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Multiple Levels of Factors Protecting Against Peer Rejection in Children With Attention-Deficit/Hyperactivity Disorder

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Abstract

This study investigated both the risk factors and the protective factors against peer rejection at multiple levels in children with attention-deficit/hyperactivity disorder (ADHD) and their typically developing peers. Using standard sociometric procedure, we studied the peer rejection of 108 children with ADHD (aged 7 to 12) and their classmates of the same sex and age ($n = 108$). Risk factors (i.e., emotional/behavioral difficulties, academic performance, conflicts in the student-teacher relationship, parental rejection) predicted peer rejection in both groups, but the quality of relationships with teachers had a stronger predictive power in children with ADHD. Protective factors at multiple levels: individual (*extracurricular activity*), family (*parental warmth* and *family social support*), social (*school social support* and *friendship*), compensated for all the risks of peer rejection in children with ADHD. However, the effect of *prosocial* behavior was insignificant after controlling for emotional/behavioral problems. Only *school social support* and *friendship* moderated the relationship between rejection and the risk factors in children with ADHD. Compensatory and moderating effects of all factors were found in the comparison group. Prevention and intervention of the peer rejection of children with ADHD should be focused on multiple levels of factors, especially social ones.

Keywords

attention-deficit/hyperactivity disorder, children, peer rejection, protective factors, risk factors

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder with a 5.7% prevalence rate among school-age children worldwide (American Psychiatric Association [APA], 2013). ADHD is associated with a persistent pattern of inattention and hyperactivity/impulsivity that interferes with a child's functioning and development (Barkley, 2006). Children with ADHD experienced greater rejection from their peers than typically developing children did (Mikami & Lorenzi, 2011). Furthermore, this trend remained stable when students moved to middle school (Bagwell et al., 2001), and persisted even after multimodal treatment (Hoza et al., 2005). The combination of ADHD and peer rejection predicted academic underachievement, higher levels of externalizing and internalizing problems, more serious delinquency, and heavier smoking (Mikami & Hinshaw, 2006; Mrug et al., 2012).

Peer group is a social system where the emotional cross-currents, namely attractions and repulsions, appear between individuals (Moreno, 1934). The dimensions of these two forces are conceptualized as peer acceptance and peer rejection (Cillessen, 2009). In the framework of sociometric theory and method, peer rejection, as well as acceptance, is defined as the relationship of an individual child and his or her group (Cillessen, 2009; Coie et al., 1982; Hoza et al., 2005; Murray-Close et al., 2010). Hence, the greater number of group members, with whom a child has poor relationship, the higher level of peer rejection. ADHD symptoms make peer functioning difficult; they lead to children's inability to develop social skills (Barkley, 2006). Consequently, children's inappropriate social behavior makes them rejected (Hoza et al., 2005; Murray-Close et al., 2010).

School service providers should pay attention to the peer relationship of children with ADHD as early as possible. There is a need for the development of multiple strategies for

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normalizing the peer functioning of elementary school children with ADHD (Mrug et al., 2012). Therefore, it is necessary to identify the processes that exacerbate or reduce the risk of peer rejection in these children. The risk and protective factors model is useful for identifying these processes. According to this conceptual framework, risk factors increase the likelihood of the onset of a problem, and protective factors are constructs that decrease this likelihood. Both risk and protective factors may be within an individual, family, or social system (Fraser et al., 1999).

Despite the fact that risk and protective factors framework has been used to understand child developmental outcomes since the end of the 20th century, this model began to be applied for studying the social functioning of children with ADHD only in recent decade (Climie & Mastoras, 2015; Dvorsky & Langberg, 2016; Mastoras et al., 2018; Ray et al., 2017). Two focuses have been employed in investigating peer rejection of children with ADHD. First, there is a predominant focus on the behavioral deficits that can explain the peer rejection of these children, while family and social risk contexts are often overlooked (Mikami & Lorenzi, 2011; Mrug et al., 2007; Thorell et al., 2017). This individual-focused approach to understanding the social impairment of children with ADHD increases their stigmatization and limits the effectiveness of prevention and intervention programs (Mikami & Normand, 2015). Second, despite the fact that there has been a shift from a deficit-oriented approach to a strengths perspective in studying the peer relationship of children with ADHD (Jia et al., 2021; Mastoras et al., 2018; Ray et al., 2017), most research has explored protective factors within the child's, the teacher's or the parents' behavior, while protective mechanisms may occur on three levels concurrently; individual, family, and social (Fraser et al., 1999).

In this study the three levels of factors were examined. Knowledge of the predictive power of risk factors at different levels (individual, family, and social) in one model may help improve the effectiveness of the prevention of and intervention in the peer rejection of children with ADHD. A study of protective mechanisms may enhance our understanding of the peer rejection of children with ADHD (Fraser et al., 1999) and improve the efficiency of social work with these children and their families (Ma et al., 2020). A simultaneous study of the protective factors at each of the three levels could reveal which factors of which level may be more protective than others.

Peer Rejection Risk Factors

The identification of risk factors, as well as protective factors, is crucial. In accordance with risk and protective factors framework, both cumulative and specific risks should be studied within an integrative model. Whereas cumulative risk factors are related to many types of problems, specific factors are more strongly associated with specific social problem (Fraser et al., 1999). Bronfenbrenner's ecological theory (1945) emphasize that children develop in the ecosystems and the smallest system in which children have interpersonal relationship is a microsystem (Shelton, 2019). Peer rejection occurs in a classroom, which is part of a school microsystem, hence, children's individual characteristics and their interactions with teachers may be identified as specific risk factors, while family factors are more related to cumulative processes.

ADHD symptoms and the accompanying emotional and behavioral problems are the most widely studied risk factors in peer rejection (APA, 2013). A 2-year longitudinal study showed that children's inattention and hyperactivity/impulsivity symptoms in the first year of the study predicted those children developing greater peer problems during the second year (Andrade & Tannock, 2014). Internalizing (i.e., anxiety and depression) and externalizing (i.e., aggression and emotional reactivity) problems were negatively correlated with peer acceptance but were positively related to peer rejection of children with ADHD (Becker, McBurnett et al., 2013; Mikami & Hinshaw, 2003; Thorell et al., 2017).

Academic achievement is another child-level factor that contributes to children's social status. In a community sample of school students, Hughes and Zhang (2007) found that first-grade children with a low level of academic achievement were less accepted by classmates than their peers who exhibited higher academic performance. Flicek (1992) found that the greater the negative effects of ADHD on learning and the higher the level of academic difficulties, the higher the level of peer rejection experienced by children with ADHD.

There is considerable evidence that negative parent-child interaction is related to the social skills of children with ADHD (Jack et al., 2011; Ray et al., 2017). Children with ADHD have poorer social skills, difficulty in understanding social situations (Barkley, 2006), and a negative parent-child relationship, all of which in turn increases their social impairment (Kaiser et al., 2011). In a longitudinal study with typically developing children, McDowell and Parke (2009) found that parent-child interaction predicted an improvement in the children's social skills, which in turn accounted for peer acceptance one year later. The effect of parental rejection on the social status of children with ADHD was found in the laboratory when the behavior of parents during the children's peer interactions were observed (Mikami et al., 2010).

The student-teacher relationship is part of the social context of the peer relationships of children with ADHD (Mikami & Normand, 2015). Zendarski et al. (2020) found that children with ADHD had significantly higher levels of conflict and lower levels of closeness in relationships with teachers than children without ADHD did. Despite the fact that the student-teacher relationship prospectively predicted children's social status in a community sample of school students (Hughes & Kwok, 2006), and was associated with the social skills of children with ADHD (Jia et al., 2021), the effect of student-teacher relationship on peer rejection of

children with ADHD remains unknown. Thus, risk factors, namely, emotional and behavioral problems, academic difficulties, the student-teacher relationship, and parental rejection, may contribute to peer rejection of children with ADHD, but effects of all these risk factors on peer rejection have been unexamined.

Factors Protecting Against Peer Rejection

There are also specific and cumulative protective processes which may directly affect problems or modify risks related to problems (Fraser et al., 1999). Andrade and Tannock (2014) found that prosocial behavior prospectively reduced the negative influence of ADHD symptoms on peer problems. Another study suggested that the prosocial behavior of children with ADHD symptoms compensated for the negative impact that aggressive behavior and internalizing problems had on peer relationships (Diamantopoulou et al., 2005). The presence of prosocial skills even increased the social preference of clinically diagnosed children among other children with whom they were previously unfamiliar with (Mrug et al., 2007).

The possible positive influence of extracurricular activity has on social functioning of children with ADHD has been indicated. It has been found that the breadth and intensity of after-school activities improved social skills of children with ADHD in the presence of conduct problems, depression, and negative parenting (Ray et al., 2017). McDowell and Parke (2009) longitudinal study of a community sample of students found that this extracurricular activity not only promoted the children's social skills during first year of observation, but also predicted the degree of peer acceptance found at a second point 1 year later. The extracurricular activity of children with ADHD may counteract individual, family, and social risk factors.

A positive association between the peer relationship and parental warmth has been identified in children with ADHD. Mikami et al. (2010) found that parental warmth demonstrated in a playgroup of children with ADHD was positively related to social preference. In a large cross-sectional study, Kawabata et al. (2012) found that maternal affection decreased the relationship between inattention symptoms and social problems.

The observed interactions of ADHD children with individual peers, as well as their student-teacher relationships, are a source of information that their peers use for evaluating the behavior of the children with ADHD (Hughes et al., 2001). Therefore, the dyadic relationship is an important part of the social context of peer rejection of children with ADHD. Despite the fact that children with ADHD had fewer friends than typically developing children did (Hoza et al., 2005), friendship with at least one peer can increase a child's social status in a group after controlling for social competence, and internalizing and externalizing problems (Becker, Fite, et al., 2013; Cardoos & Hinshaw, 2011).

Notably, factors protecting against peer rejection in children with clinically diagnosed ADHD, namely, prosocial behavior (Mrug et al., 2007), friendship (Becker, Fite, et al., 2013; Cardoos & Hinshaw, 2011), and parental warmth (Mikami et al., 2010), were explored in an out-of-school research setting. However, the classroom is the main environment in which children interact with their peers, and peer relationships in the classroom are more stable (Bierman, 2004). It is unclear whether these factors will have the same positive impact on children's peer relationships in an in-school setting, and knowledge of this may inform school-based prevention and intervention for children with ADHD. Moreover, the aforementioned protective factors were examined in the context of the risk arising from ADHD symptoms, along with emotional and behavioral problems. Only one study evaluated protective factors in the risk context on two levels: those of individual and family (Ray et al., 2017). How these protective factors counteracting the negative impact of academic difficulties and teacher-student conflicts on peer relationships remains unclear.

Children with ADHD need special support from their families. Hurt et al. (2007) discovered that parental affection predicted low peer rejection only for children with ADHD who experienced low level of family loneliness. The significant impact of family support can be explained by the impairments in many areas of these children's and their parent's ability to cope with increased problems (Ma et al., 2017). Mastoras et al. (2018) found that parental social support was associated with the peer acceptance of children with ADHD.

Children with ADHD need more understanding and support from their teachers and more targeted support from their school than their typically developing peers do (DuPaul & Stoner, 2003), and the level of the social support provided by the teacher also predicted the level of social acceptance of these children (Mastoras et al., 2018). Hughes et al. (2014) found that a strong peer perception of teacher–student support protected children with low academic achievement from peer rejection. Therefore, the social support received from family and school can be additional protective factors that may protect children with ADHD from being rejected by their peers.

The Present Study

The present study addressed the three research questions: (a) Do emotional and behavioral problems, academic performance, conflict in the student-teacher relationship, and parental rejection predict the peer rejection of children with ADHD and typically developing children? (b) Do prosocial behavior, extracurricular activity, parental warmth, and dyadic friendship have any effect on peer rejection after controlling for risk factors in both groups in a school setting? (c) Do family and school social support have any effect on peer rejection after controlling for risk factors in children with ADHD in a school setting? (d) Do the above-mentioned

protective factors moderate the relationship between risk factors and peer rejection?

The aim of this study was to examine the risk and protective factors surrounding the peer rejection of children with ADHD at multiple levels (individual, family, and society) in comparison with that of typically developing children. First, we hypothesized that (1) emotional/behavioral problems, (2) academic performance, (3) conflict in the student teacher relationship, and (4) parental rejection will predict the peer rejection of children with ADHD as well as those without it. Second, we hypothesized that four protective factors: (1) prosocial behavior, (2) extracurricular activity, (3) parental warmth, and (4) dyadic friendship will display a compensatory effect and will reduce the rejection by classmates of children in both groups within the context of the risk factors. Third, we hypothesized that these protective factors will have a moderating effect and will mitigate the relationship between risk factors and the rejection by classmates of both groups. Fourth, we predicted that (1) family and (2) school social support will compensate for the risk factors and mitigate the relationship between risk factors and peer rejection of children with ADHD.

Method

Study Design

The design of the present study was cross-sectional. Sociometric procedures were carried out in naturalistic settings, namely in primary schools, and were conducted in a group format. Teachers reported on their relationship quality with children and children's emotional behavioral problems. Parents reported on their parental warmth and rejection, perceived family and school social support, and extracurricular activity of their children. The data of children's academic performance were collected at the same time. The present study was approved by the Local Ethics Committee of the al-Farabi Kazakh National University (No. IRB-A051).

Study Participants

The participants were 108 children aged 7 to 12 ($MS = 9.4$; $SD = 1.56$; 96% boys) who had been clinically diagnosed with ADHD according to the International Statistical Classification of Diseases and Related Health Problems by neurologists. A comparison group ($n = 108$) was created and included classmates of the ADHD children. The children were students of primary schools in Almaty (1–4 grades). Almaty city is the largest city in Kazakhstan with 2 million ethnically diverse population. Approximately a quarter of families have three or more children. The number of children under the age of 15 is 33 % of the total population of Almaty city (The Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, 2017).

The sample was ethnically diverse, but most of the children were Kazakh (62%), Russian (27%), and Uigur (5%). Most of them were from dual (74%) or single-parent families (22.6%). The ages of most of the parents fell within the following ranges: 36 to 40 years (41.8%), 31 to 35 years (25.7%), and 41 to 45 years (23.8%). Most parents were female (91.6%). About 68.5% of the parents had full-time jobs, 42% were college and university graduates, and 68% had an average family income equal to or more than US$ 416. All teachers were females in the age range 24 to 62 years ($MS = 42$; $SD = 11.3$) with an average of 16 years ($SD = 8.3$) experience.

We recruited the participants through the public schools. The schools were randomly selected from each district of the city. We invited parents to participate in 2-hour psycho-educational talks, and then recruited them to join the present study. One hundred seventeen parents took part in the talks, and nine parents refused to participate in the research. Inclusion criteria for the children in the comparison group were (1) the same sex and (2) the same age (324 children) as the ADHD children. Exclusion criteria were the presence of diagnosed (1) conduct problems, (2) oppositional defiant disorder, and (3) autism spectrum disorder (3 children). After being sorted according to the above criteria, the children that would participate in the study were then randomly selected from the suitable candidates using a lottery method. In 12 cases this randomizing procedure was replicated because the parents of the originally selected children refused to participate in this study. Parents of both groups have given their written consent for their children to participate in the present study and consent for data pertaining to their children to be collected.

Measures

Sociometric procedure. Peer rejection was measured using a standard sociometric procedure (Coie et al., 1982); children were asked to name three classmates who they *like the most* and three they *like the least*. In this study, a limited number of nominations was used because the use of unlimited nominations did not provide a strong advantage in the case of an elementary school (Cillessen, 2009), and fixed nominations made the procedure less time-consuming. We calculated the numbers of positive and negative nominations that reflected the extent of peer acceptance and rejection. Given the importance of adjusting for group size effects in the evaluation of social status by sociometrics (Cillessen, 2009), we standardized scores within the group. We used the number of mutual positive nominations as a "Dyadic Friendship" variable. For creating dummy variables, we applied the following codes: 0 = no friends; 1 = one and more friends.

The Strengths and Difficulties Questionnaire (SDQ). The SDQ is a 25-item questionnaire (Goodman, 1997) consisting of five subscales: emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior. Each item is rated on a 3-point Likert-scale ranging from 0 (*not true*) to 2 (*certainly true*). The original scale of

the teacher version of the SDQ showed satisfactory internal consistency (Goodman, 2001; from 0.70 to 0.84) as did the version of the scale adapted into Russian (Goodman et al., 2005). In this study, the Cronbach's α was satisfactory for the SDQ-overall scale (0.71) and its subscales: emotional symptoms, 0.73; conduct problems, 0.67; hyperactivity-inattention, 0.73; peer problems, 0.77; and prosocial behavior, 0.70. The sum of the first four subscales was used as the "Emotional/Behavioral Difficulties" variable.

Student-Teacher Relationship Scale—Short Form (STRS-SF). The STRS-SF is a self-reported scale assessing a teacher's perception of his or her relationship with an individual student (Pianta, 2001). This scale includes two subscales: closeness and conflict. The teacher evaluates each of the statements in terms of how well it fits his/her relationship with the student using a five-point Likert-scale with answers ranging from 1 (*strongly disagree)* to 5 (*strongly agree*). The internal consistency of the scales was high: closeness, 0.86; conflict, 0.92 (Pianta, 2001). The STRS-SF was translated from English into Russian. A standard back-translation procedure was conducted. The Cronbach's α was satisfactory: STRS-SF-overall, 0.76; conflict, 0.86; and closeness, 0.85.

Parental Acceptance-Rejection Questionnaire (PARQ). The PARQ is a parent-reported measure assessing two dimensions: parental warmth (warmth/affection scale) and rejection (hostility/aggression, indifference/neglect, and undifferentiated rejection scales) (Rohner, 1986). Each item is rated on a 4-point Likert-scale, from 4 (*almost always true*) to 1 (*almost never true*). The internal reliabilities of the original scale ranged from 0.85 to 0.98 (Gomez & Rohner, 2011) and ranged from 0.72 to 0.91 for the Russian translation of the scale (Burmenskaya, 2018). In this study, the Cronbach's α was satisfactory: the PARQ-overall scale was 0.73; the warmth/affection, 0.83; hostility\aggression, 0.76; indifference neglect, 0.70; and undifferentiated rejection, 0.71. The first subscale was used as a protective factor, "Parental warmth," and the sum of the scores of the other subscales was used as a predictor variable—"Parental Rejection."

Perceived Social Support Scale (PSS). The PSS is a scale which gives an estimation of the parents' perception of the amount of social support the parents of children with ADHD receive (Ma et al., 2017). The PSS evaluates four types of social support (informational, emotional, tangible, and affiliated) from five possible sources (family, friends, school, medical, and social services). This scale also includes some open questions where by parents can describe the kind of help that they would like to receive. Parents evaluated their perception of help and their degree of satisfaction using a 4-point Likert scale with answers ranging from 1 (*very dissatisfied)* to 4 (*very satisfied*). Higher scores indicate greater satisfaction. The internal consistency was high and ranged from 0.91 to 0.93 (Ma et al., 2017). The PSS was translated from English into Russian. A standard back-translation procedure was conducted to ensure accuracy. The internal consistency was satisfactory: the PSS-overall was 0.82, family social support, 0.84, and school social support, 0.81.

Extracurricular Activity Scale (EAS). The EAS was developed by the authors. The structure of this scale was based on two main properties of a child's activity: a) breadth and (b) intensity (Ray et al., 2017), and four types of activity: structured and unstructured (Brooks et al., 2015); individual and group. The EAS consists of three subscales: sport, creativity, and social activity. Each subscale includes three items. Parents evaluate how regularly their child participates in a certain activity using a 4-point Likert scale with responses ranging from 1 (*never*) to 4 (*always*). The internal consistency was satisfactory: the EAQ-overall was 0.70; sport activity, 0.69; creative activity, 0.71; and social activity, 0.76.

Academic performance scores. The academic performance scores were the average scores of an academic rating of the main school subjects in elementary school. The academic scores ranged from 2 to 5.

Data Analysis

The data was analyzed using IBM Statistics SPSS 25 software. A stepwise multiple linear regression was applied to estimate the effects of the risk factors on peer rejection. A hierarchical multiple linear regression was applied to assess the main and moderating effects of the protective factors. Preliminarily, all continuous variables were mean-centered to avoid multicollinearity (Cohen et al., 2003). A hierarchical regression analysis was separately conducted for each predictor variable. The variables were entered in the following order: a predictor variable at Step 1, a protective factor at Step 2, and an interaction term at Step 3.

Results of the Study

Descriptive Analyses

The children with ADHD had a higher peer rejection index (see Table 1) than the typically developing children ($t = 8.43$, $p < .001$). Also, the children with ADHD had fewer reciprocal positive nominations: in children with ADHD, 83 children had no friends and 25 children had at least one friend; in the typically developing children, 49 children had no friends and 59 children had at least one friend. Children with ADHD demonstrated higher levels of emotional/behavioral difficulties ($M = 13.52$, $SD = 3.28$), higher levels of conflict in their student-teacher relationships ($M = 24.13$, $SD = 4.25$), and more parental rejection ($M = 77.68$, $SD = 9.36$) than did the typically developing children. Academic performance scores were lower among children with ADHD ($M = 3.59$, $SD = .33$) than among their classmates'. Conversely, children with

Table 1. Descriptive Statistics of Risk and Protective Factors.

Variables	With ADHD (n = 108)	Without ADHD (n = 108)		
	$M(SD)$	$M(SD)$	t	p
Outcome variable				
(1) Peer Rejection	.80 (.93)	–.15 (.71)	8.43	.000
Risk factors				
(2) Emotional/Behavioral Difficulties (SDQ)	13.52 (3.28)	7.15 (2.52)	15.96	.000
(3) Academic Performance Scores	3.59 (.33)	3.74 (.39)	–2.96	.003
(4) Conflict in the Student-Teacher Relationship (STRS-SF)	24.13 (4.25)	20.98 (4.40)	5.34	.000
(5) Parental Rejection (PARQ)	77.68 (9.36)	75.02 (9.34)	2.00	.046
Protective factors				
(6) Prosocial behavior (SDQ)	5.60 (1.87)	6.22 (1.86)	–2.43	.016
(7) Extracurricular activity (EAQ)	1.52 (.35)	1.68 (.32)	–3.45	.001
(8) Parental warmth (RARQ)	56.45 (9.87)	64.19 (8.55)	–6.15	.000
(9) Family social support (PSS)[a]	2.46 (.66)			
(10) School social support (PSS)[b]	2.07 (.58)			

[a]PSS from family were measured only in children with ADHD.
[b]PSS from school were measured only in children with ADHD.

ADHD had lower levels of parental warmth (M=56.45, SD=9.87), prosocial behavior (M=5.60, SD=1.87), and extracurricular activity (M=1.52, SD=.35) than the typically developing children. All the differences were statistically significant. The scores for family social support (M=2.46, SD=.66) and school social support (M=2.07, SD=.58) were average.

Preliminary Analyses

The correlations between the predictor and outcome variables were statistically significant. Peer rejection correlated more strongly with emotional/behavioral difficulties in both groups (with ADHD, r=.68; without ADHD, r=.69). As expected, peer rejection correlated negatively with academic performance (with ADHD, r=−.60; without ADHD, r=−.57) and was positively related to conflicted student-teacher relationships (with ADHD, r=.55; without ADHD, r=.51) and parental rejection (with ADHD, r=.57; without ADHD, r=.65). Hence, these variables vary together (Wagner & Gillespie, 2018), and selected risk factors can predict peer rejection in both groups.

The multicollinearity assumptions of the multiple linear regressions were met for all variables. The coefficients of the correlation of the predictor and protective variables were under .61. The intercorrelation were well within tolerance having coefficients of 0.5 and 0.6 (Tabachnick & Fidell, 2001): the correlation coefficient among risk factors ranged from—.50 to .57 in children with ADHD (from −.49 to .50 in the typically developing children) and among protective factors ranged from .22 to .51 in participants with ADHD (from .33 to .46 in the typically developing children). As the correlation between the "peer problem" subscale and peer rejection was high (children with ADHD, r=.80; comparison group, r=.82), this subscale was excluded from the regression analyses to avoid the overlapping of variables.

The results of the Independent t-tests and a one-way ANOVA did not reveal statistically significant differences in peer rejection according to the sociodemographic characteristics of children with ADHD: child's gender (t=.29, p=.76), child's age (t=.05, p=.96), child's grade (F=.49, MS=.44, p=.68), and family income (F=1.16, MS=1.00, p=.33). All the differences were statistically insignificant in the typically developing children: child's gender (t=−1.43; p=.15), child's age (t=−.55, p=.58), child's grade (F=1.06, MS=.55, p=.36), and family income (F=.80, MS=.41, p=.57).

Risk Factors Predicting Peer Rejection

The results of the stepwise multiple regression analysis revealed that all risk factors were statistically significantly associated with the peer rejection in both groups (see Figure 1). Therefore, the first hypothesis was completely confirmed. The predictor variables explained 64% of the variance in the peer rejection of children with ADHD, and 65% of that of typically developing children. The largest share of the variation in rejection was accounted for by the emotional/behavioral problems in both groups (with ADHD, ΔR^2=.47; without ADHD, R^2=.48). This predicting variable was positively associated with the rejection of children with ADHD (β=.38, $p<.001$) and typically developing children (β=.37, $p<.001$). The effect of academic performance on peer rejection was also similar (with ADHD, β=−.21; without ADHD, β=−.20). However, the effect of conflict in the student-teacher relationship was higher in children with ADHD (ΔR^2=.09, β=.23, $p<.01$) than that of the typically developing children (ΔR^2=.01, β=.14, $p<.05$). There was a significant

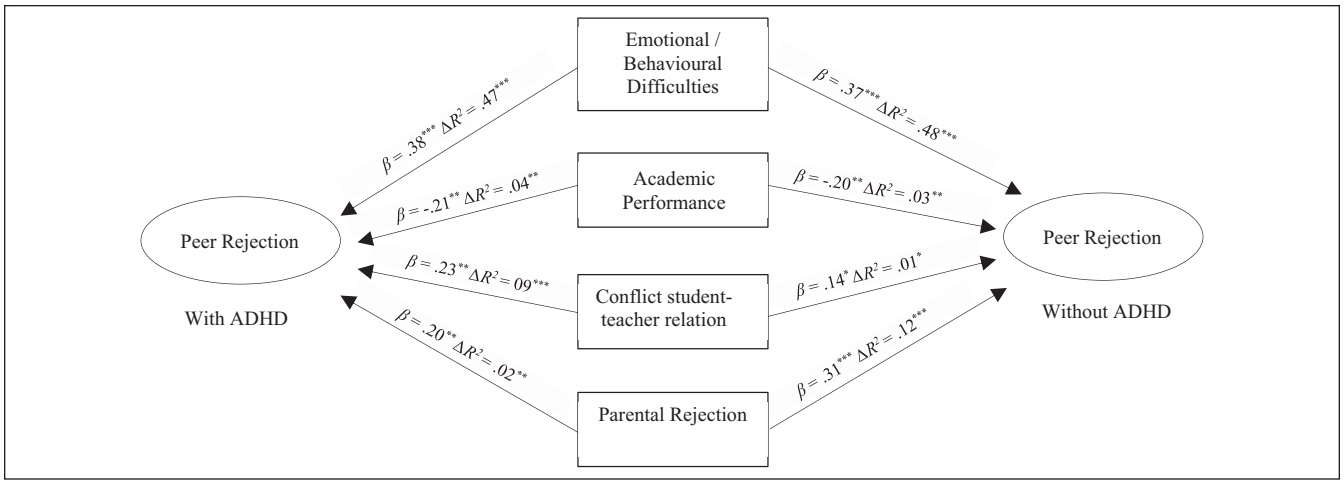

Figure 1. Relationship between risk factors and peer rejection.

difference in the effect of parental rejection; it explained 12% of the variation in peer rejection in the comparison group, but only 2% in the children with ADHD.

Compensatory and Moderating Effects

Prosocial behavior was negatively associated with the peer rejection of children with ADHD as the main effect after controlling for academic difficulties ($\Delta R^2 = .07$, $\beta = -.27$, $p < .01$), conflict in the student-teacher relationship ($\Delta R^2 = .05$, $\beta = -.26$, $p < .01$), and parental rejection ($\Delta R^2 = .06$, $\beta = -.24$, $p < .01$). However, the main effect was insignificant in the context of emotional/behavioral problems in children with ADHD ($\Delta R^2 = .00$, $\beta = -.05$, $p > .05$). In the case of the typically developing children, prosocial behavior reduced peer rejection in the context of all risk factors (see Table 2). The interactions between the risk factors and prosocial behavior made a statistically significant contribution to the prediction of peer rejection in the comparison group. However, these interactions were insignificant for children with ADHD.

Extracurricular activity was negatively associated with peer rejection as the main effect after controlling for risk factors in both groups (see Table 2). This factor as opposed to prosocial behavior had a statistically significant effect on peer rejection in the context of the emotional/behavioral risk in children with ADHD ($\beta = -.41$, $p < .001$). The two-way interactions between each risk factor and extracurricular activity were significant in the comparison group but were insignificant for the children with ADHD. Hence, this factor mitigated the relationship between risk factors and rejection only in typically developing children.

After controlling for all the risk factors, the main effect of parental warmth was significant in both groups (see Table 2). The two-way interactions between parental warmth and the risk factors were significant only for the typically developing children; the negative impact of four risks on social status was mitigated by parent's affection (e.g., emotional-behavioral problems, $\Delta R^2 = .03$, $\beta = -.20$, $p < .01$; and academic difficulties, $\Delta R^2 = .06$, $\beta = .26$, $p < .001$).

Friendship negatively predicted peer rejection in both groups after controlling for all risk factors that provided evidence for the compensatory effect of this factor (see Table 2). Dyadic friendship mitigated the associations between four risk factors and peer rejection in the comparison group. For children with ADHD, the interaction of academic performance and dyadic friendship was statistically significant ($\beta = -.22$, $p < .01$). Thus, the second hypothesis was completely supported by the results of statistical analysis in typically developing children, but was partially confirmed in children with ADHD. The third hypothesis was mostly refuted in children with ADHD, contrarily, this assumption was completely confirmed in typically developing children.

The main effect of family social support was significant in the context of all risk factors (see Table 3) but was stronger after accounting for academic performance ($\beta = -.31$, $p < .001$) and conflict in the student-teacher relationship ($\beta = -.37$, $p < .001$). However, this factor had no moderating effect on the relationship between the risk factors and peer rejection in children with ADHD. School social support negatively predicted peer rejection; the main effects of school social support were statistically significant in all regression analyses, and ranged from $\beta = -.35$ to $\beta = -.47$. The two-way interaction between emotional/behavioral problems and school support was statistically significant ($\Delta R^2 = .01$, $\beta = -.12$, $p < .05$). In other cases, the two-way interactions were insignificant in the prediction of the peer rejection of children with ADHD. Hence, the fourth hypothesis that family and school social support compensate for the risk factors in children with ADHD was completely confirmed. However, the assumption that these protective factors mitigate the relationship between risk factors and peer rejection was partially confirmed only in relation to school support.

Table 2. Protective Factors and Risk Factors Predicting Peer Rejection.

Step	Variables entered	With ADHD ($n = 108$) ΔR^2	With ADHD ($n = 108$) β	Without ADHD ($n = 108$) ΔR^2	Without ADHD ($n = 108$) β	Step	Variables entered	With ADHD ($n = 108$) ΔR^2	With ADHD ($n = 108$) β	Without ADHD ($n = 108$) ΔR^2	Without ADHD ($n = 108$) β
1	EBD	.48***	.66***	.48***	.40***	1	EBD	.48***	.50***	.48***	.51***
2	PrB	.00	–.05	.07***	–.32***	2	EA	.13***	–.41***	.11***	–.33***
3	EBD × PrB	.00	–.03	.10***	–.33***	3	EBD × EA	.00	–.01	.08***	–.29***
1	AP	.36***	–.50***	.33***	–.39***	1	AP	.36***	–.37***	.33***	–.36***
2	PrB	.07***	–.27**	.13***	–.36***	2	EA	.20***	–.52***	.16***	–.40***
3	AP × PrB	.00	–.02	.12***	.36***	3	AP × EA	.01	.12	.06***	.26***
1	C-STR	.30***	.44***	.26***	.28***	1	C–STR	.30***	.30***	.26***	.35***
2	PrB	.05**	–.26**	.19***	–.44***	2	EA	.20**	–.53***	.22***	–.42***
3	C-STR × PrB	.00	–.07	.11***	–.33***	3	C–STR × EA	.01	–.10	.05***	–.25***
1	PR	.33***	.49***	.42***	.34***	1	PR	.33***	.37***	.42***	.45***
2	PsB	.06**	–.24**	.11***	–.35***	2	EA	.21***	–.50***	.14***	–.40***
3	PR × PrB	.00	–.04	.04**	–.25**	3	PR × EA	.00	–.01	.04***	–.21**
1	EBD	.48***	.61***	.48***	.54***	1	EBD	.48***	.57***	.48***	.81***
2	PW	.04**	–.22**	.07***	–.21**	2	DF	.09***	–.38*	.08***	–.32***
3	EBD × PW	.00	–.03	.03**	–.20**	3	EBD × DF	.00	–.09	.07***	–.35***
1	AP	.36***	–.47***	.33***	–.46***	1	AP	.36***	–.52***	.33***	–.99***
2	PW	.05**	–.24**	.13***	–.29***	2	DF	.17***	–.53***	.08***	–.24**
3	AP × PW	.01	.12	.06***	.26***	3	AP × DF	.03**	.22**	.14***	.66***
1	C-STR	.30***	.47***	.26***	.36***	1	C–STR	.30***	.43***	.26***	.69***
2	PW	.07**	–.29**	.18***	–.36***	2	DF	.20***	–.50***	.13***	–.37***
3	C-STR × PW	.01	–.02	.03*	–.20*	3	C–STR × DF	.00	–.08	.08***	–.42***
1	PR	.33***	.50***	.42***	.50***	1	PR	.33***	.41***	.42***	.77***
2	PW	.06**	–.25**	.09***	–.29***	2	DF	.15***	–.48***	.06**	–.27***
3	PR × PW	.00	–.02	.01**	–.12*	3	PR × DF	.00	–.07	.05**	–.33***

Note. EBD = emotional/behavioral difficulties; AP = academic performance; C-STR = conflict in the student-teacher relationship; PR = parental rejection; PrB = prosocial behavior; EA = extracurricular activity; PW = parental warmth; DF = dyadic friendship.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Social Support and Risk Factors Predicting Peer Rejection (children with ADHD).

Family social support				School social support			
Step	Variables entered	ΔR^2	β	Step	Variables entered	ΔR^2	β
1	EBD	.48***	.58***	1	EBD	.48***	.55***
2	FSS	.03***	–.22**	2	SchSS	.12***	–.35***
3	EBD × FSS	.00	–.00	3	EBD × SchSS	.01*	–.12**
1	AP	.36***	–.46***	1	AP	.36***	–.39***
2	FSS	.08***	–.31***	2	SchSS	.12***	–.43***
3	AP × FSS	.00	.05	3	AP × SchSS	.00	.08
1	C-STR	.30***	.44***	1	C–STR	.30***	.41***
2	FSS	.13***	–.37***	2	SchSS	.20***	–.47***
3	C-STR × FSS	.00	–.06	3	C–STR × SchSS	.00	–.02
1	PR	.33***	.40***	1	PR	.33***	.38***
2	FSS	.05**	–.23**	2	SchSS	.15***	–.46***
3	PR × FSS	.00	–.06	3	PR × SchSS	.00	–.06

Note. EBD = emotional/behavioral difficulties; AP = academic performance; C-STR = conflicted student-teacher relationship; PR = parental rejection; FSS = family social support; SchSS = school social support.
*$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

In line with the results of previous studies, children with ADHD are rejected more by their peers than did their typically developing classmates (Hoza et al., 2005), and their social impairment was accompanied by higher levels of emotional, behavioral and academic difficulties (Mikami & Hinshaw, 2006), more disturbed relationships with their parents and teachers (Kaiser et al., 2011; Zendarski et al., 2020). The results of this study provide an empirical support for the assertion that emotional and behavioral problems contribute to the rejection of children with ADHD by their peer (Becker, McBurnett et al., 2013; Hinshaw et al., 1997; Mikami & Hinshaw, 2003), and confirm that this risk factor has a similar effect on peer relationship of typically developing children (Mikami & Lorenzi, 2011). This factor, emotional and behavioral problems, has a stronger effect in predicting the peer rejection of children with ADHD and typically developing children than the other risk factors do. In this study, emotional-behavioral difficulties included inattention, hyperactivity, conduct problems, and emotional symptoms that increase the likelihood of peer rejection (Bierman, 2004).

The academic performance of children predicts the rejection of ADHD children by their peers (classmates), as well as the rejection of children without this disorder (Hughes & Zhang, 2007). Moreover, the effect of this factor on peer rejection is similar in both groups. The impact of the student-teacher relationship is comparable to that found in a previous study of a school sample (Hughes & Kwok, 2006). However, this risk factor is more important to the social status of children with ADHD than that of typically developing children. This difference is consistent with the fact that ADHD status accounts for 19% of the variance in student-teacher relationships (Rogers et al., 2015). It comes as a surprise that the effect of parental rejection on peer rejection is greater in that of the comparison group, a finding that contradicts the results of a previous study (Mikami et al., 2010). Thus, the individual factors have a similar effect on the peer relationships of children with ADHD and typically developing children, while the social factor, student-teacher relationship, is more important as a risk factor in explaining the peer rejection of children with ADHD only. Perhaps conflicts in the student-teacher relationship exacerbate the negative perception of the academic and social difficulties of children with ADHD by their classmates.

The findings regarding the compensatory effect of protective factors in children with ADHD are partially consistent with expectations. Prosocial behavior and extracurricular activity compensate for the family factor, parental rejection, as found in previous studies (Mrug et al., 2007; Ray et al., 2017). Our study outcomes support the fact that both factors compensate for low academic performance and conflicted student-teacher relationships in children with ADHD. However, only extracurricular activity compensates for the negative impact of emotional and behavioral problems, as in the previous study (Ray et al., 2017). It is conceivable that these results may be related to the fact that the prosocial behavior of children with ADHD can be intensive and inappropriate (Barkley, 2006). In addition, there is the persistence of the negative reputations of children with ADHD when peers interpret the ambiguous behavior of these children as hostile, unskilled and poor (Mikami & Normand, 2015). The family and social protective factors have a broader compensatory effect; parental warmth, family social support, school social support, and friendship, compensated for risk factors at all levels in children with ADHD.

Only two social factors, dyadic friendship and school social support, display a moderating effect on the peer rejection of children with ADHD. Dyadic friendship had mitigated the relationship between academic performance and peer rejection. School social support had mitigated the relationship between the children's emotional/behavioral difficulties and peer rejection. These findings highlight the fact that teacher-student interaction and student-student intercommunion are sources of information children use in forming their own assessments of the behavior and competence of their peers in the classroom (Hughes et al., 2014). In contrast to previous studies (Andrade & Tannock, 2014; Becker, Fite, et al., 2013; Cardoos & Hinshaw, 2011; Kawabata et al., 2012; Mikami et al., 2010), the moderating effects of selected factors in other cases were not confirmed. These findings may be explained by the fact that in previous studies the participants were non-clinically diagnosed ADHD children, and the research settings were out-of-school programs.

Conversely, the outcomes of the study regarding the effect of protective factors in typically developing children are completely consistent with expectations; all protective factors, individual (prosocial behavior and extracurricular activity), family (parental warmth), and social (dyadic friendship) compensated for and reduced the negative impact of all risk factors in the comparison group. Thus, the results of the study show that at school, most of the tested protective mechanisms only have a compensatory effect on children with ADHD, while these same factors have both a compensatory and moderating effect on typically developing children.

The strength of this study lies on the attempt to examine risk and protective factors that contributed to peer rejection at multiple levels (individual, family, and social). This can improve the understanding of peer rejection and the contributions of factors at each level. Another strength of this research is the inclusion of typically developing children as a comparison group (Fraser et al., 1999). A normative sample is also important for understanding the peer problems of children with ADHD (Murray-Close et al., 2010).

However, this study has some limitations. First, the sample was gender unbalanced; there was a predominance of boys (96%) among the children and females (91.6%) among the parents. There are gender differences in the impact of risk

factors on peer rejection (Mikami & Lorenzi, 2011), and distinctions between mothers' and fathers' perceptions of the parent-child relationship (Ma et al., 2017). Second, children with ADHD were not randomly selected due to the limited amount of children with clinically diagnosed disorder were recruited. However, the results of the study can be generalized to the child population of Almaty city because the participants were representative of the schools of all urban districts, and the research setting was a natural learning environment in class. Third, social support from school and family was not evaluated in the comparison group, because it was used as an additional factor. An evaluation of the moderating effect will be more complete when the comparison group includes typically developing children.

Implications and the Future Direction of Research

This cross-sectional study fills the knowledge gaps regarding the peer rejection suffered by children with ADHD in Kazakhstan. Children with ADHD have not been regarded as pupils with Special Education Needs (SEN) in Kazakhstan, and they may not be eligible for special education services. Moreover, there is no legislation that could define general education adaptations for children with ADHD. High peer rejection of children with ADHD combined with academic, emotional and behavioral difficulties highlight the need to strengthen supportive educational services for these children in Kazakhstan.

The results of the study shed light on the need for a shift away from an individual-focused approach to a contextually based approach in enhancing social functioning of children with ADHD (Mikami & Normand, 2015) when service programs are aimed not only at modifying the behavior of child with ADHD but also include service support for their teachers and parents. This study has expanded our knowledge of the protective processes of the peer functioning of children with ADHD, which in turn supports strengths-based social work practice supposing the identification of protective factors as well as risk factors (Ma et al., 2020).

Improvement in the quality of the student-teacher relationship may be significantly helpful in promoting the children's peer acceptance. It is consistent with the conceptual framework of classroom-based intervention, where teachers encourage peers to be inclusive toward children with ADHD (Mikami & Normand, 2015). The results have provided empirical evidence that supports the model of family–peer relationships (McDowell & Parke, 2009), and supports the idea that the promotion of parental acceptance may also enhance social functioning of children with ADHD. Our outcomes of the study highlight that the participation of children with ADHD in out-of-school activity may expand their social network and enhance their social functioning (Ray et al., 2017).

The findings show that among different factors at three levels (i.e., individual, family, and social), two social factors, namely, school social support and dyadic friendship, have an important interactional protective effect on the peer relationship of children with ADHD (Fraser et al., 1999). In fact, dyadic friendship and the supportive behavior of teachers are more visible to peers of children with ADHD than are the family factors, and prevention and intervention programs may benefit from the promotion of these protective factors. Thus, using a strengths perspective to understand and enhance the social functioning of children with ADHD may help to avoid having the negative influence of the diagnostic label and professional pessimism (Saleebey, 2013), promote a shift away from the deficit-oriented model existing in Kazakhstan's schools (Hernández-Torrano et al., 2021), and show that protective factors may provide the "key" for successful interventions (Fraser et al., 1999).

Future research may expand the understanding of the causes of peer rejection by assessing other social contextual risk factors such as the impact of group norms and reputation biases (Mikami & Normand, 2015) on the peer rejection of children with ADHD. Significant adults may be "support specialists" who are sources of a specific form of social support, and "support generalists" who provide overall support for children (Thompson, 2014). Therefore, examining the effects of different types of social support (e.g., informational, emotional, material, and affiliated) on the peer relationship of children with ADHD may have important implications for social work with these children. Given that there are differences in the intensity, diversity, preference, and the enjoyment of participating children with ADHD (Engel-Yeger & Ziv-On, 2011; Shimoni et al., 2010), the direction of future studies may be to investigate the effect of the influence of certain types and aspects of extracurricular activities on the rejection of these children.

Authors' Note

The present study was approved by the Local Ethics Committee of the al-Farabi Kazakh National University (No. IRB-A051).

Author Contributions

All authors contributed to the conception and design of the study. The characteristics of the participants, sampling procedure, and measures were defined by Aigul Mustafina and Sultankozha Amitov. Data collection was conducted by Aigul Mustafina. The statistical analysis was performed by Aigul Mustafina under the guidance of Joyce Lai-Chong Ma. Oversight and leadership research activity planning and execution were realized by Sultankozha Amitov. The first draft of the manuscript was written by Aigul Mustafina. The manuscript was then reviewed by Joyce Lai-Chong Ma. All authors read and approved the final manuscript.

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