Perceived Autonomy Support in Children with Autism Spectrum Disorder

Nicole M. Shea[1,2], Margaret A. Millea[1] and Joshua John Diehl[1*]

[1]Center for Children and Families, University of Notre Dame, 1602 N, Ironwood, South Bend, IN 46635, USA
[2]Department of Psychology, Syracuse University, 430 Huntington Hall, Syracuse, NY13244, USA

Abstract

Autonomy support has been found to be critical for typically developing children, but not as much is known about its importance for children with Autism Spectrum Disorder (ASD). The current study examined the relationship between autonomy support, self-determination, scholastic competence and social acceptance in ASD. Twenty-six participants with high-functioning ASD completed self-report measures related to autonomy support, friendship, and academics. We found that greater teacher autonomy support was related to higher self-determination in school, and in turn, higher scholastic competence. Self-determination in friendship did not function as a mediator between mother/father autonomy support and social acceptance, but self-determination in friendship was significantly related to social acceptance. This study highlights the importance of fostering self-determination in both the academic and social lives of individuals with ASD. Future studies should examine best practices for incorporating autonomy support into existing scholastic settings and interventions.

Keywords: Autism; Autonomy; Self-determination; Intrinsic motivation; Extrinsic motivation; School; Social skills; Academics; Friendship

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by deficits in communication and social interaction, and is often accompanied by repetitive behaviors or stereotyped interests [1,2]. Recent prevalence rates estimate that on average 1 in 88 children is diagnosed with an ASD [3]. Moreover, the number of teachers with the training and experience needed to work with individuals with ASD has not kept up with the dramatic increase in diagnoses [4]. The number of individuals with ASD who are in need of services is a challenge for both the school and health care systems. Therefore, there is a need to understand best practices for promoting success in academics and peer relationships.

Historically, intervention approaches for children with ASD have trended towards the use of extrinsic motivation to achieve gains [5]. Extrinsic motivation is characterized by gaining something that is outside the activity itself [6] and, furthermore, an extrinsically motivated person is regulated by external rewards, pressures, or constraints [7]. In contrast, intrinsic motivation is the natural tendency to seek out novelty and to use one's abilities to learn and explore [6]. Intrinsic motivation occurs when a person engages in an activity for the inherent achievement of the activity itself; thus, an intrinsically motivated person's actions are self-determined [6]. Thus, it is possible that interventions that use extrinsic motivation to achieve gains may inhibit intrinsic motivation, especially for academic tasks and social interaction.

One approach to promoting intrinsic motivation comes from Self-Determination Theory (SDT) [6,8]. SDT focuses on three innate psychological needs: competence, autonomy, and relatedness, which appear to be essential for supporting optimal functioning, facilitating the process of natural development, and promoting social well-being [6]. When these needs are met, they foster the development of intrinsic motivation. If fulfilled to some extent, these innate psychological needs produce enhanced self-motivation and well-being; in contrast, when suppressed there is diminished motivation and poorer well-being. Research guided by SDT focuses on social-contextual conditions that facilitate intrinsic motivation and self-determination. Different social contexts may lead to individual differences in motivation [6]. Research

that focuses on conditions that facilitate intrinsic motivation, such as autonomy, may contribute to the design of social and educational environments that optimize self-determination, performance, and well-being.

A person is self-determined when he or she is intrinsically motivated and able to act in an autonomous manner [6]. Autonomy is an integral part of many daily activities including decision making, achievement, problem solving, self-management, and self-awareness [9]. People experience autonomy when they perceive themselves as the initiator of their own actions, and when they are self-governing [6,8]. In contrast to autonomy, being controlled implies that individuals feel as if they have no choice but to engage in an activity. When controlled, individuals experience their actions as determined by outside pressures, rewards, or forces external to the self [10].

Past research has shown that fostering autonomy enhances intrinsic motivation [8]. Autonomy support is particularly important for both parents and teachers, they have the ability to facilitate or hinder the development of self-determination through autonomy support. A broad range of past research has investigated autonomy support provided by both parents and teachers, and from this research a profile of characteristics has emerged that describes parents and teachers who support autonomy. Autonomy-supportive parents encourage their children to solve their own problems, participate in taking their children's perspectives, rarely use pressures and controls, and provide choice when possible. In contrast, controlling parents solve children's problems for them and value obedience and conformity [11]. It is important to keep in mind that parents are able to provide autonomy support while still caring for their children, and children can develop

*Corresponding author: Joshua John Diehl, Center for Children and Families, University of Notre Dame, 1602 N, Ironwood, South Bend, IN 46635, USA, Tel: 574-631-5729; Fax: 574-631-8885; **E-mail:** joshua.diehl@nd.edu

a secure relationship with their parents without feeling controlled in their actions [10].

Autonomy-supportive teachers are active listeners, allow students time for independent work, offer support rather than giving students answers to problems, and avoid using directives [12]. They also praise mastery, avoid criticism, communicate in an empathetic manner, and engage in perspective-taking. Teachers create an autonomy-supportive environment by providing students with meaningful rationales concerning why a lesson or way of behaving is important and relevant to the child's well-being; this allows teachers to create relationships with children that exemplify flexibility and choice rather than control and pressure [12]. Autonomy-supportive teachers also make a point to acknowledge and accept negative feelings that may arise when students are asked to engage in difficult and challenging activities. When creating an autonomy-supportive environment, it is important to take into account that choice and responsibilities offered to a child must be at a level of optimal challenge [13].

There has been a wealth of research on the effects of parental autonomy support in typically developing children, as well as some research in children with learning disabilities. Parental autonomy support has been found to be positively associated with grade point average, scholastic competence [10], social and academic adjustment at school [14], and higher perceived competence [15]. In addition, children of autonomy-supportive parents are more intrinsically motivated [16]. Research has also found that parental autonomy support has been positively associated with self-determination in friendship and school [10]. Moreover, self-determination in friendship has been found to be positively correlated with social acceptance [10]. Similarly, teacher autonomy support has been positively associated with school engagement [17], school adjustment, and higher grades [18]. Teacher support of autonomy has been positively associated with self-determination in school, and self-determination in school has been found to be predicting better school grades and academic competence [10].

Although education and therapy services for children with developmental and learning disabilities have improved greatly, there is still a belief today that individuals with disabilities are unable to independently make appropriate life decisions [9]. Despite this belief, research has also shown that autonomy support has benefits for children with learning disabilities. Perceptions of autonomy in the home and classroom environments for elementary and junior high school students with learning disabilities were related to math and reading achievement, as well as adjustment. This research also found autonomy to be a central factor for students who were unable to build or maintain satisfactory relationships with peers or teachers; autonomy was more predictive of their outcomes in comparison to competence [5].

Children with ASD often have difficulty building and maintaining social relationships, and there is reason to believe that autonomy may be an important factor for children with ASD, though no current research has been conducted to support this idea. Therapies that use extrinsic motivation to achieve gains may be at odds with the development of autonomy because they often rely on controlling behavior through external rewards, pressures, or constraints [9], which in turn may be fostering dependency on others rather than fostering autonomy and self-determination. A concrete understanding of the role that autonomy plays in the academic and social domains of life for individuals with ASD will help determine how parents and teachers can better provide autonomy support and promote self-determination in this unique group of individuals.

Purpose of this Study

The goal of the present study is to investigate the role that autonomy plays in academic and social functioning for children with ASD. Specifically, this research will examine relationships between perceived autonomy support, self-determination, and specific domain outcomes in individuals with ASD. Based on previous research on autonomy support in typically developing children and children with learning disabilities, we predict that self-determination in school will act as a mediator between teacher autonomy support and scholastic competence for children with ASD, and that self-determination in friendship will act as a mediator between mother/father autonomy support and social acceptance.

Method

Participants

Participants were 26 adolescents with ASD between the ages of nine and 15 (Mean=12.37, SD=1.90). Participants were recruited from the community, with appropriate permission, through local parent groups, local ASD service agencies, doctors' offices, and local schools. We also used our laboratory database, which consists of families who have voluntarily provided their contact information, or who have previously participated in research at the lab and have indicated an interest in being contacted for future studies. The gender ratio for this study (22 males, four females) is generally reflective of the demographic of the general population of individuals with ASD, the current gender ratio of males to females ranges from 4:1 [19] to 8:1 [20]. Ninety-two percent of participants identified themselves as Caucasian and eight percent identified themselves as mixed race. The average IQ of this sample was 107.73 (SD=19.10, Range=78-142) as measured by the Wechsler Abbreviated Scale of Intelligence (WASI) [21].

Participants in this study were required to meet criteria for an ASD: Autistic Disorder, Asperger Disorder, or Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) as outlined in the DSM-IV-TR [1]. All participants had completed a phone screen prior to the study, during which they indicated that they had previously received one of these diagnoses from a community professional. Diagnoses were independently confirmed by a combined evaluation using the Autism Diagnostic Observation Schedule [22], parent report using the Social Communication Questionnaire-Lifetime (SCQ-L) [23], and clinical judgment by a clinical psychologist with expertise in the diagnosis of ASD. This approach is considered a gold standard for confirming diagnoses of ASD in research [24]. Participants were also required to have an IQ score above a 75 and be above 9 years of age; these exclusion criteria were put into place to ensure that participants would be able to understand the self-report measures used in this study. Given this cutoff, most of our sample would be characterized as having "high-functioning" ASD, although there are no set definitions or standard for what is considered high-functioning [25]. Originally a total of 30 participants participated in the study, but three participants did not meet ASD criteria, and one did not meet the IQ cut off.

Materials

Learning climate questionnaire (LCQ)

The LCQ [26] was used to assess children's perceptions of their teacher's autonomy support. The LCQ is a 15 item questionnaire, participants rate each response on a 7-point Likert scale from strongly disagree to strongly agree. An example of an item on this questionnaire is "My teacher tries to understand how I see things

before suggesting a new way to do things" [26]. Concurrent validity for this scale was established by comparing the scale to the General Causality Orientations Scale (GCOS). Children's autonomy orientation was positively correlated with perceptions of their teachers autonomy support r=0.24, p<0.05 [26]. The Cronbach's alpha for the LCQ was 0.93 in our sample.

Academic self-regulation questionnaire (SRQ-A)

The SRQ-A was used to assess self-determination in school. The SRQ-A is a 32-item questionnaire, completed by the child that concerns reasons why children do their schoolwork. There are four questions, each followed by eight responses; participants rated each response on a 4-point Likert-type scale from "not true at all to "very true". The intrinsic motivation subscale was used as an indicator of self-determination. Ryan and Connel [27] reported extensive evidence for the construct validity of the SRQ-A, it has been shown to correlate positively with scales of intrinsic versus extrinsic motivation and autonomy, which provides evidence that this scale adequately assesses self-determination in school. Cronbach's alpha for the intrinsic motivation subscale in our sample was .81.

Perceptions of parents scale, the child scale (POPS)

The POPS assesses children's perceptions of the degree to which their parents are autonomy supportive. This questionnaire has six items on mother's autonomy support (POPS-M) and six items on father's autonomy support (POPS-F). On each item participants choose one of four descriptions that best described their parents. An example of a possible choice from one question on the scale is, "Some mothers always like their children to decide for themselves what to do". Concurrent validity for this scale was established by comparing the scale to interviews' ratings of parental autonomy support; children's perceptions of their parents' autonomy support was significantly related to interviewer ratings of parental autonomy support r=0.36, p<0.005 [15]. For our study, Cronbach's alpha was 0.33 for mothers (POPS-M) and 0.52 for fathers (POPS-F). These numbers indicate poor internal consistency of this scale in our sample of children with ASD; alphas for this scale in a typically developing population have been reported at 0.76 for the POPS-M and 0.75 for the POPS-F [10].

Friendship self-regulation questionnaire (SRQ-F)

The SRQ-F concerns the reasons why a person is in a particular friendship, and the degree to which a person feels self-determined and autonomous with respect to friendship. The questionnaire has four overall questions followed by multiple responses that represent the same four regulatory styles as in the SRQ-A. Each response is rated on a 4-point Likert scale from "not true at all" to "very true". The intrinsic motivation subscale was used as an indicator of self-determination in friendship. The Cronbach's alpha for this scale was 0.87 in our sample.

Self-perceptions profile for children (SPPC)

Two subscales from the SPCC, the scholastic competence (SPPC-SC) and social acceptance (SPPC-SA) subscales were used. The SPCC scale is for children between the ages of eight and 15 years. Each item on the SPPC consists of two contrasting descriptions, for example "Some children often forget what they have learned" and "Other children are able to remember things easily". After reading the two statements children chose what statement best described them and then indicated whether the description was "somewhat true" for them or "very true" for them [28]. Convergent validity was established for the SPPC with Harter's Teacher Rating Scale of Child's Actual Behavior

(TRS), Pearson Correlations for the SPPC-SC and the SPPC-SA scales were both significant at 0.53 and 0.31, p<0.001 [29]. Cronbach's alpha for the internal consistency in our sample for the subscales was 0.77 for the SPPC-SC subscale and 0.81 for the SPPC-SA subscale.
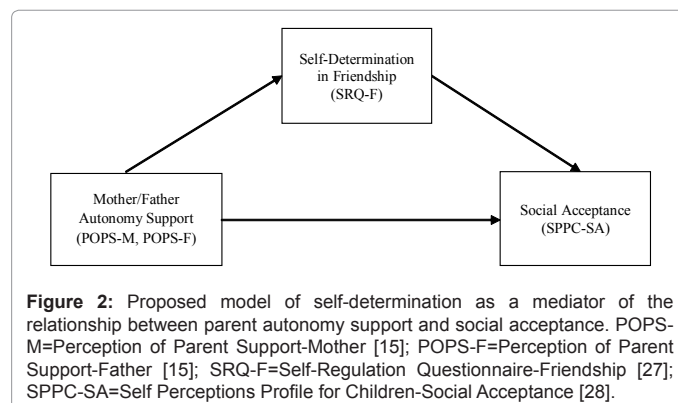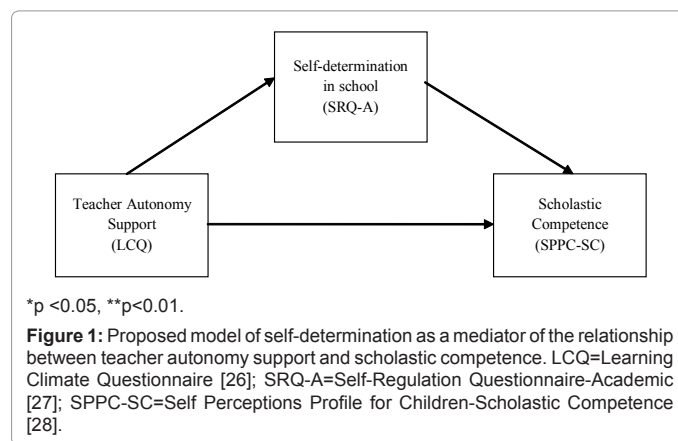
Procedure

This study took place at an off-campus university center devoted to community-based research on children and families. After obtaining consent and assent, each participant with ASD was administered the ADOS and then administered the WASI. Following these examinations, participants filled out the seven brief self-report questionnaires: LCQ, POPS-M, POPS-F, SRQ-A, SRQ-F, SPPC-SC, and SPCC-SA. During this time, parents were in a separate, adjacent room filling out the SCQ-L. Assistance was available for both participants and primary care givers if they had any questions or concerns with the questionnaires. Completion of the study took two to three hours, including time for breaks.

Results

Two separate mediation models were used in order to test our hypotheses: (a) self-determination in school will function as a mediator between teacher autonomy support and scholastic competence (hypothesis 1, Figure 1); and (b) self-determination in friendship will function as a mediator between mother/father autonomy support and social acceptance (hypothesis 2, Figure 2). Correlations between measures for each hypothesis are presented in tables 1 and 2, respectively.

For hypothesis 1, we implemented the nonparametric, bias-corrected bootstrap method [30-32] to test the association between teacher autonomy support (LCQ) and scholastic competence (SPPC-

*p <0.05, **p<0.01.

Figure 1: Proposed model of self-determination as a mediator of the relationship between teacher autonomy support and scholastic competence. LCQ=Learning Climate Questionnaire [26]; SRQ-A=Self-Regulation Questionnaire-Academic [27]; SPPC-SC=Self Perceptions Profile for Children-Scholastic Competence [28].

Figure 2: Proposed model of self-determination as a mediator of the relationship between parent autonomy support and social acceptance. POPS-M=Perception of Parent Support-Mother [15]; POPS-F=Perception of Parent Support-Father [15]; SRQ-F=Self-Regulation Questionnaire-Friendship [27]; SPPC-SA=Self Perceptions Profile for Children-Social Acceptance [28].

Measure	1	2	3
LCQ	-		
SRQ-A	0.453*	-	
SPPC-SC	0.331*	0.497**	-

Note. LCQ=Learning Climate Questionnaire [26]; SRQ-A=Self-Regulation Questionnaire-Academic [26]; SPPC-SC=Self Perceptions Profile for Children-Scholastic Competence [28].

*p<0.05, **p<0.01

Table 1: Correlations between self-report measures: LCQ, SRQ-A, and SPPC-SC.

Measure	1	2	3	4
POPS-M	-			
POPS-F	0.728**	-		
SRQ-F	-0.122	0.061	-	
SPPC-SC	-0.57	0.004	0.565**	-

Note. POPS-M=Perception of Parent Support-Mother [15]; POPS-F=Perception of Parent Support-Father [15]; SRQ-F=Self-Regulation Questionnaire-Friendship [27]; SPPC-SA=Self Perceptions Profile for Children-Social Acceptance [28].

**p<0.01.

Table 2: Correlations between self-report measures: POPS-M, POPS-F, SRQ-F and SPPC-SC.

SC), and whether self-determination in school (SRQ-A) mediated this association. The bootstrap resampling was run in SPSS using Preacher and Hayes [33] mediation code. Teacher autonomy support was related to self-determination in school, $\beta=0.02$, $p<0.05$, which was, in turn, related to scholastic competence, $\beta=2.14$, $p<0.05$. The direct effect was not significant ($\beta=0.07$, $p=0.12$); however, using a 95% confidence interval with 1000 resample of the data, it was found that the bias corrected and accelerated confidence interval obtained from testing the indirect pathways did not include zero, CI=0.006 to 0.118, indicating, as hypothesized, that the indirect pathway from teacher autonomy support to scholastic competence via self determination was significant.

For hypothesis 2, the bootstrap resampling method was used to test the association between parental autonomy support (POPS-M, POPS-F) and social acceptance (SPPC-SA), and whether self-determination in friendship (SRQ-F) mediated these relationships. Contrary to our predictions, neither maternal autonomy support ($\beta=-0.04$, $p=0.55$) nor paternal autonomy support ($\beta=0.008$, $p=0.94$) were related to self-determination in friendship. Moreover, we did not find a relationship in the two proposed direct pathways between maternal ($\beta=0.03$, $p=0.90$) and paternal ($\beta=0.12$, $p=0.67$) autonomy support and social acceptance. We did, however, find a relationship between self-determination in friendship and scholastic competence, ($\beta=1.58$, $p<0.01$). Using a 95% confidence interval with 1000 resamples of the data, it was found that the bias corrected and accelerated confidence interval obtained from testing the indirect pathways between parental autonomy support and social acceptance included zero (CI=-0.400 to 0.163 for maternal autonomy support, CI=-0.305 to 0.330 for paternal autonomy support), therefore the indirect pathways were not significant. These results suggest that hypothesis 2 was not supported; self-determination in friendship did not function as a mediator between mother/father autonomy support and social acceptance. Nonetheless, self-determination in friendship was significantly related to social acceptance for participants with ASD.

It should be noted that self-determination in friendship (SRQ-F) and self-determination in school (SRQ-A) were not significantly correlated, $r=0.17$, $p=0.40$. Additionally, while self-determination in friendship (SRQ-F) was strongly correlated with reports of social acceptance (SPPC-SA), $r=0.55$, $p<0.01$, self-determination in school (SRQ-A) was not correlated with social acceptance, $r=0.05$, $p=0.81$.

Moreover, these correlations were significantly different, Fisher's z=1.93, p=0.05, a finding which highlights the unique and independent importance of self-determination in friendship for social acceptance. We also found that self-determination in school (SRQ-A) was significantly correlated with scholastic competence (SPPC-SC), r=0.46, p<0.05, but self-determination in friendship was not, r=0.27, p=0.18, although these correlations were not significantly different, Fisher's z=0.74, p=0.74. It is important to note that social skills have been found to be very important for academic performance in ASD, perhaps even more important than IQ [34], which might partially explain the lack of significant difference between the SRQ-A and the SRQ-F in the domain of scholastic competence.

Discussion

There is extant research on using autonomy support to promote self-determination in multiple contexts for typically developing children ([35] for a review), and some research involving children with learning disabilities [5], but there is limited research on the impact of autonomy support and self-determination on children with ASD. This study examined the relationship between perceived autonomy support, self-determination, and academic and social outcomes in high-functioning individuals with ASD. We found that self-determination is an important factor for both social acceptance and scholastic competence, and that teacher autonomy support increased self-determination in school, which in turn increased scholastic competence in this population.

The results of this study supported the hypothesis of an indirect effect of self-determination on the relationship between teacher autonomy support and scholastic competence. This relationship has been found before in typically developing children [10]; this is the first study to establish this relationship in children with ASD. Our findings suggest that, for children with ASD, autonomy support might have similar benefits in school settings as those found in their typically developing peers. Children with ASD who rated their teachers higher in autonomy support reported greater self-determination in school, which in turn was related to higher scholastic competence. Autonomy-supportive teachers promote independence, provide support for the learning process, praise mastery, and avoid controlling directives [12]. Therapy approaches that rely on controlling behavior through external rewards, pressures, or constraints are useful for building basic skills that make autonomy possible for children with ASD, but our results suggest that autonomy support, when possible, has the potential to improve school performance for high-functioning children with ASD who have attained these basic skills.

The results of this study did not support our second hypothesis; self-determination in friendship did not function as a mediator between mother/father autonomy support and social acceptance. This study was the first to use the mother/father autonomy support (POPS-M & POPS-F) measures in children with ASD; the Cronbach's alphas for this measure (0.33 and 0.52, respectively) indicate that it may not be reliable in children with ASD. It is possible that this measure is not appropriate for use with this population. For example, parents of children with ASD often play multiple roles in the lives of their children; they may not only be a parent but a therapist or an advocate. The multiple roles that parents may play in the lives of children with ASD may distort their child's perceptions of their autonomy support in relation to parenting, which may contribute to why the measures had such low internal consistency. The POPS-M and POPS-F scales had low internal consistency, but it may also be the case that there is no relationship between mother/father autonomy support and self-determination in friendship.

Although self-determination in friendship was not found as a mediator between mother/father autonomy support and social acceptance, feelings of self-determination in friendship were positively correlated with feelings of social acceptance. Self-determination in friendship involves an intrinsic interest (enjoyment) in being friends. In the context of the SDT model, it would be important to provide individuals with ASD opportunities to participate in activities of interest to them, which would in turn provide them with natural opportunities to meet people with shared interests. For example, it would follow that a child with a special interest in robots would have more opportunities for self-determination in friendship in an afterschool science program even if the parents would prefer that the child participate in a sport. Of course, there are many factors that affect opportunities for social interactions (e.g., availability of programs, comorbid symptoms for the child with ASD), but we believe that the situations most likely to promote self-determination will be the ones most likely to facilitate social development.

Clinical Implications

There are many clinical implications from the findings of this study that could contribute to existing therapies and provide teachers with tools to help their students with ASD become more self-determined. The number of children with ASD who are in need of services is a challenge for school systems, and educational programs are not adequately funded [36]. Teaching teachers to better support autonomy in their students with ASD would be relatively inexpensive and has been shown to increase self-determination in typically developing children. For example, past research has found that teachers who participated in independent study and informational sessions on how to support student's autonomy were able to teach and motivate their students in more autonomy supportive ways [37]. Teaching teachers skills to support autonomy in their students would not only help to develop their self-determination, something that is greatly needed in children with ASD [9], but in addition it would have the potential to increase their scholastic competence.

The findings from this study provided initial evidence that autonomy support is beneficial for children with ASD. Future research should explore ways to make existing therapy approaches more autonomy supportive or new therapies that emphasize autonomy support and the development of self-determination. For example in Pivotal Response Training (e.g., [38,39]) sessions are conducted in natural environment and with natural reinforcement, based on a child's own intrinsic interests or desires.

Another implication from the findings in this study is that self-determination in friendship was uniquely related to social acceptance, and self-determination in school was uniquely related to scholastic competence. Self-determination in school was not related to social acceptance and self-determination in friendship was not significantly related to scholastic competence. These findings support that self-determination in different domains of life is uniquely related to an individual's functioning in that domain. This means that interventions could target increasing self-determination in areas of life where children with ASD have difficulty, and increasing self-determination could lead to improvement in those areas. This study showed that self-determination in friendship was significantly related to social acceptance; an intervention could target increasing self-determination in friendship, which would then have the potential to lead to better social acceptance. Although this study did not find a relationship between self-determination in friendship and academic competence,

previous studies have noted the effect that improved social skills have on academic performance for individuals with ASD [34], therefore, these potential downstream effects warrant further study.

Limitations and Future Directions

It will be important for future studies to replicate these findings in a larger, more diverse population of individuals with ASD. A sample size of 26 participants, although a modest sample size for a study involving children with ASD, is not ideal. Because child self-report measures were used, this study only included children with ASD who had IQ scores above 75. This subset of "high-functioning" individuals with ASD constitutes a majority of individuals with the diagnosis, and a much higher proportion than previously thought [3,40]. Still, approximately thirty eight percent of children with ASD have IQ scores below 70 [3], which mean that this research cannot be generalized to children with ASD who have lower IQ scores. It will be important to examine the role of fostering intrinsic motivation in this population, as well. Future studies could use observer, parent, or teacher ratings of these constructs in children with ASD who are unable to fill out self-report questionnaires.

It will be important to find a measure of perceived parental autonomy support that would be reliable in children with ASD in order to determine if mother/father autonomy support is related to self-determination in friendship and social acceptance, or if this relationship does not exist. Understanding this relationship is particularly important for children with ASD because they often struggle with friendships [41]. A better understanding of this relationship would give researchers the ability to incorporate these findings into social skills interventions. Another way to provide support for the model that SDT has created would be to further investigate self-determination in school. In typically developing children, self-determination in school has been associated with better learning strategies and higher school grades [10]. The present research found a significant relationship between self-determination in school and perceived scholastic competence; future studies should investigate this general relationship in greater detail.

We must also note that we cannot infer causation from these findings. Although our results were consistent with our predicted indirect pathway, we cannot be sure that high scholastic competence did not lead to more self-determination in school or greater teacher autonomy support. Previous research on autonomy and self-determination in other populations with and without impairments in social and academic settings, however, offers a compelling argument for the importance of these constructs on social and academic performance.

Conclusions

In sum, this study found important relationships between self-determination and social and academic functioning in individuals with ASD. Moreover, the findings highlight the importance of teacher autonomy support in facilitating self-determination in school, which in turn improved academic competence in this population. It will be important for future studies to investigate the unique contributions that an SDT model [6] can make to improving outcomes for children with ASD in multiple contexts.

References

1. American Psychiatric Association (2000) Diagnostic and statistical manual of mental disorders. (4thedn), American Psychiatric Pub, Washington DC.

2. http://www.dsm5.org

3. Centers for Disease Control (2012) Prevalence of autism spectrum disorders-Autism and developmental disabilities monitoring network, 14 sites, United States, 2008. Surveillance Summaries MMWR 61: 1-19.

4. Hollander E, Kolevson A, Coyle JT (2010) Textbook of Autism Spectrum Disorders. American Psychiatric Publishing.

5. Deci E, Hodges R, Pierson L, Tomassone J (1992) Autonomy and competence as motivational factors in students with learning disabilities and emotional handicaps. J Learn Disabil 25: 457-471.

6. Ryan RM, Deci EL (2000) Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol 55: 68-78.

7. Brophy J (2008) Developing students' appreciation for what is taught in school. Educational Psychologist 43: 132-141.

8. Deci EL, Ryan RM (1985) Intrinsic motivation and self-determination in human behavior. Springer, New York.

9. Clark E, Olympia DE, Jenson J, Heathfield LT, Jenson WR (2004) Striving for autonomy in a contingency-governed world: Another challenge for individuals with developmental disabilities. Psychology in the Schools 41: 143-153.

10. Soenens B, Vansteenkiste M (2005) Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support. Journal of Youth and Adolescence 34: 589-604.

11. Grolnick W, Ryan R (1989) Parent styles associated with children's self-regulation and competence in school. J of Educ Psychol 81: 143-154.

12. Deci EL, Ryan RM (2004) Handbook of self-determination research. University of Rochester Press, Rochester, NY.

13. Deci EL (2004) Promoting intrinsic motivation and self-determination in people with mental retardation. Int Rev Res Ment Retard 28: 1-29.

14. Joussemet M, Landry R, Koestner R (2008) A self-determination theory perspective on parenting. Can Psychol 49: 194-200.

15. Grolnick WS, Ryan RM, Deci EL (1991) Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. J Educ Psychol 83: 508-517.

16. Grusec JE, Kuczynski L (1997) Parenting and children's internalization of values: A handbook of contemporary theory. Wiley, New York.

17. Assor A, Kaplan H, Roth G (2002) Choice is good, but relevance is excellent: autonomy-enhancing and suppressing teacher behaviors predicting students' engagement in schoolwork. Br J Educ Psychol 72: 261-278.

18. Ryan RM, Stiller JD, Lynch JH (1994) Representations of relationships to teachers, parents and friends and predictors of academic motivation and self-esteem. J Early Adolesc 14: 226-249.

19. Kogan MD, Blumberg SJ, Schieve LA, Boyle CA, Perrin JM, et al. (2009) Prevalence of parent-reported diagnosis of autism spectrum disorder among children in the US, 2007. Pediatrics 124: 1395-1403.

20. Volkmar FR, Szatmari P, Sparrow SS (1993) Sex differences in pervasive developmental disorders. J Autism Dev Disord 23: 579-591.

21. Wechsler D (1999) Wechsler Abbreviated Scale of Intelligence. San Antonio, TX: Pearson.

22. Gotham K, Risi S, Pickles A, Lord C (2007) The autism diagnostic observation schedule: Revised algorithms for improved diagnostic validity. J Autism Dev Disord 37: 613-637.

23. Rutter M, Bailey A, Lord C, Berument SK (2003) Social Communication Questionnaire. Western Psychological Services, Los Angeles.

24. Volkmar F, Chawarska K, Klin A (2005) Autism in Infancy and early childhood. Annu Rev Psychol 56: 315-336.

25. Volkmar R (2013) Encyclopedia of autism spectrum disorders. Springer Publishing, New York.

26. Williams GC, Deci EL (1996) Internalization of biopsychosocial values by medical students: A test of self-determination theory. J Pers Soc Psychol 70: 767-779.

27. Ryan RM, Connell JP (1989) Perceived locus of causality and internalization: Examining reasons for acting in two domains. J Pers Soc Psychol 5: 749-761.

28. Harter S (1985) Manual for the Self-Perception Profile for Children. University of Denver, Denver, CO.

29. Van Den Bergh B, Marcoen A (1999) Harter's self-perceptions profile for children: Factor structure, reliability, and convergent validity in a Dutch-speaking Belgian sample of fourth, fifth and sixth graders. Psychol Belg 39: 29-47.

30. Fritz MS, MacKinnon DP (2007) Required sample size to detect the mediated effect. Psychol Sci 18: 233-239.

31. MacKinnon D, Lockwood CM, Hoffman JM, West SG, Sheets V (2002) A comparison of methods to test mediation and other intervening variable effects. Psychol Methods 7: 83-104.

32. MacKinnon DP, Lockwood CM, Williams J (2004) Confidence limits for the indirect effect: Distribution of the product and resampling methods. Multivar Behav Res 39: 99-128.

33. Preacher K, Hayes AF (2004) SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav Res Methods Instrum Comput 36: 717-731.

34. Estes A, Rivera V, Bryan M, Cali P, Dawson G (2011) Discrepancies between academic achievement and intellectual ability in higher-functioning school-aged children with autism spectrum disorder. J Autism Dev Disord 41: 1044-1052.

35. Wentzel KR, Wigfield A (2009) Handbook on motivation at school. Routledge, New York.

36. Lord C, Bishop SL (2010) Autism spectrum disorders: diagnosis, prevalence, and services for children and families. Soc Policy Rep.

37. Reeve J, Bolt E, Cai Y (1999) Autonomy-supportive teachers: How they teach and motivate students. J Educ Psychol 91: 537-548.

38. Koegel RL (1989) How to teach pivotal behaviors to children with autism: A training manual. University of California Santa Barbara, CA.

39. Koegel RL, Frea WD (1993) Treatment of social behavior in autism through the modification of pivotal social skills. J Appl Behav Anal 26: 369-377.

40. Rice M, Warren SF (2004) Developmental language disorders: From Phenotypes to Etiologies. Psychology Press.

41. Schopler E, Yirmiya N, Shulman C, Marcus LM (2001) The research basis for autism intervention. Springer, New York.