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Feasibility and Preliminary Efficacy of a Parent-Mediated Sexual Education Curriculum for Youth with Autism Spectrum Disorders

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Abstract

Youth with autism spectrum disorders (ASD) can face social-communication challenges related to sexuality, dating, and friendships. The purpose of this study was to assess the feasibility, acceptability, and preliminary efficacy of the Supporting Teens with Autism on Relationships (*STAR*) program. Eighty-four youth with ASD aged 9-18 and their parents participated in this study; two groups received the *STAR* program (interventionist-led parent group vs. parent self-guided), while an attentional control group received a substance abuse prevention program that included instruction in problem-solving and social skills. Feasibility and acceptability of the *STAR* program was high overall. The *STAR* program was effective in increasing parent and youth knowledge of sexuality, while the attentional control was not. There was preliminary support for improvement in parenting efficacy related to discussing sexuality with their children. Gains were seen among completers regardless of whether the parent received support from a facilitator. Implications and future directions are discussed.

Keywords

Autism spectrum disorder; adolescence; sexuality; sexual education

For many youth and young adults with ASD, core deficits in social communication and inflexibility can create unique challenges related to sexuality, dating, and friendships. Individuals with ASD mature physically and sexually on a similar timeline compared to their typically developing (TD) peers (Sullivan & Caterino, 2008). However, deficits in social cognition, communication and interaction skills, as well as limited peer interactions can impact their sexual satisfaction and ability to demonstrate socially appropriate sexual

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behavior in context (Byers & Nichols, 2014; Hellemans, Colson, Verbraeken, Vermeiren, & Deboutte, 2007; Stokes, Newton, & Kaur, 2007). Problems with perspective taking, in particular, may increase an individual with ASD's risk of exploitation due to difficulty recognizing dangerous situations (Nichols, Blakely-Smith, Reaven, & Hepburn, 2005). With the growing number of individuals with ASD entering adolescence and adulthood (Shattuck et al., 2012), there is an urgent need for research on how to best educate youth with ASD on sexuality and related decision making so that they can lead safe and fulfilling lives in accordance with their sexual needs.

There has been limited research into sexual education in individuals with ASD relative to other intervention targets, such as social skills or communication, (Holmes & Himle, 2014; Kellaher, 2015) in part because, historically, individuals with ASD were mistakenly thought of as typically asexual or disinterested in relationships. However, recent literature including youth with ASD without intellectual disability (ID) has contradicted this notion and found that sexuality and romantic relationships are important aspects of autistic life (Pecora, Mesibov, & Stokes, 2016; Dewinter, Van Parys, Vermeiren, & van Nieuwenhuizen, 2017). Comparable numbers of autistic adults and adolescents with ASD have been found to have the same level of sexual interest and functioning as their TD peers (Byers, Nichols, & Voyer, 2013; Dewinter et al., 2015; May, Pang, O'Connell, & Williams, 2017). In a sample of 229 adults with ASD, Strunz and colleagues (2017) found only 7% reported that they had no desire to be in a romantic relationship, suggesting that the majority of individuals with ASD have at least some interest in pursuing sexual or romantic relationships.

Despite reporting similar levels of sexual and romantic interest to TD peers, prior studies have found that many autistic adolescent and adults have less sexual knowledge and awareness (Hannah & Stagg, 2016; Brown-Lavoie, Viecili, & Weiss, 2014). Adults with ASD not only tend to have less perceived and actual sexual knowledge about sexually transmitted infections, contraception, and reproduction, and acquire this knowledge from non-social sources (e.g., television, the internet, educational pamphlets, pornography) compared to those without ASD, who more often acquire this knowledge socially (e.g., through parents, peers, romantic partners; Brown-Lavoie, Viecili, & Weiss, 2014). Furthermore, researchers have associated this lack of sexual knowledge with an increase in experiences of sexual victimization and sexual exploitation. Brown-Lavoie and colleagues (2014) found that 78% of adults in their sample with ASD (n=95) reported experiences of sexual victimization compared to 47% of the control group (n=117). Other studies have confirmed this finding, albeit with smaller prevalence rates. For example, Mandell and colleagues (2005) reported 16.6% of their sample with ASD (n=155) had been sexually abused. Importantly, females with ASD reported higher rates of adverse sexual experiences compared to males with ASD or their TD counterparts (Pecora, Mesibov, & Stokes, 2016). Additionally, this lack of sexual knowledge may also lead to riskier and potentially criminalized sexual behaviors, such as undressing in inappropriate places, masturbating in public, or touching strangers inappropriately (Stokes, Newton, & Kaur, 2007).

Individuals with ASD may also experience gender variance and varied sexual orientation at higher levels compared to TD individuals, possibly further complicating their sexual development and expression. In regards to gender identity, Strang and colleagues (2014)

found that parents of youth with ASD were over seven times more likely to report that their child expressed gender variance compared to TD children, and that this gender variance occurred equally in birth-assigned females and males. In a more recent study with a large sample of autistic and TD adolescents and adults, Cooper, Smith, and Russell (2018) found that autistic people, particularly females, demonstrated less attachment to and derived fewer positive feelings from a gender group (i.e., gender self-esteem). Walsh and colleagues (2018) similarly found that trans and non-binary identities were elevated in adults diagnosed with ASD with autistic natal females reporting such identities more frequently than autistic natal males. With respect to sexual orientation, George and Stokes (2018) found that adults with ASD reported higher rates of homosexuality, bisexuality and asexuality and lower rates of heterosexuality than TD adults. In particular, females with ASD report more variance in their sexual attraction compared to non-ASD females. Autistic females have lower rates of heterosexual preference, higher rates of bisexual attraction, and express more uncertainty in their attraction towards specific sexes compared to females who were not diagnosed with ASD (May, Pang, & Williams, 2017). As such, information regarding diversity in gender identification and sexual orientation are important components to include in a sexual education curriculum for youth with ASD.

Pecora, Mesibov, and Stokes (2016) emphasize that sexuality is an integral aspect of self-identity and quality of life, but their meta-analysis indicated greater difficulties adapting to changes during puberty in ASD, as well as increased sexuality-related psychological distress, and fewer opportunities to acquire knowledge and skills to initiate relationships and practice safe sexual behaviors. However, mainstream sex education curricula may not effectively teach these concepts to youth with ASD, and their sexuality education needs may not be addressed by current educational frameworks (Hannah & Stagg, 2016; Pecora, Mesibov, & Stokes, 2016). Autistic youth often excel at learning concrete concepts, but have difficulty thinking abstractly about social and sexual situations (Müller, Schuler, Burton, & Yates, 2003; Ozonoff, Dawson, & McPartland, 2002). In fact, in the US, only 32.8% to 73.5% of secondary schools provide the lead health teacher with professional development on teaching students with physical, medical, or cognitive disabilities (Brener, Demissie, McManus, Shanklin, Queen, & Kann, 2017). As such, Pecora, Mesibov, and Stokes (2016) highlight the growing body of literature calling for specialized sexual education programs that target specific social, cognitive, and emotional needs of individuals with ASD.

In order to create a curriculum that effectively teaches individuals with ASD about sexuality, it is important to consider an individual's learning style and their environmental context in order to select appropriate educational strategies (Stokes & Kaur, 2005). Dekker and colleagues (2015) have presented preliminary data that their individualized clinic-based training program Tackling Teenage Training improves psychosexual knowledge in teens with ASD in The Netherlands. While this is encouraging, parents and teens in our focus groups (see below) indicated they would prefer a parent-delivered curriculum. Because parents often serve as the primary source of sexuality information for their children in the US, they may wish to transmit their own values along with sexual information, and the results may be more generalizable to the real-world than if knowledge was taught in clinic-based sessions. This may also reflect cultural differences and preferences between The Netherlands and the United States, as there is a well-established contrast between the more

“sex-positive” and pragmatic policies and sex education provided in the Netherlands versus the more limited, abstinence-focused policies and sex education in US culture (Schalet, 2000; Weaver, Smith, & Kippax, 2005).

Because individuals with ASD often demonstrate a greater reliance on caregivers than do their TD peers for information related to sexuality (Griffiths, Quinsey, & Hingsburger, 1989; Stokes et al., 2007), in the US, parents may be the most appropriate people to educate their children about these difficult subjects, especially to pass down their own family morals and values related to sexuality. However, parents of youth with ASD often struggle with how to teach these topics and often leave out discussions on relationships, sexual health and prevention, or general sexuality (Holmes & Himle, 2014). Many parents of youth with ASD may underestimate their child’s sexual experience and may be unaware of their child’s knowledge about sexuality, which may impact the type and amount of information they provide their child with about sexuality (Dewinter, Vermeiren, Vanwesenbeeck, & van Nieuwenhuizen, 2017). Therefore, there is an explicit need for resources on sexuality for youth with ASD and their families.

The purpose of this study was to evaluate the Supporting Teens with Autism on Relationships (STAR) program, a parent-mediated sexuality education program for youth with ASD without intellectual disability (ID). The STAR program includes a curriculum for parents of youth with ASD called *Charting the Course* (Baker, Ziegert, Bowen, Owczarzak, & Willis, 2013a), as well as an interactive computer game for youth called *Boardwalk Adventure* (Baker, Ziegert, Bowen, Owczarzak, & Willis, 2013b). To our knowledge, this is the first parent-mediated sexual education intervention specifically designed for individuals with ASD that includes an online interactive program for youth with ASD, leveraging their learning strengths in visual instruction and the practical application of concepts and skills (Tager-Flusberg, 2003). The aims of this study were to assess the initial feasibility and acceptability of the STAR program and examine preliminary efficacy when compared with an attentional control drug and alcohol education program. Assessing feasibility and acceptability is an important part of creating an intervention for youth with ASD, measured by participant attendance, ability to deliver the program to the desired audience, and participant ratings of satisfaction (Pavuluri et al., 2004; White et al., 2010). To assess preliminary efficacy, we examined the mode of delivery of the STAR program on parent and child outcome measures of sexual and social knowledge and self-efficacy. We hypothesized:

1. The *STAR* program would be feasible to deliver and acceptable to youth and parents. Specifically, we expected participant ratings of the program would be high and at least 80% of the participants would complete the intervention
2. Parents who received the *STAR* program that was facilitated by a leader and their children would demonstrate the most improvement on key outcome measures when compared to the self-guided group and attentional control group
3. Parents and their children who received the *STAR* program would improve on key outcome measures, more so than those who received an attentional control intervention focused on drug and alcohol abuse prevention

Methods

Participants

All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments. IRB approval was obtained from the institution and informed consent and assent were obtained from all individual participants included in the study. Participants were recruited through a children's hospital participant pool, consisting of parents who volunteer to be a part of research. Participants were not required to have been seen at the hospital for assessment or therapy. An initial sample of 104 youth with ASD and their families were recruited from a participant pool of approximately 400 children with ASD who had previously participated in a research trial or completed a clinical evaluation at an academic medical center. All youth were required to meet DSM-5 (APA, 2013) criteria for a diagnosis of ASD based on the judgement of a clinical psychologist with expertise in ASD and to possess a Full-Scale IQ score at or above 80 ($M=101.88$, $SD=17.22$), as determined by a standardized IQ measure, such as the Wechsler intelligence measures (Wechsler, 1999; Wechsler, 2003; Wechsler, 2008) or the Differential Ability Scales (Elliott, Murray, & Pearson, 1990). From the initial sample, eighty-four youth with ASD (68 males) between 9 and 18 years of age ($M=13.10$, $SD=2.18$) and their parents (See Table 2 for demographics and the CONSORT diagram, Figure 1) completed the interventions.

Procedures

The study employed a pretest-posttest (12 weeks following the pretest) controlled design. After eligibility ascertainment, participants were randomized into the STAR or Attentional Control (AC) condition. Parents were aware of randomization prior to participating in the study and families were compensated for their participation. Within the STAR condition, attempts were made to randomize participants to either a facilitator led (FL) or self-guided (SG) group, however, some participants could not attend the facilitator led sessions and were switched to the SG group (no participant was switched from the SG to the FL condition). The two conditions were well-matched on characterization variables except for age, as noted in the results section below.

All measures were administered across the three groups prior to beginning the interventions and again following completion of the 12-week intervention. The *STAR* (FL and SG) groups completed all measures for this study, while the AC group completed all measures except for feedback questionnaires. For the FL and SG groups, parents were encouraged to present developmentally appropriate *STAR* worksheets to their children and set the *Boardwalk Adventure* game level based on their child's age and developmental level. Participants in the *STAR* program were divided into age groups and received the appropriate corresponding questions on the youth sexual knowledge questionnaire and video vignette test. Youth aged 9-12 were assigned to age group 1 9-12 ($n=47$), 13-15 to age group 2 ($n=27$), and 16-18 to age group 3 ($n=10$).

STAR Curriculum Development

The *STAR* program consists of two components: a parent curriculum called Charting the Course and an interactive youth computer game called Boardwalk Adventure. *STAR* was developed with funding from a National Institute of Mental Health (NIMH) Small Business Innovation Research (SBIR) grant and created with input from stakeholders (youth with autism and their parents, as well as ASD experts). In the first phase of the SBIR, the research team conducted a series of formative focus groups to identify curriculum content that was relevant to stakeholders.

The initial parent ($n=7$) and teen focus groups ($n=5$, 10-14 years old; $n=5$ 15-18 years old) were conducted to gain insight into proposed content ideas for the parent manual and suggested structure for the interactive computer game. Upon completion, the project team analyzed the recordings, noting reoccurring themes and trends. While the younger group expressed little interest in learning about romantic relationships, a main priority was the development of friendships. Older participants wanted more guidance on understanding levels of friendships and relationships. The overall interactive website structure received positive feedback from participants and resulted in the creation of the Boardwalk Adventure game for the study based on suggestions (e.g., building in a point system and using levels to “unlock” content to increase motivation, interweaving a story to provide context for educational material). Participants also provided content related suggestions to aid in the development of the *STAR* curriculum.

A second stakeholder review of the Boardwalk Adventure game was conducted with teens with ASD ($n=6$, ages 14-16) and their parents ($n=6$) regarding website functionality and relevancy and appropriateness of content to the target audience. Participants were asked to play Boardwalk Adventure for 1-2 hours, discuss the experience of the website together, and respond to both open- and closed-ended questions. Based on this feedback several game design and functionality changes were made before being launched in the present study (e.g., addition of more sounds, music, pictures, and “humor”). In response to formative research with parent and teen groups, curriculum authors drafted *Charting the Course*, circulated the manual and worksheets through an advisory panel of ASD experts (e.g., clinical psychologists and educational consultants with expertise in ASD, sexuality education experts, ASD intervention developers) for feedback on the content itself and any adjustments needed to content or content delivery to ensure appropriateness for ASD youth, and then revised the curriculum before implementing it in the present study.

The final *Charting the Course* product is a curriculum designed to help parents of youth with ASD aged 9-18 years to support and educate their children in learning the skills needed to navigate relationships, sexual health, and sexuality. The parent’s guide focuses on didactic instruction regarding puberty and hygiene, and also teaches socially appropriate behaviors in a variety of circumstances, such as private versus public sexual behavior, dating, discussing sexual topics with peers, and avoiding exploitation. ASD specific modifications include psychoeducation about ASD as related to sexuality and relationship topics covered, structured delivery of content, simple visual diagrams, concrete language, sample conversations between parents and their children, and common questions from teens with ASD with sample answers. Curriculum chapters include: Puberty (e.g., reproductive

maturity, hygiene), Relationships (e.g., friendships, attraction and interest in others), Sexual Feelings and Behavior (e.g., masturbation, shared sexual behavior), and Maintaining Sexual Health (e.g., sexually transmitted infections, sexual orientation, gender identity, sexual harassment; see Table 1). Each chapter is followed by a group of worksheets that provide a structured, hands-on approach to discussing relationships and sexuality topics in a way that is appropriate for youth with ASD. The worksheets help parents facilitate concrete skills practice by preparing, practicing, and purposefully applying sexuality education to the child's life. To account for variability in family values and morals, as well as developmental maturity, parents are permitted to choose which content to present to their children but are provided with psychoeducation about the value of beginning comprehensive sexual education early and are encouraged to review all content with their children.

Boardwalk Adventure (see Figures 2 & 3) is an interactive videogame and phone application developed in collaboration with professional designers, and is meant to complement the parent's guide as a way for adolescents with ASD to practice some of the more abstract concepts in the curriculum. Adolescents create an avatar and earn tickets to a concert through beach boardwalk games that reinforce curriculum concepts such as puberty and personal hygiene, friendships and relationships, dating etiquette, and sexuality-related topics in an interactive and fun way.

The *Boardwalk Adventure* game targets children and teens with ASD at different developmental levels. Each "area" of the game corresponds to a specific content area closely tied to the *Charting the Course* curriculum. Area 1 contains games and quizzes related to personal hygiene, communicating with peers, and establishing and maintaining friendships. Area 2 contains quizzes related to distinguishing between friends and romantic relationships and negotiating relationship boundaries. Area 3 quizzes adolescents on topics such as puberty and masturbation, sexual urges and behaviors, how to avoid harassment, and inappropriate versus appropriate behaviors for different contexts. Each area of the game is intended to be played by adolescents of any age, but questions in the quizzes are tailored for each of the three age levels. In response to feedback from parent focus groups and our stakeholder advisory panel, parents were able to customize the *Boardwalk Adventure* to present content at the level they felt was appropriate for their child based on age, developmental level, and family values.

Treatment Conditions

We compared the parent-mediated *STAR* curriculum to a parent-mediated substance abuse program that served as an attentional control (see below for more details). Both programs targeted problem-solving and social skills related to the core content (i.e., sexuality or substance abuse) and included parent guides and family worksheets. The mode of delivery of the *STAR* curriculum was also investigated through comparing a facilitator-led parent group to a self-guided group.

Facilitator-Led *STAR* Group.—Parents assigned to the FL *STAR* group ($n=31$) attended six, 90-minute, biweekly parent-only psychoeducational group sessions at a local library facilitated by postdoctoral fellows in clinical psychology with expertise in the assessment

and treatment of youth with ASD. Group facilitators completed additional training with *STAR* curriculum developers on sexuality in ASD and implementation of the *STAR* curriculum. Each group session consisted of curriculum review, small-group discussions, role-play exercises, discussion of worksheets, and problem-solving regarding family implementation. During alternate weeks when group sessions were not held, parents were assigned readings from the *Charting the Course* curriculum and instructed to complete worksheet activities with their child. Youth participants completed *Boardwalk Adventure Game* assignments independently. Parents were instructed to spend approximately one hour per week on homework assignments and were asked to ensure that their child spent approximately 30 minutes per week on the *Boardwalk Adventure* game.

Self-Guided STAR Group.—Participants assigned to the SG *STAR* group ($n=25$) completed the *Charting the Course* program independently at home. Each week, the research team assigned readings for parent participants from the *Charting the Course* curriculum and instructed them to complete worksheet activities with their child. Youth participants completed *Boardwalk Adventure Game* assignments independently in a manner similar to the FL group. Parallel to the FL *STAR* group, parents were instructed to spend approximately one hour per week on homework assignments and were asked to ensure that their child spent approximately 30 minutes per week on the *Boardwalk Adventure* game.

Attentional Control.—The attentional control (AC) program ($n=28$) was a self-guided multimedia educational substance abuse prevention program with components for both parents and youth that attempted to control for the effect of parents and kids communicating about a sometimes-difficult health-related topic. It was comprised of two versions: *Kidsdom* (Baker, Ziegert, Owczarzak, & Willis, 2000) for participants aged 9-11 and *The Keys to Brain Power!* (Baker, Ziegert, Owczarzak, & Willis, 2006) for participants aged 12-18. Both curricula provided education on the impact of substances (i.e., drugs and alcohol) on the brain and body, as well as lessons to build refusal skills, problem-solving skills, and positive social skills. The curriculum materials were previously developed through an SBIR through the National Institute of Health and the National Institute on Alcohol Abuse and Alcoholism in a process similar to the *STAR* curriculum, and the substance abuse prevention demonstrated feasibility and efficacy (Holtz & Hoffman, 2000; Twombly, Holtz, & Tessman, 2008). Parents were assigned to review the curriculum and complete accompanying worksheets with their child for approximately 30 minutes every other week for a 12-week period independently at home.

Measures

Feasibility and Acceptability Measures

Parent Feedback Questionnaire (STAR groups posttest only).: Parents provided feedback on the feasibility and acceptability of the *Charting the Course* curriculum and *Boardwalk Adventure* game through 11 open ended questions (e.g., “What changes could be made to make the parent’s guide more valuable to parents of children with ASD?” “Did you feel that the *Boardwalk Adventure* game provided useful and concrete information for your child to learn about relationships, dating, and sexual behaviors?”) and 31 items rated on a five-point

Likert scale from “Strongly Disagree” (1) to “Strongly Agree” (5), with higher scores reflecting greater satisfaction.

Youth Feedback Questionnaire (*STAR* groups posttest only): Youth with ASD were asked to provide qualitative and quantitative feedback on the *Charting the Course* worksheets and *Boardwalk Adventure* game in a similar manner as described above. They completed 10 questions about the *Charting the Course* worksheets: four of these questions were rated on a five-point Likert scale rated from “Strongly Disagree” (1) to “Strongly Agree” (5), with higher scores reflecting greater satisfaction, and six questions were open-ended (e.g., “Were there any activities in the worksheets that you found confusing or difficult?”). Youth also completed 17 questions about the *Boardwalk Adventure Game*: 12 were rated on a five-point Likert scale similar to the above, and 5 were open-ended (e.g., “Were any fun games (bowling, bumper cars, fishing) or quizzes too easy?” “Were any of them too hard?”).

Parent Efficacy Measures

Parent Knowledge Questionnaire: The project team developed a knowledge questionnaire specific to topics covered in the *STAR* curriculum, which was used to assess parent knowledge of the key concepts for each curriculum chapter. The Parent Knowledge Questionnaire consists of 31 questions covering all topics included in *STAR*, with approximately 6 questions devoted to each of 5 chapters (e.g., timing of development of sexual feelings compared to TD individuals, why individuals with ASD may be at a heightened risk for STIs, legal implications of inappropriate touching). These questions were refined from prior pilot testing of the questionnaire using a Stakeholder Panel consisting of six parents of youth diagnosed with an ASD to ensure an even distribution of question difficulty.

Parenting Self Efficacy Scale (PSES; Dilorio et al., 2006): The PSES is a 17-item measure that assesses parental confidence in discussing sexual health issues with their adolescent (e.g., “You can always explain to your adolescent what is happening when a girl has her period”). Items are rated on a 7-point Likert-type scale ranging from “not sure at all” to “completely sure.” Total scores range from 7-119, with higher scores signifying more parental confidence to discuss sex-related issues with their children. The PSES demonstrates good construct validity and internal consistency in TD samples ($\alpha=.85$; Dilorio et al., 2001; Dilorio et al., 2006). In the present sample, the PSES demonstrated excellent internal consistency ($\alpha=.95$).

Parenting Outcome Expectancy Scale (POES; Dilorio et al., 2001): The POES measures the outcome parents expect when discussing sexual issues with their adolescents (e.g., “If you talk with your adolescent about sex topics you will feel proud,” “If you talk with your adolescent about sex topics, your adolescent will not want to talk with you”) across 23 items. Items are rated on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree.” Scores range from 23-115 with higher scores corresponding to a more positive outcome expectancy. The POES has demonstrated good construct validity and internal

consistency in TD youth ($\alpha=.83$; Dilorio et al., 2001; Dilorio et al., 2006). Internal consistency of the POES was also good in the present sample ($\alpha=.82$).

Youth Efficacy Measures.

Youth Knowledge Questionnaire.: The project team developed a 43-item knowledge questionnaire specific to topics covered in the *STAR* curriculum to assess youth knowledge and attainment of the learning objectives from the curriculum. Adolescents received developmentally appropriate questions based on their age. A pilot test of the knowledge questionnaire was conducted prior to the current study, and questions were revised for an even distribution of question difficulty. Youth participants in group 1 (aged 9-12) answered 19 questions regarding hygiene, puberty, friendships and social relationships (e.g., how to tell a casual friend from close friend, how taking a shower can impact friendships); participants in group 2 (aged 13-15) answered 12 additional items (for a total of 32 items) assessing knowledge related to dating, attraction, and masturbation (e.g., definition of nocturnal emission, physiological signs of physical attraction in the body, appropriate ways to approach someone you like); and participants in group 3 (age 16-18) answered the entire questionnaire, which contained 12 further items regarding shared sexual behavior, contraception, sexually transmitted infections (STIs), and sexual orientation (e.g., definition of sexual orientation, characteristics of an intimate relationship). Total scores were reported as percentage of items answered correctly to standardize across age groups.

Social Self-Efficacy Scale (S-EFF; Connolly, 1989).: The S-EFF is a 15-item scale designed to measure social self-efficacy and its relationship to self-concept, adjustment, and mental health. This measure describes commonly occurring social events that capture social assertiveness, performance in public situations, participation in social groups, and friendships. Youth rated items on a 7-point scale ranging from 1 (“impossible to do”) to 7 (“extremely easy to do”) with greater scores indicating greater social self-efficacy. This scale has demonstrated good convergent and discriminant validity, as well as internal consistency and reliability. In previous studies, Cronbach’s alpha ranged from .90 to .95 and test-retest reliability at 2 weeks was .84 (Inderbitzen, 1994). In the current study, internal consistency was also high ($\alpha=.85$).

Video Vignette Skills Application Test (VVSAT).: The project team developed a skills application test designed to examine teens’ abilities to apply information learned from the *Boardwalk Adventure Game* and worksheet activities from the *Charting the Course* curriculum to real-life social situations. Youth with ASD viewed short clips (on average 30 seconds to 1 minute) from popular television shows of youth interacting in various social settings. After the clip, they were asked questions about the social situation, the people involved, and what they would do next (e.g., “what are some signs from the clip that the girl is ready for physical intimacy?” “what should the boy in the clip do if he finds his girlfriend annoying and doesn’t want to talk to her?”, “how do you know the girl in the clip is ok with the boy touching her?”). As with the Knowledge Questionnaire, this tool was designed to be developmentally adjusted, such that participants in the three age groups received different clips and different questions, reflective of the material they received in the curriculum. A pilot test of the VVSAT was conducted with a Stakeholder Panel consisting of six youth

diagnosed with ASD. Based on those pilot test results, the questions were revised and finalized to have an even distribution of question difficulty. For the present study, participants in group 1 (9-12 years of age) answered 18 questions, group 2 (aged 13-15) answered 15 questions, and group 3 (aged 16-18) answered 14 questions. Scores were converted into percentage of items correct to standardize across age groups.

Data Analyses

Data were analyzed using SPSSv24 (IBM Corp, 2016). A power analysis using G*Power with an $\alpha=.05$ was completed prior to the study and indicated that a sample size of 159 parent-youth dyads would provide a power of .80 to detect a medium effect size ($f=0.25$). Because the sample size was not attained, a post-hoc power analysis indicated that with the current sample size, an $\alpha=.05$, and a medium effect size ($d=0.5$), the achieved power was 0.7 to detect differences between the AC group and combined FL and SG groups, and 0.9 to detect differences within the combined FL and SG group. Demographic variables were compared across groups using chi-square analyses for demographic variables and one-way Analysis of Variance (ANOVA) and *t*-tests for continuous variables.

Feasibility and Acceptability of the Charting the Course Program.—Descriptive statistics, including means and standard deviations were assessed on both the Parent and Youth Feedback Questionnaires that were given to participants in the FL and SG groups. Higher scores indicated greater acceptability.

Efficacy Analysis.—Both between group and within group changes were analyzed. Independent samples *t*-tests were used to detect differences in outcome measures between the FL and SG groups. Initial investigation revealed that there were no significant differences in findings when the FL was compared to the SG groups, thus, these groups were combined and compared to the AC group for between group analyses. ANCOVA was used to test for hypothesized changes from baseline to endpoint between groups, with the treatment group as the independent variable. The dependent variables were change scores (baseline – endpoint) from the Parenting Self Efficacy Scale, Parenting Outcome Expectancy Scale, and Social Self-Efficacy Scale, as well as percentage correct (due to age group variations) from the Parent Knowledge Questionnaire, Youth Knowledge Questionnaire, and Video Vignette Skills Application Test. Because participants' ages differed across groups at baseline, youth age was included as a covariate. We also examined change from baseline to endpoint within the combined STAR group and the AC group using paired samples *t*-tests.

Results

The three groups were well-matched on all characterization variables except for youth age (see Table 2). Youth in the FL group were significantly older than those in the AC group ($t=-2.60, p=.01$) though there was no difference between the FL and SG group. Thus, age was included as a covariate in all subsequent analyses. There were no significant differences between STAR facilitator-led (FL), STAR self-guided (SG) and attentional control (AC) groups with respect to youth full-scale IQ, severity of ASD behaviors on the SRS Total

Score, gender, race, or ethnicity. There were also no group differences in parent income, education, age, gender, race, ethnicity, or treatment completion.

Study groups did not differ at baseline in parent sexuality knowledge ($F_{2,83}=1.82, p=.17$), parent confidence in discussing sexuality on the PSES, ($F_{2,83}=0.42, p=.66$), parent expectation of a positive outcome in discussing sexuality with their children on the POES ($F_{2,83}=1.07, p=.35$), youth social self-efficacy on the SSES ($F_{2,83}=0.02, p=.98$), or youth social knowledge on the VVSAT ($F_{2,83}=0.28, p=.76$; see Table 4 for baseline means and standard deviations). However, youth differed significantly in knowledge of sexuality ($F_{2,82}=3.90, p=.02$), with youth in the FL group ($M=76.25\%$) obtaining higher baseline scores than those in the AC group ($M=66.40\%$), $t=-2.65, p=.01$.

Differences between age groups in the whole sample (age group 1: 9-12, age group 2: 13-15, age group 3: 16-18) on each of these measures at baseline were also investigated. The three different age groups did not differ at baseline in youth social self-efficacy ($F_{2,82}=.05, p=.96$). However, they did differ significantly in youth sexuality knowledge ($F_{2,82}=5.18, p=.008$). Post-hoc comparisons using Tukey HSD test indicated that youth in the age group 1 obtained a significantly lower percentage correct at baseline ($M=66.69\%$) than youth in age group 3 [$(M=80.00\%)$] ($p=.02$). In addition, the age groups differed significantly at baseline in age-based video vignette social knowledge ($F_{2,82}=8.92, p<.001$), with youth in age group 1 receiving a higher percentage correct at baseline ($M=64.25\%$) than those in age group 2 [$(M=51.39\%)$] ($p<.001$) and age group 3 [$(M=52.67\%)$] ($p=.04$).

Hypothesis 1: Feasibility and Acceptability

Clinicians were able to deliver the FL intervention in six sessions following a course outline and two training sessions. In total, 22 participants dropped out of the study and 84 completed the intervention. Comparable proportions of participants completed the intervention across all groups [$X^2(2, N=104)=4.70, p=.10$] (FL-89%, SG-69%, AC-85%). Although there were no statistically significant differences in completion rates, it is notable that the STAR self-guided group had the lowest completion rate and did not reach the 80% benchmark suggesting that it was not feasible and acceptable to participants. Study completers did not differ on youth age, FSIQ, SRS total score, gender, race, or ethnicity compared to study non-completers (see Table 3). There were also no statistically significant differences between completers and non-completers on parent income, education, age, gender, race, or ethnicity, though there was a trend towards significance with a higher proportion of White participants among completers relative to non-completers [parents: $X^2(5, N=104)=9.93, p=.08$; youth: $X^2(5, N=102)=10.54, p=.06$].

Parent quantitative and qualitative feedback was positive overall regarding the *Charting the Course* curriculum and *Boardwalk Adventure Game*. On feedback questionnaire items (1 to 5 scale, greater scores indicate higher satisfaction, 5 being the maximum), parents rated the *Charting the Course* program as a comprehensive guide ($M=4.47, SD=0.51$) with high quality information ($M=4.35, SD=0.52$), and as an overall very useful tool to teach their child with ASD about sexual relationships and sexual health ($M=4.52, SD=0.63$). Parents indicated that they were highly likely to recommend it to other parents of youth with ASD ($M=4.52, SD=0.71$). Furthermore, they indicated the curriculum demonstrated an acceptance

and appreciation for different cultural perspectives ($M=3.97$, $SD=0.80$) and religious perspectives, ($M=3.88$, $SD=0.73$), and is appropriate for use by caregivers from diverse racial and ethnic backgrounds ($M=4.00$, $SD=0.85$). Youth participants generally found the worksheets to be easy to understand ($M=3.70$, $SD=.84$) and indicated that the material covered was important ($M=3.96$, $SD=1.03$). Youth participants found the *Boardwalk Adventure Game* instructions easy to understand ($M=4.11$, $SD=.99$), and parents found the website reasonably easy to navigate ($M=3.44$, $SD=1.20$). Both youth participants and their parents indicated that youth found the game to be moderately enjoyable ($M=3.34$, $SD=1.24$; $M=3.02$, $SD=1.42$, respectively).

In response to open-ended questions on the feedback questionnaire, parents expressed gratitude to have participated in the study and found the curriculum to be well-organized and helpful in guiding their conversations with their child about sexuality. They continued to express some discomfort with topics included in the curriculum (e.g., masturbation) and felt that abstinence was not sufficiently discussed, though they were happy for the ability to present material in accordance with their family value system. Qualitative feedback from youth participants indicated that the curriculum was generally informative and covered important information. They expressed some discomfort in discussing sexuality with their parents and had some concerns about language used in the worksheets (e.g., the term “disability”).

Hypothesis 2: Differences on outcome measures between SG and FL group

There were no significant differences between the SG and FL groups on parent sexuality knowledge [$t(54)=0.83$, $p=.41$, $d=.23$], parental confidence in discussing sexuality topics [PSES; $t(54)=0.59$, $p=.56$, $d=.16$], positive parental expectancy in discussing sexuality with their children [POES; $t(54)=0.79$, $p=.43$, $d=.21$], youth sexuality knowledge [$t(54)=1.68$, $p=.10$, $d=.46$], youth social self-efficacy [SSES; $t(54)=.74$, $p=.47$, $d=.02$], and youth social knowledge [VVSAT; $t(54)=.08$, $p=.08$]. While differences were not significant, there were small effect sizes for differences in parent sexual knowledge (with the FL group showing a greater increase in knowledge) and teen sexual knowledge (with the SG demonstrating greater change in accuracy of scores).

Hypothesis 3: Preliminary Efficacy for Between-Group Changes

ANCOVA analyses of change scores, with youth age included as a covariate, revealed a small trend-level effect of group on change in parent sexuality knowledge ($F_{1,87}=3.62$, $p=.06$, partial $\eta^2=.04$), such that parents in the collapsed STAR groups showed greater gains in sexuality knowledge than parents in the AC group (See Table 4 for mean scores and standard deviations). There were no significant differences in change on parental confidence in discussing sexuality ($F_{1,87}=.33$, $p=.57$, partial $\eta^2=.004$) or parental outcome expectancy in discussing sexuality with their children ($F_{1,87}=.17$, $p=.68$, partial $\eta^2=.007$). There was a significant small-medium effect of group on change in youth sexuality knowledge ($F_{1,79}=6.74$, $p=.01$, partial $\eta^2=.09$), such that youth in the collapsed STAR groups showed greater gains in sexuality knowledge than youth in the AC group. Baseline sexuality knowledge was a significant covariate ($F_{1,80}=9.69$, $p=.003$, partial $\eta^2=.11$), though age was not ($F_{1,80}=.16$, $p=.69$, partial $\eta^2=.002$). There were no significant group differences in

change on youth social self-efficacy ($F_{1,80}=.77$, $p=.38$, partial $\eta^2=.009$). Given the differences in baseline scores across age groups, change in youth social knowledge (VVSAT) was assessed using ANCOVA analysis of change score, with both youth age and baseline score included as covariates. Youth in the collapsed STAR groups showed significantly greater gains in social knowledge than youth in the AC group, with a small effect size ($F_{1,79}=4.52$, $p=.03$, partial $\eta^2=.05$). Baseline score was a significant covariate ($F_{1,79}=32.76$, $p<.0001$, partial $\eta^2=.29$), though age was not ($F_{1,79}=.61$, $p=.44$, partial $\eta^2=.008$).

Of note, parents in the FL group showed significantly greater change in parent sexuality knowledge [$t(57)=-2.29$, $p=.03$] and greater improvement in youth social knowledge at the trend level than those in the AC group [$t(56)=1.76$, $p=.08$]. No differences in change between the FL and AC emerged in parent self-efficacy [$t(57)=.05$, $p=.96$], parent outcome expectancy [$t(57)=1.18$, $p=.24$], youth self-efficacy [$t(56)=-.70$, $p=.49$], or youth sexuality knowledge [$t(56)=.91$, $p=.37$]. Youth in the SG group showed significantly greater improvement in sexuality knowledge than those in the AC group [$t(50)=2.13$, $p=.04$]. There were no significant differences in change on parent self-efficacy [$t(51)=.63$, $p=.53$], parent outcome expectancy [$t(51)=.30$, $p=.77$], youth social self-efficacy [$t(50)=-.66$, $p=.52$], parent sexuality knowledge [$t(51)=-1.09$, $p=.28$], or youth social knowledge [$t(50)=1.65$, $p=.11$] between AC or FL group.

Hypothesis 3: Preliminary Efficacy for Within-Group Changes

Within the combined STAR group, paired samples t -tests indicated that there were significant improvements from baseline to endpoint on parent sexuality knowledge [$t(55)=5.55$, $p<.0001$, Cohen's $d=.75$], parental confidence in discussing sexuality on the PSES [$t(55)=6.09$, $p<.0001$, Cohen's $d=.94$], positive parental outcome expectancy in discussing sexuality on the POES [$t(55)=4.20$, $p<.0001$, Cohen's $d=.56$], youth sexuality knowledge [$t(55)=6.80$, $p<.0001$, Cohen's $d=.91$], and youth social knowledge on the VVSAT [$t(55)=4.10$, $p<.0001$, Cohen's $d=.55$], with medium to large effect sizes. There were no significant gains in youth social self-efficacy on the SSES [$t(55)=.22$, $p=.83$, Cohen's $d=.03$]. In contrast, participants in the AC group did not demonstrate statistically significant changes from baseline to endpoint on parent sexuality knowledge [$t(27)=1.74$, $p=.09$, Cohen's $d=.33$], parental outcome expectancy on the POES [$t(27)=1.84$, $p=.08$, Cohen's $d=.35$], youth sexuality knowledge [$t(26)=1.70$, $p=.10$, Cohen's $d=.33$], youth social knowledge [$t(26)=.31$, $p=.76$, Cohen's $d=.04$], or youth social self-efficacy [$t(26)=.74$, $p=.47$, Cohen's $d=.15$]. However, parents in the AC group did show significant gains in parenting self-efficacy [$t(27)=4.18$, $p<.0001$], with a large effect size (Cohen's $d=.85$).

Discussion

This is the first study assessing the feasibility, acceptability, and preliminary efficacy of a parent-mediated sexual education program for children and adolescents with ASD. The results of this pilot study provide initial support that a parent-delivered curriculum to provide sexuality education to youth with ASD can be successfully implemented, providing gains in knowledge and skills among parents and youth.

In partial support of our first hypothesis, completion rates in the FL group were high, but the SG did not meet the 80% benchmark for completion suggesting that the curriculum may have been more feasible and acceptable when parents were guided by an expert. However, there were no differences in outcome measures between the two STAR conditions, suggesting there may have been a problem with the delivery system rather than with the content. Parents in the FL group may have felt they had more support and group accountability, and it is plausible they were more likely to carry out the curriculum as intended. It is also possible that parents dropped out due to difficulty implementing the curriculum independently, because they disliked the curriculum content, or because the curriculum did not align with their belief system. Finally, it is plausible that difficulties with completion may have been an artifact of our lack of randomization within the STAR conditions. The current study was formulated as a developmental trial, and questions regarding efficacy of delivery systems need to be answered with true randomization procedures. It is also notable that, upon visual inspection, more African Americans dropped out of the study regardless of assigned group, which may indicate difficulties retaining this group in research studies in general (George, Duran, & Norris, 2014; Morgan et al., 2015).

Rating scales and qualitative feedback from both parent and youth participants indicated that this program was a helpful, culturally sensitive, resource for families that addressed important topics related to sexuality and relationships. By relying heavily on stakeholders to develop this program, we were able to create a curriculum that targeted issues of critical importance to individuals on the spectrum and their families, with specific adaptations and content designed to meet the unique needs of youth with ASD in a way that families found acceptable and supportive. Sexuality is a sensitive topic for families that necessarily involves discussions of cultural differences and family values and beliefs. In our development process with stakeholders, giving families a strong voice in the way in which topics are presented and discussed with youth was identified as a key issue. The end result of that process was the creation of a program that includes factual and important information for all youth, including potentially difficult topics such as protection from STIs and the diversity of sexual orientation and gender expression, while also respecting the diversity of family values and the importance of parents in sexuality education by allowing parents to choose the content they presented to their child. Notably, a parent mediated intervention fulfills a gap in the current US sex education system. Only 24 states and the District of Columbia mandate schools to teach sexual education, and 37 states and the District of Columbia allow parents to opt-out on behalf of their children (Guttmacher Institute, 2018). Combined with the lack of specialty training in sex education with students with disabilities (Brener et al., 2017), this leaves many students with an absence of, or suboptimal, sex education. It is particularly important for those parents who either opt out of such a curriculum, or in a district that does not deliver an effective curriculum, to have the resources to fully educate their children about sex and feel comfortable doing so in the process. *Charting the Course* gives parents the tools and resources they need to provide comprehensive sexuality education, along with the possibility to decide which topics are most relevant for their children at different developmental stages and the ability to present the information in the broader context of their own values and beliefs. During the study, parents who felt their children were too

young to receive some content according to their own personal values qualitatively indicated they would use the STAR curriculum to discuss these topics at a later age.

Contrary to our second hypothesis, there were no significant differences in improvement on outcome measures between the facilitator-led and self-guided groups suggesting the content was equally helpful for families in both groups who completed the intervention with or without clinician support. This may be because the materials in this curriculum were specifically designed to be readily accessible to youth with ASD and their parents. “The success of this program is encouraging, as it indicates that *Charting the Course* provides families with an accessible set of resources to provide developmentally appropriate and ASD-specific sexuality education at their own pace. Clinicians may be important in prompting families to discuss these topics sooner rather than later and in encouraging them to provide comprehensive and detailed information, even if families do not believe it to be relevant to their child, but the actual education process can be entirely in the hands of families, making this an accessible and affordable resource to families who are often already struggling to access the range of specialists necessary for their child with ASD.

To test our third comparative efficacy hypothesis, we collapsed data from the self-guided and facilitator-led groups and compared them to the drug and alcohol prevention program. We found that the STAR program increased youth knowledge related to sexual health and development to a greater extent than the attentional control in both between-group and within-group analyses. We did not find any other significant differences when comparing treatment groups. There was a trend towards a greater increase in parent sexual knowledge in the STAR group compared to the attentional control, though within-group analyses indicated significant change. This may be due to the fact that parents who self-selected into a sex education study were already knowledgeable about sex and comfortable discussing it with their teens. It is possible that our small sample size may have limited our ability to detect group differences, thus we chose to explore within-group change on key outcome measures. The STAR participants, but not those in the attentional control treatment, showed gains in parenting self-efficacy and outcome expectancy for discussing sexuality with their children on the POES, and youth skills for navigating video-based social situations dealing with sexuality and relationships on the VVSAT. Interestingly, parents in the attention control group also showed within-group improvements in parenting self-efficacy related to discussing sexuality with their children. This may be due to the fact that both the *STAR* curriculum and the attentional control program focused on topics that are usually uncomfortable and difficult for parents to discuss with their children. It is possible that upon completion of one program that discusses a difficult topic (i.e., alcohol and/or drug use), parents also felt more at ease to discuss another complicated topic (i.e., sexuality), leading to improved self-efficacy overall.

Limitations & Future Directions

There were several limitations to this initial feasibility study, including variation in randomization within the *STAR* group conditions, overrepresentation of males, small sample size, differences in age of youth across groups at baseline, age effects seen in the Youth Knowledge Questionnaire, and a lack of standardized and normed sexuality outcome

measures. Although the completion rates did not statistically differ in the self-guided and facilitator STAR group, the self-guided group had a greater dropout rate, with African American families tending to dropout at higher rates than Caucasian families regardless of group. Unfortunately, we did not track reason for dropout. It is possible some parents may have disliked or not been comfortable independently leading the curriculum and/or that the curriculum conflicts with certain cultural beliefs and future studies should assess these important moderator variables. Although participants were randomized across treatment condition (*STAR* vs. attentional control), true randomization did not occur within the *STAR* program which precludes interpretation regarding dropout rates between the facilitator led and self-guided groups. Our facilitator led group was a sample of convenience that excluded children who may have had conflicts due to child treatment or family schedules, indicating we might have lost the busiest families, families with fewer resources, or youth who were getting the most treatment, to the self-guided group. Overall, more research is also needed to examine differences between the FL and SG group. Data on other measures of fidelity like homework completion and specific content to which youth were exposed, should be collected in the future to provide a more thorough analysis of feasibility and acceptability, as well as understanding of how amount of exposure to the curriculum may affect outcomes. Furthermore, our lack of control over the content parents presented to youth makes it difficult to understand whether youth knowledge of sexuality did not improve because the curriculum content was ineffective or because parents simply chose not to expose youth to the content that would have increased their knowledge. Future studies will need to specifically track which content parents present to youth participants, both to better understand what materials parents feel comfortable reviewing with their children, as well as to clarify the relationship between presented material and progress made by youth.

A second area for future direction is the inclusion of more females in future studies of this program. While our sample reflected the current prevalence of ASD in males and females, and the curriculum content addressed both male and female sexual development, we did not have a large enough sample of females to test whether outcomes varied by gender. Furthermore, it is possible that our findings would be different in a more balanced or female-dominant sample, perhaps because parents differ in their level of comfort in discussing sexuality with sons versus daughters and/or because youth with ASD face different challenges in sexual development by gender. Indeed, studies of adolescent girls and young adults with ASD, and their families, often highlight the intersection of ASD and sexuality as a particularly critical issue (Bargiela, Steward, & Mandy, 2016; Cridland, Jones, Caputi, & Magee, 2014). Similarly, as is commonly found in ASD research, our present sample is also restricted in cultural and socioeconomic diversity. Particularly given the fact that individuals with ASD from lower socioeconomic backgrounds and from families of color have reduced access to services and care, it will be critical to evaluate the effectiveness of the STAR curriculum in more diverse samples. Families with reduced access to services may find these resources even more valuable than families who participated in the present study. Additionally, the profound impact of culture on sexual values is an important factor to consider and investigate in the context of a parent-mediated sexuality curriculum.

Because of the lack of normative sexuality knowledge measures for youth with ASD, we relied on study-specific measures rather than standardized measures to provide a targeted,

sensitive measure of change. However, we acknowledge that the lack of test-retest reliability, validity, and normative data on the knowledge questionnaires and video vignettes limits our understanding of how treatment change relates to real world functioning. Thus, it is difficult to accurately interpret findings surrounding knowledge differences across age groups. The development of normative data for these types of innovative measures is an important goal for future studies. While we attempted to correct for age differences in the analyses by including age as a covariate, future studies should assess the efficacy of *Charting the Course* and *Boardwalk Adventure* with larger samples across a range of ages and also follow participants longitudinally to investigate whether changes emerge or are preserved over time. Despite these limitations, this study indicates that the *Charting the Course* curriculum and the *Boardwalk Adventure Game* was a feasible and acceptable intervention as evaluated by participants who completed the program and these programs were effective overall in increasing parent and youth knowledge about sexual health and development. Future research is needed to replicate these findings in a randomized control trial using an equally rigorous attentional control intervention.

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DX = diagnosis; FSIQ = Full Scale IQ; STAR = Supporting Teens with Autism on Relationships Program

Figure 1.
CONSORT diagram for the STAR project.

Figure 2.
Image from Boardwalk Adventure Game

Figure 3.
Example question targeting relationship skills from Boardwalk Adventure game.

Table 1**Charting the Course Table of Contents**

Introduction to Charting the Course
About Charting the Course
Foundation Topics
Sexuality
Values
Decision Making
Introduction Worksheets
Chapter 1: Puberty
Reproductive Maturity
Secondary Sexual Characteristics
Hygiene
Emotional Changes
Chapter 1 Worksheets
Chapter 2: Relationships
Friendships
Attraction and Interest in Others
Progressing Relationships
Chapter 2 Worksheets
Chapter 3: Sexual Feelings and Behaviors
Getting to Know Sexual Feelings and Behaviors
Masturbation
Shared Sexual Behavior
Chapter 3 Worksheets
Chapter 4: Maintaining Sexual Health
Male and Female Sexual Health
Sexually Transmitted Infection
Contraception
Sexual Orientation and Gender Identity
Sexual Harassment
Chapter 4 Worksheets

Table 2**Characterization Variables Across Treatment Groups**

	Facilitator Led (n=31) Mean (SD)	Self-Guided (n=25) Mean (SD)	Attentional Control (n=28) Mean (SD)	Test Statistic
Youth age (yrs)	13.8 (1.8)	13.0 (2.7)	12.4 (1.6)	$F_{2,83}=3.43, p=.04^*$
Youth FSIQ	100.3 (16.4)	103.4 (19.9)	102.3 (15.9)	$F_{2,83}=0.24, p=.79$
Youth SRS total	79.27 (10.74)	77.12 (8.01)	76.61 (7.91)	$F_{2,82}=0.70, p=.50$
Youth Gender	83.9% male	80.0% male	78.6% male	$\chi^2=0.29, p=.87$
Youth Race	71.0% Caucasian (n=22) 19.4% African American 3.2% Asian American 3.2% Multiracial	72.0% Caucasian 8.0% Asian American 4.0% American Indian 12.0% Multiracial 4.0% Other	71.4% Caucasian 7.1% African American 7.1% Asian American 10.7% Multiracial 3.6% Other	$\chi^2=11.46, p=.32$
Youth Ethnicity	16.1% Hispanic/Latino	12.0% Hispanic/Latino	25.0% Hispanic/Latino	$\chi^2=1.39, p=.50$
Income *	80.6% Upper Income 9.7% Upper Middle Income 3.2% Lower Middle Income	96.0% Upper Income 4.0% Upper Middle Income	75.0% Upper Income 14.3% Upper Middle Income 3.6% Lower Middle Income 7.1% Lower Income	$\chi^2=6.87, p=.33$
Parent Education	33.3% Graduate Degree 26.7% Bachelor's Degree 26.7% Some College 13.3% High School	20.0% Graduate Degree 40.0% Bachelor's Degree 32.0% Some College 8.0% High School	25.0% Graduate Degree 32.1 % Bachelor's Degree 25.0% Associate's Degree 17.9% High School	$\chi^2=2.92, p=.82$
Parent Age	48.35 (6.73)	48.52 (11.60)	45.00 (12.71)	$F_{2,83}=0.10, p=.37$
Parent Gender	12.9% male	16% male	10.7% male	$\chi^2=.33, p=.85$
Parent Race	74.2% Caucasian 19.4% African American 6.5% Asian American	88.0% Caucasian 4.0% Asian American 4.0% American Indian 4.0% Other	75.0% Caucasian 7.1% African American 7.1% Asian American 3.6% Multiracial 7.1% Other	$\chi^2=12.82, p=.23$
Parent Ethnicity	9.7% Hispanic/Latino	4.0% Hispanic/Latino	17.9% Hispanic/Latino	$\chi^2=2.61, p=.27$
Completion Rate	88.6%	69.4%	84.8%	$\chi^2=4.70, p=.10$

Note: FL: Facilitator Led, SG: Self-Guided; AC: Attentional Control; SRS: Social Responsiveness Scale Income Groups: Upper Income: >\$75,000; Upper Middle Income \$51,000-\$75,000; Lower Middle Income \$26,000-\$50,000; Lower Income 7.1% <\$25,000.

* $p < .05$.

Table 3

Characterization Variables for Study Completers and Non-completers

	Completers (n=84) Mean (SD)	Non-completers (n=20) Mean (SD)	Test Statistic
Youth Age (yrs)	13.10 (2.12)	12.76 (1.80)	$t_{102}=-0.67, p=.51$
Youth FSIQ (SS)	101.88 (17.22)	104.60 (16.09)	$t_{102}=0.64, p=.52$
Youth SRS total	77.72 (9.03)	76.89 (6.47)	$t_{100}=-0.38, p=.71$
Youth Gender	n male = 68 (81.0%)	n male = 16 (84.2%)	$\chi^2=0.11, p=.74$
Youth Race	n Caucasian = 60 (72.3%) n African American = 8 (9.6%) n Asian American = 5 (6%) n American Indian = 1 (1.2%) n Multiracial = 7 (8.4%) n Other = 2 (2.4%)	n Caucasian = 9 (47.4%) n African American = 7 (36.8%) n Asian American = 2 (10.5%) n Multiracial = 1 (5.3%)	$\chi^2=10.54, p=.06$
Youth Ethnicity	n Hispanic/Latino = 15 (18.5%)	n Hispanic/Latino = 3 (15.8%)	$\chi^2=0.08, p=.78$
Income*	n Upper Income = 70 (85.4%) n Upper Middle Income = 8 (9.8%) n Lower Middle Income = 2 (2.4%) n Lower Income = 2 (2.4%)	n Upper Income = 14 (77.8%) n Upper Middle Income = 3 (16.7%) n Lower Middle Income = 1 (5.6%)	$\chi^2=1.66, p=.65$
Parent Education	n Graduate Degree = 22 (26.5%) n Bachelor's degree = 27 (32.5%) n Some College = 23 (27.7%) n High School = 11 (13.3%)	n Graduate Degree = 4 (22.2%) n Bachelor's degree = 9 (50%) n Some College = 4 (22.2%) n High School = 1 (5.6%)	$\chi^2=5.47, p=.71$
Parent Age (yrs)	47.29 (10.51)	45.63 (6.90)	$t_{101}=-0.65, p=.52$
Parent Gender	n male = 11 (13.1%)	n male = 3 (15.8%)	$\chi^2=0.10, p=.76$
Parent Race	n Caucasian = 66 (78.6%) n African American = 8 (9.5%) n Asian American = 5 (6%) n American Indian = 1 (1.2%) n Multiracial = 1 (1.2%) n Other = 3 (3.6%)	n Caucasian = 10 (52.6%) n African American = 7 (36.8%) n Asian American = 1 (5.3%) n Other = 1 (5.3%)	$\chi^2=9.93, p=.08$
Parent Ethnicity	n Hispanic/Latino = 9 (11%)	n Hispanic/Latino = 2 (10.5%)	$\chi^2=0.003, p=.96$

Note: Income Groups: Upper Income: >\$75,000; Upper Middle Income \$51,000-\$75,000; Lower Middle Income \$26,000-\$50,000; Lower Income 7.1% <\$25,000.

Table 4

Means, (Standard Deviations), and [Ranges] on Outcome Measures at Baseline (BL) and Endpoint (EP)

	Facilitator Led (n=31)		Self-Guided (n=25)		STAR Treatment (FL+SG, n=56)		Attentional Control (n=28)	
	BL	EP	BL	EP			BL	EP
Parent Sexuality Knowledge	67.8 (10.3) [41.9-83.9]	75.8 (7.5) [54.8-87.1]	71.1 (6.9) [54.8-83.9]	76.9 (8.0) [61.3-90.3]	69.3 (9.0) [41.9-83.9]	76.3 (7.7) [54.8-90.3]	66.7 (8.0) [54.8-80.7]	70.0 (7.7) [48.4-80.7]
PSES	93.9 (18.5) [34-116]	106.4 (10.7) [81-119]	91.6 (23.0) [24-117]	106.8 (11.3) [75-119]	92.8 (20.5) [24-117]	106.6 (10.9) [75-119]	88.8 (22.7) [46-119]	101.1 (16.8) [61-119]
POES	83.6 (8.1) [69-107]	90.2 (9.1) [72-110]	86.3 (9.2) [72-106]	90.8 (10.3) [70-110]	84.8 (8.6) [69-107]	90.5 (9.6) [70-110]	83.0 (8.6) [69-107]	86.6 (9.4) [63-102]
SSES	68.1 (16.3) [39-94]	67.7 (16.4) [28-100]	67.4 (12.7) [37-94]	67.2 (12.3) [37-88]	67.8 (14.7) [37-94]	67.5 (14.6) [28-100]	67.6 (15.7) [37-102]	69.1 (18.9) [32-105]
Youth Sexuality Knowledge	76.3 (12.4) [47.4-96.9]	83.6 (9.8) [65.6-100%]	68.6 (15.4) [31.3-95.4]	80.6 (15.9) [28.1-100]	72.9 (14.2) [31.3-96.9]	82.3 (12.9) [28.1-100]	66.4 (14.8) [36.8-94.7]	70.9 (18.5) [31.6-94.7]
VVSAT	58.9 (15.7) [25-94.4]	67.3 (12.1) [43.8-83.3]	57.0 (15.8) [18.8-77.8]	63.9 (13.4) [33.3-83.3]	58.0 (15.6) [18.8-94.4]	65.8 (12.9) [33.3-83.3]	60.0 (12.7) [33.3-83.3]	60.8 (14.7) [37.5-88.9]

Note: PSES=Parent Self-Efficacy Scale, POES=Parent Outcome Expectancy Scale, SSES=Social Self-Efficacy Scale, and VVSAT=Video Vignette Skills Application Test

Parent Knowledge, Teen Knowledge, and VVSAT are presented as percentage correct, while PSES, POES, and SEES are presented as total scores.