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Comparing the Effects of Online and In-Person Social Skills Training for Adolescents With Autism Using PEERS®

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A thesis submitted to the faculty of
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in partial fulfillment of the requirements for the degree of

Educational Specialist

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ABSTRACT

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Autism Spectrum Disorder (autism) is a neurodevelopmental disorder characterized by social skills differences which can interfere with success in developing or maintaining relationships. Social skills training may promote more satisfying change in social interactions for individuals with autism, especially if they already have age-appropriate cognitive and language abilities. Social skills training is a typical approach for addressing social skills needs for many individuals with autism. In some instances, in-person social skills training or groups may not be readily available because of geographical, transportation, or other barriers. Delivering social skills training online is one way to increase access to intervention for individuals without feasible access to in-person social skills groups. However, very little is known about the untapped potential for interactive online social skills groups to provide similar benefits to in-person groups. We conducted a study delivering the same curriculum (UCLA PEERS®) in two modalities -- in person (per the manual) and online (same curriculum, delivered in a live interactive online teleconference environment). Pre- and post-intervention parent report measures were used to assess autism symptoms and social skills were compared across groups.
An analysis of variance (ANOVA) was used to identify any significant differences between the two groups. Under analysis, the interaction term indicated no significant differential change over time according to group membership (time by group). This indicates that there were no statistically significant differences between online and in-person groups with the single exception of one subtest score, the detrimental behavior subscale. There were many main effects for time in both groups which indicates positive social improvements over time occurred in both in-person and online groups, primarily with similar trajectories. Our objective is to provide evidence that the outcomes of both modalities were not significantly different. The results indicate that this is generally the case according to our study. It is interesting to note that while students were satisfied with the social validity of either delivery modality, parents were generally more satisfied with the online delivery of social skills.

Keywords: online, autism, social skills, PEERS®, telehealth

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DESCRIPTION OF THESIS STRUCTURE AND CONTENT

This thesis, *Comparing the Effects of Online and In-Person Social Skills Training for Adolescents With Autism Using PEERS®,* is written in a hybrid format. This format adheres to the traditional requirements for a thesis and is formatted in preparation for a journal publication.

The opening pages of this thesis fulfill the requirements for submission to Brigham Young University. This report will be presented as a journal article and meets the style and length requirements of standard research reports.

The literature review section may be found under Appendix A. Appendix B contains the Institutional Review Board Letter of Approval to Conduct Research. Consent forms, measures, and other related materials are located in the subsequent appendices.

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that 1 out of every 44 children aged 8 years is diagnosed with autism spectrum disorder (Maenner et al., 2021). Current rates of autism are significantly higher than the previous rates of 1 in 68 during the 2010-2012 period, and higher still than the rates during 2000-2002 period of 1 in 150 children (Baio et al., 2018) when autism prevalence rates using the current methods was first calculated. The Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) states that autism is a neurodevelopmental disorder which leads to differences in an individual's ability to communicate and interact across social settings and contexts (American Psychiatric Association [APA], 2013). Because rates of autism are increasing over time (Maenner et al., 2020; Maenner et al., 2021), and this expanding population will require effective interventions in order to support their social skills needs. In this document, both person-first (e.g., individuals with autism) and identity-first language (e.g., autistic individuals) will be used to acknowledge and respect the preferences of different groups and individuals in the autism community.

Autism sometimes manifests with socially isolating behaviors which may be related to differences in social communicative and recognition skills. These differing levels of social skills and social cognition may interfere with the ability of an autistic individual to respond and engage in regular conversation, resulting in a social barrier that might impede the formation of meaningful social relationships (Bellini et al., 2009). Difficulties recognizing and responding to nonverbal communication in expected neurotypical styles (i.e., gestures, body language, eye contact, facial expressions) as well as having restricted interests and reluctance to adjust behavior in accordance with a change in their social environment are additional factors which can interfere with social functioning for individuals with autism (APA, 2013). Difficulties matching expected

social norms may affect skills related to essential aspects of employment, relationships, and independent adult living. Thus, it is important to address the primary differences that autism presents by employing effective intervention strategies which assist these individuals in obtaining the social skills necessary for success (Goin-Kochel et al., 2007). As such, it is essential to address the needs of this growing population by identifying and utilizing effective intervention strategies, one of which is social skills training.

The development of effective social skills training programs to address the social differences affecting individuals with autism is paramount. A study by Laugeson et al. (2012) indicates that autistic individuals who had participated in social skills programs were successful in reducing their anxiety-related traits and were also able to increase their social awareness and social interactions. According to the findings of the study, participants experienced gains in their social skills, social responsiveness, and had an increase in their overall social skills knowledge; these gains were maintained at follow up (Laugeson et al., 2012). Moreover, the National Standards Project has stated that social skills package interventions are an effective form of group or individual instruction capable of ameliorating limited communication and interpersonal skills. These social skills packages can be modified to the needs of the individual with the express goal of providing individuals with the necessary skills to effectively engage in multiple social settings, e.g., home, school, or in public (May Institute, 2015). Additional research suggests that increasing the dosage of social skills interventions may also lead to increases in the overall effectiveness of this type of intervention (Bellini et al., 2009).

In the past, many schools and clinics have been limited in their ability to provide access to groups that meet (at a minimum of) once a week (Bellini et al., 2009). Research shows that this form of intervention on a regular basis (once a week) is effective in addressing the social

needs of individuals with autism, however limited accessibility to social skills interventions may lead to poorer outcomes (Bellini et al., 2009). At present, few locations in Utah (even in urban areas) provide social skills training services on a weekly basis. An Internet search using the search terms “social skills,” “Utah,” and “autism” yielded fewer than 5 locations which included: a private university, an early intervention and autism service provider agency (in the same county as the private university), the largest public university in the state, and a local autism service provider in that same county, all of which are in major metropolitan areas. It is possible that there are other groups in the state, but they are not easily discoverable by a general Internet search. These locations and the services they provide may also not be accessible to families throughout the state, as they are all located within 50 miles of each other in the main population center for Utah (which is primarily within the distance between the large public university and the large private university). This furthers the importance of increasing the availability of this intervention, as many outside of the major metropolitan areas are currently faced with possibly subpar access to even rudimentary levels of social skills interventions.

One primary challenge in delivering effective interventions for autistic individuals is the fact that these autism interventions may not be widely available in geographically distant areas--rural communities, disadvantaged areas, etc. (Azano & Tackett, 2017). For instance, autism services for rural parts of Canada are highly limited due to the vast geographic distances between the care provider (service centers, clinics, hospitals, etc.) and the client, making in-person visits for interventions and other services difficult (Young et al., 2019). However, in some cases, the judicious use of the Internet has allowed clients to connect themselves virtually to the relevant services they need in order to overcome these obstacles (Young et al., 2019). Other rural communities in Australia have also utilized a remote or online version of parent intervention

training for children with autism in order to overcome the geographic boundaries between them and their service providers (Wilkes & Lincoln, 2018). Hence, an efficacious social skills intervention that can be delivered online may be an effective means in ameliorating this current challenge in parts of the United States with similar geographic or other barriers to access. As a result of COVID-19 and the burgeoning transition of mental health practices to a telehealth environment, additional research is required in order to identify if we may fully adopt telehealth for social skills groups as an evidence-based option (AlRasheed et al., 2022).

Statement of the Problem

This research attempts to address the problem of limited accessibility to social skills interventions faced by many individuals with autism who live in rural, remote, or other areas lacking these services. The goal of wider accessibility via online services seeks to overcome this limitation and provide intervention for individuals in need of it, who currently may not have ready access to it. Access may not be the only issue, however. In order for online services to be considered to be good alternatives to in-person alternatives, we need to know how the online delivery compares with in-person delivery in terms of effectiveness. As a result, this study investigated effectiveness of in-person social skills groups compared to an alternative online delivery method as a means to address this growing concern.

Statement of the Purpose

The purpose of this study was to examine the effects of an online delivery method for social skills interventions/social skills training in direct comparison to the in-person method of intervention delivery. The intervention used was a treatment-as-usual intervention with considerable evidence of effectiveness when delivered in person. To our knowledge, it has not yet been implemented or researched in an online format, compared with in-person delivery.

Research Questions

This study will address the following research questions or research hypotheses:

1. Are there any differences in parent-reported measures of social skills over time over the duration of the intervention (approximately 14 weeks)?
2. Are parent report measures of social behaviors following participation in an online group similar to those seen in on-site or in-person groups?
3. What are parent and participant perspectives on the social validity of this intervention, and will participants (and parents) be as satisfied with online delivery as they are with on-site/in-person groups?

Method

This study compares two groups using a within- and between-groups design with some pre-/post-intervention measure analyses. One of the groups included participants from in-person groups (n=22) that met in the Child and Family Studies Lab at Brigham Young University (BYU), and the other included participant in online groups (n = 19) who attended using Zoom, a group video conferencing platform (Cisco Systems, San Jose, CA). Data were gathered regarding the social interactions pre- and post-intervention through parent report. Social validity data were also collected. All study procedures were approved by the university institutional review board. Informed consent and assent were obtained for all participants.

Participants

Recruitment and Demographics

Participants for both the online and in-person social skills groups were recruited via word of mouth, flyers delivered at autism workshops, events, and on social media. Families interested in participating contacted Dr. Terisa Gabrielsen for enrollment information. Inclusion criteria

were based on age (12 to 17 years old), and parent report of autism spectrum disorder identification for their adolescent. In order to characterize the ability of participants to benefit from the curriculum (verbal comprehension), parents also reported that participants had language and cognitive abilities within two years of age-appropriate levels.

As part of the study, autism characteristics were verified through the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012). IQ and language levels were also verified using standardized measures. All other demographic areas were not statistically different. See Table 1 for characteristics of the sample by group.

Table 1

Demographics of the Sample

	In-Person Group, n=22	Online Group, n=19
Male : Female Ratio	5:1	4.7:1
Caucasian, Non-Hispanic, n (%)	18 (82)	18 (94)
Caucasian, Hispanic, n (%)	4 (18)	1 (6)
	m (SD) [range]	
Age	13.52 (1.31) [12-17]	14.7 (1.6) [12-17]
FSIQ	101.83 (17.23) [65-128]	101.42 (16.7) [61-118]
Verbal Communication Index	99.74 (18.31) [57-124]	104.04 (20.67) [57-136]
ADOS Comparison Score	7.41 (1.84) [3-10]	7.17 (1.82) [5-10]

Groups

In-Person Group. Participants in the in-person group lived within the state, generally closer to campus than the online group. Participants in the in-person groups, for example, live an

average of 17 miles from the university campus with 24% of participants living beyond 17 miles from campus. Participants in this group traveled weekly to attended group instruction held on Monday afternoons into the early evening.

Online Group. Participants in the online groups, on average, lived much farther away from campus, including one who lived in another state. Online participants within the state live on average of 27 miles from campus, including 5 participants who lived in rural areas of the state without nearby access to similar services. About 50% of the online participants lived beyond the 27 mile range from campus. Participants in the online group traveled to campus on 2-3 occasions, including the participant from out-of-state who volunteered to come to campus, as the participant had extended family living within a 50-mile radius of campus. This participant from outside of the state was excluded as an outlier when calculating the aggregate distance of the participants' homes from BYU campus.

Settings

In-Person Environment

For the in-person setting, participants came to Brigham Young University's Child and Family Studies Lab. In this room, two long rectangular tables were placed in the center of the room immediately parallel to one another with chairs arranged evenly around the sides and back end, leaving the front of the room open for the instructors. There are two white boards in this room, the one at the front is used by instructors to make lists of comments made by students, as well as to refer to a bulleted list of "rules" of the topic for the day (e.g., rules for entering a conversation). The second white board on the right wall of the room is used for recording points earned by participants' engagement throughout the session and for completing homework.

The parent group sessions were held in a separate room down the hallway from the adolescent group. In the parent group (a room furnished with chairs), two researchers reviewed the lesson being taught in the adolescent social skills group to increase generalization of skills at home, using the Program for the Education and Enrichment of Relational Skills (PEERS®) curriculum (Laugeson & Frankel, 2010) for both groups. Parent sessions were interactive and engendered lively discussions.

Online Environment

To participate in the online setting, participants joined via video conference (using Zoom) from their own homes, while researchers/instructors had the option of joining either from their own home or from campus. Participants used their home computers, tablets, or phones, requiring a working camera and microphone attached to their electronic device in order to participate, as well as access to the Internet. During the didactic portion of the sessions, participants were encouraged to keep their microphones muted in order to reduce excess background noise, which is difficult to filter in the online environment. Instructors made use of PowerPoint visual aids through screen sharing on Zoom (in lieu of writing on a white board) during didactics. Participants could contribute to lessons by raising their hands, at which point they were called on to unmute their microphone and participate.

Parent group sessions were held under the same conditions, immediately following the adolescent sessions. Parents took over the computer or other device and were asked to use headphones or be in a separate room from their children during the parent session to protect confidentiality.

Measures

The measures utilized for this study included autism verification measures, parent report of social function, cognitive measures, behavioral observation measures and social validity. All were administered by qualified research personnel according to each measure. In-person autism assessment measures were administered by a research reliable clinician, and all cognitive measures were administered by school psychology graduate students who had completed formal training in cognitive assessment under the supervision of a licensed psychologist. In some cases, assessment had coincidentally been completed prior to joining the study by qualified personnel (i.e., a school psychologist for cognitive assessment and another research-reliable (Autism Diagnostic Observation Schedule-2) psychologist at the university.

Baseline

History, Autism Symptom Verification. For both groups, autism symptoms were first verified by way of the Social Communication Questionnaire (SCQ; Current and Lifetime versions; Rutter et al., 2003), the Social Responsiveness Scales, 2nd Edition (SRS-2; Constantino, 2012), and the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012). Parents also completed a background survey asking about prior diagnosis of autism and basic demographic information.

Cognitive Measures. Standardized cognitive assessments were also conducted in order to identify language ability as established by a Verbal Comprehension Index or equivalent index. The test used most frequently was the Wechsler Intelligence Scale for Children, Fifth Edition (WISC-V; Wechsler, 2014), with a few Wechsler Adult Intelligence Scales, Fourth Edition (WAIS-IV; Wechsler, 2011) as appropriate for age. Other standardized cognitive assessments used included the Stanford-Binet Intelligence Scales, Fifth Edition (SB-V; Roid, 2003),

Wechsler Non-Verbal Scale of Ability (WNV; Wechsler & Naglieri, 2006) and the Differential Ability Scales, Second Edition (DAS-II; Elliott, 2007) administered in prior research studies. These cognitive measures were conducted to characterize cognitive and language abilities, as the PEERS® manual specifies that participants have age-appropriate language skills in order to participate in this intervention meaningfully (Laugeson & Frankel, 2010).

Social Skills. The Autism Social Skills Profile (ASSP; Bellini & Hopf, 2007) is a parent-report measure asking specifically about positive and negative social behaviors of children and adolescents with autism. The ASSP consists of three subscales, namely: social reciprocity, social participation/avoidance, and detrimental social behaviors. The social participation/avoidance and detrimental social behaviors subscales are reverse scored in order to provide consistent valence so that high scores reported in results show more positive/pro-social characteristics and low scores indicate more socially isolating behaviors. These subscale scores contribute to the total score on the ASSP, with higher total scores indicate higher social skills competence. The SRS-2 and SCQ-Current were also used to gather social skills data.

Post-Intervention Measures

Repeated Measures. Parents completed post-intervention SRS-2 and SCQ-Current and a repeat of the ASSP following the final classroom sessions in each condition (online and in person). Most were administered on paper and completed in person. Any questionnaire data that was not collected in person was collected online via Qualtrics.

Social Validity. The Treatment Acceptability Rating Form (TARF; Reimers et al., 1991) was utilized to identify both treatment acceptability and the social validity of each condition of the intervention (in-person or online). The TARF is composed of several Likert-type rating scale questions with responses ranging from 1 to 7 adapted to specific interventions. Some examples

of questions include: “How acceptable do you find the strategies for teaching social skills in your child’s group?” (for parents) and “How much do you like the way they teach social skills in your group?” (for adolescents). This form was completed by both parents and adolescents in order to measure their perceptions about this study.

Access to Prior Data. We also accessed data from a prior study of group therapists who worked in both in-person and online environments as part of our intervention, who were also interviewed about their perspectives of the social validity of this study. Data from therapists were obtained in order to ascertain their overall impressions of the intervention. This qualitative data ultimately collected both negative and positive feedback surrounding the online delivery and in-person delivery of interventions (Rosenbaum, 2019), which will be interpreted in the discussion along with parent and participant data to provide a more full context.

Procedures

Overview of the PEERS® Intervention

The teaching procedures used in this study are based on what was originally known as the UCLA PEERS® curriculum by Laugeson and Frankel (2010). The PEERS® program includes 14 didactic lessons which are included in Table 2. Each session was structured to include a check-in on homework at the beginning. Following that, the therapists proceeded with the didactic portion of the lesson, including discussion and behavior rehearsals (role plays). At the conclusion of each session, participants were given assignments to complete by the next session (homework). These assignments initially involved participants making a phone call to a person within the group or outside the group in order to practice what they had learned in session. Assignments were expanded as the intervention progressed to include extracurricular group involvement and get-togethers.

Table 2

PEERS® Curriculum Schedule of Discussion Topics

Week	Lesson Title
1	Introduction and Conversational Skills I - Trading Information
2	Conversational Skills II - Two-Way Conversation
3	Conversational Skills III - Electronic Communication
4	Choosing Appropriate Friends
5	Appropriate Use of Humor
6	Peer Entry I - Entering a Conversation
7	Peer Entry II - Exiting a Conversation
8	Get Togethers
9	Good Sportsmanship
10	Rejection I - Teasing and Embarrassing Feedback
11	Rejection II - Bullying and Bad Reputations
12	Handling Disagreements
13	Rumors and Gossip
14	Graduation and Termination

In-Person Group

The treatment-as-usual in-person social skills group invited families to attend approximately 14 sessions on Mondays after school at a large private university over the period of approximately 3-4 months. Both teen and parent sessions included direct instruction by trained therapists/researchers (see “Therapists” below). These groups met simultaneously in separate rooms for about one hour, then reunited for another 30 minutes.

Therapist teams rotated through parent and adolescent sessions over the 14 weeks. Participation in the teen sessions was tracked by way of participation points (one comment = one

point). These points were tallied up by a research assistant on a board located to the right of the classroom which was visible to all participants.

At the conclusion of these sessions, some time was reserved at the end to provide time for teens to "shop for prizes." They did so by exchanging the participation points they had earned during the session with items provided in the "prize box." In addition, for the in-person group, we encouraged participants to bring games that they are willing to share/play with their peers as mentioned in the PEERS® lesson outlines. Both indoor and outdoor games are included in the curriculum as the weather allows.

Online Group

The novel online social skills group delivery utilized an easily accessible video conferencing platform (Zoom) to meet virtually each week. The parent group sessions were held immediately after the adolescent sessions had concluded in the same online environment (i.e., the same Zoom meeting was used, so parents could see any existing chats made in the adolescent session).

Participation points for the adolescent groups were recorded by a therapist on a white board, shown on a dedicated Zoom participant screen. This board was visible to participants and tally marks were recorded whenever they contributed to the discussion by making comments or engaging in the lesson. The online sessions for both the teens and parents lasted one hour, as there was no need to "shop" for prizes at the end of the sessions. The adaptation for prizes in this setting were in the form of electronic gift cards (i.e., Amazon) that were sent via email to the participant. Gift card amounts corresponded to the number of points earned and were transmitted each 3-4 weeks.

Therapists

In both online and in-person settings, therapists consisted of school psychology graduate students as well as undergraduate psychology (or related fields) students. Undergraduate students were preparing for graduate studies in school psychology, psychology, speech and language pathology and medical school. These individuals were all trained for at least three weeks prior to the beginning of a new group and supervised by Dr. Terisa Gabrielsen, who is a licensed psychologist. At the conclusion each intervention session, a brief group supervision meeting was held by Dr. Gabrielsen in order to go over how the lessons in both groups went, as well as address any concerns that were brought up by teens, parents, or therapists.

Adaptation of PEERS® to an Online Environment

The UCLA PEERS® program is used throughout the United States as it has a significant amount of empirical support (Laugeson et al., 2012). That being said, there were some elements of this curriculum that were necessarily adapted for the online setting. Table 3 indicates a cross comparison of the various elements in the PEERS® program and includes the method in which they were delivered between groups.

Fidelity

Every social skills session was taught according to the manualized intervention with the adaptations mentioned above. Therapists followed each lesson outline for both parents and adolescents each week. The only departure from the manualized curriculum lesson plans was that outdoor games for the online group were postponed until the “graduation” party following the last classroom session, when online groups met together in person.

Table 3

PEERS® Elements Cross-Comparison

Element	In-Person Group	Online Group
Lesson Presentation	Poster with list of rules and role plays	PowerPoints with discussion and role plays
Token Economy	Points recorded on a whiteboard, which can be exchanged for items from the prize box	Points recorded on white board visible to participants. Points determined the value of the Amazon gift card they received
Homework	Assigned each week (i.e., phone call, get together, join a group, etc.)	Same as the In-Person Group
Sharing of Personal Items	Presented to the group in the room	Presented over webcam to the group
Role Play Exercises	Partner off with a peer (or peers) while remaining in the classroom with therapists observing and assisting when necessary	Paired off and sent to "breakout rooms" with their partners and one therapist for their small group discussions
Jeopardy	A game that utilized a poster in the classroom	Interactive PowerPoint from an online template of *Jeopardy* (Alesbrook, 2016)
Indoor Games	Multiplayer board or card games brought to the classroom	Variety of popular games adapted for online use (i.e. Apples to Apples™, Balderdash™, HeadBanz™) played in breakout rooms. In-person card and board games were played when they met during on campus meetings at the conclusion of this intervention
Outdoor Games	Played during final few sessions at BYU location	Played during on-campus meetings at the conclusion of intervention
Parent Sessions	Held at the same time in a different room with therapists	Held online immediately following the adolescent session with a therapist

Research Design

The study was originally designed to be a pre-/post-intervention within and between groups comparison of skills gained (measured by behavioral observation) following completion of the 14-week social skills intervention. State health guidelines limiting gatherings and mandating mask-wearing, as well as BYU campus' closing of activity locations prohibited the final data collection (behavioral observations in naturalistic settings) for the final in-person group. This research design section describes research re-designed given the limitations of the pandemic restrictions to protect the health of participants.

This study was designed with two independent variables (delivery of social skills group intervention online vs. the treatment-as-usual in-person delivery). Within these independent variables, we measured differences in the dependent variables of parent report of social skills (questionnaires) to see how the instructional setting might affect social skills gains following the intervention. The goal of our research is to identify if there are significant differences between groups with the hypothesis that there are none, providing evidence that social skills gains are possible with either method of instruction.

Data Analysis

An analysis of variance (ANOVA) was used to determine if any significant differences existed between the two groups in terms of demographic or other characteristic variables. Distance of home address from campus was expected to be different between the two groups, however.

We utilized a pre-test/post-test, within and between-groups design for these measures. The analysis utilized was a split plot analysis of variance (ANOVA) which examined the magnitude of differences (effect size) from pre-intervention to post-intervention across the two

groups. Outcomes (post-intervention scores) will also be compared between the two groups for significant differences, with the expectation that there will be no differences between groups (null hypothesis).

The TARF data were analyzed for satisfaction across groups using an independent samples t-test. Descriptive data were used to characterize groups, then overall scores were compared across groups, using descriptive statistics for comparison. Some questions on the TARF are reverse scored according to content (i.e., if a question asked about a negative aspect of the experience, so 1 was an unfavorable response and 7 was the most favorable response).

Using an inferential method to compare groups in a pre-/post design, we decided to use a split plot analysis of variance (ANOVA). We conducted a pre-/post comparison across both groups utilizing a split plot ANOVA in the following areas: interaction between groups, main effect for time, and main effect for groups. We also determined that it would be beneficial to collapse the subgroups in order to increase the overall power of the statistical analysis. This would be done if there were no significant differences found between subgroups within the same condition (i.e., online, or in-person modalities).

The only difference between the online groups (1 and 2) was age, with group 2 being slightly older. As this was the only significant difference, groups 1 and 2 were collapsed into one online group. Additionally, the only difference between the in-person groups (3 and 4) was the average scores on the detrimental behavior subscale of the Autism Social Skills Profile (ASSP; Bellini, 2008). As this was the only significant difference, groups 3 and 4 were collapsed into one in-person group. The Statistical Package for the Social Sciences (SPSS) was used for these analyses.

Results

Interaction (Time by Group)

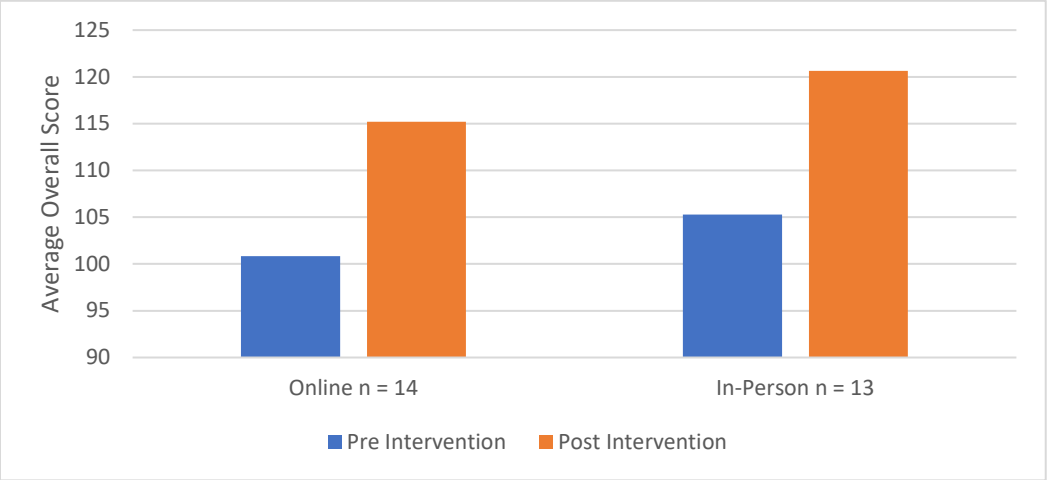
We were most interested in the interaction term which indicates differential change over time according to group membership. This is the analysis we believe most completely answers our research question regarding any differences in effects given interactions of various influences on outcomes. With the exception of one subscale explained below, there were no significant differences in the time by group analysis. There were many main effects for time overall in both groups, but group similarities served as a strong controlling factor. Some exceptions to this finding were noted. See Figures 1, 2 and 3.

Main Effects for Group

There was no main effect for group in the majority of the data. The exception to this finding was the Detrimental Behavior subscale of the ASSP (Bellini, 2008). There was a statistically significant difference between group scores, with the in-person group being rated higher (fewer detrimental behaviors) at both pre- and post-intervention measures than their online counterparts. However, this main effect moved in a positive direction for both groups with detrimental behaviors improving (lessening) over time. Ultimately, both groups changed over time at the same rate. As there were no other significant differences between groups, this provides evidence that, by parent report overall, the social skills intervention was likely to be at least as effective for the online group as it was for the in-person group. Thus, most participant outcomes (by parent report) were similar between groups (Table 4).

Figure 1

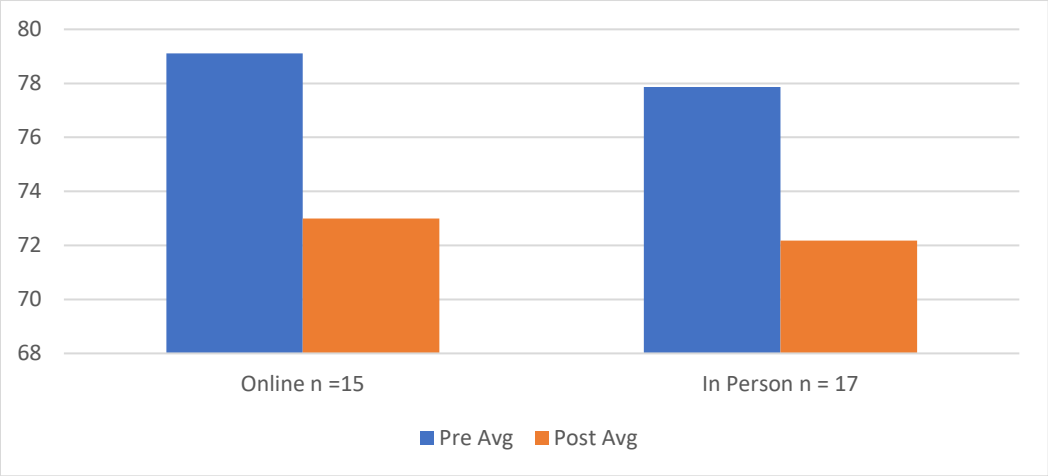
Autism Social Skills Profile



Note. There was a significant main effect for time, $F(1, 25) = 22.5$, $p = .00$ and no significant difference between groups, $F(2, 25) = .01$, $p = .911$. Higher scores = more typical skills (with some subscales measuring detrimental behaviors reverse scored).

Figure 2

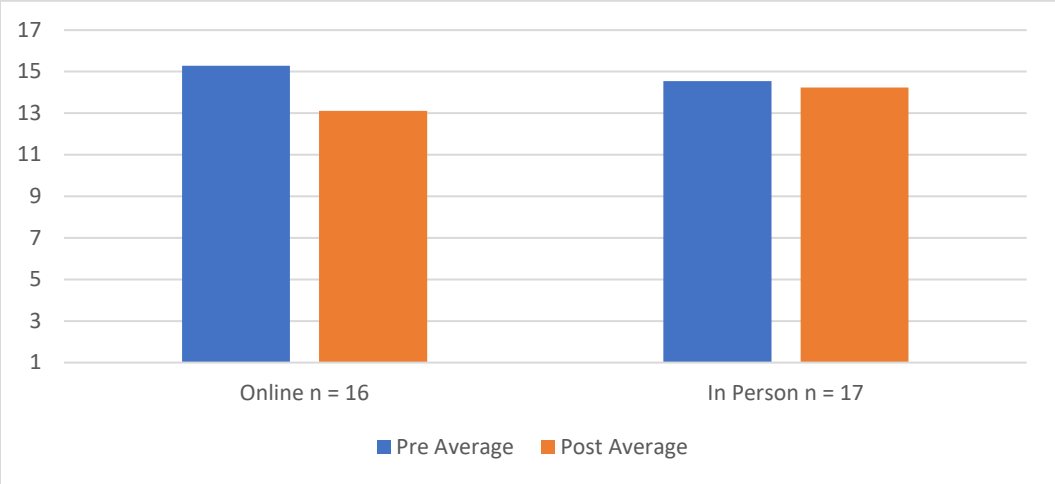
Social Responsiveness Scale – Total Score



Note. There was a significant main effect for time, $F(1, 30) = 11.44$, $p = .02$, and no significant difference between groups, $F(2, 30) = .24$. Lower scores = more typical social responsiveness.

Figure 3

Social Communication Questionnaire – Current



Note. There was no significant main effect for time, $F(1, 31) = 2.15$, $p = .15$, and no significant difference between groups, $F(2, 31) = .65$. Cutoff for concern = 15.

Table 4

Summary of Comparison Results Within and Between Groups

TOTAL/ Subdomain	In-Person Group		Online Group		F-Ratios			Main Effects*		Interaction
	Pre *m (SD)*	Post *m (SD)*	Pre m (SD)	Post M (SD)	Time (1, 27)	Group (1, 27)	Time*Group (1, 27)	Time (*p*)	Group (*p*)	Time * Group (*p*)
SRS-2 TOTAL SCORE	77.32 (9.58)	71.69 (8.73)	79.25 (11.27)	72.77 (10.11)	10.03	.48	.49	<0.01*	0.5	.49
Awareness	70.59 (10.4)	66.56 (8.35)	70 (9.85)	68 (9.55)	1.10	.08	.09	0.30	0.78	.77
Cognition	75.09 (10.07)	69.56 (8.05)	74.88 (14.19)	69.54 (11.47)	6.95	.19	.20	.01*	.82	.66
Communication	76.41 (9.65)	71.5 (9.16)	79.88 (10.45)	74.38 (10.01)	6.59	.46	.47	.02*	1.51	.50
Motivation	73.18 (13.25)	71.56 (11.22)	73.31 (14.8)	68.62 (10.94)	1.50	.40	.41	.23	.72	.53
Restrictive repetitive behavior	77.45 (11.38)	66.13 (9.59)	78.44 (10)	73.46 (12.37)	18.43	2.36	2.37	<0.01*	.22	.14
Social Communication Index	76.64 (9.51)	72.31 (8.65)	78.44 (12.24)	72 (9.05)	6.75	.93	.94	0.02*	.67	.34
SCQ (CURRENT)	19.23 (6.62)	13.44 (4.4)	15.64 (6.05)	14 (6.16)	2.01	.22	.23	0.17	.6	.64
ASSP	105.67 (14.66)	122.21 (14.88)	99.39 (14)	115.89 (15.42)	23.82	.01	.02	<0.01*	.09	.89
Social Reciprocity	39.95 (7.49)	45.92 (8.47)	38.91 (8.4)	44.75 (8.42)	10.76	.14	.15	<0.01*	.49	.70
Social Avoidance**	22.67 (4.19)	25.54 (3.17)	21.82 (2.45)	25.82 (4.11)	40.32	.66	.67	<0.01*	.62	.42
Detrimental Behavior**	27.81 (5.26)	32.17 (4.37)	22.95 (5.82)	28.54 (3.77)	24.88	1.81	1.82	<0.01*	.01*	<0.1*

*Significant differences are marked.

**Subscales are reverse scored, so *higher* scores indicate *more* pro-social behavior, *less* socially isolating behaviors.

SRS-2 = Social Responsiveness Scales, Second Ed., SCQ = Social Communication Questionnaire, ASSP = Autism Social Skills Profile

Main Effects for Time

In addition, this study also indicates that there were statistically significant differences between some pre- and post-intervention measures over time. According to parent report measures, post-intervention scores were typically better, or showing improvement compared to pre-intervention scores. This shows that parents reported improvements in their child's general social abilities overall and in many subscales. Thus, these results demonstrate that according to parent report of behaviors outside of the group setting, participants' social abilities improved somewhat over time as a result of the intervention.

In addition, we calculated the effect sizes of each measure and described them utilizing partial eta square. The partial eta square statistic is used to express the degree or magnitude change where scores between 0.01 and 0.19 is considered a "very small" effect size, scores between 0.2 and 0.49 are considered "small" effect sizes, scores between 0.50 and 0.79 are considered "medium," scores between 0.80 and 1.19 are considered "large" and scores of 1.2 and above are considered "very large." Table 5 below contains the effect sizes of each measure utilized in this study.

There was one item showing with a main effect for group, which was the detrimental behavior subscale of the ASSP (Bellini, 2008). There was a statistically significant difference between groups with the in-person group being rated higher (fewer detrimental behaviors) at both pre- and post-intervention measures than their online counterparts. However, this main effect moved in a positive direction for both groups with detrimental behaviors improving (lessening) over time. Ultimately, both groups changed over time at the same rate. The measures with no significant interaction, or differences within groups included the awareness subscale from the SRS-2, motivation subscale from the SRS-2, and the SCQ-C.

Treatment Acceptability

There was no significant difference between treatment acceptability rating forms from the student participants of either group, $F(1,13) = 1.6$, $p = .23$. However, there was a statistically significant difference between parent ratings in this area, $F(2,15) = 8.315$, $p = .01$. Parents in the online group rated treatment acceptability as higher than parents in the in-person group. Upon further analysis comparing the average score of each question on the TARF, there were slight mean differences in the following three questions: "Given the amount of time invested in the social skills group and your own child's social skill problems, how reasonable do you find the time requirements to be?"; "How affordable do you find the social skills group to be?" (All parents were offered participation at no cost); and "How will working on social skills with your child fit into your family routine?" In each of these areas, parents in the online group rated at least one point higher on average than parents in the in-person group. It is possible that parents in the online group rated higher treatment acceptability than parents in the in-person group overall as it was more convenient for parents to participate in an online environment. This could be due to the reduced time commitment for parents in the online group as there was no travel time involved and they weren't required to take as much time away from other family responsibilities (see Table 6).

Table 5

Summary of Partial Eta Squares

	Time		Group		Time*Group	
	Partial Eta Squared	Description	*Partial Eta Squared*	Description	*Partial Eta Squared*	Description
Social Responsiveness Scales Total	.27	Small	.02	Very Small	.02	Very Small
Awareness	.04	Very Small	.00	Very Small	.00	Very Small
Cognition	.21	Small	.00	Very Small	.01	Very Small
Communication	.20	Small	.05	Very Small	.02	Very Small
Motivation	.05	Very Small	.05	Very Small	.02	Very Small
Restrictive repetitive behavior	.41	Small	.05	Very Small	.08	Very Small
Social Communication Index	.20	Small	.01	Very Small	.03	Very Small
Social Communication Questionnaire (Current)	.07	Very Small	.13	Very Small	.01	Very Small
Autism Social Skills Profile	.52	Medium	.09	Very Small	.00	Very Small
Social Reciprocity	.35	Small	.02	Very Small	.01	Very Small
Social Avoidance	.66	Medium	.01	Very Small	.03	Very Small
Detrimental Behavior	.55	Medium	.31	Very Small	.08	Very Small

Table 6

Treatment Acceptability Rating Form (TARF)

	In-Person group *m (SD*)	Online group *m (SD)*	Group Differences
Treatment Acceptability Rating Form (Student)	101.83 (13.87)	109.44 (22.1)	ns
Treatment Acceptability Rating Form (Parent)	116.75 (10.40)	126.67 (4.87)	p = 0.01

Discussion

We set out to determine if any differences existed in the social skills gained by autistic adolescents following participation in an evidence-based social skills direct instruction curriculum delivered via two different methods -- traditional in-person or a novel method of live, interactive online delivery. We found that there were statistically significant within-group differences in both groups across multiple measures, primarily domains measured by the SRS-2 and the ASSP following delivery of the group intervention. We also found no significant differences between groups, with the exception of one subscale score measuring detrimental behaviors pre- and post-intervention. Most importantly, the interaction of time by group also showed no significant differences (with the single exception mentioned in group differences above), indicating that the group similarities were a strong controlling factor and that rates of change over time were similar across groups.

Improvement in Both Groups

Significant changes over time were largely positive in each group, as we saw reductions in reported autism characteristic severity using either treatment modality. According to parent reports of social responsiveness, there were statistically significant improvements in the sub-areas of social cognition, social communication, restricted repetitive behaviors (fewer), and the overall social communication index. There were no significant differences in the areas of social awareness and social motivation, however.

There are some hypotheses as to why there were no significant differences between pre- and post-intervention measures of social awareness and social motivation. One potential hypothesis is that the measures used were not particularly sensitive to changes in these areas. Alternatively, the PEERS® curriculum may not specifically train participants in these particular

areas of social skills. The lessons generally focused on overt social skills or prosocial behaviors which are reflected in participant's gains in the areas of social cognition, social communication, and decreases in restricted repetitive behaviors. The PEERS® curriculum tends toward proactive skills such as: handling disagreements, using appropriate humor/jokes, how to have a two-way conversation, and so on. These lessons teach participants positive steps that they can take for social interactions to go better.

Social motivation and social cognition are both generally intrinsic abilities that take additional time to develop. While participants learn prosocial skills, they do not necessarily develop these intrinsic desires and understanding at the same rate. Both social motivation and social cognition could be potential next steps for intervention after participating in the PEERS® curriculum. We also hypothesize that as participants experience more success in their social interactions, they may be more willing to engage in further social interactions. Thus, participants may experience an increase in social motivation over timeframes longer than this study.

Additionally, social motivation and social cognition are both internal states. Without objective data or participant input, it may be difficult to ascertain improvements in these areas. Furthermore, they are not reactive skills, perhaps more difficult to observe on a regular basis. As such, it may be difficult for parents to accurately rate participants in these areas.

The ASSP results also indicated that there were statistically significant improvements across subscales for social reciprocity, social avoidance (decreased), and detrimental behaviors (decreased). This indicates that participants in both treatment modalities exhibited positive outcomes in these areas as reported by their parents. This finding reinforces the parent reports from the SRS-2. Restrictive repetitive behaviors as measured by the SRS-2 are part of the detrimental behaviors measured by the ASSP. According to both measures, there were

statistically significant decreases in these areas. Furthermore, social reciprocity, as measured on the ASSP is related to the items included in the social communication index from the SRS-2. Both measures showed a statistically significant increase post-intervention in both groups. It is important to note that while the ASSP did show some gains in terms of reductions in social avoidance, the SRS-2 is designed to measure impairment in positive social responses, so it does not measure social avoidance directly. Social motivation (from the SRS-2) may be considered a rough proxy as the opposite of social avoidance but did not show improvement over time.

Almost No Differences Between Groups

With the exception of the ASSP's detrimental behavior subscale, there were no statistically significant differences between the groups. While the in-person group scored higher than the online group at both pre- and post-intervention measures of the detrimental behavior subscale, the rate of change over time was consistent between groups, suggesting differences inherent in individuals more than groups. Our objective was to provide evidence that the outcomes of both modalities were not significantly different. The results indicate that this is generally the case according to our study.

Social Validity

Although students were satisfied with social validity of either delivery modality, parents were more satisfied with online delivery, perhaps because of lower impacts on the family related to time and transportation issues. As part of a study with these same participants by Rosenbaum (2019), therapists who participated in both online and in-person modalities were asked to provide their overall impressions of the online delivery of social skills training. Therapists from this study noted that there were several positive aspects associated with the online delivery model, and also provided feedback on some of the disadvantages of the online environment.

Advantages of an Online Environment

According to Rosenbaum (2019), therapists noted the importance of being able to provide services to a wider population and include individuals who may otherwise have been unable to attend in-person. One of the primary advantages of being in an online environment is access to intervention that would otherwise have been problematic. Some barriers to in-person direct instruction social groups may include geographical isolation, transportation, anxiety about being in an unfamiliar group and possibly challenging behaviors that prohibited in-person participation. Although many of our participants did not face such barriers, a substantial number of the online participants faced one or more of these barriers. Being able to provide services to rural communities is certainly an advantage when delivering social skills training online. Additionally, therapists noted that in an online environment, management of disruptive behaviors was more effective as therapists had the ability to simply mute participants or turn off their video if they were engaging in inappropriate behaviors (Rosenbaum, 2019).

Furthermore, there were differences in attendance rates between groups. According to the study, the average attendance rate for the in-person group was 84.38% while the average attendance of the online group was 91.03%. The attendance rates from the online group were higher than that of the in-person group which indicates that online participants may have found it easier or more convenient to attend from home. Factors such as weather (i.e., snowstorms prohibiting travel), social anxiety, and behavior challenges in an in-person environment, were noted as circumstances in which the online delivery facilitated attendance, whereas these factors are barriers to attendance for the in-person delivery model (Rosenbaum, 2019).

Disadvantages of an Online Environment

Therapists in Rosenbaum's study also noted some challenges associated with teaching social skills in an online environment, namely: behavior management, lack of connection, and difficulty teaching the material. In terms of behavior management, therapists found that while it was easier to manage some behaviors (like talk outs) by muting participants, it was more difficult to encourage participants to remain engaged throughout the session. In addition, therapists talked about less of a personal connection with participants when sessions were held online versus in-person. Finally, therapists noted that teaching in an online environment was more difficult. In addition to difficulties encouraging participation, it was more challenging for therapists to naturally model and reinforce the social skills being taught in general (Rosenbaum, 2019).

One main disadvantage of this environment was lack of fluid, direct, in-person contact as part of the curriculum including indoor and outdoor games (Rosenbaum, 2019). As part of the manualized curriculum, turn-taking, hosting, and sportsmanship were practiced by playing games within group sessions. Games available in the online environment for skill practice were fairly limited. For instance, board games were significantly different as they were played online in "breakout" rooms between players. In addition, offering and monitoring "party foods" that were incorporated as part of hosting skills in the in-person group were not possible online. In-person outdoor games embedded in the PEERS® curriculum were used as generalization probes for all groups to allow for assessment of socialization in this context after instruction either in-person or online (generalization data is not reported here). This may be a critical feature that needs to be examined in the future as gameplay may be considered an important aspect of social interaction during the intervention rather than at the end as a generalization probe.

Finally, parents living relatively near the university campus were initially hesitant to enroll in an online group, stating their strong preference for in-person groups. Most of these parents and their adolescents participated in the online group, however, as there were no other viable alternatives in the area at the time.

Limitations

Not unexpectedly, these preliminary findings are limited by the sizes of the samples. Although two groups were monitored in each condition (online and in-person), overall numbers are small for generalization. Diversity was limited to ethnicity and gender, which may or may not reflect the composition of other PEERS® groups. There was more diversity within the parent groups in terms of country of origin and first language than existed in the adolescent participants, however. Direct observation of social behaviors was planned for the study, but the worldwide pandemic of 2020 disrupted final data collection of generalization probes. We hope to include those data in a future study.

Implications for Future Research

These results are promising and suggest that more exploration of social skills gains in the novel delivery method (online) should be conducted in diverse populations to add to this preliminary evidence of not just effectiveness but also feasibility. Such research would inform clinicians and families about options for increasing access to critical interventions to improve social skills in adolescents with autism. The worldwide pandemic beginning in 2020 with the subsequent shift to telehealth and online education have expanded the usefulness of another delivery mode extremely relevant.

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APPENDIX A

Review of the Literature

The Centers for Disease Control (CDC) reports that as of 2016, 1 out of every 44 children have significant autism symptoms, and the prevalence of autism has grown from 1:150 in 2000 and 2002 to the present 1:44 (Maenner et al., 2021). Autism Spectrum Disorder (autism) is defined as a developmental disorder associated with a wide range of social skill needs (American Psychiatric Association [APA], 2013). Additional symptoms of autism may include the diminished ability to use or recognize neurotypical nonverbal cues which include facial expressions, eye and eyebrow movements, gestures, verbal nuances like jokes, etc. Such limitations in social awareness, cognition, and motivation generally hinders children with autism from responding to emotions or engage in regular conversation, which may result in a social barrier that impedes their ability to form and maintain meaningful social relationships, leading to frustrations between the individual with autism and loved ones (Bellini et al., 2009). Difficulties meeting expected social norms may affect skills related to essential aspects of employment, relationships, and independent adult living. Thus, it is important to address the primary differences that autism presents by employing effective intervention strategies to assist these individuals in obtaining the social skills necessary for success (Goin-Kochel et al., 2007). As such, it is essential to address the needs of this growing population by identifying intervention strategies like social skills training for children with autism.

The Efficacy of In-Person Social Skills Training

Psychologists have pursued the development of social skills training programs in order to improve the quality of social interactions for individuals with autism. The National Standards Project Phase 2 has stated that social skills package interventions are an effective form of group or individual instruction capable of ameliorating limited communication and interpersonal skills. These social skills packages can be adapted with the express goal of providing individuals with the necessary skills to effectively engage in multiple social settings such as home, school, in public, etc. (National Autism Center at May Institute 2015).

A study performed by Laugeson et al. (2012) discovered that individuals who participated in social skills programs successfully reduced anxiety-induced mannerisms and increased their social awareness as well as their social interactions. In this study, participants' progress was defined by increases in multiple measures (Laugeson et al., 2012). Data gathered from pre- and post-intervention tests displayed substantive progress within subjects over the course of their treatment, which was also maintained by way of a second evaluation performed 14 weeks after the experiment (Laugeson et al., 2012). Social skills training programs are shown to be most effective when parents are also involved with this intervention. Recent findings from the Program for the Education and Enrichment of Relational Skills (PEERS®) manualized intervention program indicate that high-functioning adolescents with autism significantly benefit from this parent-involved program by way of improvements in pro-social skills (Laugeson et al., 2012). Another potential benefit of social skills training may come in the form of decreases in other negative comorbid symptoms of autism, including depression. Depressive symptoms are frequently apparent for individuals with autism and are normally related to variations in social skills and other relationship differences; these symptoms may also lead to an increased risk of

suicidality (Schiltz et al., 2018). In a study observing the effectiveness of the PEERS® program, researchers found that this social skills intervention not only increased their current levels of social interactivity, but also decreased depressive symptoms for participants (Schiltz et al., 2018). It is apparent from this study that individuals with autism may experience a decrease in their levels of depression, thereby decreasing their risk of suicidality.

In addition, Bellini et al. (2009) suggests that increased frequency of intervention may potentially increase the overall effectiveness of social skills intervention, but schools and clinics may struggle to provide sufficient access to groups that meet once a week. Therefore, one challenge in implementing social skills intervention is to overcome barriers to access for individuals who are seeking treatment. In order to provide effective interventions for children with autism, researchers and therapists should identify ways to overcome barriers limiting access to intervention groups, which may include distance, funding, and confidentiality of online platforms.

Limitations of In-Person Social Skills Training

Currently, in-person training programs have proven effective in ameliorating the development of social skills for children with autism, however resources are largely limited or constrained in addressing the growing interest in social skills training (Laugeson et al., 2012; Reich, 2017). This may be caused by a variety of circumstances. However, this does suggest that the demand for social skills training may exceed the present capacity of schools and clinics to provide access to these programs.

For instance, it may be difficult for community clinics and schools to provide access to treatment if barriers are created by inability to serve a large geographic range. In areas where this factor proves to be a challenge, online resources may be utilized to reach more people in a more

affordable and feasible way. Some concerns that may arise involving online groups are those regarding confidentiality protections. In a virtual setting it may be difficult to secure the data and video feeds from external sources. In addition, on unsecured servers, networks, or public computers, it may be easy for other individuals to gain access to information about these online social skills groups.

Covering Large Geographic Areas

A study conducted by Young et al. (2019) examined the unique challenges faced by Canadian health care providers in supplying mental health care to individuals with autism living in rural communities. As the world's second geographically largest country, approximately 90% of Canada's land mass is considered rural, with around 19-30% of its population living in these remote areas (Young et al., 2019). Thus, some significant challenges that are limiting accessibility for individuals with autism include access to screening, diagnosis, intervention services, the cost and time associated with traveling the long distance to health care providers, and ultimately the difficulty in recruiting/retaining mental health professionals in rural communities (Young et al., 2019). As such, the Canadian Autism Spectrum Disorder Alliance announced the need for a targeted outreach program in order to address the needs of the autism population living in rural communities without regular or limited access to health care providers (Young et al., 2019). At present, these rural communities are implementing strategies via "community-based discussion groups" that provide information regarding autism; this includes a autism parent support group using Facebook as a platform for discussion (Young et al., 2019). This study indicates the limiting factors that geographic distance has on providing mental health services for individuals with autism living in rural areas. Thus, it is apparent that effective

interventions by way of the Internet or other online services may be beneficial for these individuals.

Another study by Wilkes and Lincoln (2018) examined the efficacy of remotely delivered parent-mediated intervention training for children with autism who reside in rural parts of Australia. This study highlights the importance of establishing a remote version of intervention which may benefit individuals with autism who are otherwise unable to access intervention due to geographic distance.

Home-to-service travel time due to geographic distance appears to be one of the main barriers to autism services. Thus, computer-based or telehealth services may be a beneficial tool to facilitate timely interventions that support more families who do not have access to regular services (Salomone & Arduino, 2017). As a result of COVID-19 and the burgeoning transition of mental health practices to a telehealth environment, additional research is required in order to identify if we may fully adopt telehealth for social skills groups as an evidence-based option (AlRasheed et al., 2022).

Telehealth Services

Telehealth (or "telemedicine") services may be one way to integrate computer-based videoconferencing and real-time interventions which would allow for a professional to provide their services over vast physical distances (Dudding, 2009). By increasing access to efficacious and empirically supported interventions for individuals with autism by way of telehealth, this may potentially overcome the lack of availability of intervention resources in rural or underserved areas (Bearss et al., 2018). The technology behind telehealth services has been expanding quickly, with these services formerly available exclusively in hospitals or clinics, they

have within recent years become more prominent in the home and even on mobile devices (Dorsey & Topol, 2016).

One primary obstacle for access to telehealth interventions lies in the form of Internet access. A study by Salomone and Arduino (2017) indicates that approximately 16% of families do not have access or have very limited access to the Internet which ultimately prevents them from accessing telehealth interventions. In addition, there may also be families that are hesitant to utilize telehealth services (typically due to limited Internet skills) which subsequently leads them to being unsatisfied with online services and may be unlikely to enroll in telehealth programs (Azano & Tackett, 2017). However, some families in urban areas that are physically closer to clinics and other services are still enrolling in online telehealth programs (Salomone & Arduino, 2017). This shows that there might be other factors besides the time and cost associated with transportation. One explanation for this comes in the form of hidden costs (i.e., work, childcare, lack of time, etc.) impacting families, making a telehealth intervention option more appealing (Salomone & Arduino, 2017).

Even with these recent developments, telehealth services designed for assessing and treating adolescents with autism are lacking (Bearss et al., 2018). A review by Boisvert et al., (2010) which examined the use of telehealth for assessing and treating individuals with autism found only eight peer-reviewed papers, most of which were single subject designs. In recent years, functional communication training (FCT) has been provided by researchers via telehealth services to children with autism; this study has shown that it has been effective in reducing behavior problems in children with autism (Lindgren et al., 2016). We have been unable to discover any reference to live online social skills groups for the treatment of autism in adolescents to date.

During the COVID-19 pandemic in 2020, government regulations on insurance and providing service online across state lines was relaxed during the crisis. These alterations were made to telehealth rules and coverage allowing for many individuals to receive services remotely. According to the Center for Connected Health Policy, telehealth services throughout the country experienced increased surges in accessibility, as illustrated by an unprecedented number of remote screenings in order to reduce the risk for individuals visiting clinics and hospitals in-person (Center for Connected Health Policy, 2020). This increase in remote screenings and general telehealth provisions prompted some changes to the Health Insurance Portability and Accountability Act (HIPAA). According to the relaxed guidelines, the Health and Human Services' Office for Civil Rights (OCR) would waive penalties for violations against health care providers who were serving patients via remote communicative technology (i.e., FaceTime, Skype, etc.). Due to this overall relaxation of requirements and increased coverage of billing, the popularity of using telehealth services may continue after this crisis is over, further bolstering online social skills training as a viable form of treatment. However, as this pandemic continues to be a developing situation at the time of this writing, it is unclear what this may mean for the future of telehealth services.

Efficacy of Online Social Skills Training

At present, there are other neurological disorders that may also benefit from social skills training. Individuals with Attention Deficit Hyperactivity Disorder (ADHD) have been shown to be at risk of comorbid symptoms including social skills differences. In one study, the social skill needs of boys with ADHD were addressed by way of a computer-based interactive social skills training program. Following this program, the participants showed increased levels of social problem-solving skills and maintained these improvements up to 6 weeks following the initial

assessments (Fenstermacher et al., 2006). From this study, it is apparent that computer-based social skills interventions may be a beneficial method to address social differences of individuals with autism and ADHD. Thus, this research surrounding social skills interventions for individuals with ADHD may potentially be generalized to individuals with autism.

Potential Limitations of Online Social Skills Groups

The primary difficulty that online groups might pose are those regarding security and confidentiality. In a virtual setting it may prove difficult to secure the data and video feeds from the streaming platform used. Approximately 95% of teens currently have access to the Internet, however, most of this screen time is spent engaged in social networking activities (Lehenbauer et al., 2013). This data may potentially be generalized to adolescents with autism, which leads to the assumption that individuals with autism are present on social media platforms or are at least familiar with these sites. Given this statistic, it may suggest that social skills tools could potentially be offered online as the Internet is a medium that teens are already comfortable or at least familiar with. However, the potential limitation with this example lies in the fact that online social skills training may be dissimilar from the social media sites they use.

Currently, the only available online tool for social skills training with an interactive component appears to be presented in the format of an online prosocial game wherein participants may communicate and exchange gifts with other participants via an avatar (Chung et al., 2016). The study examined this prosocial online game for children with autism and evaluated the effectiveness of the game as compared to a live in-person group. The study evaluated participants over the course of six weeks and observed that participants treated with the online game showed no significant difference from the in-person treatment group (Chung et al., 2016). Other studies involving online resources for social skills have shown increases in social skills as

well as decreases in social fears and have established a strong correlation between online and offline prosocial behaviors (Lehenbauer et al., 2013; Reich, 2017). From this research, online platforms promoting pro social behavior for individuals with autism may potentially be beneficial as it leads to positive improvements in their behavior. Despite the overall lack of published research about online resources in terms of social skills groups, this emerging avenue of research appears to strongly suggest that there are substantial benefits that may potentially be available by way of online materials.

Research has demonstrated the significant benefits of social skills training for children and adolescents with autism. Yet, many of those seeking this form of intervention are unable to utilize them due to great distances or lack of room in the groups. Given the benefits of social skills training, it should be a priority to make sure that there are adequate resources for those who seek it out. In order to find a solution, this study seeks to determine whether a live, online social skills group is a feasible option that can provide similar benefits to an in-person group. The study investigates the usage of online platforms, the accessibility it can provide, the level of funding required, and the ability to protect participant confidentiality throughout the process.

Feasibility

A prior feasibility study conducted by Rosenbaum (2019) utilized a mixed methods design in order to examine the differences between an online delivery method for social skills and the treatment-as-usual in-person delivery method. This study utilized a blend of qualitative and quantitative data and gathered descriptive statistics from parent and teen groups in order to identify the feasibility of the study (Rosenbaum, 2019). This preliminary data provided evidence which informed our current study.

Conclusion

With very limited research available on any live online social skills training programs, our study will gather data regarding the outcomes of the same curriculum delivered in the traditional manner (in person) and in an online, live, interactive teleconference platform. This study will not only contribute to filling the gap on telehealth delivery of an evidence-based social skills intervention but will also provide data to compare the outcomes of such delivery compared to in-person groups that are more traditional, but less available to many adolescents with autism.

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APPENDIX B

Institutional Review Board Approval Letters

Institutional Review Board
for Human Subjects

Brigham Young University
A-285 ASB Provo, Utah 84602
(801) 422-3841 / Fax: (801) 422-0620

January 25, 2017

Professor Terisa Gabrielsen
340-A MCKB
Campus Mail

Re: Online, Real Time, Interactive Social Skills Interventions for Students with Autism Spectrum Disorder in Rural and Other Underserved Areas

Dear Professor Terisa Gabrielsen

This is to inform you that Brigham Young University's IRB has approved the above research study.

The approval period is from 1-25-2017 to 11-2-2017. Your study number is F16423. Please be sure to reference this number in any correspondence with the IRB.

Continued approval is conditional upon your compliance with the following requirements.

1. A copy of the 'Informed Consent Document' approved as of 1-25-2017 is enclosed. No other consent form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject must be given a copy of the signed consent form.

2. All protocol amendments and changes to approved research must be submitted to the IRB and not be implemented until approved by the IRB.

3. The enclosed recruitment advertisement has been approved. Advertisements, letters, Internet postings and any other media for subject recruitment must be submitted to IRB and approved prior to use.

4. A few months before this date we will send out a continuing review form. There will only be two reminders. Please fill this form out in a timely manner to ensure that there is not a lapse in your approval.

If you have any questions, please do not hesitate to call me.

Sincerely,

Robert Ridge, PhD, Chair
Sandee Aina, MPA, Administrator
Institutional Review Board for Human Subjects

Memorandum

To: Terisa Gabrielsen
Department: BYU - EDUC - Counseling, Psychology, & Special Education
From: Sandee Aina, MPA, HRPP Manager
Wayne Larsen, MAcc, IRB Administrator
Bob Ridge, PhD, IRB Chair
Date: December 13, 2019
IRB#: IRB2019-327
Title: PRIOR APPROVAL F16423: Online, Real Time, Interactive Social Skills Interventions for Students with Autism Spectrum Disorder in Rural and Other Underserved Areas

Brigham Young University IRB approved the research study referenced in the subject heading at the full-board level. The approval period is from 12/13/2019 to 12/12/2020. Please reference your assigned IRB identification number in any correspondence with the IRB. Continued approval is conditional upon your compliance with the following requirements:

1. A copy of the approved informed consent statement and associated recruiting documents (if applicable) can be accessed in iRIS. No other consent statement should be used. Each research subject must be provided with a copy or a way to access the consent statement.
2. Any modifications to the approved protocol must be submitted, reviewed, and approved by the IRB before modifications are incorporated in the study.
3. All recruiting tools must be submitted and approved by the IRB prior to use.
4. In addition, serious adverse events must be reported to the IRB immediately, with a written report by the PI within 24 hours of the PI's becoming aware of the event. Serious adverse events are (1) death of a research participant; or (2) serious injury to a research participant.
5. All other non-serious unanticipated problems should be reported to the IRB within 2 weeks of the first awareness of the problem by the PI. Prompt reporting is important, as unanticipated problems often require some modification of study procedures, protocols, and/or informed consent processes. Such modifications require the review and approval of the IRB.

Instructions to access approved documents, submit modifications, report complaints and adverse events can be found on the IRB website under iRIS guidance: http://orca.byu.edu/irb/iRIS/story_html5.html.

A few months before the expiration date, you will receive a prompt from iRIS to renew this protocol. There will be two reminders. Please complete the form in a timely manner to ensure that there is no lapse in the study approval. Please refer to the IRB website for more information.

APPENDIX C

Parental Permission Forms

Parental Permission for a Minor--Online Social Skills Group

Introduction

My name is Terisa Gabrielsen. I am a professor from Brigham Young University. I am conducting a research study about ways to deliver social skills group interventions. I am inviting your child to take part in the research because (he/she) is an adolescent with autism spectrum disorder or similar developmental disorder.

Procedures

If you agree to let your child participate in this research study, the following will occur:

Your child will be asked to join a videoconference session once a week for 14-20 weeks for a social skills group. The group meets Mondays, 5:30 -6:30 online. You will be given a link to join the online sessions. You must have access to a computer with camera to participate in the session. Audio participation can be by microphone built into your computer or by phone.

You will also be asked to join a one-hour videoconference session for parents once a week at a different time.

You will be asked to bring your child to BYU's campus on two separate days to complete some testing (3 hours – autism and IQ testing) and to participate in group activities (3-4 hours each day) on campus such as bowling, movies, museums, playing outside, shopping, and fast food. If you cannot come to campus, we can arrange for research staff to visit your community and your home to complete testing and to observe your child engaging in similar activities with same age peers.

Your child will be asked to complete some "homework" assignments each week that include calling others in the group on the phone, calling people outside the group on the phone, and inviting someone to a get together outside of the group. This requires us to share phone numbers among group members. Your child will receive points for doing the homework assignment, and can have your help, but will never be punished or embarrassed for not doing the homework.

You and/or your child will be recorded during the online sessions and in activities on campus or in your community. You will have the opportunity to give your permission for how these videos will be used in a separate video release form. Videos will never be posted anywhere.

You will be asked to complete some questionnaires at the beginning and again at the end of the 14-20 weeks. Most parents are able to do this in less than an hour.

When we participate in some of the activities on campus or in your community, you may have to provide very small fees for admission (e.g., bowling, movies, museums, playing outside, shopping, fast food), and possible one "get-together" that is part of your child's homework as part of the curriculum. We use these opportunities for handling money and paying admission as part of the social skills practice.

Risks

There are minimal risks involved in the study. As we participate in more activities towards the end of the 14-20 weeks, there will be everyday risks of age appropriate activities (e.g., bowling, movies, museums, playing outside, shopping, fast food, etc.). We ask BYU Risk Management to approve all activities on campus, and their staff examines the details of each activity to reduce risks and only approves activities with minimal risks.

Confidentiality

Your name or your child's name will never be connected to any presentation of the study at conferences, trainings meetings, or in publications. All identifying information will be removed from all records, with the possible exception of hearing your child's name on a video recording. If you do not give your permission for your child's video images to be shown outside of study personnel on a separate video release form, we will honor your wishes. All hard copy and electronic records will be stored in locked and/or password protected storage. I am the only person who will have access to the data at the end of the study. All data will be kept in these same locked and/or password protected storage for future research of any data not previously analyzed. Because this is a new area of research, multiple replications of the study are anticipated. We plan to keep all data collected until this line of research is completed, but we don't know when that will be, so we are planning to keep the data collected indefinitely.

Benefits

Your child will benefit directly from participating in this study by receiving direct instruction and practice in age-appropriate social skills.

Compensation

There will be no compensation for participation in this project.

Questions about the Research

Please direct any further questions about the study to Terisa P Gabrielsen at 801-422-5055 or Terisa_gabrielsen@byu.edu.

Questions about your child's rights as a study participant or to submit comment or complaints about the study should be directed to the IRB Administrator, Brigham Young University, A-285 ASB, Provo, UT 84602. Call (801) 422-1461 or send emails to irb@byu.edu.

You have been given a copy of this consent form to keep.

Participation

Participation in this research study is voluntary. You are free to decline to have your child participate in this research study. You may withdraw your child's participation at any point.

Child's Name: _____

Parent Name: _____

Signature: _____

Date: _____

Parental Permission for a Minor-BYU Social Skills Group

Introduction

My name is Terisa Gabrielsen. I am a professor from Brigham Young University. I am conducting a research study about ways to deliver social skills group interventions. I am inviting your child to take part in the research because (he/she) is an adolescent with autism spectrum disorder or similar developmental disorder.

Procedures

If you agree to let your child participate in this research study, the following will occur:

- You and your child will be asked to come to BYU once a week for 14-20 weeks for a social skills group. The group meets Mondays, 5:30 -7 in the Joseph F Smith Building (JFSB, Room 1086, inside the Child and Family Studies Lab) on campus. In the past, all families have typically been finished and on their way home long before 7 pm each week. Teens meet in one room and parents meet at the same time in another room. In the last few weeks, some activities will be held in various locations on campus other than the JFSB.

- Your child will be asked to complete some "homework" assignments each week that include calling others in the group on the phone, calling people outside the group on the phone, and inviting someone to a get together outside of the group. This requires us to share phone numbers among group members. Your child will receive points for doing the homework assignment, and can have your help, but will never be punished or embarrassed for not doing the homework.

- You and/or your child will be videotaped during group sessions and in activities on campus. You will have the opportunity to give your permission for how these videos will be used in a separate video release form. Videos will never be posted anywhere.

- You will be asked to bring your child to campus on two additional occasions for assessment of autism and cognitive abilities (IQ). The autism appointment takes about an hour. The IQ appointment can sometimes take 2 hours. These appointments will be made at your convenience.

- You will be asked to complete some questionnaires at the beginning and again at the end of the 14-20 weeks. Most parents are able to do this in less than an hour.

- When we participate in some of the activities toward the end of the 14-20 weeks, you may have to provide very small fees for some on-campus activities for your child (e.g., bowling, movies, museums, playing outside, shopping, fast food). And possibly one "get-together" that is part of your child's homework as part of the curriculum. We use these opportunities for handling money and paying admission as part of the social skills practice.

Risks

There are minimal risks involved in the study. As we participate in more activities towards the end of the 14-20 weeks, there will be everyday risks of age-appropriate activities (e.g., bowling, movies, museums, playing outside, shopping, fast food, etc.). We ask BYU Risk Management to approve all activities on campus, and their staff examines the details of each activity to reduce risks and only approves activities with minimal risks.

Confidentiality

Your name or your child's name will never be connected to any presentation of the study at conferences, trainings meetings, or in publications. All identifying information will be removed from all records, with the possible exception of hearing your child's name on a video recording. If you do not give your permission for your child's video images to be shown outside of study personnel on a separate video release form, we will honor your wishes. All hard copy and electronic records will be stored in locked and/or password protected storage. I am the only person who will have access to the data at the end of the study. All data will be kept in these same locked and/or password protected storage for future research of any data not previously analyzed. Because this is a new area of research, multiple replications of the study are anticipated. We plan to keep all data collected until this line of research is completed, but we don't know when that will be, so we are planning to keep the data collected indefinitely.

Benefits

Your child will benefit directly from participating in this study by receiving direct instruction and practice in age-appropriate social skills.

Compensation

There will be no compensation for participation in this project.

Questions about the Research

Please direct any further questions about the study to Terisa P Gabrielsen at 801-422-5055 or Terisa_gabrielsen@byu.edu.

Questions about your child's rights as a study participant or to submit comment or complaints about the study should be directed to the IRB Administrator, Brigham Young University, A-285 ASB, Provo, UT 84602. Call (801) 422-1461 or send emails to irb@byu.edu.

You have been given a copy of this consent form to keep.

Participation

Participation in this research study is voluntary. You are free to decline to have your child participate in this research study. You may withdraw your child's participation at any point.

Child's Name: _____

Parent Name: _____

Signature: _____

Date: _____

APPENDIX D

Youth and Child Assent Forms

Child Assent (12-14 years old) – Online Social Skills Group

What is this research about?

My name is Terisa Gabrielsen. I want to tell you about a research study I am doing. A research study is a special way to find the answers to questions. We are trying to learn more about teaching people about social skills. You are being asked to join the study because your parents thought you would like to learn about social skills.

If you decide you want to be in this study, this is what will happen.

1. You will do a video call once a week on Mondays at 5:30 to meet with other kids your age. We talk about social skills, play games, and you can earn points for prizes. Your parents will do their own video call at a different time to talk about social skills.

2. We record the video calls, and we have asked your parents for permission to do that. We never post the videos anywhere.

3. Your parent will bring to BYU two other times to do some more games and talking with one of the BYU students you meet in the group or with me. We will play games, talk, and maybe eat snacks. Your parents will be able to wait for you at BYU. While you are at BYU, you can meet the other kids from the video call. We can go bowling, play outdoor games, go to a movie, go shopping, go to a museum or get some fast food. We will do this together.

4. You will have easy homework each week, like calling someone on the phone. Your parent can help you.

Can anything bad happen to me?

We don't think anything bad will happen to you.

Can anything good happen to me?

Most kids really like being in the group.

Do I have other choices?

You can choose not to be in this study.

Will anyone know I am in the study?

We won't tell anyone you took part in this study. When we are done with the study, we will write a report about what we learned. We won't use your name in the report.

What happens if I get hurt?

We don't think you will get hurt, but if you do, your parent is always close by and can help you.

What if I do not want to do this?

You don't have to be in this study. It's up to you. If you say yes now, but change your mind later, that's okay too. All you have to do is tell us.

Before you say yes to be in this study; be sure to ask Terisa Gabrielsen to tell you more about anything that you don't understand.

If you want to be in this study, please sign and print your name.

Name (Printed): _____

Signature: _____ Date:_____

Youth Assent (15-17 years old) – BYU SOCIAL SKILLS

What is this study about?

My name is Terisa Gabrielsen. I am from Brigham Young University. I would like to invite you to take part in a research study. Your parent(s) know we are talking with you about the study. This form will tell you about the study to help you decide whether or not you want to be in it. In this study, we want to learn about the best ways to teach groups of teenagers about social skills.

What am I being asked to do?

If you decide to be in the study, we will ask you to do the following:

1. Your parent will bring you to BYU once a week on Mondays at 5:30 to meet with other teenagers. We talk about social skills, play games, eat snacks, and you can earn points for prizes. Your parents are in another room in their own meeting.

2. Your parent will bring you to BYU two other times to meet with one of the BYU students you know from the group or with me. We will play games, talk, and maybe eat snacks. Your parents will be in another room waiting for you.

3. Sometimes when you come to BYU, we will go do something else, like bowling, play outdoor games, go to a movie, go shopping, go to a museum or get some fast food. We will do this together and your parents will give you the money you need for admission.

4. You might see a video camera recording the group each week. We have asked your parents to give us permission for that and we never post the videos anywhere.

5. You will have easy homework each week, like calling someone on the phone. You can earn points for doing the homework, and we will ask you about it each week, but we never embarrass people who haven't done the homework.

What are the benefits to me for taking part in the study?

Most teens who participate in the social skills group have fun, meet new people, and learn more about how to make friends.

Can anything bad happen if I am in this study?

We don't think anything bad will happen in the study. Sometimes you might not want to come, and sometimes other people in the group might be annoying but can usually help everybody to get along okay.

Who will know that I am in the study?

We won't tell anybody that you are in this study and everything you tell us and do will be private. We do tell your parents how you did each week in the group, including the great things you did that day, because they don't watch the group, they have their own meeting. If you ever tell us that you want to hurt yourself, we will talk to you and your parents about that to make sure you are getting help. When we tell other people or write articles about what we learned in the study, we won't include your name or that of anyone else who took part in the study. We have asked your parents for permission to record our sessions and asked them how they want those videos to be used, but we never post them anywhere or give them to anybody. We only use them for research and training.

Do I have to be in the study?

No, you don't. The choice is up to you. No one will get angry or upset if you don't want to do this. You can change your mind anytime if you decide you don't want to be in the study anymore.

What if I have questions?

If you have questions at any time, you can ask us and you can talk to your parents about the study. We will give you a copy of this form to keep. If you want to ask us questions about the study, contact Terisa Gabrielsen at 801-422-5055, Terisa_gabrielsen@byu.edu

Before you say yes to be in this study what questions do you have about the study?

If you want to be in this study, please sign and print your name.

Name (Printed): _____

Signature: _____ Date: _____

Youth Assent (15-17 years old) ONLINE SOCIAL SKILLS

What is this study about?

My name is Terisa Gabrielsen. I am from Brigham Young University. I would like to invite you to take part in a research study. Your parent(s) know we are talking with you about the study. This form will tell you about the study to help you decide whether or not you want to be in it. In this study, we want to learn about the best ways to teach groups of teenagers about social skills.

What am I being asked to do?

If you decide to be in the study, we will ask you to do the following:

1. You will join a video call once a week on Mondays at 5:30 to meet with other teenagers. We talk about social skills, play games, and you can earn points for prizes. Your parents will do their own video call at another time.

2. Your parent will bring you to BYU two other times to meet with one of the BYU students you know from the group or with me. We will play games, talk, and maybe eat snacks. While you are at BYU, you will meet the teenagers from your video calls and do activities on campus, like bowling, play outdoor games, go to a movie, go shopping, go to a museum, or get some fast food. We will do this together and your parents will give you the money you need for admission.

4. We record the video calls each week and you might see video cameras when you are doing activities on BYU's campus. We have asked your parents to give us permission for that and we never post the videos anywhere.

5. You will have easy homework each week, like calling someone on the phone. You can earn points for doing the homework, and we will ask you about it each week, but we never embarrass people who haven't done the homework.

What are the benefits to me for taking part in the study?

Most teens who participate in the social skills group have fun, meet new people, and learn more about how to make friends.

Can anything bad happen if I am in this study?

We don't think anything bad will happen in the study. Sometimes you might not want to join, and sometimes other people in the group might be annoying but can usually help everybody to get along okay.

Who will know that I am in the study?

We won't tell anybody that you are in this study and everything you tell us and do will be private. We do tell your parents how you did each week in the group, including the great things you did that day, because they don't watch the group, they have their own meeting. If you ever tell us that you want to hurt yourself, we will talk to you and your parents about that to make sure you are getting help. When we tell other people or write articles about what we learned in the study, we won't include your name or that of anyone else who took part in the study. We have asked your parents for permission to record our sessions and asked them how they want those videos to be used, but we never post them anywhere or give them to anybody. We only use them for research and training.

Do I have to be in the study?

No, you don't. The choice is up to you. No one will get angry or upset if you don't want to do this. You can change your mind anytime if you decide you don't want to be in the study anymore.

What if I have questions?

If you have questions at any time, you can ask us and you can talk to your parents about the study. We will give you a copy of this form to keep. If you want to ask us questions about the study, contact Terisa Gabrielsen at 801-422-5055, Terisa_gabrielsen@byu.edu

Before you say yes to be in this study what questions do you have about the study?

If you want to be in this study, please sign and print your name.

Name (Printed): _____

Signature: _____ Date: _____

APPENDIX E

Video Release Form

As part of this project, I will be making video recordings of you and your child during your participation in the research. Please indicate what uses of this video you are willing to permit, by initialing next to the uses you agree to and signing at the end. This choice is completely up to you. I will only use the video in the ways that you agree to. In any use of the video, you (or your child) will not be identified by name, but sometimes names can be heard on video, which is unavoidable.

We do not have any way to remove individual images from the recordings. You do have a choice as to whether any data are collected from the video recordings, however. The main research data that are being collected are the social engagement of participants, taken from the video recordings of the social skills group sessions. The main research data collected from the parent groups are the qualitative experiences (comments) of families with a teen who has high functioning autism. All data collected is completely de-identified. Parent group data are aggregated as a group, not individually identified.

Myself My child

_____ _____ Video can be viewed by the research team for use in the research project.

_____ _____ De-identified data gathered from viewing the videos can be used for scientific publications.

_____ _____ Video can be shown at scientific conferences or meetings.

_____ _____ Video can be shown in classrooms to college students.

_____ _____ Video can be shown in public presentations to non-scientific groups.

I have read the above descriptions and give my express written consent for the use of the video of my child _____ (name of child) as indicated by my initials above.

Name (Printed): _____ Signature: _____ Date: _____

I have read the above descriptions and give my express written consent for the use of the video of myself as indicated by my initials above

Name (Printed): _____Signature _____ Date: _____