Structural integrity of the corpus callosum predicts long-term transfer of fluid intelligence-related training gains in normal aging.

Abstract:
Although cognitive training usually improves cognitive test performance, the capability to transfer these training gains into respective or functionally related cognitive domains varies significantly. Since most studies demonstrate rather limited transfer effects in older adults, aging might be an important factor in transfer capability differences. This study investigated the transfer capability of logical reasoning training gains to a measure of Fluid Intelligence (Gf) in relation to age, general intelligence, and brain structural integrity as measured by diffusion tensor imaging. In a group of 41 highly educated healthy elderly, 71% demonstrated successful transfer immediately after a 4-week training session (i.e. short-term transfer). In a subgroup of 22% of subjects transfer maintained over a 3-month follow-up period (i.e. long-term transfer). While short-term transfer was not related to structural integrity, long-term transfer was associated with increased structural integrity in corpus and genu of the corpus callosum. Since callosal structural integrity was also related to age (in the present and foregoing studies), previously observed associations between age and transfer might be moderated by the structural integrity. Surprisingly, age was not directly associated with transfer in this study which could be explained by the multi-dependency of the structural integrity.
integrity (modulating factors beside age, e.g. genetics). In this highly educated sample, general intelligence was not related to transfer suggesting that high intelligence is not sufficient for transfer in normal aging. Further studies are needed to reveal the interaction of transfer, age, and structural integrity and delineate mechanisms of age-dependent transfer capabilities.