Scheme 1. Synthesis of piperazine analogs 3.1, 3.5, 3.8–3.11 by use of the coupling reagent TBTU a

\[ \text{Reagents and conditions: (a) TBTU, DIPEA, dry DMF, rt, 20 h, 40–58\%} \]

\( \text{[t]-endo-exo-3.1: } R = H \)
\( \text{[t]-endo-exo-3.5: } R = 2-F, C \)
\( \text{[t]-endo-exo-3.7: } R = 2-Cl, \)
\( \text{[t]-endo-exo-3.8: } R = 3-H, O \)
\( \text{[t]-endo-exo-3.9: } R = 2-NC \)
\( \text{[t]-endo-exo-3.10: } R = 3-MeO \)
\( \text{[t]-endo-exo-3.11: } R, R = 2-F, 4-F \)

a Reagents and conditions: (a) TBTU, DIPEA, dry DMF, rt, 20 h, 40–58\%.