |                | Center (C)      | 98.37   | 10.81 | -   |      |
|   |                          |                                       | LV-Rac1 inj.   | Familial (S1)   | 210.6   | 20.47 | p=0.0055 (One-way ANOVA + B);<br>p=0.0057 (Two-way ANOVA + B)     |      |
|   |                          |                                       |                | Unfamiliar (S2) | 289.5   | 22.24 |   |      |
|   |                          |                                       |                | Center (C)      | 99.92   | 5.068 | -   |      |
|   |                          | Sniffing time (s) - Social approach   | LV-GFP inj.    | Mouse (S1)      | 107.3   | 4.932 | p=0.0003 (Unpaired <i>t</i> test);<br>p=0.0015(Two-way ANOVA + B) | 6i   |
|   |                          |                                       |                | Empty (E)       | 68.46   | 6.365 |   |      |
|   |                          |                                       | LV-Rac1 inj.   | Mouse (S1)      | 103.9   | 8.609 | p=0.0060 (Unpaired <i>t</i> test);<br>p=0.0010(Two-way ANOVA + B) |      |
|   |                          |                                       |                | Empty (E)       | 60.41   | 9.863 |   |      |
|   |                          | Sniffing time (s) - Social novelty    | LV-GFP inj.    | Familial (S1)   | 61.15   | 10.99 | p=0.5157 (Unpaired <i>t</i> test);<br>p=0.8951(Two-way ANOVA + B) | 6j   |
|   |                          |                                       |                | Unfamiliar (S2) | 71.05   | 9.982 |   |      |
| LV-Rac1 inj.                                | Familial (S1)            |                                       | 44.88          | 2.959           | p=0.0061 (Unpaired <i>t</i> test);<br>p=0.0314(Two-way ANOVA + B) |       |   |      |
|   | Unfamiliar (S2)          |                                       | 80.35          | 10.27           |   |       |   |      |
| <b>Three</b>                                | KO+Vector=10             | Duration in                           | Saline - 90min | Familial (S1)   | 229.5   | 25.66 | p=0.5799 (One-way ANOVA + B);                                     | S13e |

|                                     |  |  |  |                 |               |   |  |   |
|-------------------------------------|--|--|--|-----------------|---------------|---|--|---|
| <b>chamber (drug treatment)-DCS</b> | KO+DCS=10  | chamber - Social novelty                   | Unfamiliar (S2)                            | 246.2           | 25.15         | p>0.9999 (Two-way ANOVA + B)                                  |  |   |
|                                     |  |  |  | Center (C)      | 124.2         | 6.324   |  | -   |
|                                     |  |  | DCS - 90min<br>20mg/kg                     | Familial (S1)   | 179.2         | 18.03   |  | p=0.0002 (One-way ANOVA + B);<br>p=0.0003 (Two-way ANOVA + B)     |
|                                     |  |  |  | Unfamiliar (S2) | 305.4         | 23.74   |  |   |
|                                     |  | Center (C)                                 |  | 115.2           | 18.68         | -   |  |   |
|                                     |  | Sniffing time (s) -<br>Social novelty      | Saline - 90min                             | Familial (S1)   | 45.84         | 10.07   |  | p=0.3288 (Unpaired <i>t</i> test);<br>p=0.4964(Two-way ANOVA + B) |
|                                     |  |  |  | Unfamiliar (S2) | 59.06         | 8.494   |  |   |
|                                     |  |  | DCS - 90min<br>20mg/kg                     | Familial (S1)   | 37.51         | 4.947   |  | p=0.0093 (Unpaired <i>t</i> test);<br>p=0.0528(Two-way ANOVA + B) |
|                                     |  |  |  | Unfamiliar (S2) | 63.6          | 7.469   |  |   |
|                                     |  | Duration in<br>chamber - Social<br>novelty | Saline - 7days                             | Familial (S1)   | 236.6         | 24.47   |  | p=0.7473 (One-way ANOVA + B);<br>p>0.9999 (Two-way ANOVA + B)     |
|                                     | Unfamiliar (S2)                                  |  |  | 245.1           | 18.66         |   |  |   |
|                                     | Center (C)                                       |  |  | 117.8           | 7.501         | -   |  |   |
|                                     | DCS -7days<br>20mg/kg                            |  | Familial (S1)                              | 242.1           | 20.3          | p=0.8335 (One-way ANOVA + B);<br>p>0.9999 (Two-way ANOVA + B) |  |   |
|                                     |  |  | Unfamiliar (S2)                            | 235.5           | 28.07         |   |  |   |
|                                     |  |  | Center (C)                                 | 122.4           | 16.92         |   | -  |   |
|                                     | Sniffing time (s) -<br>Social novelty            | Saline - 7days                             | Familial (S1)                              | 42.79           | 5.992         | p=0.5034 (One-way ANOVA + B);<br>p>0.9999 (Two-way ANOVA + B) |  |   |
|                                     |  |  | Unfamiliar (S2)                            | 49.74           | 8.231         |   |  |   |
|                                     |  | DCS -7days<br>20mg/kg                      | Familial (S1)                              | 43.1            | 5.694         | p=0.7124 (One-way ANOVA + B);<br>p>0.9999 (Two-way ANOVA + B) |  |   |
|                                     |  |  | Unfamiliar (S2)                            | 46.49           | 7.012         |   |  |   |
|                                     | <b>Three chamber (drug treatment)-PF-4778574</b> | KO+Vector=8<br>KO+PF-4778574<br>=9         | Duration in<br>chamber - Social<br>novelty | Saline - 90min  | Familial (S1) | 242.6   | 25.68  | p=0.9117 (Unpaired <i>t</i> test); p>0.999<br>(Two-way ANOVA + B) |
| Unfamiliar (S2)                     |  |  |  |                 | 239.5         | 18.59   |  |   |
| Center (C)                          |  |  |  |                 | 117.9         | 10.85   | -  |   |
| PF-4778574 -<br>90min 0.3mg/kg      |  |  |  | Familial (S1)   | 253.2         | 16.98   | p=0.3685 (Unpaired <i>t</i> test); p=0.8420<br>(Two-way ANOVA + B) |   |
|                                     |  |  |  | Unfamiliar (S2) | 234.4         | 15.49   |  |   |

|  |  |                                       |                                |                 |       |       |  |      |
|--|--|---------------------------------------|--------------------------------|-----------------|-------|-------|--|------|
|  |  |                                       | Center (C)                     | 111.9           | 10.04 | -     |  |      |
|  |  | Sniffing time (s)<br>- Social novelty | Saline - 90min                 | Familial (S1)   | 41.97 | 7.564 | p=0.5215 (Unpaired <i>t</i> test); p>0.9999<br>(Two-way ANOVA + B) | S13j |
|  |  |                                       |                                | Unfamiliar (S2) | 48.96 | 7.467 |  |      |
|  |  |                                       | PF-4778574 -<br>90min 0.3mg/kg | Familial (S1)   | 38.3  | 9.239 | p=0.4387 (Unpaired <i>t</i> test);<br>p=0.7592(Two-way ANOVA + B)  |      |
|  |  |                                       |                                | Unfamiliar (S2) | 48.97 | 9.75  |  |      |

<sup>1</sup>One-way ANOVA + B: One-way ANOVA with Bonferroni's Multiple Comparison Test

<sup>2</sup>Two-way ANOVA + D: One-way ANOVA with Dunn's Multiple Comparison Test

<sup>3</sup>Two-way ANOVA + B: One-way ANOVA with Bonferroni's Multiple Comparison Test