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BETWEEN ISOLATION AND LONELINESS: SOCIAL NETWORKS AND PERCEIVED INTEGRATION WITH PEERS OF CHILDREN DIAGNOSED WITH ADHD IN REGULAR CLASSROOMS

Abstract

Individuals with attention deficit hyperactivity disorder (ADHD) are characterized by a number of social deficits. The aim of the current study was to investigate the associations between ADHD diagnosis and social relationships among children from primary schools. Findings revealed that ADHD may contribute to both objective (social isolation) and subjective (dissatisfaction with peer relations) social problems. Children with a diagnosis of ADHD were more likely to have a "rejected" and "neglected" status and viewed their peer relations more negatively than children without this diagnosis. The effect of ADHD diagnosis on perceived integration with peers was found to be fully mediated by sociometric status. Our results underscore the relevance of social aspects of ADHD, which need to be addressed in the therapeutic programs. Interventions aiming to promote a positive image of children with ADHD among their peers should also be undertaken.

Introduction

Relationships with peers in the early school years are of central importance to a child's development (Rubin, Bukowski & Parker, 2006). Children derive significant benefits from interactions with their peers, which are a source of social and emotional support (Wentzel, Battle, Russell & Looney, 2010). At the same time, negative peer experiences may contribute to internalizing and externalizing behavior problems (Bukowski, Brendgen & Vitaro, 2007), and can also negatively influence school attitude adjustment, attendance and dropout as well as academic motivation and achievements (Wentzel, Baker & Russell, 2009).

Research results support an association between sociometric status and children's feelings of social dissatisfaction in early adolescence (for a review, see Parker, Rubin, Erath, Wojslawowicz & Buskirk, 2006). Obviously, children who are rejected by their peer group, experience higher levels of social dissatisfaction than their better accepted peers (Nangle, Erdley, Newman, Mason & Carpenter, 2003). On the other hand, previous studies also demonstrated that perceived satisfaction with peer relations and social isolation are at least partially independent constructs (Laursen & Hartl, 2013) and that they are not conceptually equivalent (de Jong Gierveld, van Tilburg & Dykstra, 2006). Individuals with a negative perception of their own social relationships are not necessarily socially isolated in an objective sense (Heinrich & Gullone, 2006). Perceived quality of relationships depends not only on the "objective" social network characteristics, but also on personal standards and expectations regarding what an optimal social network should look like.

Earlier studies of group acceptance and rejection indicate that peer group status is relatively stable over time (Hardy, Bukowski & Sippola, 2002). Generally, this is consistent with the hypothesis that group acceptance or rejection status reflects

children's social skills, rather than "whimsical or idiosyncratic aspects of the groups in which they find themselves" (Parker et al., 2006, p. 449). A subjective evaluation of relationships with others was also found to be associated with the level of social competence (Margalit, 2010).

It is well documented (Cervantes et al., 2013) that individuals with attention deficit hyperactivity disorder (ADHD) are characterized by a number of social deficits, including: (1) negative/aggressive interactions; (2) restless and intrusive behaviors that are inappropriate for the context; (3) inattention; (4) cognitive deficits. These deficits are associated with negative evaluations by peers and may be a risk factor for rejection by the group (Landau & Moore, 1991). In fact, researchers have noted that children with ADHD occupy a rather peripheral sociometric position as compared with non-ADHD peers (Tseng, 2012). It should be noted, though, that the association between sociometric status and perception of the quality of peer relationships among children with ADHD is not self-evident. The results of some studies reveal that ADHD children show an increased perceived dissatisfaction with peer relationships, as measured by the level of loneliness (Langher, Ricci, Reversi & Krstikj, 2009). On the other hand, there are also studies demonstrating that ADHD symptoms are related to more negative peer relations, but not to feelings of loneliness (Diamantopoulou, Henricsson & Rydell, 2005). This paradox may be due to the positive illusory bias (PIB) that protects self-confidence and self-esteem, and wards off negative affect (Wiener et al., 2012).

The main aim of the current study was to investigate the links between ADHD diagnosis and the objective and subjective dimensions of social relationships among children from primary schools. Based on the existing literature, we formulated the following three hypotheses to be tested: (a) children diagnosed with ADHD have more peer relationship problems as compared to children without a diagnosis of ADHD (H1); (b) children with ADHD perceive their peer relations more negatively than those not diagnosed with ADHD (H2); (c) the effect of ADHD diagnosis on perceived integration with peers is mediated by the sociometric variables (H3).

Methods

Sample

The data for the present analyses were drawn from the School Effectiveness Study realized by the Educational Research Institute in Warsaw. It is a longitudinal representative study of the cohort of Polish students who began the third grade of primary schools in autumn 2011. There were sampled 306 classes within 180 schools covering 6067 children. We used the data from 36 regular classrooms, with each containing at least one child with established clinical diagnosis of ADHD. Our final sample consisted of 718 students (357 boys), of which 38 (28 boys) had been diagnosed with ADHD.

Measures

Children's objective peer status was identified by using the standard sociometric procedure developed by Coie, Dodge and Coppotelli (1982). The participants were asked to nominate schoolmates from the same classroom with whom they most and least liked to play. These nominations were counted for each child and standardized within classrooms to control for the differences in classroom size. In this way, two

measures of sociometric position for each student were obtained: most liked position (MLP) and least liked position (LLP). Subsequently, they were used to classify children as: (a) popular, (b) rejected, (c) neglected, (d) controversial, and (e) average (Maassen & Landsheer, 1998).

To measure perceived social integration, we used a 15-item Social Integration (SI) subscale of the Fragebogen zur Erfassung von Dimensionen der Integration von Schülern (FDI 4-6) (Haeberlin, Moser, Bless & Klaghofer, 1989). This subscale contains eight positively and seven negatively worded items. Participants indicate their response on a 4-point rating scale with anchors of 1 (not true) and 4 (very much true). In this study, Cronbach's alpha coefficient for the SI subscale of the FDI was .92.

Data analyses
Preliminary analyses
Since the factor structure of the SI subscale of the FDI has not yet been established, we began by performing an exploratory factor analysis (EFA). The EFA was conducted using the WLSMV estimator with an oblique Geomin rotation (Muthén & Muthén, 1998-2012). The number of factors to retain was determined based on the Kaiser's eigenvalue-greater-than-one rule (Kaiser, 1960).

Next, a confirmatory factor analysis (CFA) based on the WLSMV estimator was used to verify the fit of the exploratory-based model. The CFA results were evaluated on three goodness-of-fit statistics: RMSEA, CFI and TLI. A model was considered acceptable if RMSEA was equal .08 or less, and CFI and TLI were close to .9 or greater (Geiser, 2013).

Study hypotheses testing
First, descriptive statistics were calculated for each subtype of sociometric status. Next, in order to test our first hypothesis (H1), two separate statistical models were used: (1) multinomial logistic regression model (MLRE), and (2) latent linear regression model (LLRE) (Geiser, 2013). MLRE was conducted with a qualitative classification of the students into five groups (i.e., popular, rejected, neglected, controversial, and average) as dependent variables, and ADHD diagnosis as an independent dummy variable. LLRE was performed with the unobserved latent sociometric status (LSS) with two observed indicators (i.e., most liked position – MLP and least liked position – LLP) as a dependent variable, and ADHD diagnosis as an independent observed variable. In the final step, Structural Equation Modeling (SEM) was employed to verify our second (H2) and third (H3) hypotheses (mediation model). According to Baron and Kenny (1986), a full mediating relationship exists if: (1) the independent variable (IV – ADHD) predicts the presumed mediator variable (MV – LSS); (2) the MV predicts the dependent variable (DV – SI), controlling for the IV (ADHD); (3) after controlling for the effects of the MV (LSS), a previously significant relationship between the IV (ADHD) and the DV (SI) becomes non-significant. In these analyses, the dependent variable was social integration (SI), construed as a latent trait based on the CFA solution.

In all analyses conducted, gender was used as a covariate. Calculations were performed using Mplus 7.11 (Muthén & Muthén, 1998-2012), with the cluster option.

Results

Preliminary analyses

The following first three eigenvalues for sample correlation matrix were obtained: 6.39, 1.48, .95. Such results supported the retention of two empirical factors. Although for the one-factor solution the fit statistics were acceptable (RMSEA = .07, CFI = .93, TLI = .92), they were clearly better for the two-factor model (RMSEA = .05, CFI = .97, TLI = .96). This indicates that the SI subscale is not "strictly" unidimensional and has a more complex structure than assumed by its developers (Haeberlin et al., 1989).

The analysis of the two-factor model revealed that all positively worded items loaded on the first factor and all negatively worded items loaded on the second factor. Thus, these subdimensions may be related to the difference in method (response pattern to reverse-scored items), rather than in traits. The presence of two factors and one trait suggests that a bi-factor model (Grygiel, Humenny, Rębisz, Świtaj & Sikorska-Grygiel, 2013; Reise, Scheines, Widaman & Haviland, 2013) may offer an adequate account of the factor structure of the SI. Therefore, we tested a model that assumes the presence of two (mutually orthogonal) classes of factors: a single general factor and two local sub-factors. The general factor (General Social Integration Factor – GSIF) was defined by loadings of all scale items, the first sub-factor only by positively worded items (Positive Social Integration Factor – PSIF), and the second one by negatively worded items (Negative Social Integration Factor – NSIF). This model had good fit parameters (RMSEA = .04, CFI = .98, TLI = .98). The loadings of all items on the GSIF and the NSIF were significant. A problem occurred with the PSIF. Four of eight items had non-significant loadings, so they didn't contribute to this factor. For this reason, an incomplete bi-factor model was computed with the same structure of factors, except that the PSIF was defined only by four items. This model had good fit statistics (RMSEA = .04, CFI = .98, TLI = .97), and all item loadings on the GSIF, NSIF and PSIF were significant.

ADHD Diagnosis and Sociometric Status

Out of 718 children, 14.5% were in the popular group, 12.3% in the rejected group, 14.1% in the neglected group, 5.6% in the controversial group, and 53.6% in the average group. The MLRE model showed gender-adjusted association between ADHD diagnosis and being in the rejected and neglected groups ($p < .01$). No statistically significant difference between children with and without ADHD was observed in the likelihood of being in the popular and controversial groups (in relation to the average group). The relative risk ratio (RR) switching from children without ADHD diagnosis to children with ADHD diagnosis was 14.01 for being in the rejected group and 2.25 for being in the neglected group. In other words, the expected risk of being in the rejected and neglected groups was substantially higher for subjects diagnosed with ADHD. While as many as 52.6% of children diagnosed with ADHD belonged to the category "rejected", only 7.8% of students without a diagnosis of ADHD fell into this category.

The LLRE model proved to fit the data very well: RMSEA = .03, CFI = .99, TLI = .97. Importantly, ADHD diagnosis had a significant negative standardized effect ($\beta = -.33$; $p < .01$) on the LSS. Subjects with ADHD had lower scores in the overall sociometric status as compared to their peers without this disorder.

ADHD Diagnosis and Perceived Integration with Peers

As indicated by the RMSEA, CFI and TLI values of .03, .98 and .97, respectively, the hypothesized model exhibited a good fit to the data. After controlling for gender, ADHD diagnosis was negatively related to the GSIF (β = -.17, p < .01). This means that children with a diagnosis of ADHD viewed their peer relations more negatively than children not diagnosed with ADHD. The regression coefficients for the impact of ADHD diagnosis on both SI sub-factors (i.e., PSIF and NSIF) were statistically non-significant.

Sociometric Status as a Mediator of the Effect of ADHD Diagnosis on Perceived Integration with Peers

The SEM assuming not only the effect of the LSS on the GSIF and the effect of ADHD on the GSIF, but also the impact of ADHD on the LSS, had good fit statistics: RMSEA = .03, CFI =.97, TLI = .97. The regression coefficient for the effect of the LSS on the GSIF turned out to be statistically significant (β = .42, p < .01). The positive value of the coefficient indicates that as the LSS increases – with all other variables in the model controlled – the GSIF score also grows. The regression coefficient for the effect of ADHD diagnosis on the LSS was also significant, but negative (β = -.35, p < .01). This indicates that children with ADHD had lower scores in the overall sociometric status compared to their peers without ADHD.

In the context of our hypotheses, it is important that the direct impact of ADHD diagnosis on the GSIF proved to be statistically non-significant (β = -.03; p = .53). When both ADHD diagnosis and the LSS were introduced to the model, the effect of the LSS remained significant, but the effect of ADHD diagnosis did not. We also calculated the indirect effect of ADHD diagnosis on the GSIF via the LSS. This indirect impact was statistically significant (β = -.15, p < .01). These findings support the view that sociometric status acts as a mediator in the relationship between ADHD diagnosis and perceived integration with peers.

Conclusions

Overall, the findings from our study confirm that ADHD may contribute to both objective (social isolation) and subjective (dissatisfaction with peer relations) social problems. Children with a diagnosis of ADHD were more likely to have a "rejected" and "neglected" status and viewed their peer relations more negatively than children without this diagnosis. These peer relationship difficulties probably result in large part from the very nature of the core symptoms of ADHD (i.e., inattention and hyperactivity/impulsivity), which may disrupt social interactions (Hoza, 2007). It seems, however, that additional, underestimated factors aggravating the social problems of individuals labeled ADHD are stigma, prejudices and discrimination (Hoza, 2007; Mueller, Fuermaier, Koerts & Tucha, 2012).

It should be noticed that ADHD diagnosis was found to be a significant predictor of perceived satisfaction with peer relations only when social isolation was not controlled. However, ADHD diagnosis proved to exert an indirect effect on self-perception of peer relationships (i.e., their subjective dimension), through its impact on sociometric status (i.e., the objective dimension of social relations). Sociometric status fully mediated this association.

Our results underscore the relevance of social aspects of ADHD, which should be addressed in the therapeutic programs. The use of stimulant medications and social skills training integrated with behavioral contingency management – as the most effective treatments for peer problems of children with ADHD (Hoza, 2007) – should lead to the reduction of not only present, but also future negative outcomes. No less important is the need to implement intensive and specialized interventions focusing on promoting a positive image of children with ADHD among their peers and on reducing the social stigma attached to this diagnosis. Efforts should be undertaken to educate teachers how they can assist students diagnosed with ADHD to build positive relationships with classmates and avoid social rejection.

References

Baron, R. M. & Kenny, D. A. (1986): The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Bukowski, W. M., Brendgen, M. & Vitaro, F. (2007): Peer and socialization: Effects on externalizing and internalizing problems. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research* (pp. 355-381). New York, NY: Guilford Press.

Cervantes, P. E., Matson, J. L., Adams, H. L., Williams, L. W., Goldin, R. L. & Jang, J. (2013): Comparing social skill profiles of children with autism spectrum disorders versus children with attention deficit hyperactivity disorder: Where the deficits lie. *Research in Autism Spectrum Disorders, 7*(9), 1104-1110.

Coie, J. D., Dodge, K. A. & Coppotelli, H. (1982): Dimensions and types of social status: A cross-age perspective. *Developmental psychology, 18*(4), 557-570.

de Jong Gierveld, J., van Tilburg, T. & Dykstra, P. A. (2006): Loneliness and social isolation. In A. L. Vangelisti & D. Perlman (Eds.) *The Cambridge handbook of personal relationships* (pp. 485-499). Cambridge; New York: Cambridge University Press.

Diamantopoulou, S., Henricsson, L. & Rydell, A.-M. (2005): ADHD symptoms and peer relations of children in a community sample: Examining associated problems, self-perceptions, and gender differences. *International Journal of Behavioral Development, 29*(5), 388-398.

Geiser, C. (2013): *Data analysis with Mplus*: New York, NY: The Guilford Press.

Grygiel, P., Humenny, G., Rębisz, S., Świtaj, P. & Sikorska-Grygiel, J. (2013): Validating the Polish adaptation of the De Jong-Gierveld Loneliness Scale. *European Journal of Psychological Assessment, 29*(2), 129-139.

Haeberlin, U., Moser, U., Bless, G. & Klaghofer, R. (1989): *Integration in die Schulklasse: Fragebogen zur Erfassung von Dimensionen der Integration von Schülern: FDI 4-6.* Bern, Stuttgart: Verlag Paul Haupt.

Hardy, C. L., Bukowski, W. M. & Sippola, L. K. (2002): Stability and change in peer relationships during the transition to middle-level school. *The Journal of Early Adolescence, 22*(2), 117-142.

Heinrich, L. M. & Gullone, E. (2006): The clinical significance of loneliness: A literature review. *Clinical Psychology Review, 26*(6), 695-718.

Hoza, B. (2007): Peer functioning in children with ADHD. *Journal of Pediatric Psychology, 32*(6), 655-663.

Kaiser, H. F. (1960): The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141-151.

Landau, S. & Moore, L. A. (1991): Social skills deficits in children with Attention-Deficit Hyperactivity Disorder. *School Psychology Review, 20*(2), 235-251.

Langher, V., Ricci, M. E., Reversi, S. & Krstikj, N. (2009): Adhd and loneliness social dissatisfaction in inclusive school from an individual-context paradigm. *The Journal of Special Education and Rehabilitation, 10*(3-4), 67-88.

Laursen, B. & Hartl, A. C. (2013): Understanding loneliness during adolescence: Developmental changes that increase the risk of perceived social isolation. *Journal of Adolescence, 36*(6), 1261-1268.

Maassen, G. H. & Landsheer, J. A. (1998): SSRAT: The processing of rating scales for the determination of two-dimensional sociometric status. *Behavior Research Methods, Instruments, & Computers, 30*(4), 674-679.

Margalit, M. (2010). *Lonely children and adolescents:Self-perceptions, social exclusion, and hope*. New York, NY: Springer.

Mueller, A., Fuermaier, A. M., Koerts, J. & Tucha, L. (2012): Stigma in attention deficit hyperactivity disorder. *ADHD Attention Deficit and Hyperactivity Disorders, 4*(3), 101-114.

Muthén, L. K. & Muthén, B. O. (1998-2012): *Mplus user's guide. Seventh edition.* Los Angeles, CA: Muthén & Muthén.

Nangle, D. W., Erdley, C. A., Newman, J. E., Mason, C. A. & Carpenter, E. M. (2003): Popularity, friendship quantity, and friendship quality: Interactive influences on children's loneliness and depression. *Journal of Clinical Child and Adolescent Psychology, 32*(4), 546-555.

Parker, J. G., Rubin, K. H., Erath, S. A., Wojslawowicz, J. C. & Buskirk, A. A. (2006): Peer relationships, child development, and adjustment: A developmental psychopathology perspective. In D. Cicchetti & D. J. Cohen (Eds.) *Developmental psychopathology, Vol 1: Theory and method (2nd ed.)* (pp. 419-493). Hoboken, NJ: John Wiley & Sons Inc.

Reise, S. P., Scheines, R., Widaman, K. F. & Haviland, M. G. (2013): Multidimensionality and structural coefficient bias in structural equation modeling: A bifactor perspective. *Educational and Psychological Measurement, 73*(1), 5-26.

Rubin, K. H., Bukowski, W. M. & Parker, J. G. (2006): Peer interactions, relationships, and groups. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology* (6th ed., Vol. 3, pp. 571-645). Hoboken, NJ: John Wiley & Sons.

Tseng, W.-L. (2012): *Peer relationships among children with symptoms of attention-deficit/hyperactivity disorder: A developmental psychopathology perspective.* University of Minnesota.

Wentzel, K. R., Baker, S. A. & Russell, S. L. (2009): Peer relationships and positive adjustment at school. In R. Gilman, E. S. Huebner & M. J. Furlong (Eds.) *Handbook of positive psychology in schools* (pp. 229-243). New York, NY: Routledge.

Wentzel, K. R., Battle, A., Russell, S. L. & Looney, L. B. (2010): Social supports from teachers and peers as predictors of academic and social motivation. *Contemporary Educational Psychology, 35*(3), 193-202.

Wiener, J., Malone, M., Varma, A., Markel, C., Biondic, D., Tannock, R. & Humphries, T. (2012): Children's perceptions of their ADHD symptoms: Positive illusions, attributions, and stigma. *Canadian Journal of School Psychology, 27*(3), 217-242.

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