The purpose of this study was to investigate the impact of a peer-mediated intervention on the generalization of acquired social skills for high-functioning youth with social competence deficits. The literature underscores the importance of providing opportunities for students with social competence deficits to engage in social interactions across settings and peers outside the original instructional setting. Initial studies investigating the Social Competence Intervention for Adolescents (SCI-A) program where students with high-functioning autism were taught social skills, have shown promising generalization outcomes (Schmidt, Stichter, Lierheimer, McGhee, & O’Connor, 2011; Schmidt & Stichter, 2012). The current study replicated and extended the work of Schmidt and Stichter (2012) by training peer networks, based on skills and concepts of the SCI-A program, to encourage the generalization of social skills acquired in the SCI-A program. This study used a multiple-baseline across three target students to determine if the peer-mediated intervention would increase overt social interactions. Additional dependent variables included implementation fidelity, social validity, and pre-post measures of social competence. Results indicated that the peer-mediated intervention showed promising generalization outcomes related to increases in appropriate responses and decreases in inappropriate social interactions. Additionally, results indicated high consumer acceptability of the peer-mediated intervention. Finally, results showed that peers’ implementation of the strategies taught in the peer training impacted the rate at which target students engaged in social interactions. Implications for peer dynamics are discussed. In addition, considerations for interpretation and future directions of the current study are also discussed.