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Stack the Deck: A Self-Monitoring Intervention for Adolescents with Autism for Balancing Participation Levels in Groups

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ABSTRACT

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Autism spectrum disorder (ASD) affects the lives of 1 in 54 children in the United States. By definition, these children often have social communication deficits as well as restrictive and repetitive behaviors that are socially isolating. Inclusion of participants with disabilities such as ASD in classroom or group settings with peers is a high-priority goal for building skills that lead to independent living and higher quality of life for all. Balancing an individual's class or group participation is not always easy with different levels of social skills, however. In a classroom, this can translate to difficulty in knowing how to participate in a way that is equal to that of their peers—oftentimes children with ASD do not realize that others also need a turn to speak or that other children are not as interested in their restricted interests as they are. We used differential reinforcement and self-monitoring within an existing token system to reduce excess participation in group settings for some individuals, with the goal of better balancing opportunities for all group members to participate. Called "*Stack the Deck*," this simple intervention allowed for more uninterrupted instruction time with fewer talk-outs and meltdowns from adolescents with ASD.

Our intervention occurred in a clinical setting, a once-weekly social skills group utilizing the PEERS® Social Skills manualized intervention for adolescents with ASD. Groups ran for 12–14 weeks in duration and taught skills such as how to make friends, how to enter and exit conversations, as well as how to host "get-togethers." Our sample size was 33, with 26 males and 7 females. These participants met criteria for autism spectrum disorder and/or had significant social impairment. They had age-appropriate verbal and cognitive abilities by parent report (later measured within the study). Across our A-B intervention, we saw changes over time when it came to participation rates for over-responders (participants who attempted to respond far above the group average during baseline) and under-responders (participants who attempted to respond at rates far below the group average during baseline), with no changes (the desired result) for individuals who were already participating at an appropriate rate. Over-responders showed the most significant changes. A secondary finding of reduced talk-outs overall within the groups was also found.

These results suggest that a fairly simple group behavioral intervention was able to produce a group environment more conducive to direct instruction that has direct application to inclusive classrooms as well as clinical environments. Further research can determine if the effects within individuals seen in one setting carry over to others.

Keywords: Autism spectrum disorder, self-monitoring, differential reinforcement, secondary reinforcement, social skills training

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DESCRIPTION OF THESIS STRUCTURE AND CONTENT

This thesis, Stack the Deck: A Self-Monitoring Intervention for Adolescents with Autism for Balancing Participation Levels in Groups, is written in a journal-ready hybrid format. This hybrid format combines the requirements of traditional theses with journal publications. This thesis report is presented as a journal article and coincides with length and style requirements for submitting research articles to education journals. The initial pages of this thesis reflect requirements for submission to Brigham Young University. The extended literature review is included in Appendix A.

In this thesis, Appendix B comprises a copy of the directions for how to implement Stack the Deck. This Stack the Deck handout outlines the rules and guidelines for the intervention in further detail. Appendix C includes contains information regarding the research consent form and a consent form approved by the Institutional Review Board (IRB) at Brigham Young University. This appendix also includes the IRB letter of approval to conduct research. Appendix D contains the study's main data collection instrument, a coding sheet. Appendix E includes the Social Validity Survey that was sent out to therapists.

This thesis structure contains two reference lists. The first reference list solely contains references included in the journal-ready article. The second list includes all citations used in Appendix A, entitled Review of the Literature.

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects about 1.5% of the population worldwide, with the prevalence estimates in children similar to their adult counterparts (Brugha, McManus, & Bankart, 2011). Within the U.S., specifically, 18.5 out of 1000 (or 1 in 54) children nationwide (at age 8) are estimated to be on the autism spectrum, with males being identified four times more frequently than females (Maenner et al., 2020). In Utah, the prevalence reported in 2016 was 1:58, and this statistic has historically been cited as higher than the national average rate (Christensen et al., 2016; Utah Registry of Autism and Developmental Disorders [URADD], 2017), but Utah was not included in the study published in 2020 for comparison. Utah's historically higher rates may be largely due to the fact that states which are consistently cited as having higher rates of autism (such as Utah and New Jersey) employ the use of autism registries, which facilitates more comprehensive record keeping than the states with lower prevalence rates (Bakian & Bilder, 2015; Howell et al., 2016).

There are two main features that comprise diagnostic criteria for autism spectrum disorder—persistent deficits in social communication and social interaction across multiple contexts, and restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association [APA], 2013). These characteristics come together to create unique challenges in a classroom setting.

According to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (APA, 2013), children with ASD present with deficits in social communication and social interaction across multiple contexts, which is measured in three domains—social-emotional reciprocity deficits, difficulties with nonverbal communication necessary for social interactions, and relational problems. A lack of social-emotional reciprocity has been defined as the inability

to engage with others and share thoughts and feelings in the same ways as neurotypical peers. These deficits may be evident in reduced or no initiation of social interaction, reduced or absent imitation of others' behavior, as well as a lack in sharing of emotions. These social behaviors are stamps of healthy peer relations—the kind of mutuality that leads to social and relational fulfillment (Petrina, Carter, Stephenson, & Sweller, 2016). These autism symptoms interfere with adeptly learning from the environment, which can leave adolescents struggling and socially isolated, often leading to depression (De-la-Iglesia & Olivar, 2015).

Deficits and differences in nonverbal communication can range from abnormalities in eye contact and body language to a total lack of facial expressions. Other nonverbal difficulties include reduced use of nonverbal communication cues as well as difficulty with recognition of nonverbal cues from others (APA, 2013). These symptoms create difficulties for children and adolescents with autism socially and are also likely to affect their mental health (Bhasker, 2013; Mehrabian, 1970).

These two aspects of ASD social impairment often contribute to difficulties children and adolescents with ASD have developing, maintaining, and understanding relationships. They can have difficulties adjusting behavior to suit differing social contexts; have trouble sharing imaginative play with others; work hard to understand perspectives and discern the interests of others; or ultimately struggle in making friends and having intimate peer relationships (Bellini, Peters, Benner & Hopf, 2007). In classroom settings, this challenge to take the perspective of others may manifest in talking-out or over-participation during direct instruction sessions—children with autism may not realize that others also want a turn. Reduced social awareness in combination with perseverative thoughts and perhaps poor impulse control can lead to frequent classroom disruptions and present barriers to forming peer relationships.

Social skills intervention packages have been shown to improve social functioning in adolescents with ASD (National Autism Center, 2015). Unfortunately, it is not a given that all children with ASD have access to adequate social skills programming (Hume, Bellini, & Pratt, 2005). Impairments in social navigation have been shown to be a predictor of less favorable future outcomes such as poor academic achievement; social failure and peer rejection; as well as substance abuse, anxiety, depression, and other mental disorders (Bellini, 2006; La Greca & Lopez, 1998; Tantam, 2000; Welsh, Park, Widaman & O'Neil, 2001).

Social impairments do not mean that children and adolescents with autism do not have a desire to interact socially with others (Lipscomb et al., 2017). On the contrary, children with autism are often painfully aware of their social shortcomings and often feel distressed when they are socially isolated without a clear understanding of what is needed to overcome these social setbacks (Locke, Ishijima, Kasari, & London, 2010). Most social skills interventions rely on this desire to change as a key component of their promised success (Laugeson & Frankel, 2010).

Social skills interventions for children and adolescents with autism are not a new concept. Today, there are many manualized interventions—including readily available, evidence-based manualized programs such as the *Social Skills for Teenagers with Developmental and Autism Spectrum Disorders: The PEERS Treatment Manual* (Laugeson & Frankel, 2010). Social skills packages seek to teach adolescents with autism how to be better able to interact with their peers, teaching the rules that were missed earlier in development. Social skills packages purport to provide individuals with ASD the skills necessary to meaningfully participate in the social environments of their homes, schools, and communities (National Autism Center, 2015). These manualized treatments are intense, multi-week interventions, teaching specific skills for forming and keeping relationships and friendships.

In addition to social communication impairment, repetitive and restrictive behaviors are also hallmarks of ASD. Because children and adolescents with ASD tend to demonstrate higher rates of stereotypic behavior than individuals with other developmental disabilities, these stereotypic behaviors are often associated with individuals with ASD (DiGennaro Reed, Hirst & Hyman, 2012). This category encompasses a variety of fluctuating behaviors, including hyper-reactivity, hypo-reactivity, or unusual interest to sensory aspects of the environment; restrictive and fixated interests that are abnormal in intensity or focus; insistence on sameness, rigidity, and inflexibility; as well as stereotypical or repetitive motor movements, use of objects, or speech patterns (APA, 2013). These behaviors can translate to extreme preference for routine, narrow interests, stereotypy, and self-injurious behavior (Bregman & Higdon, 2012). Severity can range from harmless to injury for both themselves and those around them.

In classroom and clinical settings, repetitive tendencies may be problematic when it comes to rigidity of interests and expectations. Sometimes individuals with ASD have problems transitioning between tasks, because they cannot bring themselves to move on from the task they are involved in. Oftentimes, this involves significant worry and anxiety when they are not ready for a transition, which can lead to classroom disruption (Colvin & Sheehan, 2012; Kerns et al., 2014). Others may have problems relating to their peers because they have inflexible interests and have trouble realizing that not everyone shares their narrow tastes or have a hard time contributing to conversations with others outside of these specific topics (Adams, 2000).

Rigidity and insistence on sameness during direct instruction may also manifest as an intense need to answer every question or make comments regardless of the social disruption it causes. Depending on how frequently these behaviors happen, they can impede or even halt task completion, instructional routines, and social interactions, all of which have potential for

increasing social isolation (Kennedy, Myers, Knowles, & Shukla, 2000; Koegel & Koegel, 1990; Koegel, Koegel, Hurley, & Frea, 1992; Lanovaz et al., 2014).

There are many approaches to controlling and minimizing problematic behaviors in classroom settings. One commonly used technique is using the behavioristic approach of differential reinforcement to reward desired behaviors in order to increase their frequency and withhold rewards (instead of using punishments) in order to extinguish those behaviors that are not compatible with the learning setting (Madsen, Becker, & Thomas, 1968). These two conditions are often referred to as Differential Reinforcement of Higher (DRH) rates of behavior and Differential Reinforcement of Lower (DRL) rates of behavior, respectively. In the cases of children with autism, DRLs can be especially useful in classroom management, where problem behaviors are reduced by rewarding lower levels of the behavior through the application of non-aversive stimuli (e.g., positive reinforcement). In these cases, oftentimes a token economy or points system is used in conjunction with the DRL, in order to encourage participation and discourage talking out, repetitive behaviors or other disruptive actions (Dietz & Repp, 1973).

It is commonly acknowledged that differential reinforcement's greatest strength is in its ability to promote unprompted correct responses, fostering greater participant independence over time (Johnson, Vladescu, Kodak, & Sidener, 2017; Vladescu & Kodak, 2010). Differential reinforcement is a commonly used and well-researched behavioral intervention to maintain order and facilitate learning in classroom settings, though research into the specific problem of helping regulate participation and communication skills amongst adolescents with autism is very limited.

One issue with differential reinforcement alone is that the responsibility falls solely on the teacher. The teacher must be proactive with rewards and put in the extra time and effort to correctly monitor how everyone is doing as they are teaching, which can oftentimes be

overwhelming (Jessel, Ingvarsson, Whipple, & Kirk, 2017). It also takes a lot of the responsibility away from the participants. They are not learning to be more accountable; they are not learning valuable life skills—they are learning to pair a consequence with their actions.

A useful addition to DRH/DRL is a self-monitoring intervention. These interventions work to foster personal capability and accountability. Pennington and Ozonoff describe self-monitoring as the ability to monitor one's own progress toward a goal (1996). It is a higher-order cognitive process that supports behavioral and emotional flexibility, planning, and decision making. (Henderson et al., 2015). These skills fall under the umbrella of executive functioning skills that are problematic for many populations, including adolescents with autism (de Vries & Geurts, 2015; Gilotty, Kenworthy, Sirian, Black, & Wagner, 2002; Russell, 1997). Teaching children to improve their self-control through the reinforcement of self-monitoring processes in addition to modification of participation behaviors has potential to decrease social isolation and increase classroom learning.

Statement of the Problem

Adolescents with autism, by definition, have difficulties with restricted and repetitive behaviors as well as social deficits. These weaknesses often come together to cause problems in structured social situations, like the classroom. This often goes one of two ways—either the adolescent with autism has difficulty realizing that others also need turns to participate, resulting in the monopolization of classroom discussions or the other extreme, or they do not participate at all. This lack of participation could be for a variety of reasons--feeling anxious in a social setting, not finding interest in discussions that do not fit with their limited and restrictive interests, or feeling overwhelmed by the sensory input of the classroom environment, which inhibits their ability to participate meaningfully.

Excessive commenting by a student with ASD can be hard on everyone involved in the classroom. The teacher, who is trying to manage the classroom and trying to help everyone participate equally may be stressed by trying to ignore or extinguish the persistent behaviors. Other students may feel overwhelmed or may find themselves lashing out in response to behaviors of a child with ASD in the classroom. This also applies to students with autism, themselves, who generally may not even realize that they are doing anything wrong can become frustrated when others react to unexpected social behaviors.

Because these atypical comment or participation rates may occur frequently in an ASD population, causing disruption and social isolation, we aimed to fill the gap in research surrounding the regulation of verbal group participation skills as well as balancing participation levels in group settings.

Statement of the Purpose

The underlying goal of this work was to benefit all participants in a group setting. We have created and implemented a self-monitoring intervention called *Stack the Deck* that utilizes a differential reinforcement intervention for both low (DRL) and high (DRH) rates of participation concurrently, while maintaining participation levels of participants who are already participating at a typical rate. The purpose of this study is to use a differential reinforcement intervention in conjunction with a token system to improve the group experience within a clinical social skills intervention session. The intervention was designed to lower the number of unsolicited talk-outs as well as balance verbal participation—lowering participation for those with excessive participation rates and raising input levels from those with low participation rates. These token incentives (with backup reinforcers) are purported to give participants a concrete and tangible method for self-monitoring and self-regulation in terms of their classroom input by giving them a

visual representation to help them "budget" their proper number of "turns" for participation in addition to giving them enticements (bonus points) to shape their own verbal behaviors.

Our ultimate goal is that through the implementation of *Stack the Deck*, we can help teach adolescents with ASD to self-regulate their own participation levels (instead of having to rely on a parent or teacher's input) and become more balanced classroom contributors on their own. In the pilot of the intervention, some parents reported generalization of benefits to other settings. Although collection of data regarding generalization to other settings is beyond the scope of this project, we hope that through our implementation of this intervention in a clinical setting, that participants will find greater self-monitoring abilities generalized to other classroom settings.

Research Hypotheses

This study addressed the following research hypotheses:

1. We hypothesize that a DRL/DRH self-monitoring intervention using a token system and backup reinforcers will be able to equalize participation among the group members during direct instruction.
2. Because our intervention is focused most on the classroom problem of over-participation, we hypothesize that this intervention will affect the target group of over-participators the most. We hope that secondary effects will be seen within the under-participators. We expect to see no effect on those students who already have acceptable participation rates.
3. We hypothesize that the effects of the intervention will generalize to other disruptive classroom habits, such as helping to lower talk-outs and interruptions in addition to its effects on balancing participation levels

Method

The University Institutional Review Board approved all study procedures. Parents and adolescent participants gave informed written consent and assent, respectively.

Setting

All participants were a part of a social skills group that met for approximately 14 weeks of instruction on a university Campus Child and Family Studies Laboratory. Adolescents met in one room of the lab, while parents met simultaneously in a different room of the laboratory as described in the manualized curriculum.

Participants met weekly for social skills instruction using the manualized intervention**,** *Social Skills for Teenagers with Developmental and Autism Spectrum Disorders: The PEERS Treatment Manual* (PEERS®; Laugeson & Frankel, 2010; sometimes referred to as UCLA PEERS® because of its origin at University of California at Los Angeles), which consists of a curriculum distributed across 14 hour-long sessions, administered over approximately 14 weeks. Within each adolescent session, the direct instruction portion of weekly sessions averaged about 20 minutes in duration. The PEERS® program covers a variety of topics concerning the necessary skills for forming and maintaining relationships and friendships, including the following: how to mutually trade information, such as in the case of getting to know others; how to select and approach appropriate friends; how to appropriately use humor; how to deal with rejection and disappointment; and how to better navigate the flow of conversations (e.g., entering and exiting). See Table 1 for a detailed list of lesson titles.

Table 1

Social Skills for Teenagers with Developmental and Autism Spectrum Disorders: The PEERS® Treatment Manual—Treatment Sessions Outline

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

*Laugeson & Frankel, 2010

The instruction for these classes was given by both undergraduate and graduate participants studying school psychology and other related fields (e.g., communication disorders, pre-medical, etc.). All sessions were directly supervised by a licensed psychologist. One graduate participant involved in the administration of the first group's instruction received formal (in-

person) training on the administration of the PEERS® curriculum and participated (with the licensed psychologist) in manual-based training of other therapists prior to treatment. Fidelity checks were conducted each week to monitor delivery of the intervention as outlined.

Adolescent instruction sessions normally began with homework review, followed by direct instruction, including discussion, surrounding that week's specific topic. After this instruction, adolescents were split into smaller, breakout groups where they put the new skills into practice, (e.g., trading information about a personal item or participating in indoor or outdoor games). At the end of the hour-long session, parents would then be reunited with their adolescent in order to review the coming week's homework together. Throughout the course of the class, the adolescents' attendance, participation and completion of assignments were rewarded with points, which could be redeemed for various prizes each evening as the sessions finished. The prize selection process was an optional one which could last as long as 30 additional minutes beyond class instruction.

Existing token system. At the beginning of the PEERS® intervention, a token economy was established to reward participant participation. This token economy purported to reward desirable behaviors, such as being an active contributor in the group. Points could be received for coming to the session, completing homework assignments outside of class, and participating in all aspects of the session (by making comments throughout direct instruction as well as by participating in behavior rehearsals, etc.). No points were ever taken away for disruptive behaviors such as talking out of turn—points were simply not awarded when the participants acted out. Disruptive behaviors that were not offensive to others were generally ignored in favor of differential attention to participants who were following group rules.

***PEERS®* group rules**. As noted in the PEERS intervention manual, the participants were asked to abide by 5 rules while participating. These rules were explained and discussed on the first day of class, revisited frequently verbally, and posted visually on the wall of the classroom at all times. Thus, group expectations were consistent and constantly present. These rules were to listen to others (no talking when others are speaking), follow directions, raise your hand, be respectful (No teasing, no making fun of others, no swearing, no making comments about others' bodies), and no touching (no hitting, kicking, pushing, hugging, etc.) (Laugeson & Frankel, 2010).

Parent groups. During direct instruction time with the adolescents, parents met in a separate room to receive the same lesson outline as their adolescent, in order to help them be a knowledgeable resource in helping their adolescent generalize skills learned to settings outside of the clinic. This gave the parents a place to learn "buzzwords" (vocabulary), give feedback regarding homework assignments; a place to share (and sometimes seek counsel with other parents) about the progress of their children, or lack thereof; and a place to ask for as well as share strategies that had benefitted the growth of their adolescent. Instruction for this parent group was facilitated by the same group of university participant therapists, in rotation, supervised by the same licensed psychologist mentioned previously.

Participants

The sample included 39 total participants, ranging in age from 12–17 (*M = 13.69, SD = 1.28*), comprising 30 males and 9 females. From this pool of 39 participants, 6 were removed from data analysis for a variety of reasons, including incomplete data sets due to absences and other special considerations as explained below. The final group with complete data collection included 26 males and 7 females. To protect confidentiality of participants, male pronouns will

be used to refer to all participants. Participants were recruited through the local autism community (e.g,. announcements at autism workshops, ASD parent listservs, school districts, etc.). All participants were diagnosed with ASD and/or presented with significant preexisting social skills difficulties. Recruitment materials specified that (by parent report) participants possessed age appropriate language skills, a lack of significant classroom behavioral issues and academic levels no more than two years behind their age group. Data were collected across four different cohorts, or intervention groups.

To verify ASD symptoms, as well as cognitive and language abilities, participants were evaluated. Cognitive and language abilities were estimated using standardized cognitive assessments. Selection of a specific IQ measure was determined by the need to avoid conflicts with prior or future assessments within one year of study participation. IQ measures were not administered until the sessions were underway. Within the groups, occasionally a participant's IQ was measured to be below the average range, but all of these participants continued in the group as they seemed to be benefitting per parent report.

In order to confirm ASD symptoms, a research-reliable clinician administered Module 3 or 4 of the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012) in combination with data from the Social Responsiveness Scale Second Edition (SRS-2; Constantino & Gruber, 2012) and the Social Communications Questionnaires (SCQ-Lifetime; Rutter et al., 2003). All participants met criteria for autism spectrum disorder and/or had significant social impairment, and had age-appropriate verbal and cognitive abilities by parent report.

Social skills groups also included participants who were not directly receiving the intervention, but instead acted as "typical peers," to help model social interaction. These peers

were siblings of participants (n = 6) and thus were not screened for social skills difficulties, cognitive abilities, or for ASD. These typical peers' data were not analyzed, and thus were not included in our 33 participants. Groups were consecutively created over several years as enough participants were acquired to constitute a group.

Group 1. This group spanned February 2nd, 2015, to May 18th, 2015, and consisted of 13 sessions (including one double session). The average direct instruction duration time was 27 minutes, 56 seconds (*SD* = 11:29). The therapists, on average asked 21.23 (*SD = 5.6)* questions directed to the whole group and extended an average of 9.38 (*SD = 7.29)* individual opportunities to respond per session.

The group included 13 total participants. While all 13 participants participated in the intervention during group instruction, two participants were not included in the analysis. Both participants were siblings of another participant and attended and participated only as a typical peer.

The remaining 11 participants ranged in age from 12–17 with 3 females. All 11 participants were white/Caucasian. These participants' mean Full Scale IQ or equivalent (FSIQ) score was in the average range, as was their Verbal Comprehension Index (VCI) or equivalent score, which measures verbal abilities. Most individual scores were in the average range or slightly above. The group's average Autism Diagnostic Observation Schedule, 2nd edition (ADOS-2) Comparison Severity Score (CSS) was calculated (on a scale of 1–10) to be in the moderate range. Their average Social Communication Questionnaire- Lifetime Version (SCQ-L exceeded the cutoff for concern (15). See table 2 for more detailed demographic information.

Group 2. This group spanned April 28th, 2015, to July 21st, 2015, and consisted of 12 sessions (some lessons were combined to meet schedule needs of the families). The average

direct instruction duration time was 27 minutes and 56 seconds (*SD* = 11:29). Therapists, on average asked 19.67 (*SD* = 7.68*)* questions directed to the whole class and extended an average of 11.33 (*SD* =5.77*)* individual opportunities to respond per session.

Group 2 included eight total participants. While all eight participated in the intervention during group instruction, four participants were not included in the analysis. One participant was a sibling of another participant and attended and participated only as a typical peer. Two participants were not included due to attendance concerns—both participants only attended two sessions and then decided to leave the social skills group. Another participant attended all group sessions but had a comorbid diagnosis of selective mutism and did not produce any speech during any of the group sessions, thus was a significant outlier. Despite frequent individual opportunities to respond, this participant often chose not to respond, and if he did respond, he used nonverbal communication, such as gestures. Thus, this co-morbid diagnosis was incompatible with our treatment goals, and this participant's data was excluded from group analysis.

The remaining four participants ranged in age from 11–15 and were all males. Three participants identified as white/Caucasian while the last identified as Native American. These participants' mean FSIQ or equivalent score was in the average range as was their VCI or equivalent. The group's average ADOS-2 CSS score was in the moderate range, and their average SCQ-Lifetime score exceeded the cutoff for concern of 15. See table 2.

Group 3. This group spanned November 30th, 2015, to March 28th, 2016 and consisted of 12 sessions, with some lessons combined to meet the scheduled needs of the families. The average direct instruction duration time was 21 minutes and 35 seconds, (*SD* = 7:46). The

therapists, on average asked 20 (*SD* = 7.75) questions directed to the whole class and extended an average of 12.27 (*SD* = 8.3) individual opportunities to respond per session.

The group included 15 total participants. While all 15 participants participated in the intervention during group instruction, five participants were not included in the analysis. Two participants were siblings of another participant, who attended and participated as a typical peer. The other three could not be included because they did not have complete data sets, due to attendance issues. One participant missed 2/3 baseline sessions, and thus there was not enough accurate data for this participant to determine target behaviors. The other two participants were not included because they only attended the first few sessions, and then decided to terminate group enrollment.

The remaining 10 participants ranged in age from 12–14 and included 7 males and 3 females. One participant identified as Asian/Hispanic, but the rest identified as white/Caucasian. These participants' mean FSIQ or equivalent score was in the average range, as was their VCI or equivalent score. Most individual scores were in the average range or slightly above, but there were some outliers. The group's average ADOS-2 score was in the moderate range, and their average SCQ-Lifetime score was well above cutoff for concern. See table 2.

Group 4. This group spanned November 28th, 2016, to March 20th, 2017, and consisted of 12 sessions. The average direct instruction duration time was 28 minutes and 4 seconds (*SD* = 8:14). Therapists, on average, asked 19.91 (*SD* = 9.46*)* questions directed to the whole class and extended an average of 6.82 (*SD* = 3.92) individual opportunities to respond per session.

The group included 12 total participants. While all 12 participants participated in the intervention during group instruction, 4 participants were not included in the analysis. Of these 4, three were female and one was male. One participant was a sibling of another participant, who

attended and participated as a typical peer. The other three could not be included because they did not have complete data sets, due to attendance issues. One participant was not included because there was no baseline data collected for her as he joined the group in session 4. Another two participants discontinued enrollment halfway through the study because of schoolwork loads.

The remaining 8 participants ranged in age from 12–15 and included 7 males and 1 female. While one participant identified as Hispanic, the other seven participants identified as white/Caucasian. These participants' mean FSIQ or equivalent score was in the average range as was their VCI or equivalent score. Most individual scores were in the average range or slightly above, but there was one outlier, whose scores were below average. The group's average ADOS-2 CSS score was high range. Their average SCQ-Lifetime score was above the cutoff for concern. See table 2 for more detailed demographic information.

Table 2

Mean (SD) Participant Demographic Information by Chronological Group

Group	*Age*	*(M:F)*	*FSIQ*	*VCI*	*ADOS-2*	*SCQ-L*
1	13.72 (1.55)	8:3	103.27 (11.01)	105.91 (10.97)	6.36 (1.91)	22.73(5.71)
2	12.75 (1.63)	4:0	97.50 (14.01)	108.75 (14.08)	6.00 (.81)	23.25(8.38)
3	13 (.93)	7:3	92.56 (24.89)	99.78 (19.06)	5.66 (2.87)	23.38 (6.8)
4	13.25 (1.17)	7:1	100.5 (17.02)	98.17 (29.16)	8.29 (1.17)	18.38 (8.11)
Total Mean	13.28 (1.30)	26:7	99.12 (16.80)	102.9 (18.02)	6.55 (2.28)	21.84 (6.95)

Note. M = Male, F= Female, FSIQ = Full-Scale Intelligence Quotient or equivalent, VCI = Verbal Comprehension Index or equivalent, ADOS-2 = Autism Diagnostic Observation Schedule, Second Edition, SCQ-L = Social Communication Questionnaire—Lifetime Version.

Measures

Direct observation of participation. While the precedent for most studies of social skills interventions is to use solely pre-/post-intervention repeated measures to obtain mean difference of scores (Karst et al., 2015; Wang & Spillane, 2009) a direct behavioral observational measure was implemented in this study in addition to typical parent report measures. The purpose of this added measure was to discern a pattern of change, in contrast with simply reporting the difference between the starting and ending points across our A-B intervention design. All group sessions were video recorded and subsequently coded.

Behavioral coding. Researchers coded commenting behaviors from videos of the direct instruction portions of each session, usually occurring in the middle third of a typical 60-minute PEERS® session (each weekly session was 90 minutes in total to include time for reunification with parents and choosing backup reinforcers). The times where this direct instruction began and ended were recorded on the coding sheet (see Appendix C). Each class session was recorded from three angles, due to the room size and seating set-up (surrounding a central table, typically) enabling total class visibility. Coding was completed from each of these camera views to ensure all participants were visible and all participation was coded. Data on the same individual from different camera views (by different coders) were used to determine reliability of coding.

A complete list of coded behaviors is included in table 3. Video coding was conducted by viewing each video twice. The first viewing was to code general classroom trends. Opportunities to respond, choral responses, and talk-outs were all assessed on a group level on the first viewing. The second coding pass through the video focused on specific individual behaviors. Coders recorded each participant's number of attempted comments (raised hand), noted individual opportunities to respond (called on by name before the question was asked),

counted the number of comments each adolescent made (called on after the question was asked), made note of the times the participants entered or left the instruction, and monitored points earned in the token economy throughout the session.

Table 3

Operationalized Definitions of Behavioral Variables

Variable Name	Operationalized Definition
Comment	Therapist calls on participant to answer a question using verbal or visual signal
Talk-Out	Out-of-turn comment addressed to class or therapist, loud enough for all class to hear Does not include unintelligible verbal stimming Therapist saying "Shhh" = 1 talk-out. If everyone is talking out of turn, indistinguishable = 1 talk-out Side conversations still count as a talk-out if audible on the video
Opportunity to Respond (Individual)	Therapist asks a question directly to one individual participant (by name)
Opportunity to respond (Whole Class)	Therapist asks a question/bid for entire class to respond by raising their hands
Choral Response	When the whole class responds together (No USE/KEEP cards are collected)
Hand Raise	Discrete hand up all the way or partial. Count new hand raise if hand drops all the way down and then is raised again
USE Card	USE card relinquished for a comment during direct instruction, good for bonus points if used (see Procedures)
KEEP Card	KEEP card relinquished for comment or talk-out after USE cards were used up, good for bonus point if NOT used (see Procedures)
Time IN/ OUT	Time elapsed on video when participant went off camera or returned to view
Complaints/Praise of the program	Whenever a participant comments about the intervention (e.g,. "This isn't fair!!!" or "Are we going to use the cards today?")

Comments on the effectiveness of *Stack the Deck* (e.g., comments about the fairness of the intervention or meltdowns when participation are limited) were also noted when/if they occurred as an approximate measure of social validity. Any time the participant left the room or went out of camera range for any reason throughout the instruction period were recorded under

the columns labeled time IN and time OUT, as there were no opportunities to respond during that time. See Table 3 for a comprehensive list of variables and their operationalized definitions.

Reliability. Reliability was measured by comparing the scores (percentage of individual behaviors relative to the whole group) for each of the above-mentioned categories across at least 2 individual coders for each session, with an agreement of at least 80%. Coders were trained undergraduate, post-baccalaureate and graduate students who participated regularly in group training and reliability sessions in order to attain and then maintain reliability. There were 6 total coders throughout the project. Four were undergraduate students, one was a post-baccalaureate student, and the last was a school psychology graduate student.

Before they started coding independently, coders were required to achieve reliability scores of over 80% when compared with the group consensus in at least three consecutive training sessions. To maintain this reliability, coder agreement was periodically monitored. In order to continue coding independently throughout the study, they met the requirement of consistent reliability scores over 80%. If a particular coder's reliability were to drop below 80% agreement, additional training sessions would have been necessary.

Overall reliability was 92% agreement over 15 of 45 available videos (33%; see Table 4). Overall reliability was calculated by taking the average reliability percentage of 6 available statistics. Reliability was calculated by looking at the number of agreements between coders divided by the number of available codes in the statistic (e.g., individual opportunities to respond, individual hand raises, individual comments, whole-class opportunities to respond, total opportunities to respond, and whole-group talk-outs). As shown in Table 4, individual comment levels tended to be the most reliable statistic measured. This may be because discrete comments were easy to tell apart, there was little subjectivity or personal discretion involved. The least

reliable statistic measured was whole-class opportunities to respond. This may be because this was the smallest statistic calculated (with maybe 10–20 opportunities to responder per session, as compared to talk-outs, where there were sometimes 400 per session), so fewer disagreements were allowed without greatly changing reliability statistics.

Table 4

Agreement Between Coders Across 15 Reliability Sessions

Coded Variable	Percent Agreement
Individual Opportunities to Respond	91.34%
Hand Raises	92.79%
Comments	94.52%
Whole-Class Opportunities to Respond	89.78%
Total Opportunities to Respond per session	91.91%
Talk-Outs	91.96%
Overall Reliability	92.05%

Cognitive abilities. Each participant was administered a cognitive assessment in order to characterize the sample in terms of both cognitive and broad language abilities. The PEERS® program was created for and intended to be used with participants with cognitive and language abilities at age appropriate levels. Cognitive and language abilities were estimated using standardized cognitive assessments. See Table 2 for results.

Autism symptoms. Autism symptoms and diagnosis were verified in order to characterize autism spectrum disorder symptom presence and severity using both direct

observational measures and parent report questionnaires. Participants were evaluated by a licensed and research-reliable clinician using the Autism Diagnostic Observation Schedule, 2nd ed. (ADOS-2; Lord et al., 2012). Parents completed the Social Responsiveness Scale (SRS-2; Constantino & Gruber, 2012), the Social Communication Questionnaire (SCQ-Current; Rutter et al., 2003; see Table 2 for reported SCQ results).

Social validity. Social validity is defined as whether the participants perceive an intervention as being beneficial or not, which in turn impacts how participants go on to apply what they have learned to other contexts in their lives (Ledford, Hall, Conder, & Lane, 2016). No assessment was completed by the participants to gauge how the helpful the participants viewed the intervention. Not giving a survey to assess this was a conscious decision, because it has been seen that children and adolescents with ASD tend to be poor at seriation (Yirmiya & Shulman, 1996), which is a cognitive skill necessary to reliably attain data when using self-report methods of social validity. In lieu of a questionnaire asking for Likert-scale answers, participant complaints and comments about the intervention were noted throughout the classes.

A last measure for social validity was in the opinions of the therapists administering the intervention about *Stack the Deck.* We created a survey to assess the therapists' opinions on various facets of *Stack the Deck*—such as if they saw the intervention as being useful to the participants or to them personally; if overall the therapists saw the intervention as worthwhile; and how they would change/improve it for future use. See *Appendix E* for the full survey.

Procedures

***Stack the Deck* intervention.** Within the framework of the social skills intervention sessions, the independent variable is the addition of an intervention to help balance participation rates within the group sessions. Thus our study is considered to have an A-B design, wherein

Stack the Deck, a differential reinforcement intervention for high or low rates of behavior (DRH/DRL) was introduced (after baseline behaviors were established) within an existing token system with backup reinforcers. The intervention also includes self-monitoring, as the participant is in control of how many bonus points they receive based on their own "budgeting" of their participation behaviors. The aim of the intervention is to limit the number of attempts and upset incidents (meltdowns) from participants with high rates of participation (including outbursts when they are not called on) and balance verbal participation in classroom settings by allowing opportunities for participants with low rates of participation to respond more.

The first step towards equalizing participation involves identifying participants as being over-responders needing the DRL reinforcement, under-responders need DRH reinforcement, and typical responders whose participation levels were already in sync with most members of the group during the baseline phase. Throughout analysis, participation rates were defined as the number of attempted comments relative to the total number of opportunities to respond (percentage score relative to the entire session). For example, if a participant attempted to answer every opportunity to respond in the session, the participation rate would be 100%. Target behaviors are then identified based upon this data, and the participants are subsequently given either an intervention to increase or decrease their participation levels to a more balanced, average level. The intervention was "stacking the deck" by giving different bonus incentives to participants who needed to regulate their participation behavior in different directions (increasing the reinforcement of targeted, desired behaviors, which differed by participant). Some had a target behavior of more participation, some had a target for letting others participate more by decreasing their own attempts at participation, and some were just maintaining their current

balance of participation that was already within the average range, all within the same token system of reinforcement.

While points were awarded within the existing token economy regardless of what intervention stage the group was in (e.g., baseline, or treatment), *Stack the Deck* cards were only implemented throughout the intervention phases of the experiment. By monitoring the use of these cards, we purported to back up the data gleaned from the behavioral coding and the noted comment rate. The card counts served as another reliability check in this regard.

Baseline data collection. Baseline data were collected for a minimum of three weeks in each data cycle. Many aspects of participation levels were recorded and analyzed. Although comment levels were recorded each session as points. These points were used as part of the group token economy and used to make decisions about target behaviors while the group was running. Comments were defined as the participant raising his or her hand, waiting to be called on, and then completing the comment. Because there was an element of bias in comments (participants may or may not have been called on despite their desire to participate), a different participation metric was used for data analysis. Throughout analysis, participation rates were defined as the number of attempted comments relative to the total number of opportunities to respond (percentage score relative to the entire session). For example, if a participant attempted to answer every opportunity to respond in the session, the participation rate would be 100%. talk-outs (attempted participation when they have not been called on) were not counted as participation, were not rewarded with points, and were tracked separately when the video was coded.

Target behaviors. From the baseline data, there were two methods used in order to determine and assign target behavior for each specific group member. The primary method was

using observation data in conjunction with points to decide what intervention was necessary for each participant individually in order to equalize group participation levels (see table 5). Therapists were able to observe each participants' classroom participation rates and behaviors in class for the first three sessions. Thus, clinician judgement was the primary method of determining appropriate target behaviors for each participant as the experiment was occurring.

The second method of determining target behaviors was descriptive statistical analysis. This statistical analysis was mainly used to verify previous clinician judgement based upon observation. Each groups' target behavior divisions were verified by statistical analysis of means and standard deviations. First, an average group participation rate was calculated from the baseline data. This participation rate was defined as attempted participation rates (number of hand raises) per opportunities to respond (an individual's percentage of participation within the group).

Then, target behaviors were determined by how far the participants' individual participation rates deviated from the mean. For example, group members with below average participation, defined as below one standard deviation from the average participation rate, had the goal of increased participation as their target behavior. Participants with participation rates that were at least one standard deviation above the mean had the goal of decreased participation as their desired behavior. Participants with average or typical levels of participation, shown through their percentages which were within one standard deviation of the mean and thus were within the average range, had no target behavior other than to maintain their participation rates.

Table 5

Target Behavior Distribution Across Chronological Groups

Chronological Group	Over-Participators Decrease Participation	Under-Participators Increase Participation	Average Participators Maintain Participation	Total
1	3	4	4	11
2	3	1	0	4
3	0*	4	6	10
4	2	2	4	8
Total	8	11	14	33

*Statistical analysis varied from observational data. By observation, no participants in this group were over-participating. Statistical analysis produced one member of the group as <1SD above the mean, but clinician judgment overruled the statistical analysis.

When statistical analysis was used to verify treatment group membership, all decisions about group membership made by clinician judgment were verified, with the exception of an anomaly in Group 3. In chronological Groups 1, 2, and 4 the spread of target behaviors was as predicted by clinician judgment based on observation and point totals. Statistical analyses and clinician observation both attained the same results for target behavior divisions. For Group 3, this small group was characterized by a large number of quiet participants. During the baseline phase, there were several individuals with zero participation rates despite multiple attempts to engage them. Thus, statistical analysis would have expected that there were at least 1 or 2 over participators in this group, when that was not actually the case in reality, as the group average was skewed to such a low level. Statistical analysis failed to match clinician assignment in Group 3, likely due to lack of variation among the individuals. Thus, our method of determining target behaviors by observation and clinician judgement first, and then using statistical analysis as a

secondary method of verification was deemed to be the more accurate indicator of which target behavior was most appropriate for the individual as low numbers in a group can skew statistical analysis.

Because over-participation was the most disruptive behavior to balancing group participation, anticipated results were expected to be most noticeable for participants with excessive talk-outs and comments. This change in behavior, in turn, was expected to help under-participators because with the intervention in place, high participators had a visual signal that their "turns" had been used up and notice that other participants need a turn and would choose to not attempt a comment in favor of earning more bonus points for restraint, clearing the way to encourage the low participators.

In addition, target behaviors were never explicitly discussed with participants. No direct feedback was ever given to the participants about their participation levels and no goals were ever openly given to the participants. Thus, all changes were likely to have happened based on the DRL/DRH and self-monitoring, not because the participant had a cognizant goal and thus exercised any restraint or extraordinary effort either to please the therapist or for their own satisfaction.

Intervention. The intervention included each participant receiving 10 slips of colored paper at the beginning of the social skills session, which measured approximately 2 inches by 4 inches. As a warm-up activity, adolescents wrote their names on each slip before direct instruction began. The colors we describe here will be green and red for "USE" and "KEEP" cards respectively, but these card "decks" always contained two colors, with the colors varying from week to week in order to decrease face validity, or association of any particular color with a behavior. As stated before, no goals were ever explicitly discussed with individual participants;

thus, by frequently changing the colors, the participants were less aware of the differences in the way the various decks were "stacked" to regulate their behavior. This allows us to attribute the reason for behavioral change over the course of the intervention on Stack the Deck, as a self-monitoring intervention.

Stack the Deck cards were worth bonus points in addition to the existing token economy, meaning that *no participation points were ever taken away* throughout the intervention. Opportunity costs could be considered by participants if they were over-participating, but there was never a penalty for participation, with points continuing to be given for all participation regardless of card status. Each participant received one of three types of "stacks" or ratios of cards, depending of their individual target behavior. For example, for those with a target behavior of *decreased* participation, the ratio of USE to KEEP cards would be 4:6, with more incentive to refrain from responding excessively (e.g., they could make 4 comments and get 4 bonus points for USE cards, but then had to decide if they would rather refrain from commenting after their 4 USE cards were gone in order to receive bonus points for the 6 KEEP cards that were not used for additional comments). In line with this, another ratio was implemented for those with a target behavior of *increased* participation (USE to KEEP ratio of 6:4), and a third "stack"—an even ratio (where the USE to KEEP ratio is 5:5)—was applied to those whose participation was already in the average range (see Table 6).

Table 6

Stacking the Decks—Composition of "Decks"

Stack Type	"Green Cards" USE cards	"Red Cards" KEEP cards	Target Behavior
Stack Type 1:	6	4	Increased participation
Stack Type 2:	4	6	Decreased participation
Stack Type 3:	5	5	No change in behavior

At the start of the intervention (following three weeks of baseline data collection), the *Stack the Deck* classroom rules were established, setting up the expectations for the participants throughout the intervention. The given rules were as follows (see Appendix A for more detail):

- *Stack the Deck* cards are only valid during direct instruction periods. These parts of the session (core instructional time) are designated as "bonus" times when participants may earn bonus points when they budget their participation in the discussion. Participants may contribute to the discussion as they wish, but every time they make a comment during direct instruction (including talk-outs), they must give a card to the facilitator, starting with the "green" or USE cards first until they are all gone. Points were awarded, as usual, for all comments made when called on by a therapist during this time, as *Stack the Deck* cards were merely for bonus points.
- Other parts of the session are designated as "free participation time." Cards do not have to be used and any group member can volunteer comments or respond to questions and receive participation points, but no bonus points from *Stack the Deck* cards. Points for participation were given as usual. Examples of free time in the group

can be checking-in, reporting on homework, choral responses, behavioral rehearsals, etc.

- Green (USE) cards earn extra bonus points if they are used. Talk-outs during direct instruction/bonus time will result in the forfeit a USE (green) card. No participation points are granted for talk-outs, but none are taken away. The opportunity for a bonus point is lost, however, as the USE card from a talk-out is thrown away.
- Red (KEEP) cards earn extra bonus points only if they are kept. After all USE cards have been used, *participants can still be called on to answer if they are not paying attention* and have to forfeit a KEEP (red) card if their USE (green) cards are gone (even if they give no response). This rule was created to avoid a participant "checking out" of the group if their USE cards were all gone. In order to keep their KEEP cards, they had to maintain attention even if they were refraining from commenting.

Thus, when implementing *Stack the Deck*, it was in the participant's favor to learn to budget their comments. They could earn more bonus points within the token economy if they used their USE cards and kept their KEEP cards. It could pay off if a participant learned to participate at a level that was more equal to their peers within the group. It was the goal of *Stack the Deck* to teach participants how to self-monitor their comment levels, without constant prompting from therapists. Token reinforcement with backup reinforcers were used to incentivize increased awareness in participation levels and lead to a greater capacity for self-regulation in classroom settings. Points in this token economy could be redeemed at the end of class for individual incentivizing tangible rewards. Backup reinforcers included food, candy, or small items of current interest (e.g., *Magic the Gathering* cards, Rubik's cubes, *Minecraft* items, art supplies).

Research Design

The intervention was an A-B design, meaning that the intervention was not withdrawn in order to assess for generalization after it was introduced. The experiment spent the first three sessions with no intervention implementation, in order to gain the sufficient baseline data to inform target behaviors. The duration of baseline data collection was the same for each chronological group. The rest of the sessions were then spent utilizing *Stack the Deck*. This amount of sessions varied by chronological group, with three groups spending eight sessions utilizing the intervention and one group utilizing nine.

While pilot studies utilized A-B-A-B and A-B-A designs, it was anecdotally noted that withdrawal phases were difficult both for students as well as teachers and aides, notably in the domain of classroom management (Montgomery, 2018). Although withdrawal was contemplated in the study design, therapists expressed strong concerns about disruption to direct instruction, so withdrawal was deemed to be detrimental to the participants. Thus, it was decided that an A-B intervention would be the most ethical design to fit the needs of our participants.

One group (group 3) included an extra session on personal hygiene after the completion of the initial intervention, after implementation phase was completed that could have served as a return to baseline, but this was not available for the other groups and was not analyzed.

Dependent variables. Within each of these chronological groups, the same dependent variables were calculated from behaviors that were coded. These variables are as follows.

Attempted participation rates. Our major dependent variable throughout the course of the implementation of Stack the Deck was the change in individual rates of attempted classroom participation throughout the direct instruction period of a clinical social skills group session. This

attempted rate of participation was operationalized as number of hand raises per opportunity to respond across each session.

First, hand raises were behaviorally coded as a discrete raising of a hand up to any degree angle above the desk (see Table 3)—all the way up in the air (perpendicular to the table) or partial. It was counted as a new hand raise if the participant's hand dropped all the way down (parallel to the table) and then was raised again. The expectation with intervention was to see rates of hand raises/attempts regress towards the mean rate, indicating a normalization in attempted participation over time.

Next, these numbers of hand-raises were then turned into a rate of participation by dividing them by the number of opportunities to respond per session. The number of total opportunities to respond (or therapist bids) was assessed by counting the number of times the therapist asked a question directed to the whole group. This created a ratio that informed researchers how intensely a participant attempted to answer each question posed to the whole class. It was anticipated that these participation rates would regress towards the mean over the course of the intervention, meaning that over- and under-participators' rates normalized over time, as evidence of the efficacy of the intervention.

Completed comment rates. In addition to attempted participation rates, frequency of completed comments were also noted as a dependent variable. A comment was defined as the participant raising his or her hand, waiting to be called on, and then completing the comment. These individual frequency counts were examined in comparison to the attempted participation levels (or hand raises), because it helped researchers ascertain qualitative data.

Other rates. In addition to the variables that contributed directly to these participation rates, other variables that helped characterize each session were noted: the number of total

opportunities to respond, as well as individual opportunities to respond and choral responses. The number of total opportunities to respond (or therapist bids) was assessed by counting the number of times the therapist asked a question directed to the whole group. Individual opportunities to respond (where the therapist has directed the question to a specific participant and no other participants have opportunity to respond) were recorded only if the therapist asked a participant to answer specifically by name.

Choral responses, where the whole group was expected to respond in unison and there were no opportunities for anyone to respond individually, were also noted, but not counted as participation as it was too difficult to determine who was responding and who was not. These variables helped to characterize each day of direct instruction: for example, some days just had fewer opportunities to comment—or fewer opportunities to respond (both whole class and individual). Percentage scores based on the number of opportunities ameliorated these variabilities.

Social validity comments. Comments on the effectiveness of Stack the Deck (e.g., comments about the fairness of the intervention or meltdowns when participation was limited) were also noted when/if they occurred. This was to assess the social validity of the intervention and noted the opinions surrounding the intervention of the participants involved.

Statistical Analysis

The precedent set in similar research is to analyze the data on an individual level, in order to look at specific, individualized gains (Bellini et al., 2007; Radley, 2017). These studies, though, tend to have small sample sizes, with less than 10 participants to examine. Our study, on the other hand, has a sample that is large enough to be conducive to traditional parametric statistical analysis methods. Thus, instead of looking at each individual separately, each

treatment group—separated by their baseline participation rates and specific target behaviors—was analyzed as an entity using methods similar to analysis of individuals. Prior to separation into treatment groups, each of the chronological groups was compared for differences in demographic makeup to ensure that any changes were not due to chronological group effects. This analysis was done using a chi-squared test.

Each group was scrutinized and analyzed first using visual inspection—analyzing participation rates for changes in trend, level, and variability over time. Baseline and intervention data were collected and plotted. The desired behavioral outcome was that over time, participation rates will regress towards the mean—meaning that outlying levels of participation will converge into the balanced target range throughout the course of the intervention.

Next, the data as a whole were analyzed using a split plot analysis of variance (ANOVA) in order to evaluate if there was an interaction between treatment group status and time when it comes to the rates of classroom participation. Even though we assigned the treatment group status to each participant on the basis of baseline behavioral trends, this split plot ANOVA assessed for the strength of group status as a predictor when it comes to the optimal outcome of balanced participation. This methodology is relatively common when it comes to social skills interventions (Schreibman & Stahmer, 2014), though our study will take these methods one step further by separating out the participants by their target behaviors.

Lastly, data that is of a more global nature—such as that of whole-class levels of talk-outs—was analyzed in a descriptive manner, beginning with analysis of the same visual inspection elements. Other global qualitative data—such as the opinions on the intervention of the therapists administering *Stack the Deck*, or social validity through comments on fairness made by the participants—were also documented.

Results

Prior to the main analysis, the makeup of the chronological groups was examined to determine the appropriateness of separating participants into treatment groups across the four chronological groups. A chi-squared test of independence was run on categorical chronological group data. Number of participants in each chronological group were assessed against the group mean, as well as gender makeup within each chronological group. Of these statistics, none of the categories were statistically significant, X^2 (6, N = 33) = .98, p = .98. Because this p-value is not within the .05 cutoff, the chronological groups did not vary significantly from the mean expected values. This establishes that while our chronological groups varied slightly in their individual makeup due to the differences within participants, there were no significant differences between chronological groups on demographic variables.

Because no significant differences were found on the basis of chronological group, the whole pool of 33 participants was then broken down into treatment groups. These treatments groups are split on the basis of participation rates at baseline into three groups: over-participators, who have the target goal of decreasing participation; under-participators, who have the target goal of increasing participation rates; and those who already had appropriate participation rates, and thus have no target behavior.

Our study had three major research hypotheses. The first was that *Stack the Deck* would be able to equalize participation over time, as it purported to do. This question was addressed first through the statistical method of a split-plot ANOVA. These statistical tests measure whether there was a significant interaction between time and target behavior when it comes to participation rates of participants. Next, these results were examined with more detail, leading into our second research hypothesis, which asked if there were any of the treatment groups

(separated by their target behaviors) that had greater gains than others. We delved into responders and non-responders for participants with each target behavior and discussed characteristics of those for which *Stack the Deck* was effective or ineffective. Lastly, the generalization effects of these results were inspected. We looked at how other classroom behaviors, such as talk-outs, were affected by *Stack the Deck.* Social validity was also reported.

Was *Stack the Deck* Able to Equalize Participation Over Time?

From the results of pilot studies, it was hypothesized that all participants in all groups' comment rates regress towards the mean over time. As seen in Table 7, the overall mean of participation at baseline across all chronological groups was a rate of .39 hand raises per opportunity to respond, with a standard deviation of .26. This means that on average, participants would try to respond roughly once every three questions when the group started. Across time, the group average actually went down. At the time of Lesson 11 (chosen at random near the end of the PEERS® curriculum for analysis), the average participation rate was .30, with a standard deviation of .20. This shows that across the whole sample, regardless of time or target behavioral goal, participation rates were shown to decrease slightly over time and become slightly less variable.

Whole group chi square statistic. Within these whole group statistics, we further broke down the participants into treatment groups by their target behavior. A chi-square test of independence was run on the categorical data for these treatment groups. Number of participants in each treatment group were assessed against the group mean, as well as gender makeup within each treatment group. Of these statistics, none of the categories were statistically significant, X^2 (6, N = 33) = 1.58, p = .87. Because this p-value is not within the .05 cutoff, this means that the treatment groups did not vary significantly from the mean expected values. This establishes

that while our treatment groups varied slightly in their individual makeup due to the differences within participants, there were no significant differences in the makeup of each treatment group.

Table 7

Participants' Overall Descriptive Statistics of Participation Rates Before and After Treatment

	Pre-Treatment	Post-Treatment
Mean	.38	.32
Median	.36	.31
Standard Deviation	.25	.24
Skewness	.59	.27
Standard Error of Skewness	.41	.41

Over-participators with decreased participation targets. Within each treatment group's descriptive statistics, it can be seen that all groups' means changed over time. Some participants had decreased participation as their target behavior. These participants were defined as those with participation rates at baseline over one standard deviation above the group mean at baseline. Overall, the mean for this treatment group started out the highest at .67 at baseline, which was almost double the rate of the those whose participation was considered to be in the average range. By the end of treatment, this mean decreased to .48 (19%), approaching the mean (see Table 8). These overall trends are visually represented in Figure 1.

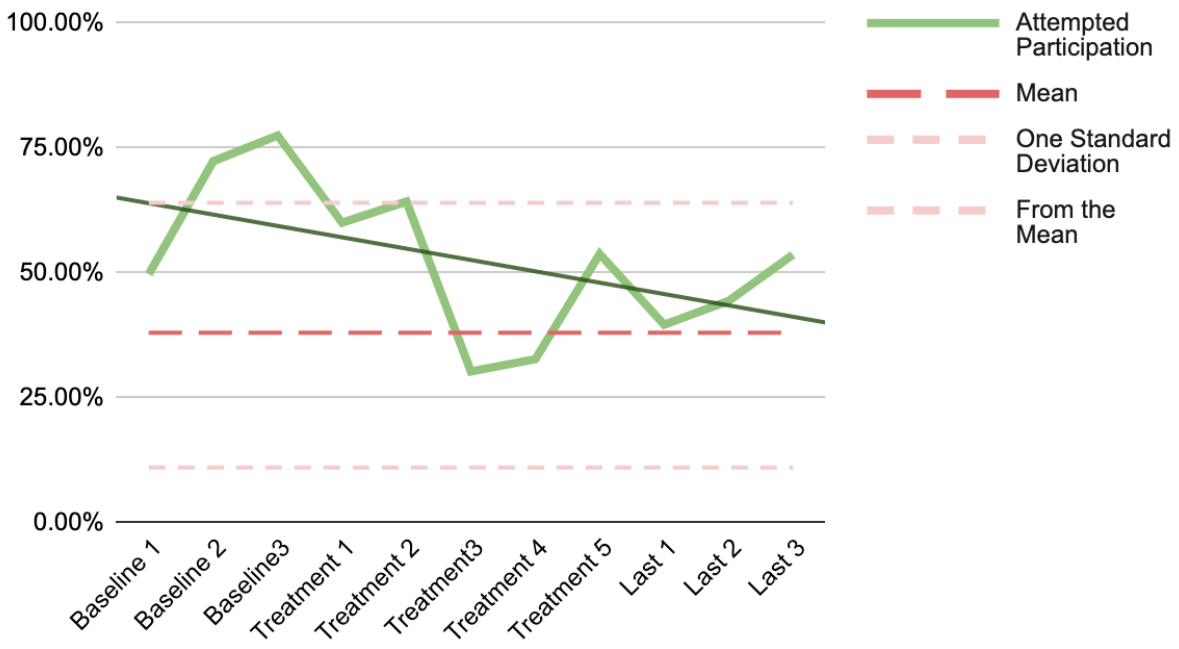

Figure 1. Overall over-participators' participation rates. This figure represents the average attempted participation rates (in percentages) for the group of participants that had a target behavior of decreasing participation over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

Typical participators with no target behavior. Over time, the typical participation rate group's comment rates slightly increased slightly over time. The average mean of those that fell within one standard deviation of the average range (.38 ± .25) at baseline was .35. Over the last three sessions, their mean participation decreased to .33, approaching the mean baseline participation rate for the whole group (see Table 8).

This group had no target behavior other than to maintain participation rates. In line with this, it was hypothesized that their participation rates would be more or less unchanged over time. This goal was met, as their participation stayed within one standard deviation of the mean. These overall trends are visually represented in Figure 2.

Table 8

Participation Rates Before and After Treatment on the Basis of Target Behavior

Target Behavior	N	Pre-Treatment Mean (Hand Raises/OTR)	Post-Treatment Mean (Hand Raises/OTR)
Decrease Participation	8	.67	.48
Sustain Participation	12	.35	.33
Increase Participation	13	.15	.18

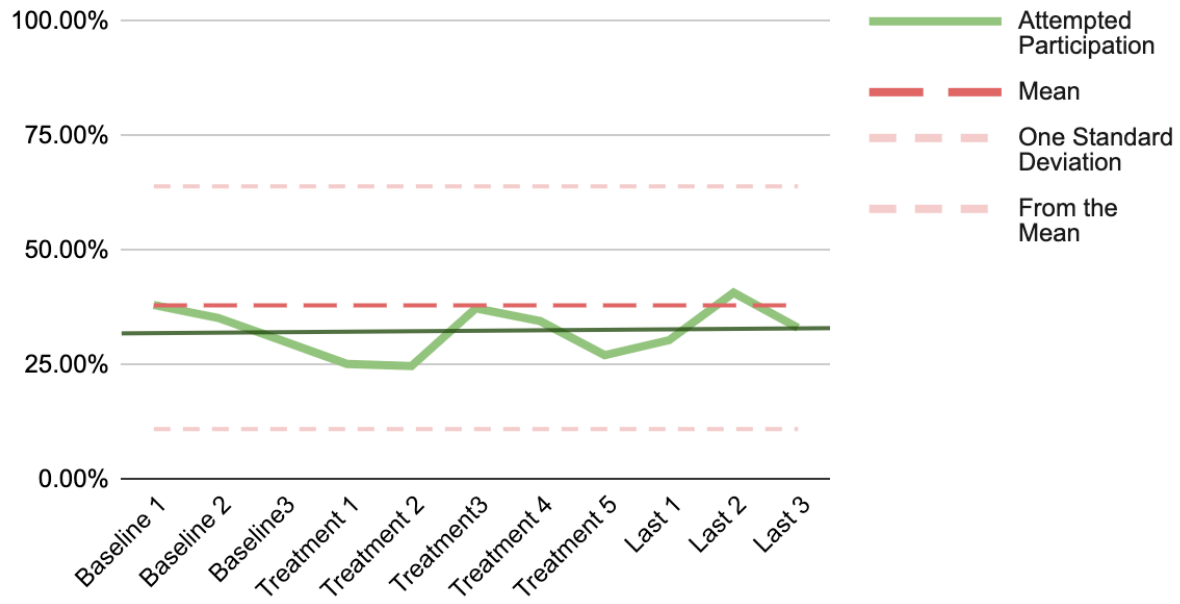

Figure 2. Overall attempted participation rate of participants with no target behavior. This figure represents average attempted participation rates (in percentages) for the group of participants that had no target behavior. These students started out within the average range and ended in the average range. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

Under-participators with increased participation targets. While the low participators' participation rates also regressed slightly towards the mean, it did so at the slowest rate. By the end of treatment (the last three sessions), their means only increased slightly, changing much less in magnitude compared to reductions in over-participators' attempts. This group's baseline mean was .15 comments per opportunity to respond, while over the last three sessions of treatment their participation rates increased slightly to .18 (see Table 8). These overall trends are visually represented in Figure 3. This change is not as vast, nor as significant as the changes in the other groups. Possible explanations for these changes will be considered in the discussion section to follow.

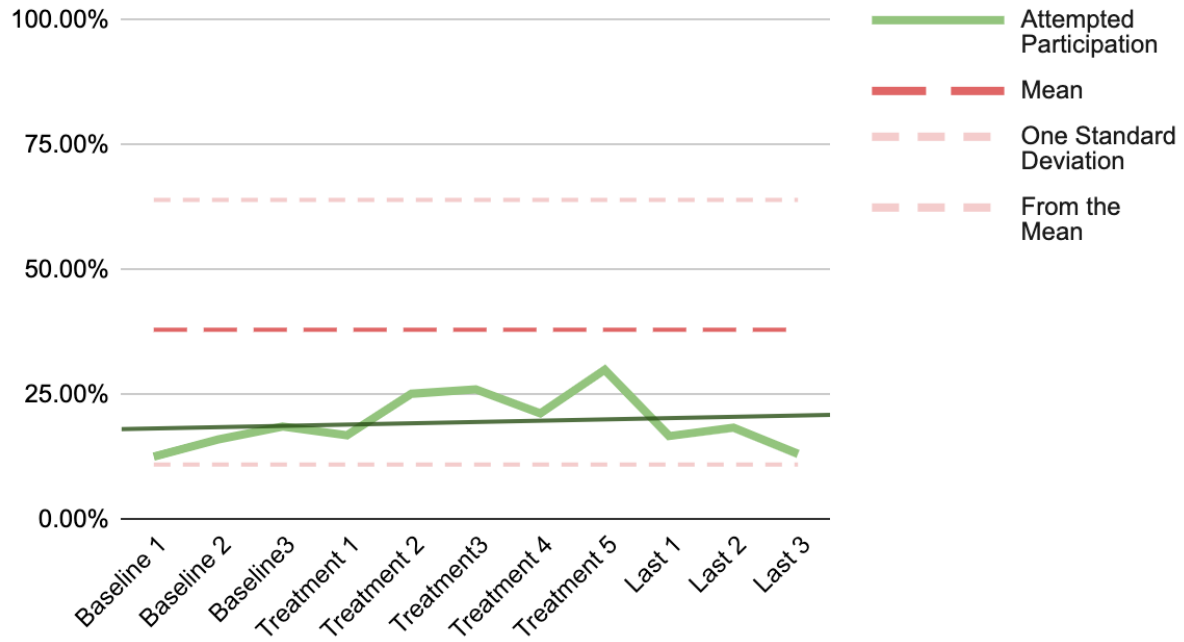

Figure 3. Overall under-participators' participation rates. This figure represents average attempted participation rates (in percentages) for the group of participants that had a target behavior of increasing participation. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

Whole group split-plot ANOVA. The three treatment groups were then further analyzed using a split-plot ANOVA. Because the participants were split into three different groups based upon their target behavior determined at baseline (dependent on how far each participant's participation rates deviated from the mean), the repeated measures results were further broken down into these three groups and then analyzed to determine the strength of their change towards the mean. For the purpose of this measure, the average of the baseline sessions and the average of the last three lessons were calculated to represent the sample before and after the intervention. Figure 4 and Table 8 show the results of the split-plot ANOVA when run using data from all chronological groups across treatment group.

We hypothesized that there would be significant differences in participants' classroom participation rates in a therapeutic setting over time, and that there would also be a significant interaction between time and treatment group (split by target behavior), in participation rates. After performing a split-plot ANOVA on the data, the *p*-value for participation rates over time was not significant ($p = .09$). This result was expected, because the different treatment groups purported to change in *different directions* over time, and the varying effects were expected to negate each other when looked at as a whole. Participation rates over time by treatment group were found to be significant ($p = .034$) and within the .05 cutoff (see Table 9). There was a significant difference between the participation rates prior to treatment and at the end of the intervention. This shows that treatment group status (and thus, target behavior) was a good predictor when it came to change over time towards the mean. Both time and target behavior together were important factors when it came to participants' behavioral change.

Table 9

Statistical Analyses of Change Over Time and Across Conditions

	Type II Sum of Squares	Degrees of Freedom	Mean Square	F	*p*
Time	.049	1	.049	3.06	.090
Time x Treatment	.120	2	.060	3.783	.034*

*$p < .05$

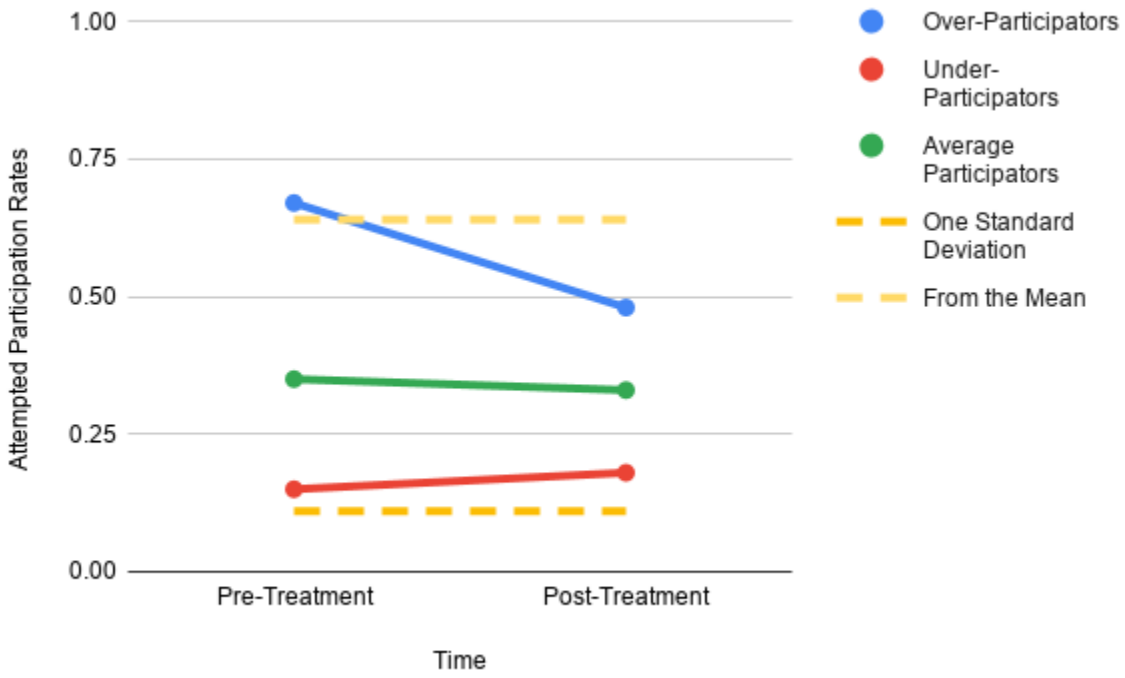

Figure 4. Estimated marginal means of participation rates by treatment group. Split-plot ANOVA graph of results using data from the baseline average and last three lessons average (post-intervention). The yellow dotted lines indicate one standard deviation above and below the mean participation rate during baseline.

Post-hoc tests were also conducted on the Split-Plot ANOVA, in order to show where the most significant change was amongst the three groups. A Tukey's HSD multiple comparison test was completed. These post-hoc statistics show that while all groups changed significantly, the

greatest change was seen in the Over-participators group as compared to all other groups. All groups, when compared to each other were within the .05 cutoff for significance. The greatest difference was in the Over-participator group. Their change had the greatest magnitude, so compared to both those in the average range and the under-participators, the difference had significance of $p = .000$*. The difference between the under-participators and those already in the average range was less drastic, yet still significant ($p = .002$*).

Our goal with the intervention was to see all groups regress towards the mean over time. As seen in Figure 3, all three groups behaved as expected and regressed towards the mean—over-participators participated less, under-participators were able to participate slightly more, and those whose participation started out balanced, or typical, stayed balanced. For all groups, treatment group status was a good indicator that *Stack the Deck* worked to help their participation regress towards the mean over time. These findings coincide with the primary hypotheses and expected outcomes going into this intervention.

These results show that *Stack the Deck* produced statistically significant change when it comes to normalizing participation rates (operationalized as hand raises per opportunity to respond) over time. While this intervention was most effective for over-participators and those already in the average comment range, the significant interaction between treatment group status and time shows that *Stack the Deck* provides change towards the mean over time. Qualitative observations that *Stack the Deck* was effective in helping all participants better regulate their participation levels can be supported through the quantitative analysis of participation data.

Will This Intervention Affect Any Target Groups More Than Others?

As seen in the previous split-plot ANOVA analysis, *Stack the Deck* was more effective for some treatment groups than others. The participants who had a hard time limiting their

comments during baseline showed the most dramatic results. Those who had no target behavior or no participation goals also behaved as expected and had no change. The under-participators, on the other hand, showed less change than the other groups. In order to delve more into these results, each target behavior will be subsequently discussed. We will examine overall trends for each group, determine non-responders and responders, and analyze common characteristics that either made participants resistant to change or ideal candidates for *Stack the Deck.*

Target behavior: Decrease participation. As shown in the overall trends section, this study reduced the percentage of attempted comments by participants who exhibited excessive participation rates. This was our primary goal and expected finding. These above average rates were generally seen to be lowered into within the target range of "average" verbal participation through the use of *Stack the Deck*. These participants were defined as anybody who attempted participation (raised their hand) more often than the average (defined as one standard deviation above the class average, calculated per each opportunity to respond (which varied from group to group; see Table 7). Across each group, when the intervention phase began, participants with excessive participation rates were given a USE:KEEP card ratio of 4:6 to encourage waiting and holding back comments. Among the 33 participants, there were 8 participants (24%) in this group.

Within these eight, there were some participants that responded better to the treatment than others. Those who responded well to treatment tended to be the ones who constantly had their hands up—the ones who had a really difficult time not responding to questions. These participants also tended to talk-out when they felt like they were being ignored or passed over. While there were multiple participants with the target behavior of lowering participation, one good example of a responder was Participant 10.

With the exception of the first day, Participant 10 constantly had his hand up throughout baseline and into the beginning of the intervention. Even if a question had yet to be asked, Participant 10 frequently had his hand up to express his comments. Throughout the first couple of weeks of class, when he was asked to wait, or ignored during the lesson, Participant 10 often started making noise by hitting the table or talking out in order to gain attention. Throughout baseline, his average participation rate was 66.78%, with a standard deviation of 44.8. His median participation rate at baseline was 94.44%.

These behaviors initially escalated after *Stack the Deck* was implemented. Over the next two sessions, his average participation was 164%, meaning that for every opportunity to respond, he attempted to answer the question (e.g. raised his hand) 1–2 times. With *Stack the Deck,* by week 6, Participant 10's participation rates stayed within one standard deviation of the average range, sometimes even dipping below the classroom average participation rate. See Figure 5.

By the last three days of direct instruction, Participant 10's mean participation rate had decreased to 43.7% with a standard deviation of 21.72. The median of these last days of direct instruction was 44.44%. Over time, Participant 10 was able to decrease his participation drastically without any direct instructions to change his behavior. Thus, *Stack the Deck* was effective in helping Participant 10 learn to self-monitor and regulate his participation rates. Participants in the Over-participator group who did not respond well to *Stack the Deck* tended to be the participants who did not seem to be constantly raising their hands in order to gain attention. One participant that fit this description was participant 15.

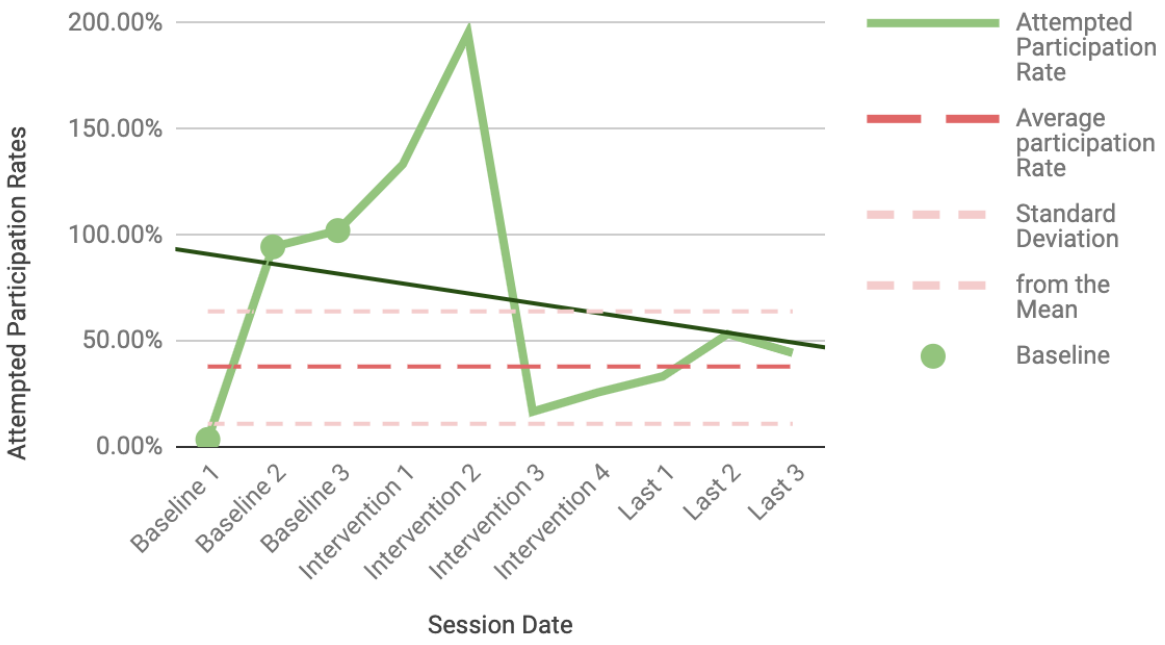

Figure 5. Participant 10's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline. This shows that on some days, participant 10 raised his hand 2 times for every opportunity to respond.

Participant 15 was not one of the participants who constantly had his hand up. Perhaps this was partially due to the small sample size of Group 2, but Participant 15 was not one who was bubbly or constantly initiating bids for attention. Participant 15 did not engage in talk-outs. He listened attentively and did not raise his hand until the question was completed, unlike Participant 10. Despite this, he responded to almost every question on some days. Sometimes he seemed to get frustrated when he forgot what he was going to say or his answer did not come out perfectly. Throughout baseline, his average participation rate was 56%, with a standard deviation of 21.4%. His median participation rate at baseline was 68%. See Figure 6.

These behaviors drastically decreased after *Stack the Deck* was implemented initially. Over the next two sessions, his average participation was 27.94%, meaning that his participation

reduced by half. Over time, Participant 15's participation increased back up to about the level at which it was prior to intervention, however.

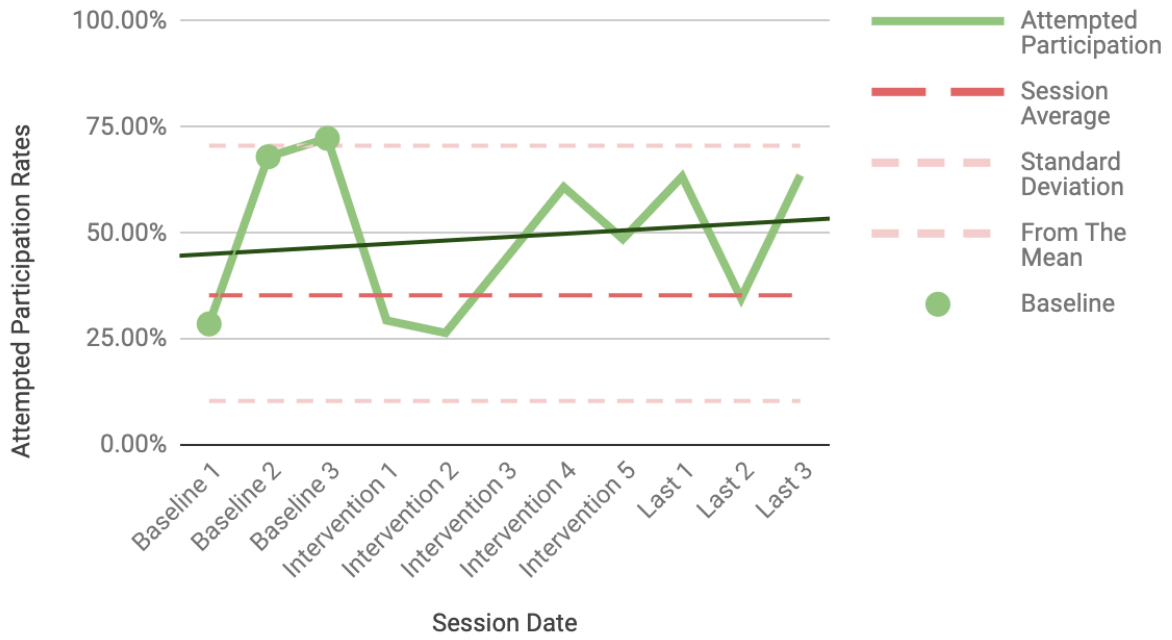

Figure 6. Participant 15's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

By the last three days of direct instruction, Participant 15's mean participation rate had decreased to 53.86% with a standard deviation of 16.66%. The median of these last days of direct instruction was 63.33%. This shows that despite initial large change towards participating less, he was not able to maintain the behavior change, and his trendline generally pointed upwards over time, which is opposite of what would have been expected. Thus, *Stack the Deck* alone was not effective over time in helping Participant 15 learn to self-monitor and regulate classroom participation rates.

Target behavior: Increase participation. To reach our goal of seeing all participants' participation rates approach the mean, we needed to look at where there was an increase in the

percentage of attempted comments by participants who exhibited disproportionately low participation rates. It was the hope of this study that these below average rates would be increased into within the target range of "average" verbal participation through the use of *Stack the Deck*. As seen in the ANOVA data above, this was occasionally the case, but did not happen the majority of the time. Most participants in this group saw little to no change in their participation rates over time, which was unexpected.

Participants in the Under-participators' group were defined as anybody who attempted (raised their hand) participation less often than one standard deviation below the class average for every opportunity to respond (which varied from group to group). In some cases, when no participants' participation rates stayed below one standard deviation below the mean for the majority of baseline points, clinician judgement was used when deciding who were the lowest group participators. In these cases, participant with the lowest participation rates in the group were subsequently given the target behavior of increased participation as a way to encourage more group interaction.

Across each group, when the intervention phase began, participants with minimal participation rates were given a USE:KEEP card ratio of 6:4 to encourage participating over waiting and holding back comments. Among the 33 participants, there were 13 participants (39%) in this group.

Overall, *Stack the Deck* did not seem to be particularly helpful when it came to increasing participation for these under-participators—their participation only very slightly increased. Within these 13, however, there were a few participants who responded better to the treatment than others. These were the participants that participated in small group breakout sessions, talked one-on-one with therapists before and after class, but seemed to freeze and go silent in whole-

group instruction. They were the ones that responded well to encouragement—the ones that just needed a little push. While there were a few participants that had the target behavior of increasing participation and were successfully able to increase their participation, one good example was Participant 9.

On the first day of class, Participant 9 raised his hand twice, when there was a total of 18 questions posed to the class. This was much less frequent than his classmates, who raised their hands 3 times as frequently on average. Despite this, on this first day, he was willing to participate in smaller settings. He participated in behavioral rehearsals and engaged with therapists one-on-one during unstructured time. While his baseline rate of participation normalized to being closer to the class mean, with an average participation rate of 24.5% and standard deviation of 13, he was still one of the least frequent participators within that particular chronological group. See Figure 7.

Throughout the intervention phase, Participant 9's comment rates rose steadily. After baseline, his participation levels were always within the average range, except for one day, when his participation even exceeded this range. On this day (day 6), he raised his hand for 3 questions out of every 4 (with a participation rate of 75%). His overall average participation rate for the intervention phase was 42%, which is nearly 18% higher than his rate in baseline. His participation improved with the addition of *Stack the Deck*—over time he increased his participation with the reminder of the cards. His participation increased towards the mean participation rate, and even ended up exceeding it. He was successfully able to match the participation rates of his peers with the help of Stack the Deck, which was our goal for those with the target behavior of increased participation.

Figure 7. Participant 9's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

By the last three days of direct instruction, Participant 9's mean participation rate had increased to 43.63% with a standard deviation of 15.53%. The median of these last days of direct instruction was 63.33%. This shows that Participant 9's participation rates changed greatly over the course of the intervention. Thus, *Stack the Deck* seems to have been effective in helping Participant 9 learn to self-monitor, and regulate classroom participation rates.

The majority of the participants with the target behavior of increased participation did not respond to the intervention as well as Participant 9. In fact, the majority of participants in this group had little to no change over time. Some even had decreased participation. These participants were the ones who hardly participated—the ones who had a really difficult time responding to questions. These participants were the ones that sometimes even refused to comment when given an individual opportunity to respond. For the majority of under-

participators, *Stack the Deck* did not seem to have a positive effect on their participation. One participant in this sub-group was Participant 19.

Participant 19 was generally quiet throughout the sessions. Even when therapists specifically asked him questions that were easy to answer, he often just looked at the therapist blankly until they moved on. While he was not off task, he generally did not seem to be engaged in the lessons. The majority of the time, he was hard to encourage to participate even in small group settings, like behavioral rehearsals break-out groups of 2–3 people. Throughout baseline, his average participation rate was 8%, with a standard deviation of 0.95%. His median participation rate at baseline was 7.5%.

These behaviors showed a trend towards decreasing after *Stack the Deck* was implemented. Over every other session but one, his average participation was 0%, meaning that his participation reduced to nothing after *Stack the Deck* was implemented. Most sessions the therapists asked at least one question directly to Participant 19, which he occasionally decided to answer. Most times he declined. Some sessions, the therapists gave him as many as three individual opportunities to respond, most of which he declined to respond to. See Figure 8.

By the last three days of direct instruction, Participant 19's mean participation rate had decreased to 0% with a standard deviation of 0%. The median of these last days of direct instruction was 0%. Given Participant 19's target behavior, we would have expected his participation rates to increase, or at least not reduce this drastically directly after baseline. Thus, *Stack the Deck* alone was not effective.

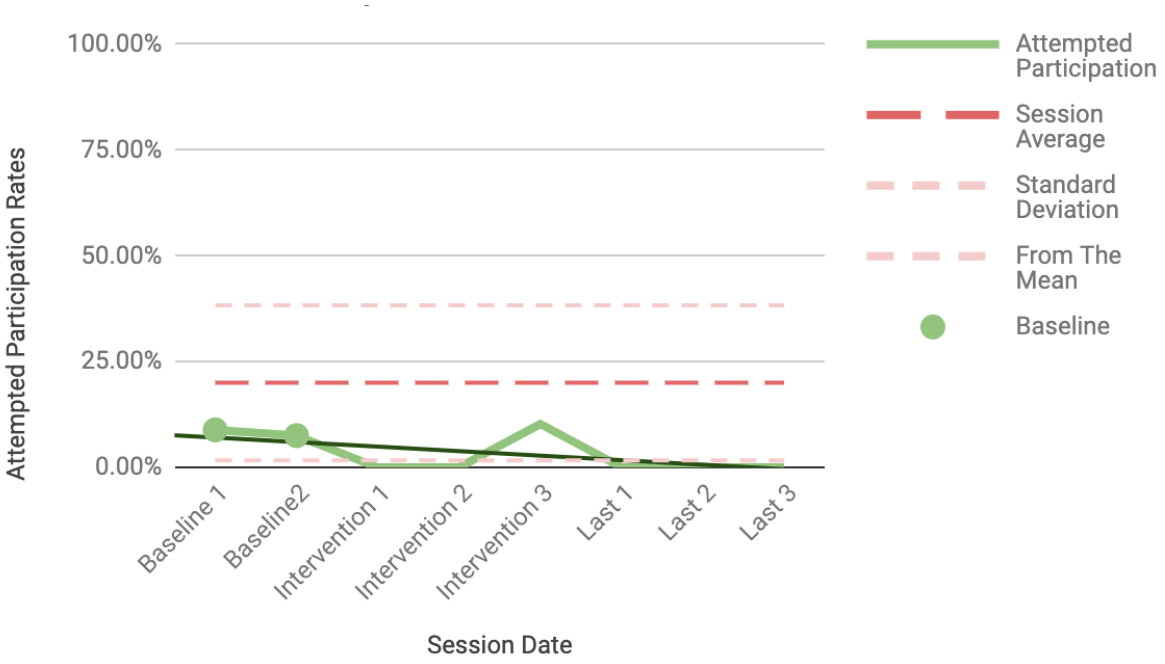

Figure 8. Participant 19's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

Stack the Deck was not universally effective when it came to increasing the participation rates of those who did not comment enough. Instead, it may have given them the opportunity to earn bonus points (KEEP cards) with zero effort. For these participants, *Stack the Deck* was not a powerful enough reinforcement system to incentivize them to comment—it was not able to teach them to self-monitor nor stop them from shutting down and withdrawing.

Target behavior: Maintain participation levels. As shown in the overall trends section, this study was able to maintain the same percentage of attempted comments in baseline and into the intervention phase by participants who exhibited typical participation rates that were already in the average range. These average rates were generally seen to be maintained more or less the same through the use of *Stack the Deck*. These participants were defined as anybody who attempted (raised their hand) participation at a rate within one standard deviation of the class

average (which varied from group to group) per opportunity to respond throughout baseline. Across each group, when the intervention phase began, participants with minimal participation rates were given a USE:KEEP card ratio of 5:5 to encourage the maintenance of their previous participation and abilities to hold back comments.

Among the 33 participants, there were 12 participants (36%) in this group. When it came to comment levels, these participants tended to vary day-to-day, sometimes participating more than others, or sometimes holding back. These participants tended to attempt to answer about 1 in every 3 questions. These participants were the ones who were able to stop easily (e.g., without showing signs of frustration) when they ran out of USE cards. While there were multiple participants that had no target behavior, some participants responded better to the treatment than others. One good example was Participant 1.

Participant 1 was a very respectful and polite participant. He hardly ever talked out, rarely talked over another participant and seemed very intent on pleasing adults by following every rule. When he did talk-out, it was to ask other participants to be quiet. All of his comments throughout direct instruction were on-topic and thoughtful. Whenever the therapists needed help with anything, he was the first to volunteer. He hardly ever seemed to get frustrated or melt down, nor did he run out of USE cards often. Across all 14 sessions, he had no absences. Throughout baseline, his average participation was a little higher than the class average, at 45% with a standard deviation of 21.6%. His median participation rate through this period was 35.7%. Throughout the intervention, none of these behaviors changed in Participant 1. He was still helpful, kind and thoughtful.

Initially, his participation decreased. Throughout the intervention he participated at a mean rate of 27.85%. This rate of commenting gradually increased as the intervention went on to

return to right around his participation rate at baseline. Over the last three classes, Participant 1's participation rate was an average of 37.92%, with a standard deviation of 25.4%, which is right at the target rate his chronological group cohort. His median participation rate at the end of the intervention was 28.5%.

Given Participant 1's target behavior, this is exactly what we would have expected—the effect size was small, meaning that his participation rates maintained over time rather than changing. Thus, Stack the Deck was effective in helping Participant 1 maintain his baseline levels of participation. See Figure 9.

For other participants, Stack the Deck was not as effective at maintaining their original participation rates. This seemed to be true much less frequently than the success stories, however. The group analysis data shows that overall, Stack the Deck had little to no effect on this group. But some participants' participation in this group also actually decreased over time. One hypothesis for why this may have happened is that perhaps these participants had greater abilities to self-regulate when they came into the experiment, so gaining more self-monitoring skills actually caused them to over-correct. These participants seemed to already be able to read the classroom, and were already sensitive to their environment, or at least more so than their fellow participants. This claim is backed up by anecdotal evidence and observations—these participants tended to be the ones who commented in order to help others, rather than to gain attention for themselves. A good example of this was Participant 8.

Participant 8 was the oldest participant in his chronological group cohort. He seemed to try to take on the role of "older brother" to all of the younger participants in the group, often sharing helpful tips and tricks that he had found useful in the past when it came to social interactions. He did this quite frequently across baseline days.

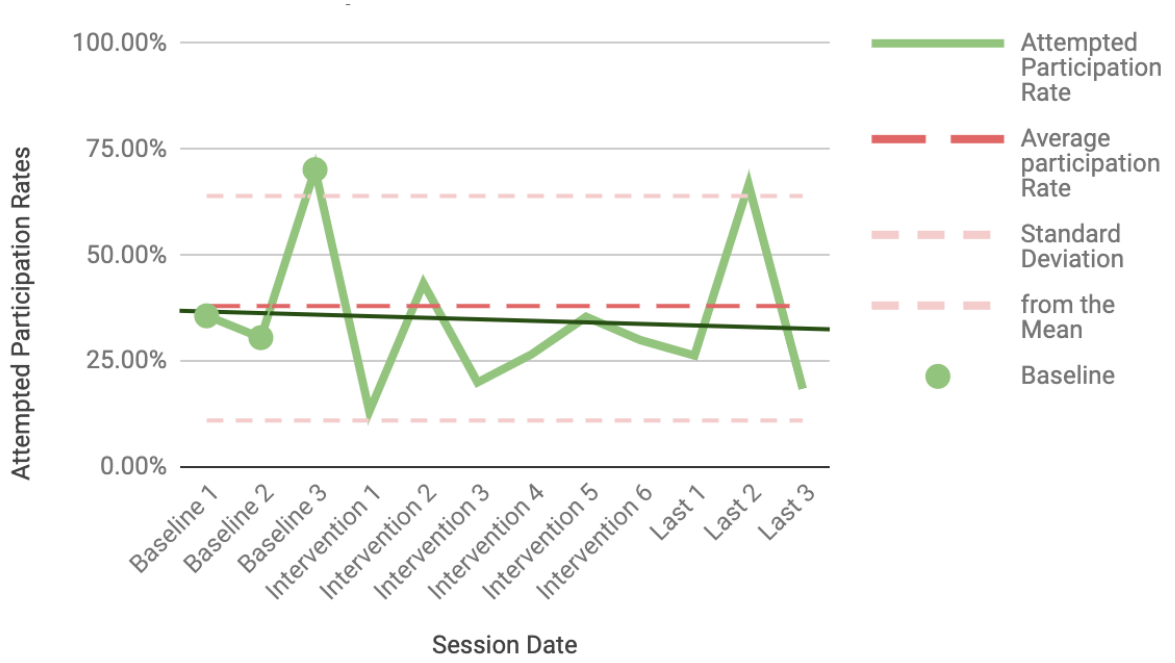

Figure 9. Participant 1's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

While there were some days that he participated more than others (e.g., Intervention day 3), overall, his participation throughout baseline and intervention phases always stayed within the average range. Over baseline, his average participation was 36.5% with a standard deviation of 8.7%. This is just under the group average of 38%. Throughout intervention, he mostly continued this trend of responding at just below the average rate. His average participation rate lowered to around 28%, which is still well within one standard deviation of this group's average participation range, but certainly a decrease from where he started (see figure 10).

Figure 10. Participant 8's participation rates over time. Dotted lines indicate the mean, as well as one standard deviation above and below class mean participation rate during baseline.

Participant 8 seemed to have a good grasp of the intervention and its intentions. One day another participant talked-out about, "How great an idea it would be to have cards that gave you points for not commenting." Participant 8 then gently reminded him that that was the purpose of the KEEP cards. He never melted down or got frustrated when he ran out of USE cards, because he never seemed to struggle with pacing himself with respect to comments. On days when other participants seemed to have more talk-outs, or where other participants over-participated, Participant 8's comment levels went down. On one day, most participants saw an uncharacteristic spike in participation due to the graduation excitement. On this same day Participant 8's participation was at its lowest. He was able to easily self-monitor his participation and seemed to grasp the social ramifications of commenting too frequently.

This intervention did not complete its purported goal for this participant because his participation decreased overall, when it was supposed to be maintained at the same level, although he stayed within the group average. Over the last three sessions, Participant 8's participation dropped to an average of 22% with a standard deviation of 10.9%. Given Participant 8's target behavior, we would have expected his participation rates maintained and be shown through an effect size close to zero. Thus, Stack the Deck was not as effective in helping participant 8 maintain his baseline levels of participation.

Therefore, it can be seen that the participants that maintained their already acceptable comment levels were the ones who already balance their participation with the rest of the group. Thus, when Stack the Deck was implemented, it did not change the trajectory of their participation.

Did the Effects of *Stack the Deck* Generalize to Talk-Outs?

In some cases, Stack the Deck has been shown to decrease talk-outs. For some groups, like the first chronological group cohort of this study, Stack the Deck seemed to work effectively to decrease talk-outs. Similar results were anecdotally noted by pilot studies and found in a previous classroom study (Montgomery, 2018). While each group differed in character and group dynamic, they all included participants who talked or commented out-of-turn without raising their hands. These out-of-turn comments were noted and recorded during coding. While researchers were unable to attribute talk-outs to individual participants, global talk-out data were able to be collected. Some days, such as the last day of class, or graduation, tended to cause more excitement and thus talk-outs increased.

Therapists were supposed to take a card (first USE, then KEEP) for every talk-out a participant made, but this became unfeasible in some groups due to the chaos of class and the

difficulty in deciphering who exactly was talking-out when multiple participants talked-out at once. Analysis of talk-outs reverted to the original chronological group cohorts because the data were collected on a group basis rather than for individuals.

Group 1. Out of all the groups, Group 1 had the most talk-outs by far. There were certain participants who struggled with talking out more than others. Two of these participants, in particular, seemed to feed off each other, getting wrapped up in side conversations and calling out jokes to each other. In this group the average number of talk-outs per session was 222 with a standard deviation of 109. The highest number was during baseline with 463 talk-outs, while the lowest was the second to last day of class, after 11 weeks of social skills instruction with 93 talk-outs. The last lesson was an outlier, at 301 talk-outs, likely due to the excitement of having a graduation party to follow the week.

As seen in Figure 11, talk-outs were seen to decrease over time throughout the intervention phase with this group. Even with the graduation session outlier included, the general trend of talk-outs for this group was downward. This may be because participants learned to self-monitor. They realized that it was not worth the opportunity cost of a bonus point just to say whatever they wanted whenever they wanted. The participants also helped each other—some encouraged others to be quiet and listen to the instructors when they were being disruptive. This social support could be another reason that talk-outs decreased over the course of the intervention.

Groups 2–4. Groups 2–4 did not have as clear talk-out data nor trends as Group 1. This is probably due to the fact that the make-up of each social skills group was a little bit different, but none of the groups following the first had as many over-participators. Although the groups were similar in demographic makeup, group make-up in terms of personality led to fewer talk-

outs at the beginning of each group than with Group 1. Group 2 was an unusually small and quiet group. This led to the average number of talk-outs being 30.71 and the standard deviation being 19.86. The highest number of talk-outs was on day 10, with a total of 64 total talk-outs. This statistic is 29 comments lower than Group 1's best day, where the fewest talk-outs occurred. The day with the lowest number of talk-outs for Group 2 was on day 1, where there were 3 overall comments made out of turn. The next lowest number of talk-outs occurred on session 11, where there were 8 total talk-outs.

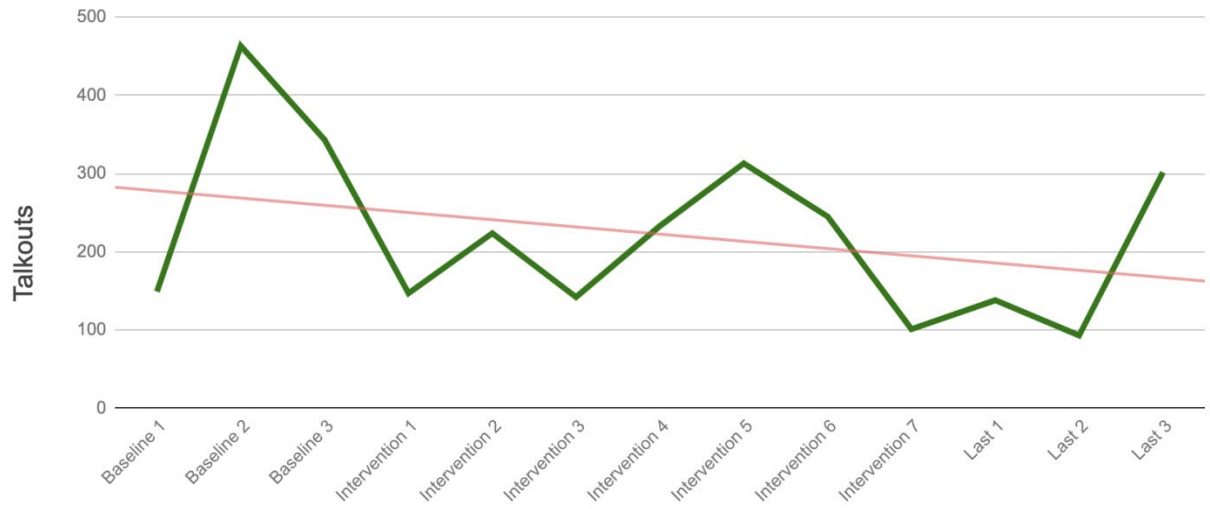

Figure 11. Group 1 talk-out data over time.

Due to higher levels of supervision and individualized instruction, the baseline talk-out rate started out at a low level. There never was any room for improvement in this domain. The talk-out rates for Group 2 increased slightly but stayed more-or-less consistent over time (see figure 12). This is vastly different than the talk-out trends in Group 1.

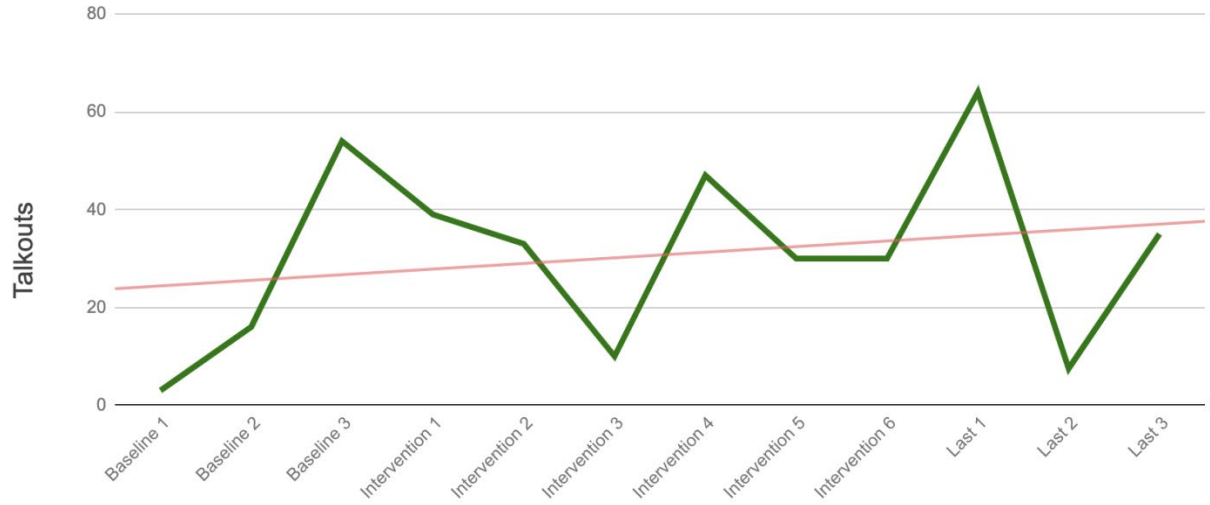

Figure 12. Group 2 talk-out data over time.

In Groups 3 and 4, talk-outs actually increased over time, which is unexpected given the nature of *Stack the Deck.* Group 3 had an average talk-out rate of 106.17 (*SD* = 81.85) talk-outs per session, while Group 4's rate was 72.55 (*SD* = 57.57). This may be due to the fact that groups 3 and 4 included many more under-participators than Groups 1 and 2 did (see figure 13 and figure 14). Thus, depending on the nature of the participants' personalities and willingness or tendencies to talk-out, *Stack the Deck* could have varying results when it comes to talk-outs.

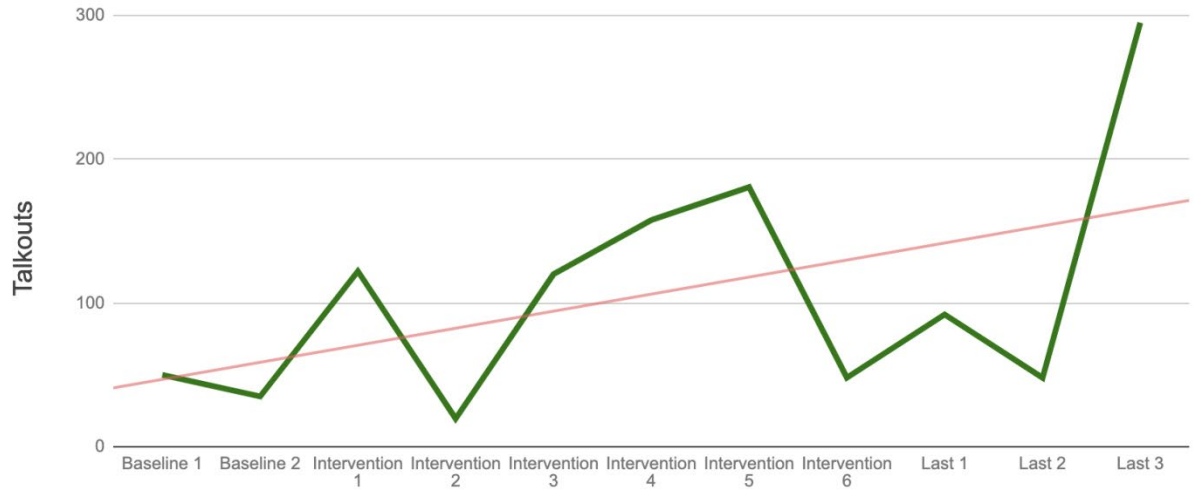

Figure 13. Group 3 talk-out data over time.

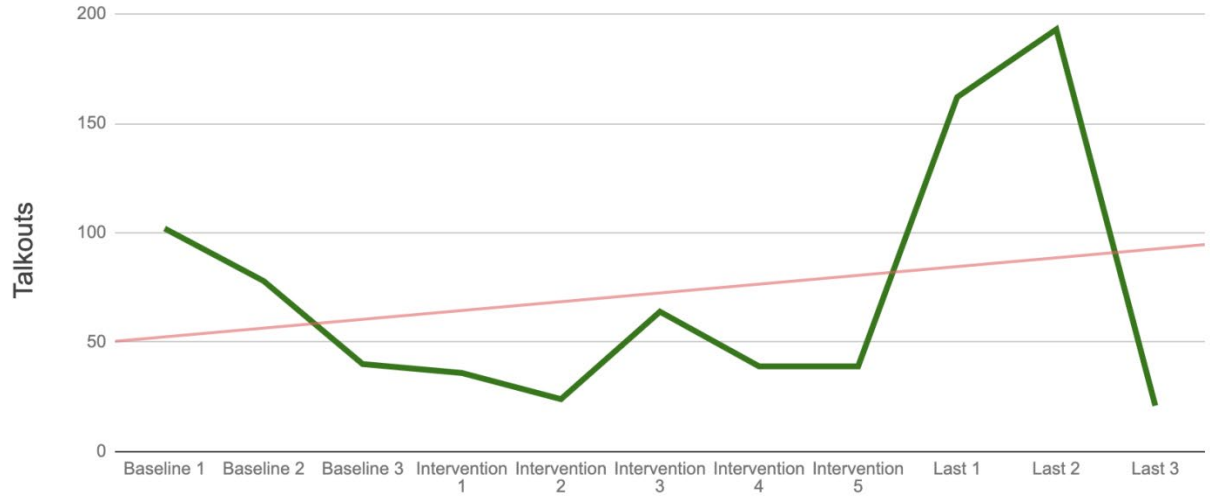

Figure 14. Group 4 talk-out data over time.

Social Validity

In order to assess social validity, comments on fairness were noted throughout coding. These comments occurred in almost every chronological group—when cards were first introduced in the 4th session in each group, there was always a learning curve. Participants grumbled that it "wasn't fair!" when they ran out of cards or were not able to make a comment. In the beginning the participants often went one of two ways: Some were annoyed when therapists reminded them that if they completed a comment they would have to give up a KEEP card, while others bragged about blowing through their cards so fast that they "set a new record!" (Group 1).

As time went on, participants gained awareness of the intervention's benefits. By the last sessions, not only did the complaints that the cards were "tortuous" stop, but the participants often requested extra card time (Group 1, Session 7). They more frequently asked if they could use the cards for points at times that did not include direct instruction. Over time, they were able to see the use of Stack the Deck and able to see how it benefitted them in the long run.

Another method of assessing social validity was through therapist comments and a therapist survey. This survey (included in Appendix E), was made up of 10 Likert scale questions that asked about Stack the Deck's effectiveness with 3 open-ended response questions. The survey started with an electronic consent form, which was approved by the University's Institutional Review Board for all participants to give their consent to participate. While the survey was sent out to all participating therapists, six responses were collected. The totality of responses rated the experience of using Stack the Deck as a favorable one.

When asked about *Stack the Deck* overall, therapists indicated that on a scale from 1–5, where 1 was "not effective," a 3 was "somewhat effective" and 5 was "very effective," that *Stack the Deck* was a 3.83 (*SD* = .37). This indicates that the therapists administering the intervention believed that *Stack the Deck* was somewhere between "somewhat effective" and "very effective" when it came to managing student participation levels overall. The therapists noted that they believed that the intervention was more effective for over-participators (*M* = 4.5, *SD* = .5) and less so for under-participators (*M* = 3.17, *SD* = .69). They noted that the intervention was only somewhat effective at helping students learn to support their peers in equal participation (*M* = 3.17, *SD* = .9).

Therapists noted that behaviors were harder to manage in baseline (*M* = 3.33, *SD* = .75), than they were during the intervention (*M* = 2.33, *SD* = .47) or after the intervention ended, where a rating of 1 was "there are no problems managing participation" and 5 was "managing participation was a serious problem." Therapists noted that participation started out less equal in baseline (*M* = 1.67, *SD* = .75) and equalized as the intervention was used (*M* = 3.67, *SD* = .75), where a rating of 1 was "there were a lot of under/over-participators" and 5 was "participation was very equal."

When therapists were asked their personal opinions on *Stack the Deck* (in a way where their answers were anonymous), they noted that they liked the intervention ($M = 4.33$, $SD = .47$) and they thought their students did as well ($M = 4.0$, $SD = .58$), where rating of 1 was "I hated it, it wasn't helpful" and 5 was "I loved it! It made my life easier." They reported that they were likely to use *Stack the Deck* in the future ($M = 4.33$, $SD = .47$), where a rating of 1 was "No, it was more effort that it was worth" and 5 was "Yes, it was a worthwhile intervention!"

Therapists were then given the option to give feedback on *Stack the Deck* and how they thought it could be improved. One therapist noted that they believed the reason *Stack the Deck* was less effective for under-participators was because social anxiety got in their way. This therapist believed that *Stack the Deck* could be improved by teaching anxiety reduction techniques in conjunction with the implementation of the intervention and that this might help some students show more gains. Another therapist noted that *Stack the Deck* as an intervention was a little complicated to implement, but once they did, they were able to see that the intervention was worth the effort. Other therapists noted that *Stack the Deck* could be combined with "Mystery Motivator" interventions (Rhode, Jenson, & Reavis, 1992), or that the cards could be designed to look more official in order to increase teen buy-in and make the intervention more fun.

Discussion

This study examined the effects of self-monitoring in a DRL/DRH behavioral intervention within a token economy with back up reinforcers. We examined participation rates of adolescents with ASD who were enrolled in a weekly social skills group. Our primary objective was to change the behaviors of individuals whose participation rates exceed the average range. Their target behavior was to decrease their participation rates to that of the class

average. We believed that the participants who talked too much in class would be able to self-monitor their own participation rates with the intervention and, over time, be able to participate at rates comparable to their peers. We also hoped to see a surge in comment levels for those participants who had the target behavior of increasing their participation rates. This was a secondary goal—that the other participants in the class, those that were not over participators, would also see benefits from this whole class intervention. In line with this, we also hoped to see no change in the participation rates of those participants who already had acceptable participation levels.

Throughout our study, we primarily found that in our clinical setting, *Stack the Deck* was most effective in changing behavior for over-participators—those who had the target behavior of learning to decrease their own behavior to levels comparable to their peers. We also saw that the group of adolescents that started out with participation in the average range stayed in the average range. The only group that *Stack the Deck* was not as effective for was the under-participators. Despite pilot study results showing drastically increased participation (Montgomery, 2018), where these participants were encouraged to participate more and acted on these encouragements, we did not see the low participators bring their comment levels up to the same extent in our study. There were some under-participators for which the intervention worked (for example, Participant 9), but the majority of under-participators seemed to shut down and their participation levels maintained or decreased over time. Possible reasons for this will be discussed in sections to follow.

Analysis of the group overall showed a general effect, however. Our primary statistical analysis was a split-plot ANOVA which looked to see if the whole group's participation rates (separated by target behavior) regressed towards the mean over time. Analysis shows that,

overall, the 33 participants' participation rates over time regressed towards the mean. Results were significant (p = .034), showing that the group regressed towards the mean over time, when divided into target behavior groups. *Stack the Deck* was able to help the group participation levels become less disparate as time went on.

Despite the overall effect, over-participators showed more significant response than under-participators, with the majority of typical participators maintaining within one SD of the mean. This is in contrast the results of *Stack the Deck* in a younger population (5th grade) in a classroom setting. In the classroom study (Montgomery, 2018), the participants often cheered each other on and encouraged those with USE cards remaining to earn their bonus points. This did not happen as often in the clinical setting. The clinical setting of once-weekly meetings did not have the benefit of the kind of camaraderie that comes with being with peers all day, every weekday for an entire school day. Participants did not know each other as well as they did in the pilot settings, so this may be a factor that dampened the effects of *Stack the Deck* in our clinic. Age of participants may also play a role. Sizes of the groups was comparable.

Throughout coding, this type of peer encouragement was only noted once, during session 7 of Group 3. In this instance, when the therapists asked for someone who had not participated as much to answer, an over-participator noticed that one participant still had cards and encouraged him to respond, and that participant answered. Thus, encouragement seemed to work when it came to increasing under-participators' comment rates but did not happen as often or as organically as in the other study. Rapport and encouragement seem to make the difference when it came to reinforcing the participants that tended towards under-participating.

Therapeutic relationship building could also play a part in their lack of response. In our study, the therapists rotated positions day-to-day. On any given week, a therapist could be

running the parent group, pulling cards, teaching the social skills lesson, or observing behind the one-way mirror. This lack of stability across therapists is much different than in the classroom setting, where they spent seven hours being taught by the same adult. These novel therapists and differences in teaching style might have acted as changes in routine that may have had some effect on participation rates.

Across the four chronological groups, the teaching styles varied. Some therapists introduced group specific rituals (such as giving drum rolls before role plays), that may have influenced the classroom environment and how the material was received. These techniques were generated because overall participation rates in these Group 3 and Group 4 tended to be lower than previous groups. These rituals occurred more frequently in the latter groups, which also may have had an effect of the increase in talk-out rates as time went on.

Secondly, we cannot claim to be able to see as consistent results as the classroom study due to the frequency of classes. Participants only used the intervention once a week, instead of every day in their classroom, so it is logical that the gains that we saw occurred at a slower rate than in other studies. Perhaps the once-a-week clinical setting is not conducive for a self-monitoring intervention. Participants needed to be reminded often how the intervention worked—they frequently got caught up in the class and seemed to forget to regulate their participation. If this happened, a participant may have begun to melt down or make negative comments when they realized that they had blown through all of their cards. Perhaps results could have been maximized if this catch-up factor had been minimized with repetition of the intervention every day, as in a classroom setting.

In some cases, Stack the Deck seemed to be very effective at regulating talk-out frequencies within the group overall. The first chronological group had similar results to pilot

studies, where the rate of talk-outs decreased drastically over time as Stack the Deck was implemented. This group had more over-participators than latter groups. Although our over-participator group was the smallest of the three treatment target groups at just 8 of the 33 participants, it is possible that even a small percentage of disruptors have a large effect on the group. This was seen in the Group 1 talk-out rates. The effects of Stack the Deck, even for just a few participants may yield a significant improvement for the group overall.

Group 2 saw talk-out-rates that stayed more or less the same across the group setting. This could have been because of the small sample size in this group. Because this group was small and had a higher therapist-to-participant ratio, influencing behavior and availability of attention. Thus, this groups' talk-out rates started out low and stayed fairly low throughout the course of the intervention.

The last two groups saw talk-out levels that started out low and increased over time. These groups were the largest groups of all, with the lowest therapist-to-participant ratios. These groups had a lot of under-participators (as can be seen from their average baseline participation rates starting out lower than the other groups). For these groups, statistical analysis failed to determine appropriate target behaviors reliably. Perhaps for groups such as Group 3, qualitative observations and clinician judgement are a more appropriate analysis method than global quantitative data (such as talk-outs that cannot take individual characteristics into account). Perhaps individual characteristics of these under participators directly affected talk-out data.

In addition, these last two groups had more creative group rituals—as mentioned before, Group 3 had a role-play ritual, where they made massive amounts of noise, pounded the table and chanted in anticipation of role plays. They also do many more rapport-building exercises, both were intended to increase energy and participation levels. For example, during one class in

Group 3, participants quickly switched seats after each opportunity to respond. The intention of this activity was for the participants to get to know everyone and sit next to new people. Yet this activity also increased group chaos for the day and there were higher amounts of talk-outs than were typical. In the quest to increase participation overall, these activities and group norms may have inadvertently reinforced talking-out, which may have, in turn, affected the classroom environment and participant behaviors.

Limitations

Our study may have been strengthened if the context was not a social skills intervention, although it may be argued that a very common group setting outside of classrooms for adolescents with ASD is a social skills group. In the pilot study, *Stack the Deck* was implemented in a classroom setting during math instruction (Montgomery, 2018). Because that study showed self-regulation gains and *Stack the Deck* was the only intervention involved, there is at least some evidence that *Stack the Deck* was able to elicit change independent of the context. In the future, it would be interesting to take this a step further and have a study where a control group was introduced. These students would only receive *Stack the Deck* in a clinical setting, or only receive the PEERS® program intervention, and then results could be compared to students who received both. Only then could the effects be attributed to each specific intervention.

Another limitation to our study was lack of generalization data. One group had a generalization data point, where the participants were invited back in order to receive personal hygiene instruction, but this day was conducted by a different teacher, and departed from the usual routines of the group because of the topic (e.g., a video was shown as part of instruction, and personal hygiene products were distributed instead of earning points for prizes). Thus, the

talk-out and behavioral trends more closely resembled days like graduation, where excitement was high. Thus, we were not able to attain reliable generalization data. In future studies it would be interesting to see the effects of withdrawing *Stack the Deck* at some point throughout the group. This could look like withdrawing the intervention mid-way through the group and then re-implementing it for the last sessions, or only withdrawing it for the last three sessions in order to see if the gains were maintained. This added withdrawal would strengthen the results of future studies and give more information into generalization potential. Although withdrawal was contemplated in the study design, therapists expressed strong concerns about disruption in direct instruction, so withdrawal was deemed to be detrimental to the participants.

One way our study was limited in scope was in diversity of participants. While we did have some participants with minority status, and we did include males to females in about a 4:1 rate (which is similar to that of the national gender ratio), our catchment area has less diversity than many samples. Because our recruitment came from the local ASD community, most of our sample were white males. It would be interesting to note if findings differed amongst a more diverse population.

Age was another limitation in terms of generalization. The average age of our participants was about 13. While this nearly homogeneous group of adolescents around age 13 was helpful for our group statistics, it also makes our results less generalizable to a broader population. These population limitations may be possible threats to external validity. The pilot study was conducted in a classroom of 5th grade students and seemed to have more overall success for all participator groups. While we are unable to directly correlate age with ability to use *Stack the Deck*, it is possibly a factor in overall effects. Was the younger age range in the other study part of the reason why there was more camaraderie between subjects and thus the intervention was more

successful? In line with this, it would also be interesting to see what differences occurred in an older sample than ours.

Implications for Future Research

Because this study is the first experiment studying the effects of *Stack the Deck* in a clinical setting, the intervention was the main focus. We were able to see gains in the primary target population (those who participated too much). Future research should build upon what we have found and focus less on the populations for which *Stack the Deck* already works fairly well. Future studies should explore ways to modify the intervention to work for the non-responder and those with the target behavior of increasing participation.

One potential part to this would be to devote the time and resources to doing functional behavioral assessment (FBA) for each poor responder studied. This would give the experimenters more information, and direct future steps. We could definitively say, instead of simply hypothesize, why *Stack the Deck* was not effective for certain participants. This step would give us more information to pass along to clinicians and teachers. We would have greater understanding of the motivations of our participants (both responders and non-responders) and be able to direct teachers and clinicians to further steps and resources when encountering each type of participant.

After determining functions and motivational factors that may be impacting the effectiveness of *Stack the Deck*, we could use this information to explore the answers to the following questions. Would these participants do better with individualized and explicit instruction on classroom etiquette? This might increase the likelihood of improvement. Would these participants do better when the frequency of use of *Stack the Deck* was increased? Would these participants do better when the intensity of use if *Stack the Deck* was increased? This could

be done by doubling the number of cards received as well as opportunities to respond—would the extra practice better meet needs for under-participators? Would *Stack the Deck* be more effective if incentives were increased (changing the relative value of either the USE or KEEP cards, for example). Any of these strategies could be employed in order to help these under-participators and other non-responders.

Another future direction for *Stack the Deck* would be to complete this experiment but in other cultures. It would be interesting to do studies in similar settings outside of the local culture. These would give us better ideas at the limitations of *Stack the Deck* and how to apply this intervention to maximize its effects.

A criterion for being able to be a part of this study was average cognitive and verbal abilities. This was a requirement set by the PEERS® manualized intervention. It would also be interesting to see what effects *Stack the Deck* could have on groups including individuals with ASD that have lower language and cognitive levels. While we had a few participants that were cognitive ability outliers in each chronological group, it would be interesting to see if *Stack the Deck* could be applied or modified for a group of individuals more similar to our outliers.

In the future, it would be interesting to delve into the talk-outs aspect of the effects of *Stack the Deck.* One goal of *Stack the Deck* was to see if the intervention could have effects on the global classroom environment. We hoped to improve the session experience for all participants, not only in the domains of participation rates, but we hoped the effects of the intervention would generalize to other classroom behaviors. Due to the nature of our data collection and interpretation, it was not feasible to differentiate individual sources of talk-outs. In general, we could not tell who was talking out, we could just tell the frequency, duration, and intensity on a group level. This let us analyze talk-out data by chronological group but left us

without a way to tease out talk-out data by target behavior groups. It would be interesting to distinguish if there were certain treatment groups that talked out more (such as over-participators) and to discern if these maladaptive participation rates would decrease across the board or if they would regress towards the mean. It would be interesting to note if the self-monitoring skills that *Stack the Deck* teaches could be directly generalized to decreasing the amount of other maladaptive classroom bids for attention.

Because the data for this study were analyzed retroactively, there was no way to know at the time of the intervention that talk-outs should be monitored live, but this could be done in real time in future studies. Perhaps in person the talk-outs would be more distinguishable and be able to be attributed to specific participants. This would lead to more conclusions that could be drawn about the generalization of the effects of *Stack the Deck.*

Another thing that could be added to future groups would be a generalization session. It would have strengthened our experimental design and informed the researchers more about the generalization effects of *Stack the Deck,* to have a withdrawal phase built into the experiment. This would be a way to strengthen future studies on this topic and yield more information about the true capabilities of *Stack the Deck.*

Implications for Practitioners

This study is directly applicable for practitioners, teachers, school psychologists, speech and language pathologists, and community clinicians who run group interventions or teach classes. When children or adolescents with ASD are involved, social skills and behavioral norms can be taught both implicitly and explicitly for a successful group experience. *Stack the Deck* purports to directly address this problem, both for participants who talk too much in groups and those that talk too little.

Throughout both the pilot study and this experiment, the therapists consistently appreciated the increased ability to manage behaviors when *Stack the Deck* was being used. In the pilot (classroom study), whenever withdrawal days came, the classroom aide always noted she was counting the days until *Stack the Deck* was implemented again, because she felt that it made that big of a difference in the behavior of her participants (Montgomery, 2018). Our therapists noted in the social validity survey that their experiences with *Stack the Deck* were favorable and that they believed that it was a worthwhile intervention that can help equalize participation rates. While *Stack the Deck* can seem complicated to implement in the beginning, it has been noted that it is always missed when it is withdrawn and that it is worth the effort.

The main goal of *Stack the Deck* was to help teachers and therapist have a greater ease of classroom management. Our intention was to teach participants to self-monitor their own participation so that their parents and teachers would not have to. We hoped that we would be able to use *Stack the Deck* to have lasting gains in classroom social skills. Our results suggest that it is successful in many ways in our clinical setting.

Conclusion

Adolescents with ASD are often ostracized in classrooms because of their inability to regulate their participation, perhaps because they cannot get past their restrictive and repetitive interests or even because they lack the ability for the introspection required to realize that they are not giving others a turn. This can be detrimental to their peer relationships, exhausting for their teachers and overwhelming for parents. Difficulty regulating behavior in group settings can be anxiety-and-meltdown-inducing for the adolescent with ASD in question. We created *Stack the Deck* as a way to unobtrusively teach a self-regulation skill within existing reinforcement systems.

Throughout this intervention, it was our goal to help teachers and therapists have a greater ease of classroom maintenance. It was our goal to facilitate the relationships between children with ASD and their peers by helping them improve this facet of interaction. While findings in our clinical study were not as universal as the classroom study (perhaps due to the limitations of a once a week setting as compared to everyday rapport), we were able to see that *Stack the Deck* in a clinical setting has similar results to its applications in other settings—that the intervention can help to eliminate the problem adolescents with ASD have of unbalanced participation in group settings. Through the use of *Stack the Deck*, parents, participants and therapists alike can have hope that maladaptive classroom behaviors can change—participants with ASD can learn to regulate their own participation in classroom settings using relatively simple behavioral intervention.

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APPENDIX A

Extended Review of Literature

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects about 1.5% of the population worldwide, with the prevalence estimates in children similar to their adult counterparts (Brugha McManus & Bankart., 2011). Within the U.S., specifically, 18.5 out of 1000 (or 1 in 54) children nationwide aged 8 are estimated to be on the autism spectrum, with males being identified four times more frequently than females (Maenner et al., 2020). In Utah, the prevalence reported in 2016 was 1:58, and this statistic has historically been cited as higher than the national average rate (Christensen et al., 2016; Utah Registry of Autism and Developmental Disorders [URADD], 2017) but Utah was not included in the study published in 2020 for comparison. The historically higher rates may be largely due to the fact that states which are reliably cited as having higher rates of autism (such as Utah and New Jersey) employ the use of ASD registries, which facilitates more comprehensive record keeping than the states with lower prevalence rates (Bakian & Bilder, 2015; Howell et al., 2016).

History of ASD

The first accounts of what would be classified today as ASD in scientific literature occurred in 1943, describing individuals with social and emotional limitations, while demonstrating withdrawn behavior. Leo Kanner referred to this condition as Kanner's syndrome (later to be changed to Early Infantile Autism), while Hans Asperger (1944) just a year later independently described his take on ASD in Asperger's syndrome. The two scientists each believed that their diagnoses were separate, which was a mindset that pervaded throughout the psychological community (not without argument) for the following half century (Schopler, 1985; Szatmari et al., 1986; Van Krevelen, 1971). There was even confusion between these two

syndromes and what is today known as schizoid personality disorder—it was not until much later when the three were found to be qualitatively different (Wolff & Barlow, 1979).

To some, Asperger's syndrome was thought to be a pervasive personality trait that was unchanging over time and thus had closer parallels to personality disorders than other types of ASD (Kay & Kolvin, 1987). Early uses of the term autism were to describe symptoms of the more significant mental disorder, schizophrenia, even going as far as to label autism as the "trouble generator," or phenomenal core to schizophrenia (Bleuler, 1911). Others theorized that both Asperger's syndrome and Kanner's early infantile autism existed on a spectrum. However, ordering the two conditions on said scale was as hotly contested as what manner of scale the two even coexisted on (Burgoine & Wing, 1983; Gillberg & Gillberg, 1989; Wing, 1981).

Autism itself did not have a concrete definition or recognition in the *Diagnostic and Statistical Manual of Mental Disorders Third Edition* (*DSM-III*), until 1980, where it was specified as "infantile autism," which gave clinicians the ability to separate its diagnosis from the relevant personality disorders as well as from early onset schizophrenia (American Psychiatric Association [APA], 1980; Frith, 1991). In the next revision, the *DSM-IV-TR* (Fourth Edition, Text Revision), autism was further split to include additional qualifying subcategories of pervasive developmental disorder-not otherwise specified (PDD-NOS) and Asperger's syndrome (APA, 1994; Mayes, Calhoun, & Crites, 2001).

This categorical split continued to be problematic. The three different diagnoses overlapped more than was ideal and the differences were sometimes miniscule and rarely reliably differentiated (Ozonoff, South, & Miller, 2000). Critics worried that the diagnostic criteria may have been under-inclusive, fostering a rise in false negatives; that the current criteria were not faithful to the original intent, description and spirit of Kanner and Asperger's autism;

and that the categories' diagnostic performance underestimated the actual prevalence of such disorders (Eisenmajer et al., 1996; Miller & Ozonoff, 1997; Szatmari et al., 1995). In addition, these separate labels promoted confusion in parents, treatment providers, and policymakers. Many parents mistakenly thought that a diagnosis of Asperger's syndrome implied that their child did not actually have autism (Shopler, 1996).

Due to such confusion and overlap, these critics continued to wonder if these categorically different diagnoses were not actually a spectrum, more specifically a spectrum of variations on social communication deficits (Tanguay, 2011). Studies comparing those diagnosed with the label Asperger's syndrome, autism, or PDD-NOS consistently found that there was less of a qualitative difference between the distinctions but a quantitative one: Ozonoff, South, and Miller (2000) came to the conclusion that "our findings of very similar cognitive profiles and current behavioral presentations suggest that Asperger syndrome is on the same spectrum as other autistic syndromes and differs primarily in degree of impairment (see also Prior et al., 1998; p. 43).". Thus, when it came time for the next major revision of the *DSM*, these calls for reform were heard. Changes were made to the fundamental structure of autism and its related pervasive developmental disorders.

In the fifth edition, *DSM-5*, individual categories were abolished and replaced with the overarching diagnostic continuum referred to as autism spectrum disorder (ASD). While autism disorders were previously based upon a three-disorder model of separation, ASD based itself upon two continuous domains of diagnostic criteria: persistent deficits in social communication and social interaction across multiple contexts, and restricted, repetitive patterns of behavior, interests, or activities (APA, 2013). In addition, there was a relaxation in the criteria for age of

onset, and the addition of symptoms not previously included in *DSM-IV*, such as sensory interests and aversions (Huerta et al., 2012).

Those against these *DSM-5* changes argued that those whose major autistic trait was not one of those shared by the three categories would fall through the cracks and be left without the necessary mental health services (Tsai, 2012). Studies have shown that this is not the case for the vast majority—Huerta et al. (2012) found that 91% of their sample (of 4,453 children diagnosed with one of the *DSM-IV*'s pervasive developmental disorders (e.g., autistic disorder, Asperger's syndrome, or PDD-NOS) yielded a *DSM-5* diagnosis of some severity of ASD, while the other 9% met criteria for "social communication disorder," which was in line with the findings of the *DSM-5* field trials (see also Maenner et al., 2020). This social communication disorder is now known as social pragmatic communication disorder as described by the *DSM-5* (APA, 2013). It is characterized by problems with verbal and nonverbal social communication and is generally regarded as a sub-threshold condition of ASD that lacks the restrictive, repetitive behaviors and the sensory components (Mandy, Wang, Lee, & Skuse, 2017).

Relevant Symptoms

As stated previously, the *DSM-5* has recently streamlined the criteria for Autism Spectrum Disorders to include just two major diagnostic domains: social communication deficits and restrictive, repetitive behaviors. Both are important functions that come together to make up the comprehensive picture of what we know autism to be today. This viewpoint has been a qualitative shift from the previous diagnostic criteria of the different ASD disorders.

Social communication deficits. According to the APA (2013), children with ASD must present with deficits in social communication and social interaction across multiple contexts, which is measured on three domains: social-emotional reciprocity deficits, difficulties with

nonverbal communication necessary for social interactions, and relational problems. A lack of social-emotional reciprocity has been defined as the inability to engage with others and share thoughts and feelings. These deficits may be evident in little or no initiation of social interaction, reduced or absent imitation of others' behavior, as well as a lack in sharing of emotions. These social behaviors are all stamps of healthy peer relations—the kind of mutuality that leads to social and relational fulfillment (Petrina, Carter, Stephenson, & Sweller, 2016). Difficulties with social reciprocity can leave adolescents struggling and socially isolated, often leading to depression (De-la-Iglesia & Olivar, 2015).

As for deficits in nonverbal communication, these behaviors can range from abnormalities in eye contact and body language to a total lack of facial expressions in addition to impaired use as well as recognition of nonverbal communication cues (APA, 2013). Considering how well-studied the importance of nonverbal communication has been, it is clear how difficult socially and mentally this must be for children and adolescents with ASD (Bhasker, 2013; Mehrabian, 1970).

These two aspects of typical ASD social impairment often contribute to the difficulty children and adolescents with ASD have developing, maintaining, and understanding relationships. They can have difficulties adjusting behavior to suit differing social contexts; have trouble sharing imaginative play with others; try hard to understand perspectives and discern the interests of others; or ultimately struggle in making friends and having intimate peer relationships (Bellini, 2004). In classroom settings, this difficulty taking the perspective of others often manifests in talking-out or over-participation during instruction—children with ASD may not always realize that others also need a turn. Social reciprocity difficulties can be detrimental to peer relationships. Unfortunately, few children receive adequate social skills training even

though social skills deficits are a central feature of ASD (Hume, Bellini, & Pratt, 2005). Social difficulties have been shown to be a predictor of more detrimental future outcomes such as poor academic achievement; social failure and peer rejection; as well as substance abuse, anxiety, depression, and other mental disorders (Bellini, 2006; La Greca & Lopez, 1998; Tantam, 2000; Welsh, Park, Widaman & O'Neil, 2001).

These social impairments do not mean that children and adolescents with ASD do not have a desire to interact socially with others (Lipscomb et al., 2017). On the contrary, children with ASD are often painfully aware of their shortcomings and realize that they do not inherently have the tools to overcome these social setbacks (Locke, Ishijima, Kasari, & London, 2010). Most social skills interventions rely on this desire to change as a key component of their promised success (Laugeson & Frankel, 2010). Coupled with an increased likelihood of anxiety due to their inability to adequately express their subjective experience, children and adolescents with ASD may have heightened distress levels regarding their social interactions given the combined effects of a desire for social interactions and moderate levels of social cognition and interpersonal insight (Attwood 2000; Bellini, 2004; Chamberlain et al., 2007; Henderson et al., 2015). Social isolation and loneliness are common in children and adolescents struggling with ASD (Ozonoff, Dawson, & McPartland, 2002). According to Bellini, Peters, Benner, and Hopf (2007):

> Most important, social skills deficits impede one's ability to establish meaningful social relationships, which often leads to withdrawal and a life of social isolation. Social skills are critical to successful social, emotional, and cognitive development. As such, effective social skills programming should be an integral component of educational programming for children with ASD. (p. 153)

Social skills interventions for children and adolescents with ASD are not a new concept. Bellini et al. (2007) noted in their meta-analysis, "in general, these studies have demonstrated that traditional social skills training programs are only minimally effective in teaching social skills to children and adolescents" (p. 154; see also Gresham, Sugai, & Horner, 2001; Quinn et al., 1999). Thus, traditionally, social skills interventions have had bad reputations for producing low to questionable intervention and generalization effects: Over time these interventions do not seem to be having as big of an impact as desired.

This lack of generalizability is thought to be because the implementation settings for the interventions are so controlled that when these situations are encountered in real life settings, the new skills and coping mechanisms are not easily generalized. These interventions have been completed in a variety of settings, directly in the classroom, in pullout classes, as well as in clinical settings, and while none tend to have very large effect sizes, those in pullout classes (that resemble real life situations and actual experiences the participants will encounter in everyday life) tend to have significantly lower maintenance and generalization results (Bellini et al., 2007). Some critics recommend that in order to combat this, interventions should be more intensely and frequently implemented than allowed by current treatment plans (Gresham et al., 2001).

Since this major meta-analysis, key changes have been made in modern social skills interventions. Today, there are many manualized interventions—including programs such as the Social Skills for Teenagers with Developmental and Autism Spectrum Disorders: the PEERS® Treatment Manual (Laugeson & Frankel, 2010)—that seek to teach children and adolescents with ASD how to better be able to interact with their peers, teaching the rules that others seem to intuitively know. These programs are intense, multi-week interventions, teaching specific skills for forming and keeping relationships and friendships. PEERS® specifically includes 14

sessions, held weekly in a clinical setting. A school-based curriculum is also available. Each class goes into detail on one topic, such as how to mutually trade information and get to know others; how to select and approach appropriate friends; how to appropriately use humor; how to deal with rejection and disappointment; as well as how to better navigate the flow of conversation (e.g., entering and exiting). Each class has specific homework assignments such as calling peers on the phone, holding "get-togethers," and applying specific learned skills each week.

Research on the PEERS® program has shown that skills gained during treatment were seen to be maintained over time (as reported by parents and teachers at a 14-week follow up) (Laugeson, Frankel, Gantman, Dillon, & Mogil, 2012). Other replication studies found that while skills were maintained, they did not see as significant results as the original study group, but noted their participants had significant decreases in their social anxiety levels as well as decreases in problematic behaviors (as noted by parents and teachers), when compared to waitlist control groups (Schohl et al., 2014). Research on the PEERS® program notes an increased number of social get-togethers, both hosted by the teens and that the teens were invited to, in addition to a significant decrease in prominence of ASD symptoms relating to social responsiveness (Laugeson et al., 2012; Lordo et al., 2017; Schohl et al., 2014).

Thus, it can be seen that some evidence of effectiveness and usefulness of these interventions exists. Large scale meta-analyses focus on the global improvements of many studies, but may miss more subtle effects as they do not delve deep enough to see individual improvements—for example, in an individual study by Dolan et al. (2016), it was shown that while there were limitations to the study, vocal expressiveness improved (as measured by

observational coding) as well as quality of rapport, two things which are hard to quantify and compare in such a large-scale, calculated way.

These less global, yet more individualized gains—trending toward specific domain of the intervention—are actually quite a common finding across varying social skills interventions (Radley, 2017). A reason for this may be that these interventions tend to be rigid and specific, not able to match specific parts of the intervention with specific deficits (Bellini et al., 2007). In line with this, a common complaint of participants in these interventions is that they are bored—or that they already know the material and thus are more likely to tune out and miss out on relevant information to their specific cases (Bottema-Beutel, Park, & So, 2018).

Restrictive and repetitive behaviors. In addition to social and relational impairment, repetitive and restrictive behaviors are also hallmarks of ASD. These stereotypic behaviors are often associated with individuals with ASD, who tend to demonstrate higher rates of stereotypic behavior than individuals with other developmental disabilities (DiGennaro Reed, Hirst & Hyman, 2012). This category encompasses a variety of behaviors, including hyper-reactivity, hypo-reactivity, or unusual interest to sensory aspects of the environment; restrictive and fixated interests that are abnormal in intensity or focus; insistence, rigidity, and inflexibility surrounding sameness; as well as stereotyped or repetitive motor movements, use of objects, or speech patterns (APA, 2013). These behaviors can translate to extreme preference for routine, narrow interests, stereotypic behavior, and self-injurious behavior (Bregman, & Higdon, 2012). Severity can range from harmless to extremely detrimental both to themselves and those around them.

In classroom and clinical settings, these general repetitive behaviors are the most frequently problematic when it comes to the rigidity of interests and expectations. Sometimes participants with ASD have problems transitioning between subjects, because they cannot bring

themselves to move on from the activity they are involved in. Oftentimes, this involves significant worry and anxiety over these schedule changes, which can lead to classroom disruption when their expectations differ from that of the teacher (Kerns et al., 2014). Others may have problems relating to their peers because they have inflexible interests and have trouble realizing that not everyone shares their narrow taste or have a hard time contributing to conversations with others outside of these specific focuses (Adams, 2000).

Deviation from these restrictive insistences of sameness and fixated interests can lead to anxiety and meltdowns when expectations are not being met (Colvin & Sheehan, 2012). Insistence on sameness throughout direst instruction might manifest as an intense need to answer every question or make comments regardless of the social disruption it causes. Depending on how frequently these behaviors happen, they can interfere with instruction and social relationships, increasing stigmatization surrounding ASD (Kennedy, Myers, Knowles, & Shukla, 2000; Koegel & Koegel, 1990; Koegel, Koegel, Hurley, & Frea, 1992; Lanovaz et al., 2014).

Many different approaches have been taken to combat disruption of repetitive behaviors and can, in general, be quite successful. In 2008, Loftin, Odom, and Lantz looked at using a self-monitoring intervention to decrease restrictive, repetitive behaviors and thus be able to help the three participants have better social interaction with their peers. At the end of the intervention (and at maintenance one month later), all participants had an increased ability to initiate social interactions in the specified circumstances. In addition to these social gains, participants' repetitive behaviors were reduced, as the ability for social initiation increased.

Though it is unknown whether social initiation and the self-monitoring skills that came with it helped decrease the problem behaviors, it can be seen that improving ASD symptoms can improve global social interaction abilities in children with ASD in general. Although the focus

was not directly on teaching social skills, by decreasing the outward expression of socially isolating symptoms, the children with ASD were able to improve their ability to make social connections.

Anxiety (meltdowns). Part of ASD includes a higher risk of co-morbid mental, neurodevelopmental, and medical conditions. Occurrences of some conditions are three to four times more frequent in those with ASD than in the general population at large (Harris, 2006). Anxiety is especially widespread. Children diagnosed with severe ASD symptoms are rated by their parents as experiencing as much anxiety as children with anxiety disorders and significantly more anxiety than children with less severe ASD (Mayes et al., 2010; Mazurek & Kanne, 2010; Sukhodolsky et al., 2008). In general, it has been estimated that anxiety disorders co-occur in roughly 40% of individuals with ASD, though rates as high as 84% have been reported in community and clinical samples (Ollendick & Scahill, 2009; van Steensel, Bögels, & Perrin, 2011; White & Oswald, 2009).

Similar reports indicate that children and adolescents with ASD suffer from elevated and often clinically significant quantities of anxiety and rumination which may then lead to subsequent depression (Kim et al., 2000; Kuusikko et al., 2008; Mayes et al., 2010). Furthermore, when an individual is hypersensitive to errors and these mistakes are interpreted as threatening, a feedback loop may be created, resulting in future problems, such as diminished ability to control repetitive behaviors (Henderson et al., 2015). This problem internalization may be explained partly due to the concurrent effects of a desire for social interactions and only moderate levels insight into their interpersonal shortcomings, which together result in a heightened distress regarding their social deficiencies (Attwood, 2000; Bellini, 2004; Chamberlain et al., 2007; Henderson et al., 2015).

Anxiety can manifest itself in many ways in classroom and treatment settings—including higher levels of rigidity, more repetitive behaviors, declining social functioning, etc. For example, in the cases of participants with low or no participation, this can lead to an even more comprehensive feedback loop and can create confidence-defeating self-fulfilling prophecies (Henderson et al., 2015). On the other hand, in the cases of more zealous participators this can manifest as anxiety over missed opportunities throughout direct instruction, which leads to over-participation and a rigid need to compulsively try to answer each and every question.

With lower social ability and capability to adequately communicate feelings, anxiety can also be exhibited in other problem behaviors, such as aggression, frustration, or lashing out (Scarpa, Reyes, & Attwood, 2013). Sometimes anxiety can even cause or serve as a future trigger for what looks like random repetitive behaviors or unconnected outbursts. In more extreme cases, frustrated children and adolescents with ASD often have trouble stopping and thinking about alternative strategies or consequences to their aggressive actions—they may go into what can be called "blind rages," or "meltdowns," in which they are oblivious to or unable to heed signs that they should stop (Sofronoff et al., 2007). These "meltdowns," often stem from social miscommunications—not being able to express what they feel or not feeling like they got an adequate turn to express themselves—and can sometimes be aggravated in traditional instructional settings (Hill, Berthoz, & Frith, 2004). Thus, it can be seen that these seemingly distinct diagnostic categories—social communication deficits and restrictive and repetitive behaviors—are much less separate than they appear; they are all interwoven and overlapping, coming together to both explain other problematic behaviors, such as increased anxiety, aggressive outbursts, and meltdowns.

Without intervention, anxiety in individuals with ASD typically does not decrease, but is exacerbated and continues across the life span (McNally Keehn, Lincoln, Brown, & Chavira, 2013). In line with this, there have been many attempted treatments. Some researchers have looked into increasing resilience under the assumption that increasing ability to healthily cope with distress will decrease meltdowns and breakdowns. Mackay, Shocket, and Orr (2017) used Resourceful Adolescent Program-Autism Spectrum Disorder (RAP-ASD), a school-based intervention, that works much like other social skills interventions to help adolescents change the way they react in tough situations and increase the tools available to them. While they did not see a generalizable effect in regard to depression or anxiety scores at the end, the researchers argued that the increase in coping mechanisms was enough of an effect in and of itself.

In another study, Luxford, Hadwin, and Koyshoff (2016) took a different approach and looked at the effects of another cognitive behavioral therapy (CBT) intervention in decreasing anxiety, social worry, and social responsiveness in adolescents with ASD. While standard CBT has only been seen to be moderately effective for individuals with high-functioning ASD, presumably due to their social communication deficits, restricted and repetitive behaviors, limited insight, and unique expressions of anxiety, this study purported to modify traditional CBT to be more beneficial for this population (Kerns et al., 2016; Sukhodolsky et al., 2013). At the end of the six weeks of intervention (and maintained at a six-week follow-up), those who received the treatment showed greater reductions in social worry, school anxiety and general anxiety symptoms, as reported by all parties involved (parents, teachers and the young people themselves) in comparison with the control group. Social responsiveness and attentional control, on the other hand, had less of a direct link to the intervention, and thus showed less clear changes over time.

Both of these interventions took place in small scale settings, such as therapeutic and home environments that look at this anxiety in isolation, rather than within its environment. They make the assumption that anxiety in this population is due to a lack of resilience or cognitive processes that are in need of change, both internal traits that can be worked on and improved in seclusion. Both of these interventions look at attempting to prevent meltdowns before they occur. But what if internal traits are not the only inherent causes or even the greatest contributors to this anxiety? It has been seen that the social environment that adolescents with ASD are embedded within can be particularly triggering for their anxiety. By definition, these adolescents have deficits in understanding and navigating the group social situations that come easy to their neurotypical peers (APA, 2013). They have trouble knowing how to act in groups, they have difficulty fitting in, they struggle to know how to come off as "normal" to their peers. This lack of social understanding can cause alienation in group and classroom settings, which is keenly felt by most adolescents with ASD (Chamberlain et al., 2007).

Thus these interventions do not look at the specific problem in group settings that may be contributing to the causes of these outbursts and meltdowns. They do not confront the lack of social understanding that causes this classroom alienation, both of which could be contributors to high levels of anxiety in this population. Thus, these studies do not seem to have drastic results when it comes to social responsiveness and other relational consequences. Thus it can be seen that much of what is currently being done ignores this inherent social piece. There is a gap in the literature when it comes to finding an intervention that truly helps participants to see and self-monitor their own social progress and their own participation levels in a group setting.

Differential Reinforcement

There are many approaches to controlling and minimizing problematic behaviors in classroom settings. One commonly used technique is using the behavioristic approach of differential reinforcement to reward desired behaviors in order to increase their frequency and withhold rewards (instead of using punishments) in order to extinguish those behaviors that are not compatible with the learning setting (Madsen, Becker, & Thomas, 1968). These two conditions are often referred to as Differential Reinforcement of Higher (DRH) rates of behavior and Differential Reinforcement of Lower (DRL) rates of behavior, respectively. DRLs can be especially useful in classroom management, where problem behaviors can be limited through the application of non-aversive stimuli (e.g.,. positive reinforcement) in order to lower rates of problematic behavior. In these cases, oftentimes a token economy or points system is used in conjunction with the DRL, in order to encourage participation and discourage talking out, repetitive behaviors or other disruptive actions (Dietz & Repp, 1973).

It is commonly acknowledged that differential reinforcement's greatest strength is in its ability to promote unprompted correct responses, fostering greater participant independence over time (Johnson, Vladescu, Kodak, & Sidener, 2017; Vladescu & Kodak, 2010). Differential reinforcement is a commonly used and well-researched behavioral intervention to maintain order and facilitate learning in classroom settings, though research into the specific problem of helping regulate participation and communication skills amongst adolescents with ASD is very limited.

One issue with differential reinforcement when used alone is that the responsibility falls solely on the teacher. The teacher must be proactive with rewards, the teacher must put in the extra time and effort to correctly monitor how everyone is doing as they are teaching, which can oftentimes be overwhelming (Jessel, Ingvarsson, Whipple, & Kirk, 2017). It also takes a lot of the responsibility away from the participants. They are not learning to be more accountable; they

are not learning valuable life skills—they are learning to pair a consequence with their actions. This weakness is where self-monitoring interventions excel. These interventions work to foster personal capability and accountability. Pennington and Ozonoff (1996) described self-monitoring as the ability to monitor one's own progress toward a goal. It is a higher-order cognitive process that supports behavioral and emotional flexibility, planning, and decision making (Henderson et al., 2015). These skills fall under the umbrella of executive functioning skills that oftentimes adolescents with ASD are behind their peers in (de Vries & Geurts, 2015; Gilotty, Kenworthy, Sirian, Black, & Wagner, 2002; Russell, 1997). By teaching children to improve their self-control through the reinforcement of self-monitoring processes, the resilience and functional abilities of children and adolescents with ASD in classrooms increases.

While self-monitoring interventions focusing on children and adolescents with ASD certainly do exist, there is not an overabundance of studies. Most of the relevant literature consists of single (or few) sample case studies, where the effects of self-monitoring seem to be effective, though sometimes with considerable costs. In one such case, Henderson et al. (2015) looked at many of these studies together and weighed the costs against the benefits of self-monitoring interventions for high functioning children and adolescents with ASD. They found that these interventions tended to do what they purported—their findings supported the theoretical model that response monitoring could help regulate and integrate cognitive and affective attention, both when it came to others and to themselves internally, consistent with earlier work by Henderson and Mundy (2012). But, for those with age appropriate language and cognitive abilities and ASD, self-monitoring interventions appear to foster higher levels of social cognition, but it tends to come at the price of higher anxiety and a greater internalization of problems—e.g., enhanced self-monitoring increases one's self awareness and concern in how

others view and evaluate them, leading to significant increases anxiety and depression levels (Henderson et al., 2015). Thus, it can be seen that self-monitoring interventions in general tend to be successful, though it is possible that sometimes this success comes at the steep price of exacerbating mental and emotional states.

Managing Classroom Participation

The combination of ASD characteristics and intervention research come together to play key parts in the creation of our intervention, called *Stack the Deck*. Children with ASD by definition have difficulties with restricted and repetitive behaviors as well as social deficits. These weaknesses often come together to cause problems in structured social situations, like the classroom. This often goes one of two ways—either the adolescent with ASD has a difficulty in realizing that others also need turns to participate, resulting in the monopolization of classroom discussions or the other extreme, where they do not participate at all. This lack of participation could be for a variety of reasons: feeling self-conscious enough that they give up before they embarrass themselves; not finding interest in discussions that do not fit with their limited and restrictive interests; or feeling overwhelmed by the sensory input of the classroom environment.

Classroom environments serve as a microcosm of social interaction every day. This includes the teacher, who is trying to manage the classroom and trying to help everyone participate equally; as well as the other participants, who may feel overwhelmed by challenging behaviors of a child with ASD in the classroom. This also applies to participants with ASD, themselves, who may not realize what they are doing wrong, becoming frustrated when others react to the behaviors that they often do not realize are off-putting.

Because atypical comment rates may occur in this population, especially in conjunction with anxiety and predisposition to meltdowns, we aimed to fill the gap in research surrounding

the regulation of verbal group participation skills as well as the balancing participation levels in group settings. The underlying goal was to benefit all participants in a group setting. We have created and implemented a self-monitoring intervention, *Stack the Deck,* that utilizes a differential reinforcement intervention for both low (DRL) and high (DRH) rates of participation to address both concurrently. Our goal is to use a differential reinforcement intervention in conjunction with an existing token system to lower the number of unsolicited talk-outs as well as balance verbal participation—lowering participation for those with excessive participation rates, and raising input levels from those with low participation rates, through variable ratios of available participation opportunities corresponding to baseline classroom involvement. These token incentives (with backup reinforcers) are purported to give participants a concrete and tangible method for self-monitoring and self-regulation in terms of their classroom input by giving them a visual representation to help them "budget" their proper "turns" for participation in addition to giving them enticements to shape their own verbal behaviors.

Our goal is that through the implementation of *Stack the Deck*, we can help teach participants with ASD to self-regulate their own participation levels (instead of having to rely on a parent or teacher's input) and become more balanced classroom contributors on their own. In intervention development pilot studies, parents reported generalization of benefits to other settings. Although collection of data regarding generalization to other settings is beyond the scope of this project, we hope that through our implementation of this intervention in a clinical setting of a PEERS® social skills group, participants will find greater self-monitoring abilities generalized to other classroom settings. We desire to make lasting change in the lives of these adolescents and help them gain the social skills necessary to function across all social domains.

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APPENDIX B

Stack the Deck Handout

STACK THE DECK

A simple intervention ***to***
balance group participation levels
in student with high functioning autism.

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One of the difficulties with social communication students with autism experience is a deficit in reading nonverbal cues and gauging the level of their participation (making comments during group discussions) to meet the norm for the group. This can be manifest by talking too much and dominating the discussion, or by talking too little, and not contributing, which may also limit the learning experienced by the student.

This intervention can be run within a group or classroom setting to help an individual better monitor his or her own level of participation to reach a more appropriate level. Both target behaviors are addressed using the same intervention, by "stacking the deck" to reinforce the desired behavior more than the problem behavior.

	Problem Behavior 1: Talking too much	Problem Behavior 2: Not talking enough
Identified problem behaviors:	In a group discussion setting, a student with ASD participates in the discussion too much, which limits participation by others.	In a group discussion setting, a student with ASD does not participate at a level that is commensurate with the rest of the group.
Function of the behavior:	The student is seeking attention by having his attempt to join the discussion acknowledged by the facilitator/teacher (adult) or his peers.	The student is seeking to avoid attention. The student is seeking to avoid the effort of verbalization or composing a verbal response.
Desired behavior:	The student will refrain from commenting during <u>some</u> parts of the discussion.	The student will increase his or her participation in group discussions.
Reinforcement:	The student will receive extra points for refraining from commenting.	The student will receive extra points for participating in the discussion.

Method

Participants:

Pilot studies have been completed with students in a social skills group. An adaptation for younger students (5th grade) in an autism classroom setting has also been completed.

Settings:

The intervention can be run in group instruction sessions in a clinical setting. Another group has used it during teacher-led classroom academic instruction (groups size 12- 16). The group has a token system for positive reinforcement (no response cost) already established. Participants earn points for attendance, completing their homework, and participating in the discussion and group activities.

Intervention:

The intervention is based on self-monitoring with reinforcement by points (tokens) to be exchanged for preferred items at the end of each session. The mechanism for self-monitoring is a concrete, visual marker consisting of a colored slip of paper or card.

Preparation:

Assessment: Baseline data needs to be recorded for 3 weeks. Participation levels (comments) are recorded as points. Participation is defined as raising a hand, waiting to be called on, and making a comment. Talk-outs are not considered participation and will be tracked separately. The percentage or rate of participation for each individual will be calculated by dividing that individual's point total by the total points earned by the group for the day. Averages and standard deviations can be calculated on participation.

Target behaviors: Therapists or teachers determine the target behaviors for each group member according to the baseline data. Participants with percentages below one standard deviation will have Increased participation as their desired behavior. Participants with comment levels more than one standard deviation higher will have Refraining from some participation as their desired behavior. Participants one standard deviation lower will have Increasing participation as their desired behavior. Participants with appropriate levels of participation have no target behavior. This group will include those with participation levels within one standard deviation (balanced participation).

Participants are never told what their desired behavior is.

Materials needed:

Colored strips of paper, approximately 2 x 4 inches divided up by colors. About 10 strips of paper are needed for each participant each session.

Choose two colors of paper for each session. For sake of example, we will use green (USE) and red (KEEP) as example colors. Therapists prepare three different types of stacks before participants arrive in the group

Stacking the Decks—Composition of "Decks"*

	"green cards" earn points if used (participating)	"red cards" earn points if kept (refraining from participation)	*Each stack has red on the bottom and green on top. This is meant to make it difficult for participants to tell at a glance which type of stack they are receiving.*
Stack Type 1:	4	6	for participants whose desired behavior = refraining from some participation
Stack Type 2:	6	4	for participants whose desired behavior = increasing participation
Stack Type 3:	5	5	for participants whose participation level is already appropriate for the group

* Slight variations in the intervention each week will keep interest high and encourage self-monitoring to maximize points earned. Variations will also make it more difficult for participants to detect that the decks are stacked each week. Variation will make the decks seem more like they are randomly distributed.

Variations can and should include: Changing

the two colors each week

Slightly changing the total number of cards each week (10, 11, 10, 12, 9, 11, etc.), but the average should be around 10.

Slightly changing the ratio each week as the total number of slips/cards changes. (4:6 one week, 5:6 the next, 3:7 etc.)

Changing the value of the bonus points ("reds" are worth 2 points some weeks, some weeks, "greens" are worth 2, according to the behavior you want to see more of.

Participants always get a point for participating, even if they have to give up a KEEP card bonus point (it is an opportunity cost, there is no response cost).

Establish the rules for earning points with the slips/cards:

(1) Some parts of the session will be designated as "free participation time" when the cards do not have to be used and any group member can volunteer comments or respond to questions. Examples of free time in the group can be Check-in, reporting on homework, choral response, etc.

(2) Some parts of the session (core instructional time) are designated as "bonus" times when participants may earn bonus points when they budget their participation in the discussion. Participants may contribute to the discussion as they wish, but every time they make a comment, they must give a slip/card to the facilitator, starting with the "green" cards first until they are all gone.

(3) Green (USE) cards earn extra bonus points if they are used. Talkouts (data) during bonus time will result in the forfeit a USE (green) card.

(4) Red (KEEP) cards earn extra bonus points if they are kept. Students can be called on to answer if they are not paying attention and have to forfeit a KEEP (red) card if their USE (green) cards are gone.

As participants arrive, give each an appropriate stack (according to target behavior) and ask them to write their name on each of the slips or cards as a gathering or warm up activity. Participants keep their stack throughout the session, but will give a slip or card to the therapist/teacher during discussion "bonus" times each time they participate by answering a question.

At the end of the session, cards that have been *used* (data) will be totaled and bonus points for each green card used will be added to each individual's point total (data). Red cards used receive no bonus points.

Then, the cards *kept* (data) will be totaled and bonus points added to each individual's point total. Red cards kept will receive one bonus point each with green cards kept receiving no bonus points.

As the "bonus time" discussion progresses, the student must weigh the value of making a comment in light of opportunities to earn bonus points for participating (green slips/cards) or give up potential bonus points for making too many comments (red slips/cards).

If necessary, the value of either the red or green cards can be doubled to make the value of reinforcement for the desired behavior higher.

APPENDIX C

Consent Forms

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. 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.

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

Video can be used for scientific publications. _____

Video can be shown at scientific conferences or meetings. _____

Video can be shown in classrooms to college participants. _____

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** 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**

_____ under the same conditions as above

_____ under the same conditions as above with the following changes:

_____

Child's Name: _____

Parent Name: _____ Signature: _____ Date: _____

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: _____

Child Assent (12-14 years old) – BYU 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. Your parent will bring you to BYU once a week on Mondays at 5:30 to meet with other kids your age. We talk about social skills, play games, eat snacks, and you can earn points for prizes. Your parents are in another room talking about social skills too.
2. Your parent will bring to BYU two other times to do some more games and talking with one of the BYU participants you meet in 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.
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. 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:

APPENDIX D

Coding Sheet

STACK THE DECK CODING SHEET

Coder: _____ Dated Coded: _____ Reliability Check?: Yes / No Camera: 1, 2, or 3

SS Group #: _____ Session Date: _____ Direct Instruction—Start: _____ End: _____

Breakout Group #1—Start: _____ End: _____ Breakout Group #2—Start: _____ End: _____

Breakout Group #3—Start: _____ End: _____ Breakout Group #4—Start: _____ End: _____

Talk Outs		Total:	
Choral Response		Total:	
Whole Class OTR		Total:	
Intervention Fairness Comments		Time(s):	

Student Name	Ind OTR	Hand Raise	Comments	Use	Keep	Time OUT	Time IN	NOTES/ Name
1								
2								
3								
4								
5								
6								
7 8								
9 10								
11								
12								
13								

Sessions starts at first mention of lesson content

Breakout Group Time IN/OUT: *Stack the deck* is not valid during any type of instruction that is not direct (i.e. role plays, practices, etc.) Note the times when the intervention paused

Talk Out = comment addressed to class or teacher, loud enough for all class to hear (does not include verbal stimming), intelligible.

Teacher saying "SHHH" = 1 talk out.

If everyone is talking out of turn, indistinguishable = 1 talk out.

Side convos are still T/Os

Opportunity to Respond (whole class) = teacher asks a question/bid for entire class to respond by raising their hands

Program Complaints/Praise: Whenever a student comments about the fairness of the program (e.g. "This isn't fair!!!")—*make sure to mark time in the video*

Hand Raise = Discrete hand up all the way (90 degree) or partial.

Count as new hand raise if hand drops all the way down and then is raised again.

Opportunity to Respond (individual) = teacher asks someone by name to respond.

Comment = teacher calls on student to answer a question

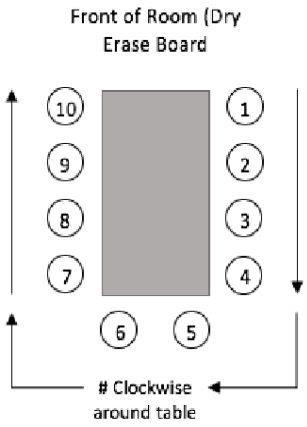
Behavioral management comments don't count as anything

If teacher doesn't call name, but indicates comment, use the NOTES column

Use = USE card pulled for comment

Keep = KEEP card pulled for comment or talk out

Time OUT/IN = time elapsed on video when student went off camera & returned



APPENDIX E

Social Validity Survey

You are invited to participate in a web-based online survey about *Stack the Deck*, the self-monitoring intervention you had contact with while you were a therapist for social skills. If you do not remember *Stack the Deck,* or had no contact with it while you were a therapist, please disregard this survey.

This survey is assessing the social validity of the intervention *Stack the Deck*. We want to know how you, as a therapist, felt about the intervention and its overall usefulness. This study will contribute to a research project surrounding *Stack the Deck* that is being conducted by Lauren Lees, a CPSE EdS student at Brigham Young University, under the direction of Terisa Gabrielsen, PhD. It should take approximately 10-15 minutes to complete.

PARTICIPATION
Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You are free to decline to answer any particular question you do not wish to answer for any reason.

BENEFITS
You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about what those involved actually thought about the intervention. It may help us establish social validity (or a lack thereof).

RISKS

There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life.

CONFIDENTIALITY
Your survey answers will be sent to a link at Qualtrix.com where data will be stored in a password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Clicking on the "Agree" button indicates that
· You have read the above information
· You voluntarily agree to participate
· You are 18 years of age or older

- o Agree
- o Disagree

1. In General, how effective did you find the intervention *Stack the Deck*?

Not Effective		Somewhat Effective		Effective
1	2	3	4	5

2. How Effective did you find the intervention *Stack the Deck*, when it came to:
   a. Decreasing the participation levels of those that tended to comment too much?

Not Effective		Somewhat Effective		Effective
1	2	3	4	5

   b. Increasing the particiaption levels of those that tended to comment too little?

Not Effective		Somewhat Effective		Effective
1	2	3	4	5

   c. Having no effect on those that already had appropriate participation levels?

Not Effective		Somewhat Effective		Effective
1	2	3	4	5

   d. Helping participants learn to help/support their classmates in participating equally?

Not Effective		Somewhat Effective		Effective
1	2	3	4	5

3. How easy were the participants to manage during the baseline phase?

There were no problems with classroom management at all	There were a couple of problems occasionally	Halfway between problematic and calm	Classroom management was difficult most of the time	Classroom management was a serious problem
1	2	3	4	5

4. Was classroom participation more or less equal across all participants durring the baseline phase?

No, there were a lot of over-/under-participators				Yes, participation was very equal
1	2	3	4	5

5. How easy were the participants to manage during the intervention phase?

There were no problems with classroom management at all	There were a couple of problems occasionally	Halfway between problematic and calm	Classroom management was difficult most of the time	Classroom management was a serious problem
1	2	3	4	5

6. Was classroom participation more or less equal across all participants after the intervention completed

No, there were a lot of over-/under-participators				Yes, participation was very equal
1	2	3	4	5

7. How easy were the participants to manage after the intervention completed?

There were no problems with classroom management at all	There were a couple of problems occasionally	Halfway between problematic and calm	Classroom management was difficult most of the time	Classroom management was a serious problem
1	2	3	4	5

8. Did you like the intervention *Stack the Deck*?

No, I hated it. It wasn't all it was cracked up to be.		It was okay, I guess		Yes! I loved *Stack the deck*! It made my life easier
1	2	3	4	5

9. Would you personally use *Stack the Deck* in a future classroom setting?

No, it was more effort than it was worth		I'm neutral on this front		Yes! It is definitely a worthwhile intervention
1	2	3	4	5

10. In your opinion, do you think your participants liked *Stack the Deck*?

No, there were a lot of classroom meltdowns over it		The participants seemed pretty neutral		Yes! They seemed to have a good time when we mplemented the intervention
1	2	3	4	5

11. Why do you think *Stack the Deck* was Effective/Not effective?

_____

_____

12. How do you think *Stack the Deck* could be improved?

_____

_____

13. Any other comments about *Stack the Deck?*

_____

_____