INCREASING ENGAGEMENT IN VIRTUAL ACADEMIC COACHING SESSIONS IN UNIVERSITY STUDENTS WITH ASD

By

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ABSTRACT OF THE THESIS

Increasing Engagement in Virtual Academic Coaching Sessions in University Students with ASD

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This study aims to add to the sparse literature on supporting successful outcomes for university students with autism spectrum disorder (ASD) specifically in regards to their level of engagement in academic coaching sessions. This was a nonconcurrent multiple baseline study conducted with three students with ASD enrolled at an east coast university. To increase levels of student engagement, we (a) restructured the students’ academic coaching sessions, (b) implemented contingency contracts, and (c) introduced consistent and salient reinforcement throughout the sessions. Results showed that the treatment was effective in increasing the levels of engagement in all three students.
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Table of Contents

ABSTRACT ........................................................................................................ ii

ACKNOWLEDGEMENTS ........................................................................ iii

LIST OF TABLES ........................................................................................ v

LIST OF FIGURES ...................................................................................... vi

Introduction ...................................................................................................... 1

Methods ........................................................................................................... 7

Participants ..................................................................................................... 7

Materials and Setting .................................................................................. 8

Design ........................................................................................................... 9

Procedure ...................................................................................................... 11

Results .......................................................................................................... 13

Discussion ..................................................................................................... 15

References ................................................................................................... 21

Tables and Figures ..................................................................................... 24

Appendices .................................................................................................. 33
List of Tables

Table 1. *Behavior definitions and measurements* .............................. 24

Table 2. *Average reported scores for Social Validity Questionnaire* ............... 26
List of Figures

Figure 1. *Proportion of session without Engagement* ........................................ 27

Figure 2. *Behavior incompatible with Engagement* ........................................ 28

Figure 3. *Percentage of items checked on the Behavior Expectations Checklist*..... 29

Figure 4. *Skill Check Performance* ................................................................. 30

Figure 5. *DBR Report* ..................................................................................... 31

Figure 6. *Average DBR Report* ................................................................. 32
Introduction

Students diagnosed with autism spectrum disorder (ASD) are enrolling in postsecondary educational institutions with increasing frequency, and these numbers are likely to continue to grow (Wolf et al., 2009; VanBergeijk, 2008). Students with ASD face a number of challenges. Wallace et al. (2015) reported that people with ASD may experience executive functioning deficits in that they may have trouble with “working memory”, planning, flexibility, and organization when it comes to problem-solving and at times behavioral regulation. These deficits can stand as barriers to success for college students who often need to juggle multiple classes, assignments, and engagements all while also maintaining different social relationships. While there is an abundance of research on the characteristics of ASD as a diagnosis and in supporting children with ASD, there is little research examining strategies to support university students with ASD (Gelbar et al., 2014).

Autism Diagnosis and the Current Literature

ASD is a class of neurodevelopmental disorders that are characterized by a lack of proficiency in both social communication and social interaction, in addition to the presence of repetitive and restrictive behavior patterns. Individuals on the spectrum may or may not present with intellectual or structural language impairments (American Psychiatric Association, 2013). Individuals with ASD can experience difficulty with social interaction, maintaining conversations in social settings, development of relationships, perseverative sometimes obsessive thoughts, restricted interests, repetitive behaviors, and difficulty interpreting nonverbal cues (American Psychiatric Association, 2013).

Shattuck et al. (2012) found that young adults with ASD are at the highest risk of being
Increasing Engagement in Students with ASD

Disengaged from any kind of postsecondary education or employment and that this risk persists two years after high school. It is reported that graduation rates for postsecondary students with ASD are low, some sources reporting rates as low as 39% compared to the 52% of the neurotypical population (Anderson et al., 2018). While a portion of students with ASD possess strengths such as strong memories and high-level technical skills that would otherwise set them up for success in a rigorous academic setting, some characteristics of the disorder like poor social and communication skills coupled with restricted interests and activities (American Psychiatric Association, 2013) place individuals with ASD at risk for significant challenges in the university setting (Anderson et al., 2018; Kapp et al., 2011). Though it was found that supports were most effective when used consistently and frequently, Anderson et al. (2017) found that not all supports are appropriate for all students and that some students require more intensive supports.

Executive functioning is generally defined as the ability to engage in goal-directed behavior (Elias & White, 2017; Gazzaley & D’Esposito, 2007). Deficits in certain executive functioning subdomains can result in certain impairments in areas such as adaptive behavior and even comorbid psychiatric problems. Universities typically have supports in place that can help students with ASD obtain the necessary executive functioning skills to succeed with their academics such as various tutoring services and study groups. However, resources for students with ASD are squandered if the students are not engaged or motivated when learning about the different strategies that can help them succeed. If students do not retain what was taught to them in this supportive setting, then they will not, in theory, be able to apply these strategies when they are alone and therefore will struggle to perform in the academic setting.

*The impact of the COVID-19 Pandemic on University Students with ASD*

The pandemic and the resulting lockdown have had a poor effect on the engagement of
students. The consequent switch to an all-online learning platform has highlighted the existing issues related to students’ lack of engagement and has significantly exacerbated the situation (Mukhtar et al., 2020). Since the spread of the COVID-19 pandemic the novel issue presented by the stay-at-home order has abruptly forced people into physical isolation, which is proving to be far more onerous than initially anticipated for some students (Bao, 2020). Mental health in the college student population as a whole has declined with increased rates of procrastination, decreased sense of self-efficacy, low motivation, increased distractions at home, and a general sense of cognitive overload (Mukhtar et al., 2020).

Bao (2020) noted that the transition to online services was anything but seamless. She labeled the shift as massively disruptive, noting that generally, planning a complete and effective online course requires an extensive lesson plan and creative teaching materials such as numerous audio and visual aids to provide an engaging environment for students. The sudden emergence of COVID-19 left professors and other faculty with no time at all to prepare. Many of them lack online teaching experience coupled with little to no knowledge of the ins and outs of online teaching platforms both staff and students were left in an awkward in-between with nothing but uncharted territory ahead (Bao, 2020).

While faculty struggled with the technology, students found themselves facing a formidable set of challenges of an entirely different nature. A large part of the learning process has to do with the exchange of ideas. There is a two-way street that allows for expression and feedback among peers and between students and teachers. This exchange enhances one’s sense of self-efficacy and motivation in the classroom (Wang, 2008).

Effective learning results from the social and emotional support that comes from the interaction between the student, the teacher, their materials, and their environment – an
interaction that can sometimes prove difficult for students with ASD (Bernard et al., 2009; Kruger & Dunning, 1999). Stiles (2000) asserts that learning is an inherently social process and that educators must do more than deliver electronic notes and lectures and hold asynchronous email conversations when students are looking for answers to their questions.

The pandemic has thrust the world into the pattern of distributed learning which is defined as learning that can take place at any time or anywhere. A distributed learner often does not have the option of in-person contact with teaching staff or peers as is the current world state (Stiles, 2000). By ignoring the social aspects of learning we not only run the risk of the learning becoming less effective, but we also risk the learner being overcome with a sense of isolation (Brown, 1996; Soloway, 1996). This isolation is what scores of students across the globe are experiencing due to the lockdown, and the previously noted successes of online learning seem to no longer stand in the face of the widespread mental health issues that it has triggered. Issues that students with ASD are by no means immune to.

**ASD Specific Supports in Universities**

There is a paucity of supports available to university students with ASD to be successful in a post-secondary education setting. Universities are required to have an Office of Disability Services or student accessibility office that handles general academic accommodations that students may need during their tenure at the school. The most common academic supports that universities provide are lecture notes, extra time on exams, extended deadlines, coursework modifications, and tutoring. Some common non-academic supports that are available to students are peer mentors, counseling, social support groups, parent involvement, and CBT interventions (Gelbar et al., 2014). These accommodations can fall short of the level of assistance that a student with ASD may need (Anderson & Butt, 2017).
One limitation of these disabilities services offices in a university setting is that students must self-advocate for supports in order to take full advantage of the services that the office has to offer. This may be difficult for some students with ASD who may be uncomfortable self-disclosing their disorder because of perceived social stigma (Pinder-Amaker, 2014). Additional challenges that this student population faces are difficulties with organization, time management, and study skills. At the college level these difficulties can be amplified by large class sizes, the hidden nature of their disability (i.e., it is not evident that they are struggling), and general reluctance to disclose their disability (Pinder-Amaker, 2014). Therefore, if the students are not asking for the relevant supports when it comes to organization, time management and study skills, they may not receive them.

Recently there has been an emergence of innovative programs within universities that specifically aim to assist students with ASD. These programs, more than 60 in the United States alone, work with the existing university infrastructure to provide additional supports to students with ASD through targeted academic coaching, life skills support, social skills training, curriculum and testing accommodations mental health support, group and individual tutoring, coordination, and correspondence with professors, amongst others (College Autism Network [CAN], 2021). Academic coaching sessions, specifically, aim to provide students with supplemental study skills to help address underlying deficits in executive functioning. Because the shift to 100% virtual learning was so abrupt, these programs may not necessarily have been equipped to provide the additional or different supports that students may have required.

We conducted interviews with academic coaches currently supporting students enrolled in an autism-specific support program at a large public state university. The switch to online coaching prompted the academic coaches themselves to notice gaps in the instructional model of
the existing sessions. They brought to the attention of their superiors that students presented with low engagement and their levels of academic procrastination had also been exacerbated. When our team spoke with the coaches, we simply asked them to outline any concerns or areas of deficit that they had noticed. The findings of the interview are as follows: each of the coaches reported that they were unfamiliar with the ASD diagnosis and were not trained on how to support the population. Two of the coaches also reported that their students frequently left sessions early and that they were not coming to session prepared with goals and areas that they would like to work on. The same two coaches also expressed that they were not able to effectively deliver content to students and that they were not certain if the students were retaining what was being taught to them. Lastly, all three of the coaches that were interviewed expressed concern that despite students attending weekly sessions many were still underperforming in their classes; therefore, it was clear that the coaching sessions were not having their intended effect. The coaches expressed that they held these concerns prior to the switch to virtual sessions however that the online sessions seem to have amplified the difficulties that they were experiencing.

The Current Study

The current study aimed to help students with ASD be more successful in these sessions in terms of engagement. The purpose of this study was to increase engagement during academic coaching sessions for college students with ASD. Some key research questions that we sought to answer were:

- How does the structure of the coaching session influence the level of engagement in the students?

- Will the implementation of a contingency contract increase the level of
engagement in students?

- Will introducing a salient schedule of reinforcement build a sufficient amount of support in the student-coach interaction to increase the efficacy of the learning environment?

We hypothesized that with the implementation of the treatment would be able to increase engagement in college students with autism.

Methods

Participants

Participants were initially four undergraduate students with ASD enrolled full-time at an east coast university, and who participated in a university-based program to support students with ASD. All participants were Caucasian males, consisting of one 19-year-old freshman (Peter), and three 21-year-old juniors (Ethan, Dylan, and Jeff). Part of the way through the study, one of the students (Jeff) withdrew from school and therefore also had to withdraw from the study. As part of the university support program, each student was assigned an academic coach. We selected two academic coaches (Caucasian, 54-year-old female and Caucasian, 25-year-old male) to be the academic coaches in this study.

The support team for each student was comprised of an academic coach who was responsible for delivering all skill acquisition instruction, quizzes, and general academic support with a given participant. The support team also included the students’ program coordinator, who met with them once a week after their academic coaching session to check-in and provide any additional support that the students may have needed. Academic coaching sessions focused on executive functioning skills to help students function better in their academic environments but
did not consist of any academic tutoring.

This study was approved by the university institutional review board (IRB). Informed consent was obtained from the responsible party prior to individuals beginning participation in the study.

**Materials and Setting**

The academic coaching center has pre-existing templates written for the purpose of teaching various tasks to students and our skill acquisition materials were based on these templates. Each of the nine templates corresponded to a distinct skill (i.e., test prep strategies, study skills, stress management, time management, etc.) taught to the students. These documents were used to initially inform the formation of the skill checks, and afterward, the researcher sat down with the academic coaches to go over each quiz and obtain specific feedback in order to make certain that the quizzes accurately reflected the material being taught in the coaching sessions.

Students were given the option to pick from a selection of three of the nine skills as determined by the primary investigator and the academic coaches based on the students’ individual course syllabi, with a new set of three options presented during each session. Because of this, students did not always take the same quiz at the same points during the semester. If the student communicated that they wanted to work on one of the nine specific skill areas that were not among the three presented as options, then accommodations were made for them to be able to do so in an effort to give the student control over their learning environment. Students were only presented three topics at one time instead of all nine to decrease response effort involved in making a selection (i.e., the more options one has the more difficult it is to choose).

The same nine skill acquisition modules were used throughout the study, no modules
were designated for use specifically in baseline or treatment. Students took one skill check quiz at the end of each coaching session corresponding to the skill that was taught during that session (see Appendices D – L). All instruction and meeting sessions were conducted remotely through Zoom, a HIPAA-compliant virtual meeting platform. All parties (i.e., participants, academic coaches, and observers) used their personal laptop computers to attend sessions.

**Experimental Design**

A nonconcurrent multiple-baseline across participants was used to evaluate the effects of the treatment on student engagement and skill acquisition. Each student began baseline at a different time due to the logistical constraints of the academic semester, thus the nonconcurrent nature of the design.

**Dependent Variables and Measurement**

Engagement was defined as any response that was contextual and matched or corresponded to ongoing session instruction (Table 1). Examples included student’s head oriented towards the screen, answering questions within 10 s of being asked, following directives within 10 s of demand, remaining on topic and on task, and turning on their camera. Nonexamples (incompatible behavior) included any instance of off-topic dialogue, excluding topics such as various strategies posed by the academic coach.

Measuring engagement directly proved challenging and for this reason our team instead reported it as a composite state by relying on observable indicators of engagement and non-engagement (i.e., interrupting, orienting away from the screen, off topic conversation) to glean as accurate a picture as possible. Due to the difficulty of reliably/concretely measuring engagement during virtual instruction, the observer recorded the participants’ engagement in the session based on the observation of specific behavioral indicators (i.e., individual topographies of
behavior) corresponding to both engagement and the non-engagement (see Appendix C). In this way, student engagement was represented as an overarching state comprised of multiple smaller observable behaviors. The observer recorded data on their laptop computer, which was the same one used for video conferencing (Table 1).

The Direct Behavior Rating (DBR) scale is a self-report measure used to help inform clinical decisions following a specified observation period (“Direct Behavior Ratings”, 2020). In this study it was added as an additional measure to help gauge how engaged each of the students was during the session. At the conclusion of each academic coaching session the student, coach, and observer each filled out this scale.

**Interobserver Agreement**

All coaching sessions were recorded through the Zoom video conferencing platform and uploaded to a secure folder in Microsoft Teams so that they could be viewed later for the purposes of calculating interobserver agreement. Four graduate students reviewed 33% of sessions equally distributed across the experimental phases. The observers completed a 45-min training session during which they were briefed on study protocols and operational definitions as well taken through some practice data collection sessions prior to beginning any scoring.

After training, the observers were provided with access to the session recordings. The datasheets were then compared, and agreement was recorded when both observers scored an interval as either an occurrence or nonoccurrence of a target behavior, and disagreement was recorded when one observer scored an interval as an occurrence and the other observer scored the interval as a nonoccurrence. IOA was calculated through exact agreement where each instance of the observers agreeing on either occurrence or nonoccurrence in each interval was
divided by the total number of intervals and then multiplied by 100. IOA was 83.33% (range, 66.67% - 100%), 69.44% (range, 44.44% - 88.89%), and 88.89% (no range, as all observers scored Dylan the same across the board) for Ethan, Peter, and Dylan, respectively.

**Social Validity**

Social validity refers to the acceptability and satisfaction of the study participants with the intervention procedures. In the current study the measure specifically aimed to gauge how effective, helpful, and enjoyable each session was for the student. Students completed a social validity questionnaire (see Appendix A) at the conclusion of each session.

**Treatment Fidelity:**

Each of the academic coaches underwent a 90-min training session. The training session consisted of an in-depth explanation and breakdown of both baseline and treatment procedures allowing ample opportunity for questions to ensure that all parties completely understood the nature and purpose of the study. Coaches were also given diagrams to help them understand how best to present and represent questions and directives in this type of one-on-one setting as well as how to redirect a student should they engage in off topic conversation (Appendices N-P).

Treatment fidelity was measured by comparing the performance of the academic coach to the expectations defined by the checklist found in Appendix M. Procedural integrity was collected for 100% of sessions and averaged to 91.5% accuracy (range, 83% - 100%).

**Procedure**

Each session was conducted virtually through the Zoom platform. Students each attended sessions once a week for about 30 to 60 min. At the beginning of each session, academic coaches stated the agenda after which they transitioned into the instructional component. Sessions were recorded, and participants, coaches, and observers completed a DBR scale on engagement at the
conclusion of each baseline session. Students also completed the relevant skill check quiz to the topic they chose at the start of the session (see Appendices D – L). Zoom session recordings were saved and uploaded to a secure folder in Microsoft Teams.

**Baseline**

During baseline, participants were presented with an infographic of behavioral expectations for the sessions (see Appendix B) at the start of the first session only. Participants then chose a skill acquisition area upon which to focus for the session. There were no programmed consequences for engagement.

**Treatment**

The treatment consisted of three components. There were two proactive antecedent strategies, the first was to set up a contingency contract based on a highly preferred reinforcer. The second was to add structure to the coaching sessions by providing a primer as to what the content of the session would be. And lastly, the third component of the intervention was a consequence-based strategy in that the academic coach delivered a salient and consistent schedule of reinforcement throughout the academic coaching session.

During the intervention condition, at the start of each session, students were presented with an infographic of behavioral expectations for the session and reminded of the terms of the contingency contract – if they received at least 8 out of 9 checkmarks on the list of expectations for three consecutive sessions, they would be able to skip the fourth session (see Appendix C for behavioral expectations checklist). They were then asked by the academic coach to choose one of three modules to be the specific skill that they would be learning that day for the first 10 min of the session.

After the teaching portion, the session progressed into reporting of grades and going into
detail about specific areas in each course that the student may need to improve on as well as addressing any other concerns that the student may have. Following this, the student and coach went over any upcoming assignments for the following week. Sessions ended with the student receiving specific feedback from the observer regarding their performance on the checklist. A steady schedule of reinforcement in the form of validating statements and praise was provided to the student throughout.

**Results**

Figure 1 displays the proportion of the academic coaching sessions during which behavior incompatible with engagement was observed for Ethan, Peter, and Dylan (pseudonyms). In the baseline phase, both Ethan and Peter displayed elevated percentages of responding ranging from about 10% to 51% of the total session duration. Dylan displayed initially low levels of time participating in incompatible behaviors in baseline with a significant increase around session five. After the implementation of the treatment, all three students displayed consistently low levels of behavior incompatible with engagement with Dylan displaying 0% of time spent engaging in behaviors incompatible with engagement by the conclusion of the study.

Figure 2 below shows the rate of responses of incompatible behavior observed during each session. Ethan showed low and more stable rates of responding in comparison to Peter who displayed higher rates of incompatible behavior in the baseline condition. Dylan, like Ethan, also displayed lower rates of incompatible behavior. In the treatment condition all three participants displayed a significant change in levels of incompatible behavior with Peter displaying the greatest amount of change. All participants showed consistently low and stable rates of responding after the implementation of the treatment package.

Figure 3 presents the percentage of items on our behavioral expectations checklist that
each participant met throughout the duration of each of their sessions. During baseline the participants completed an average of 54.17% of the items on the checklist, with Dylan performing the most consistently during these sessions. Ethan’s checklist completion increased from 33% to 90%, Peter had an increase from 55% to 90%, and lastly Dylan displayed and increase from 45% to 100%.

Figure 4 displays the results of the skill acquisition quizzes that we administered to the students at the end of each academic coaching session. The results showed that Ethan displayed a significant change in average quiz scores between baseline and treatment (63.89% to 83.63%). However, two of the three students did not have a significant difference between skill check performance during baseline and after the implementation of the treatment package – Peter’s and Dylan’s skill check scores increased from 83.27% to 86.11% and 91.67% to 95.83%, respectively.

Figure 5 shows the DBR report for each student based on the self-report of the student, and the responses of the coach and observer. This measure meant to capture the students’, coaches’, and observers’ overall impression of how engaged the student was during the session. The graphs do not show a significant change in level when looked at individually; however, when we average the responses together, we get Figure 6. Figure 6 shows the average DBR report across participants. Averages range from 60% to 93% engaged during the session.

Social validity measures aimed to gauge how effective, helpful, and enjoyable each session was for the student. Ethan reported social validity increased from 86.7% to 95% for effectiveness, 80% to 96.7% for helpfulness, and 83.3% to 93.3% for how enjoyable the session was. Peter reported increases from 84% to 94%, 84% to 96%, and 84% to 94% for how effective, helpful, and enjoyable the sessions were from baseline to treatment, respectively. Lastly, Dylan
reported no change between baseline and treatment, he consistently reported that sessions were 90% effective, helpful, and enjoyable across conditions. Each student contacted the reinforcer laid out in the contingency contract (skipping the fourth session after earning and 8/9 on the behavior expectations checklist for three consecutive sessions) once during the semester and had each moved on into the second round of the contingency contract with the expectation that these sessions will continue and the reinforcer will be made available to them should they earn it.

**Discussion**

The results of this study led us to conclude that the treatment package, which included restructuring the coaching sessions, implementing a contingency contract, and introducing a salient schedule of reinforcement, was effective in improving the level of engagement that students displayed during academic coaching sessions. We observed a decrease in the overall duration and in the rate of responding incompatible with engagement for each student during their individual sessions. There was also an observed increase in the number of behaviors displayed on the behavior expectations checklist. In terms of skill acquisition only one of the three participants displayed a significant change in average quiz scores. Collectively these findings provide support for the use of this treatment package in academic coaching sessions both in virtual and in person settings, as student engagement is crucial for desired outcomes regardless of the setting/format.

This study extended the research on university-based supports for students with ASD by exploring the existing supports that were available to them and developing an ABA-based approach to help increase their engagement increasing their likelihood of success. This research is potentially relevant to the many (i.e., over 60) autism specific support programs at universities across the United States. This research could be replicated or adapted to meet the support needs
of students with ASD across each of these distinct settings.

There were many aspects of conducting research with university students with ASD within the natural academic setting that proved challenging. Early on, we encountered difficulty when attempting to identify salient reinforcers for each of the students. This was especially difficult to do because previous models of preference assessments were not developed with university students with ASD in mind. None of the positive reinforcement contingencies that were piloted in the initial stages of the study seemed powerful enough to stand as a reliable motivator. Subsequently, a negative reinforcement strategy (i.e., providing escape from something undesirable in this case the coaching sessions) was implemented. Possible considerations arose around potential concerns that parents may have regarding their child missing a coaching session, however, team members addressed the importance of having three consecutive, meaningful, and effective sessions as being more beneficial to the student’s learning in the long term.

Another challenge of the study was the virtual nature of the sessions. We were unable to truly capture the full roster of behaviors that potentially contributed to each student’s lack of engagement because individual topographies of behavior varied across participants. Challenges exist in not only the observation phase of this study but also in the ability to effectively provide this kind of support to these students in this format.

Time presented one of the biggest challenges in this study. We were bound by the length of the semester and lost some time due to breaks and other such events in the academic calendar and in some cases, students even missed a few sessions due to being ill. Each of these sessions also only occurred weekly so that gave us a very finite space in which to work and this, in turn, affected our ability to perhaps demonstrate stronger experimental control. Due to the way in
which the academic semester is structured students only had the ability to contact the reinforcement contingency once during the semester before its conclusion. For behavioral interventions to take effect and display reliable results it can require a sufficient amount of time to carry out each aspect of the experiment, this however, is difficult under the constraints of the academic semester.

All of our students had the opportunity to contact reinforcement once based on the parameters of their contingency contract. However, the reinforcement that they will receive for following behavioral expectations during the last few weeks of the semester will be very delayed (as we will have to wait until the students return in the fall and school starts again for the remainder of the contingency to be met). Fortunately, however the students reported that the reinforcement of being able to skip a session was valuable and they would be content to wait until next semester to see the contract through.

One final challenge of the study was administering each phase of the study through academic coaches. They stand as the primary instructors of the sessions and therefore they are the ones that are in control of the session and its direction. The research team could only observe and provide suggestions and guidance during the implementation of the intervention. Because we could not be the ones in charge of the sessions, this presented the challenge of working with and relying on someone who may not precisely understand what we are trying to accomplish with each step of the intervention and thus may not carry the procedure out exactly as it would have needed to be. And while treatment fidelity checks (see Appendix M for treatment fidelity checklist) were done for each session and the coaches were able to successfully implement each component of the treatment package, some aspects of their behavior lacked the fluency that comes with having extended training in ABA. For example, both of our coaches struggled with
being able to give clear and concise directives to their students and required prompting from the
observer to represent questions and demands.

**Limitations and Future Research**

A limitation of this study was the fact that we did not directly measure engagement and
instead reported it as a composite state. We had to rely on observable indicators of engagement
and non-engagement (i.e., interrupting, orienting away from the screen, off topic conversation) to
glean as accurate a picture as possible. Future studies should examine innovative ways of
reliably measuring engagement within dynamic natural settings.

Another limitation of the study was the fact that the skill check quizzes did not have a
standard number of points across quizzes. This created a large amount of variability across
scores and made it difficult to reliably determine if the treatment package had any effect in
improving skill acquisition. A way to remedy this in future replications of this research would be
to ensure that each skill check quiz has the same number of questions and that each question has
the same point value.

An additional limitation of this study was that it did not consider that some behavioral
expectations in certain settings might be insensitive to the core characteristics and identities of
people with ASD. There are sometimes expectations for “appropriate” student behavior in some
academic contexts that may be perceived as insensitive to the needs and identities of people with
ASD (e.g., the need to sit still quietly as a passive learner for prolonged periods of time). This
research was intended to help students with ASD succeed within the context of the existing
expectations within a specific academic setting. The intent of this research was not to
fundamentally change the identities or inherent autistic qualities of the participants in the study.
This has been a criticism of ABA clinicians in the past – that they are fundamentally trying to
change individuals with ASD. While we recognize the message of the advocates in the ASD community, we simultaneously recognize that there are behaviors that may impede and interfere with learning. There are certain expectations required by students in their respective learning environments enforced by the university and/or professor. Students regardless of their diagnostic status (i.e., those with ASD) are still expected to succeed in said environment in the way that it is today. However, society has greatly shifted towards inclusion and being cognizant of the needs of neurodivergent populations. Thus, in summation, the set of rules created by the research team are based on what is currently expected in the classroom environment. It is for this reason that the checklist only makes up one component of the treatment protocol. Future studies could examine the extent to which the identities of students with ASD are accounted for in the academic environment in which they are being educated.

Future research in this area would do well to follow students across two consecutive semesters (i.e., start in the fall semester and continue through the end of the spring semester). This will allow more leeway in terms of some of the time-related challenges that the research team experienced. This would also allow the coaches to become more comfortable implementing the treatment protocol and help create more fluency across sessions. In addition, this would allow the administration of skill check quizzes in each topic more than once (ideally first administering the quiz in baseline and then again in the treatment phase) to provide a clearer basis of comparison between baseline and treatment. Lastly, future research could also include a comparison study in which we implement the same treatment package but during in-person coaching sessions to see if there is a significant difference in not only results but also in the initial baseline. This may even produce a more salient treatment effect. In addition, it may also be beneficial to see if treatment effects generalize to other forms of both online and in person
instruction. Modifications to the behavioral expectations to some of the procedures would need to be made to optimize the treatment for in person implementation.

The implications of this study however surpass the simple distinction between virtual and in person academic coaching. It would be beneficial to follow the students across multiple semesters and academic settings to see if the skills that they obtained in the sessions generalized outside of the coaching environment. It would prove interesting if we saw an increase in student grades and general academic success over time as a result of the intervention.

This research suggests that the combination of this particular treatment package – the implementation of a contingency contract, restructuring the academic coaching sessions, and introducing a salient schedule of reinforcement - was an effective approach in increasing the level of engagement in these three university students with ASD in virtual academic coaching sessions.
References


### Tables and Figures

**Table 1**

**Behavior definitions and measurements**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Definition</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>On time</td>
<td>Student is present in the Zoom waiting room at the designated session start time</td>
<td>Mark either yes or no per session</td>
</tr>
<tr>
<td>Camera On</td>
<td>Student has their video camera on so that they are visible to the coach</td>
<td>Mark either yes or no for the session. Mark yes if student has camera on for the entirety of the session. Mark no if the student has their camera off for more than 5 consecutive minutes at any point during the session.</td>
</tr>
<tr>
<td>Oriented toward the screen</td>
<td>Student is facing the computer screen head on so that they are in front of the screen</td>
<td>Frequency count of instances that student is not oriented toward the screen</td>
</tr>
<tr>
<td>Making eye contact with coach</td>
<td>Student is oriented toward the screen and is looking into the camera</td>
<td>Frequency count of instances that student is not making eye contact</td>
</tr>
<tr>
<td>Answering questions</td>
<td>Student answers the question posed to them appropriately within 10 seconds of being asked</td>
<td>Latency from the last word the coach says to the first word that the student says. Mark yes if response is on topic; mark no if no response or if response is off topic</td>
</tr>
<tr>
<td>Behavior</td>
<td>Description</td>
<td>Measurement</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Following directives</td>
<td>Student complies with given directive appropriately within 10 seconds of being asked</td>
<td>Latency from the last word the coach says to when the student complies with the directive. Mark yes if directive is followed; mark no if no response or if response is off topic/off task (i.e., coach asks to share screen student begins talking about something else that happened in the class)</td>
</tr>
<tr>
<td>Interrupting the coach</td>
<td>Student speaks while the coach is speaking, thereby cutting off what the coach was going to say and not allowing them to complete their sentence. (interruption may be either on or off topic)</td>
<td>Frequency count of instances that student interrupts the coach</td>
</tr>
<tr>
<td>Off topic</td>
<td>Student engages in conversation that does not directly pertain to the lesson or class currently being discussed</td>
<td>Frequency count of instances that the student engages in off topic conversation</td>
</tr>
<tr>
<td>Off task</td>
<td>Student engages in behavior that does not directly pertain to the lesson or class currently being discussed or to a directive given by the coach (example: reading something on their screen while the coach is giving instruction.)</td>
<td>Frequency count of instances that the student engages in off task behavior</td>
</tr>
</tbody>
</table>
### Table 2

*Average reported scores for Social Validity Questionnaire*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Baseline</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Was the session effective?</td>
<td>Was the session helpful?</td>
</tr>
<tr>
<td>Ethan</td>
<td>86.7</td>
<td>80</td>
</tr>
<tr>
<td>Peter</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>Dylan</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>
Figure 1

Proportion of session without Engagement

![Graphs showing proportion of session without engagement for Dylan, Ethan, and Peter during baseline and intervention phases.](image-url)
Figure 2

*Behavior incompatible with Engagement*

![Graphs showing baseline and intervention responses per hour for Dylan, Ethan, Peter, and Dylan. Each graph compares responses during baseline and intervention sessions.]
Figure 3

*Percentage of items checked on the Behavioral Expectations Checklist*

[Graph showing the percentage of checklist items for Dylan, Ethan, Peter, and Dylan over baseline and intervention sessions.]
Figure 4

Skill Check Performance

![Graph showing Skill Check Performance for Ethan, Peter, and Dylan.](image-url)
Figure 5

DBR Report

- Ethan
- Peter
- Dylan
Figure 6

Average DBR Report

- Ethan
- Peter
- Dylan
Appendix A

DBR and Social Validity Questionnaire

**DBR**

Mark the number which reflects the total time the student was appropriately engaged in the session.

1 2 3 4 5 6 7 8 9 10
Never 〇 〇 〇 〇 〇 〇 〇 〇 〇 〇 Always

**Social Validity**

How effective did you think today’s session was?

1 2 3 4 5 6 7 8 9 10
Not at all 〇 〇 〇 〇 〇 〇 〇 〇 〇 〇 Very

How helpful did you think today’s session was?

1 2 3 4 5 6 7 8 9 10
Not at all 〇 〇 〇 〇 〇 〇 〇 〇 〇 〇 Very

Did you enjoy participating in today’s session?

1 2 3 4 5 6 7 8 9 10
Not at all 〇 〇 〇 〇 〇 〇 〇 〇 〇 Very much
Appendix B

Behavioral Expectations Infographic

How to get the most out of your Academic Coaching Sessions

1. Be on time
2. Have your camera on
3. Be oriented toward the screen
4. Make eye contact with the coach
5. Follow all directives
6. Answer questions when asked
7. Stay on topic
8. Stay on task
9. Don’t interrupt the coach when they are speaking
Appendix C

Behavioral Expectations Checklist

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Completed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>On time</td>
<td></td>
</tr>
<tr>
<td>Camera on</td>
<td></td>
</tr>
<tr>
<td>Oriented toward the screen</td>
<td></td>
</tr>
<tr>
<td>Making eye contact with Academic Coach</td>
<td></td>
</tr>
<tr>
<td>Answering questions within 10 sec. of being asked</td>
<td></td>
</tr>
<tr>
<td>Following directives withing 10 sec. of being given</td>
<td></td>
</tr>
<tr>
<td>Staying on topic</td>
<td></td>
</tr>
<tr>
<td>Staying on task</td>
<td></td>
</tr>
<tr>
<td>Not interrupting the Academic Coach when they are speaking</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix D

Critical Thinking Skill Check Quiz

| Fill in the blank: In order to be a strong critical thinker, it is important to remain |  
|---------------------------------|---|
| Short answer text |  

| Which of the following is NOT an aspect of critical thinking? |  
|-----------------------------|---|
| Analyze |  
| Synthesizing |  
| Evaluating |  
| Recall |  

| Which of the following is an example of critical thinking during a test? |  
|-----------------------------------------------|---|
| plugging in answers |  
| identifying what the question is asking you to do |  
| recalling historical dates |  
| selecting an answer without reading all the answer choices |  

Appendix E

Focus and Motivation Skill Check Quiz

What is an example of the “Five more rule”? *
Short answer text

What are two strategies to stay focused during class time? *
Short answer text

What are some reasons that people may procrastinate? Select all that apply.

- perfectionism
- setting effective priorities
- fear of failure
- poor time management
- feeling overwhelmed
- getting good grades
Appendix F

Metacognition Skill Check Quiz

Focusing on the muddiest point is what kind of metacognitive strategy? Choose all that apply.

- Evaluating
- Planning
- Monitoring

Mark all the sample exercises that you can use to employ metacognition in your studying.

- Think alouds
- Concept maps
- Note taking
- Highlighting
- Annotated problems

Name one positive outcome of metacognition.

Short answer text
Appendix G

Note Taking Skill Check Quiz

Name one effective strategy for taking notes during a lecture

Short answer text

Choose all the options that reflect effective review of notes

- Fill in gaps
- Summarize notes
- Clarify muddy points
- Consolidate information across sources (i.e. lecture notes, textbook, slides, etc)
- Recopying notes word for word

Name one note-taking technique that you would be willing to try this week

Short answer text
Appendix H

Problem Solving Skill Check Quiz

What are the steps of problem solving?

- Set-up, Annotate, Method, Recall
- Search, Algorithm, Mark up, Strategy
- Analyze, Strategy, Procedure, Check

Fill in the blank: When solving the problem make sure that you don’t ______ steps.

Short answer text

What is an effective first step to approaching a problem?

Short answer text
Appendix I

Reading Strategies Skill Check Quiz

Name two strategies you can use while reading that will help you remember content from the material.

Short answer text

What does SQ3R stand for? *

- Survey, Question, Read, Recite, Review
- Scan, Question, Read, Recall, Review
- Summarize, Query, Recite, Review, Recall

Which of the following are useful strategies for reviewing content? Select all that apply. *

- Summarizing
- Reviewing material without having a set plan
- Reviewing material within 24 hours of reading it
- Reviewing material for the first time 24 hours before the test
- Discussing the material with another person
Appendix J

SMART Goals Skill Check Quiz

What does the “A” in SMART stand for?

- Awesome
- Achievable
- Arduous
- Allow

True or False: The more general a goal is the more likely you are to achieve it *

- True
- False

Which of the following is an effective SMART goal? *

- I want to get good grades this semester
- I want to lose 50 pounds in the next three weeks
- I want to read one book every month this year
- I want to be more involved this year
Appendix K

Stress Management Skill Check Quiz

True or False: All students experience and cope with stress in the same way.

- True
- False

Name a breathing technique that you could use if you were feeling stressed *

Short answer text

Name a coping strategy that you would be willing to try to combat stress *

Short answer text
Appendix L

Test Prep Strategies Skill Check Quiz

Which of the following is NOT one of the preparation strategies that you can create?

- Study sheets
- Concept Maps
- Flipping through flash cards
- Organizers

What is one review strategy that you can use when studying for an exam?

Short answer text

What is one strategy to help ease test anxiety?

Short answer text
Appendix M

Treatment Integrity Checklist

Observer:_________________  Participant:_________________
Condition:_________________  Session:_________________

Please circle the response that best describes the coach’s performance. The coach:

<table>
<thead>
<tr>
<th>Task</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presented student with the infographic at the start of the session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presented student with behavior expectations checklist (Tx only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewed terms of contingency contract (Tx only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gave student 3 options to choose from as the topic of the session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gave a 10 - 15 min talk on the topic of the day (Tx only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gave the student 10 seconds to respond to a question</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Represented the question exactly after 10 seconds of “no response”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropped the question after a second “no response”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gave the student 10 seconds to comply with a directive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Represented the directive exactly after 10 seconds of “no response”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dropped the directive after a second “no response”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successfully redirected student to be “on task” either immediately or after 2-3 min (no more than 3 min)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix N

Academic Coaches Treatment Fidelity Training: Questions

When asking questions:

- Ask a question

  - Student responds in under 10 seconds
    - Respond to answer appropriately (i.e., provide praise, ask a follow-up question) and move on
  - Student does not respond in 10 seconds
    - Represent the original question exactly
      - Student responds in under 10 seconds
        - Respond to answer appropriately (i.e., provide praise, ask a follow-up question) and move on
      - Student does not respond in 10 seconds
        - Drop the question and move on
Appendix O

Academic Coaches Treatment Fidelity Training: Directives

When presenting a demand:

- Remember - always be direct
  - Example:
    - Say "Please share your screen"
    - Don't say "Can you share your screen?"

```
Present a directive

Student responds in under 10 seconds
  - Provide direct praise (i.e. "that's great! Thank you for sharing your screen with me!"

Student does not respond in 10 seconds
  - Represent the original directive exactly
    - Student responds in under 10 seconds
      - Provide direct praise (i.e. "that's great! Thank you for sharing your screen with me!")
    - Student does not respond in 10 seconds
      - Drop the directive and move on
```
Appendix P

Academic Coaches Treatment Fidelity Training: Redirecting

In the event that a student engages in off-topic conversation:

- **Off topic conversation takes place**
  - It necessary to return to the task immediately
    - Redirect student to the task by saying “That's interesting, but let's get back to (insert task here).”
  - Not necessary to return to the task immediately
    - Engage in the off topic conversation with the student for 2-3 minutes
      - Redirect student to the task by saying “That was interesting, now let's get back to (insert task here).”