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TITLE: Clinical Trial of a Comprehensive Treatment for High-Functioning Children with ASD

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13. SUPPLEMENTARY NOTES

14. ABSTRACT
The purpose of this RCT is to test the efficacy of an outpatient psychosocial treatment (MAXout) on the ASD symptoms and social-communicative functioning of 7-12 year olds with HFASD. The treatment targets social/social-communication skills, non-literal language skills, emotion-decoding skills, and interest expansion. Treatment is delivered over 18 weeks (two 90 min. sessions/wk.) with each treatment group consisting of 4 children with HFASD and 2 staff clinicians. Treatment efficacy is assessed immediately following the 18-week treatment and 4-6 weeks post-treatment. Following year 3, significant progress has been made in regard to the major activities/objectives which included: (1) renewal and completion of the regulatory review; (2) implementation of the treatment for sampling wave 4; (3) completion of pretest, posttest, and follow-up measures for sampling wave 4; (4) enrollment of sampling wave 5; (5) recruitment and training of staff clinicians and research assistants; (6) implementation of the treatment for sampling wave 5; (7) completion of pretest, posttest, and follow-up measures for sampling wave 5; (8) enrollment of sampling wave 6; and (9) recruitment and training of staff clinicians and research assistants for wave 6. Per the SOW, all of these were completed in year 3.

15. SUBJECT TERMS
High-functioning children with ASD, outpatient treatment, comprehensive psychosocial treatment, MAXout, group-based treatment

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1. INTRODUCTION

This RCT is testing the efficacy of an outpatient comprehensive psychosocial treatment (MAXout) on the ASD symptoms and social-communicative functioning of 7-12 year olds with HFASD. The manualized treatment targets social/social-communication skills, interpretation of non-literal language skills, emotion-decoding skills, and interest expansion. Treatment is delivered over 18 weeks (two 90 min. sessions/wk.) with each treatment group consisting of 4 children with HFASD and 2 staff clinicians. The protocol utilizes direct instruction, modeling, role-play (rehearsal), performance feedback (reinforcement), transfer of learning, and repeated practice to foster skills acquisition and maintenance and reduce ASD symptoms. Treatment efficacy is assessed immediately following the 18-week treatment and 4-6 weeks post-treatment.

2. KEYWORDS

High-functioning children with ASD, outpatient treatment, comprehensive psychosocial treatment, MAXout, group-based treatment

3. ACCOMPLISHMENTS

Major goals of the project

Per the approved SOW, this single-site RCT is being conducted to evaluate the efficacy of the innovative outpatient comprehensive psychosocial treatment (MAXout) on the ASD symptoms and social-communicative functioning of 7-12 year olds with HFASD compared to control (waitlist) children with HFASD.

Accomplishments under the goals

Per the SOW, the major activities and objectives for year 3 involved: (1) renewal and completion of the regulatory review; (2) implementation of the treatment for sampling wave 4; (3) completion of pretest, posttest, and follow-up measures for sampling wave 4; (4) enrollment of sampling wave 5; (5) recruitment and training of staff clinicians and research assistants; (6) implementation of the treatment for sampling wave 5; (7) completion of pretest, posttest, and follow-up measures for sampling wave 5; (8) enrollment of sampling wave 6; and (9) recruitment and training of staff clinicians and research assistants for wave 6. The following is a description of progress per each of these activities/objectives.

Renewal and regulatory review

The local IRB renewed the protocol on Jun 21, 2018; there was no lapse in approval. The local IRB approval letter, local IRB renewal packet, and HRPO Continuing Review Submission

Form were submitted via email to the HRPO on Jun 21, 2018. **Per the SOW for year 3, all regulatory tasks were completed as proposed.**

Implementation of the treatment protocol for sampling wave 4

As proposed, the children with HFASD randomly assigned to the treatment group completed the 18-week treatment protocol. The treatment groups consisted of 4 children with HFASD and 2 staff clinicians. Treatment was delivered during two 90-minute sessions per week, with each 90-minute session consisting of two 45-minute treatment cycles. Each treatment cycle included 15-minutes of skills instruction followed by a 30-minute therapeutic activity designed to practice the skills learned in the skills instruction. The treatment cycles targeted social/social-communication skills, facial emotion recognition skills, non-literal language skills, and interest expansion using direct instruction, modeling, role-play/rehearsal, performance feedback/reinforcement, and transfer of learning. A structured response-cost point system and individualized daily note (IDN) were also used to promote and strengthen skills acquisition and maintenance and reduce ASD symptoms and problem behaviors. Response-cost and IDN feedback were provided throughout the sessions by the staff clinicians and each child could earn an on-site reward, as well as a reinforcer at home for reaching an individualized target level of performance.

Fidelity was monitored during randomly selected sessions by research assistants uninvolved with treatment delivery, through one-way-mirrored observation rooms; fidelity was 98% for skills groups and 97% for the therapeutic activities. Information was also collected from parents of children on the waitlist during the period that the treatment children were receiving treatment (parent reported support services/therapeutic programming, traumatic events, and medication status/changes). **Per the SOW, all activities/objectives involving implementation of the treatment protocol for sampling wave 4 were completed.**

Completion of pretest, posttest, and follow-up measures for sampling wave 4

Pretest, posttest, and follow-up measures were completed for the children that completed wave 4. There was no attrition from wave 4 however 1 child in the control condition failed to complete 1 of the posttest and follow-up measures. **Per the SOW, the pretest, posttest, and follow-up measures were completed for sampling wave 4.**

Recruitment and enrollment of sampling wave 5

The targeted and enrolled sample size for wave 5 was *n* = 16 children with HFASD. Written parental consent and written child assent were obtained for all participants that completed screening (screening consent/assent), as well as for those that qualified and were enrolled in the treatment trial (treatment consent/assent). These 16 children with HFASD were randomly assigned to the treatment or waitlist control groups (i.e., *n* = 8 children with HFASD in the treatment condition [4 children with HFASD in each of the 2 treatment groups] and *n* = 8 children with HFASD in the waitlist control condition). **Per the SOW, the recruitment and enrollment of sampling wave 5 was completed as proposed.**

Recruitment and training of staff clinicians and research assistants for wave 5

As proposed, 1 clinical supervisor was recruited, 8 staff clinicians were recruited and trained to implement the protocol, and 2 research assistants were recruited to conduct assessments and assess fidelity. Each of the staff clinicians passed a written exam testing her/his mastery of the treatment manual (score of 100% required), completed the training, and demonstrated $\geq$ 90% accuracy (fidelity) administering the protocol prior to initiation of treatment. In addition to conducting assessments and assisting with data management, each of the research assistants was trained in the use of the standardized fidelity forms and was required to demonstrate > 90% reliability (inter-observer agreement [IOA]) using the fidelity forms prior to conducting fidelity observations as part of the study. Lastly, 2 behavioral coders were recruited to code the video-recordings of the children's interactions. Each was required to establish IOA prior to the initiation of actual coding and each remained naïve to the treatment condition of the children in the recordings. **Per the SOW, the recruitment and training of staff clinicians and research assistants for sampling wave 5 was completed as proposed.**

Implementation of the treatment protocol for sampling wave 5

As proposed, the children with HFASD randomly assigned to the treatment group completed the 18-week treatment protocol (1 child withdrew from the treatment group). The treatment groups consisted of 4 children with HFASD and 2 staff clinicians. Treatment was delivered during two 90-minute sessions per week, with each 90-minute session consisting of two 45-minute treatment cycles. Each treatment cycle included 15-minutes of skills instruction followed by a 30-minute therapeutic activity designed to practice the skills learned in the skills instruction. The treatment cycles targeted social/social-communication skills, facial emotion recognition skills, non-literal language skills, and interest expansion using direct instruction, modeling, role-play/rehearsal, performance feedback/reinforcement, and transfer of learning. A structured response-cost point system and individualized daily note (IDN) were also used to promote and strengthen skills acquisition and maintenance and reduce ASD symptoms and problem behaviors. Response-cost and IDN feedback were provided throughout the sessions by the staff clinicians and each child could earn an on-site reward, as well as a reinforcer at home for reaching an individualized target level of performance.

Fidelity was monitored during randomly selected sessions by research assistants uninvolved with treatment delivery, through one-way-mirrored observation rooms; fidelity was 97% for skills groups and 96% for the therapeutic activities. Information was also collected from parents of children on the waitlist during the period that the treatment children were receiving treatment (parent reported support services/therapeutic programming, traumatic events, and medication status/changes). **Per the SOW, all activities/objectives involving implementation of the treatment protocol for sampling wave 5 were completed.**

Completion of pretest, posttest, and follow-up measures for sampling wave 5

Pretest, posttest, and follow-up measures were completed for the children that completed wave 5. As noted, 1 child withdrew from the treatment condition so he failed to complete the posttest and follow-up measures. **Per the SOW, the pretest, posttest, and follow-up measures were completed for sampling wave 5.**

Recruitment and enrollment of sampling wave 6

The targeted and enrolled sample size for wave 6 was *n* = 16 children with HFASD. Written parental consent and written child assent were obtained for all participants that completed screening (screening consent/assent), as well as for those that qualified and were enrolled in the treatment trial (treatment consent/assent). These 16 children with HFASD were randomly assigned to the treatment or waitlist control groups (i.e., *n* = 8 children with HFASD in the treatment condition [4 children with HFASD in each of the 2 treatment groups] and *n* = 8 children with HFASD in the waitlist control condition). **Per the SOW, the recruitment and enrollment of sampling wave 6 was completed as proposed.**

Recruitment and training of staff clinicians and research assistants for wave 6

As proposed, 1 clinical supervisor was recruited, 8 staff clinicians were recruited and trained to implement the protocol, and 2 research assistants were recruited to conduct assessments and assess fidelity. Each of the staff clinicians passed a written exam testing her/his mastery of the treatment manual (score of 100% required), completed the training, and demonstrated $\geq$ 90% accuracy (fidelity) administering the protocol prior to initiation of treatment. In addition to conducting assessments and assisting with data management, each of the research assistants was trained in the use of the standardized fidelity forms and was required to demonstrate > 90% reliability (inter-observer agreement [IOA]) using the fidelity forms prior to conducting fidelity observations as part of the study. Lastly, 2 behavioral coders were recruited to code the video-recordings of the children's interactions. Each was required to establish IOA prior to the initiation of actual coding and each remained naïve to the treatment condition of the children in the recordings. **Per the SOW, the recruitment and training of staff clinicians and research assistants for sampling wave 6 was completed as proposed.**

Opportunities for training and professional development provided by project

Although this project is not intended to provide training and professional development opportunities, a number of opportunities are inherent in the project activities including the enhancement of knowledge, skills, and proficiency of undergraduate and graduate students, as well as parents of children with HFASD participating in the trial. These opportunities were afforded to these individuals as a function of their involvement in the evaluation of the outpatient treatment (MAXout) (e.g., intervention implementation, fidelity monitoring, assessment, data management, parent training).

In this study, undergraduate and graduate students serve as staff clinicians (delivering the manualized treatment), research assistants, behavioral coders, and research clinician supervisors. These students receive extensive training in autism spectrum disorder/HFASD, the current state of treatments for HFASD, the empirical basis of the MAXout framework, administration of the MAXout protocol, and effective fidelity monitoring. Depending on their position, they spend considerable time prior to the intervention practicing and demonstrating proficiency ($\geq$ 90% fidelity) implementing all components of the treatment, or establishing IOA measuring fidelity or coding behaviors. The undergraduate and graduate students also receive

training in the administration and scoring of several outcome measures, as well as in data management and monitoring of data accuracy. Lastly, parents of children with HFASD in the active treatment condition participate in parent training. These parent training sessions educate parents on the components of the program, and strategies for reducing ASD symptoms and promoting skills and generalization. All of these training opportunities were provided and/or supported by the study coordinator, developers of the MAXout protocol, and/or data manager and they will continue to be offered over the course of the study.

Dissemination of results to communities of interest

Nothing to report involving dissemination of results (i.e., outcomes). To date, outreach activities have been undertaken mainly to share information about the project with clinical practitioners and school administrators/staff that would not ordinarily be aware of such research activities. Sharing this information about the project has increased public knowledge of the project, as well as assisted with recruitment of participants.

Plans for accomplishing project goals in next reporting period

For the next reporting period, we anticipate accomplishing all goals/objectives according to the timeline delineated in the SOW. The project is on-schedule and we do not anticipate any changes to the proposed timeline for the upcoming quarters or annual reporting period.

4. IMPACT

Impact of the project on development of the principal discipline(s)

Nothing to report at this point on treatment efficacy. The study is evaluating the efficacy of a comprehensive outpatient psychosocial treatment (MAXout) for children with HFASD. At present, little is known about how to effectively and robustly increase the social and communication skills, and reduce the ASD symptoms of these children in an outpatient format. This subgroup of children with ASD has received limited treatment research attention and their impairments pose a significant challenge to clinical and educational professionals, and parents. Findings from this study will likely impact the fields of psychology and psychiatry. Empirical support for the MAXout program will provide clinical professionals with a clearly-defined and manualized treatment protocol (instructional techniques, content, and progress monitoring measures) for use in clinical outpatient settings. In addition, the comprehensive intervention in this study (MAXout) is an adaptation of another evidence-based psychosocial treatment for children with HFASD that is delivered in a summer program format (summerMAX). Support for the MAXout and summerMAX programs will allow flexibility in the manner in which public resources may be directed or the delivery format of the critical elements in the programs (outpatient or summer program delivery).

Impact on other disciplines. Nothing to report

Impact on technology transfer. Nothing to report

Impact on society beyond science and technology

No conclusions on efficacy are yet available however preliminary results (from the pilot study) suggested positive effects of the treatment on several targeted areas (e.g., social-communication skills, ASD symptoms, etc.). Although final results are not yet available, support for the MAXout treatment protocol may impact the social conditions and outcomes for individuals with HFASD. Findings of other studies have indicated that individuals with HFASD experience long-term challenges that limit their independence and ability to maintain employment, leading to prolonged dependence on family members and societal resources. Improving the social-communication skills and ASD symptoms of children with HFASD may impact future adaptive functioning, and allow career- and vocational-development programs to yield greater successes.

5. CHANGES/PROBLEMS

Changes in approach and reasons for change. Nothing to report (study is progressing as originally proposed)

Problems or delays and actions or plans to resolve them. Nothing to report

Changes that significantly impacted expenditures. Nothing to report

Significant changes in use or care of human subjects. Nothing to report

6. PRODUCTS

Publications (articles, books), conference papers, and presentations. Nothing to report

Website(s) or other internet site(s). Nothing to report

Technologies or techniques. Nothing to report

Inventions, patent applications, and/or licenses. Nothing to report

Other products. Nothing to report

7. PARTICIPANTS AND OTHER COLLABORATING ORGANIZATIONS

Individuals who have worked on project

Name: Christopher Lopata
Project role: PD/PI
Nearest person month worked: 3
Contribution to project: No change

Funding support:

Name: Marcus L Thomeer
Project role: Co-PI
Nearest person month worked: 3
Contribution to project: No change

Funding support:

Name: James P Donnelly
Project role: Co-PI
Nearest person month worked: 3
Contribution to project: No change
Funding support:

Name: Jonathan D Rodgers
Project role: Co-PI
Nearest person month worked: 7 (calendar)
Contribution to project: No change
Funding support:

Name: Rachael Kapuscinski
Project role: Graduate Assistant
Nearest person month worked: 3
Contribution to project: No change
Funding support:

Name: Adam Booth
Project role: Staff Clinician Supervisor
Nearest person month worked: 6
Contribution to project: No change
Funding support:

Name:	Abigail Kovalick
Project Role:	Staff Clinician
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Zoe Gionis
Project Role:	Staff Clinician
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Audrey Holt
Project Role:	Staff Clinician and Research Assistant
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Elizabeth Pittari
Project Role:	Staff Clinician and Research Assistant
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Mara Bengry
Project Role:	Staff Clinician
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Samantha Stanford
Project Role:	Staff Clinician
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name: Joana Moraes
Project Role: Staff Clinician
Nearest person month worked: 3
Contribution to Project: No change
Funding support:

Name: Natalie Ryan
Project Role: Staff Clinician
Nearest person month worked: 2
Contribution to Project: Complete the training program, establish fidelity with the protocol, assist with materials preparation, and implement the 18-week outpatient treatment to groups of children with HFASD according to the manualized protocol.
Funding support:

Name: Shelby Brennan
Project Role: Staff Clinician
Nearest person month worked: 2
Contribution to Project: Complete the training program, establish fidelity with the protocol, assist with materials preparation, and implement the 18-week outpatient treatment to groups of children with HFASD according to the manualized protocol.
Funding support:

Name: Samantha Andrews
Project Role: Staff Clinician
Nearest person month worked: 2
Contribution to Project: Complete the training program, establish fidelity with the protocol, assist with materials preparation, and implement the 18-week outpatient treatment to groups of children with HFASD according to the manualized protocol.
Funding support:

Name: Emily Neumeister

Project Role:	Research Assistant
Nearest person month worked:	2
Contribution to Project:	No change
Funding support:	

Name:	Christian Rajnisz
Project Role:	Staff Clinician and Research Assistant
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Helena Destro
Project Role:	Behavioral Coder
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Name:	Jennifer Griebner
Project Role:	Behavioral Coder
Nearest person month worked:	3
Contribution to Project:	No change
Funding support:	

Changes in other support of the PD/PI(s) or senior/key personnel since last reporting period. Nothing to report

Other organizations involved as partners. Nothing to report

8. SPECIAL REPORTING REQUIREMENTS

None

9. APPENDIX

None