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Repetitive thinking, social connectedness, and distressing sexual experiences in autistic and non-autistic students: Examining social-cognitive risk factors and mental health during the college transition

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**REPETITIVE THINKING, SOCIAL CONNECTEDNESS,
AND DISTRESSING SEXUAL EXPERIENCES
IN AUTISTIC AND NON-AUTISTIC STUDENTS:
EXAMINING SOCIAL-COGNITIVE RISK FACTORS AND MENTAL HEALTH
DURING THE COLLEGE TRANSITION**

by

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Abstract

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REPETITIVE THINKING, SOCIAL CONNECTEDNESS, AND DISTRESSING
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The prevention and treatment of mental health concerns are consistently named among autistic adults' highest clinical and research priorities. While several theories have been proposed to explain the high prevalence of depression and anxiety in autistic populations, virtually no longitudinal research has evaluated causal mechanisms. The first study in this dissertation aims to explore how known contributors to depression and anxiety identified by general population research – namely, rumination, dissatisfaction with social connectedness, and distressing sexual experiences – relate to the development of internalizing symptoms in autistic individuals during the transition to college. The second study explores potential contributors to sexual risk, through investigating differences in sexual consent understanding and experiences in autistic and non-autistic undergraduates. Results suggest that hypothesized predictors tend to primarily contribute to depression and anxiety symptoms during the transition to college through a) a baseline tendency that seems to have some persisting, longer-term influence throughout the semester and b) a synchronous, short-term risk that may contribute to symptoms in the moment. Findings also support prior literature that autistic adults endorse more childhood experiences of sexual abuse and unsatisfying sexual education experiences.

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Chapter 1

2m2x

Introduction

Autism is a neurodevelopmental condition or "way of being" (Sinclair, 1993) characterized by atypical styles of social interaction (compared to the neurotypical majority) and the presence of repetitive behaviors or interests (American Psychiatric Association, 2013, 2022). While autistic traits must be present in childhood for an individual to meet criteria for diagnosis, autism exists across the lifespan. Estimates made from simulation and Bayesian hierarchical models suggest that currently approximately 2.2% of adults in the United States are autistic[1] (Dietz et al., 2020).

Autism frequently co-occurs with mental health conditions, with depression being one of the most common (Hofvander et al., 2009; Lever & Geurts, 2016). Meta-analyses have estimated that the prevalence of depression in autistic individuals is approximately 3-4 times higher than in non-autistic people (Hudson et al., 2019), and these high rates come with numerous negative effects on the autistic community, much as in the general population (Angermeyer et al., 2002). Specifically, among autistic individuals, depression has been associated with distress and lower quality of life (Lawson et al., 2020; Park et al., 2019), greater service use (Joshi et al., 2013), lost work days (Park et al., 2019), and self-injury and suicidality (Cassidy et al., 2018). Thus, depression is concerning both in terms of its prevalence and its relationship to health and functioning within the autistic community.

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[1] Per available data, the majority of adults diagnosed as autistic prefer identity-first language (e.g., "autistic person") over person-first language (e.g., "person with autism") (Bottema-Beutel et al., 2020; Bury et al., 2020; Kenny et al., 2016). Language in this paper is chosen accordingly to align with community preferences.

Anxiety also presents serious concerns in this population. Autistic adults are at an increased risk of anxiety disorders, with a lifetime prevalence estimated to be approximately 42% (Hollocks et al., 2019). In the general population, anxiety is associated with a variety of physical health concerns and impaired quality of life (Brenes, 2007; Salovey et al., 2000). This relationship between anxiety and negative health outcomes has been observed in autistic individuals as well. Although anxiety is more weakly related to reduced quality of life than depression (Park et al., 2019), anxiety has been related to difficulty coping with change (Gillott & Standen, 2007) and increased physical health concerns in autistic people (Taylor et al., 2021). Additionally, the development of both depression and anxiety are highly intertwined and therefore may affect one another bidirectionally (Lamers et al., 2011). Depression and anxiety thus are significant concerns for the autistic community and its various stakeholders; autistic adults have consistently called for better understanding of and interventions for these conditions among their top priorities for clinical research and services (Benevides et al., 2020; Cage et al., 2022; Crane et al., 2019; Gotham et al., 2015).

While this call for mental health prioritization has come from autistic people and stakeholders across the lifespan (e.g., Cage et al., 2022), there has been a particular emphasis from autistic young adults, including college students. An increasing number of students diagnosed as autistic have entered college (White et al., 2011) and have reported particularly salient mental health concerns during this period of their lives (Van Hees et al., 2015). Autistic adults have described "feeling overwhelmed, stressed, anxious, depressed, tired and isolated" as college students (Van Hees et al., 2015, p. 19), and recent larger scale comparisons consistently document heightened mental health issues

among autistic students, relative to non-autistic university students (Bakker et al., 2019, 2020; McLeod et al., 2019; Sturm & Kasari, 2019). Given that autistic students' ability to access and benefit from mental health resources varies greatly (Crane et al., 2019; McMorris et al., 2019), further research is needed to learn how to best support autistic university students, including by preventing and treating mental health concerns.

College provides important opportunities for autistic students, including increasing the likelihood of employment and livable wages post-graduation (Flegenheimer & Scherf, 2021; Migliore et al., 2012). However, college also comes with challenges such as lower social support, less structure, and unfamiliar social scenes (Bailey et al., 2020; Van Hees et al., 2015; White et al., 2016). While these social factors may affect most first-year students regardless of autistic status, they do not affect all students equally. Features of autism, including repetitive thinking (Keenan et al., 2018), as well as elevated risk of social disappointment or trauma (Gelbar et al., 2014; Kapp et al., 2011), may make autistic students particularly susceptible to negative mental health consequences during their transition to college.

Theoretical Factors Contributing to Depression and Anxiety in Autistic Adults

Several factors have been suggested as contributing to the high prevalence of depression and anxiety in autistic populations. In the current study we focus on repetitive negative thinking, dissatisfaction with social connectedness, and distressing or unwanted sexual experiences as candidate contributors to these internalizing symptoms. While all three of these have a strong evidence base linking them to the development of depression in non-autistic populations, each has more limited research with autistic samples, with

few to no longitudinal studies of these possible causal contributors to depression and anxiety in autistic adults.

Repetitive Negative Thinking. Rumination is a type of repetitive negative thinking (RNT) that focuses on one's distress without making active efforts to solve the problem (Nolen-Hoeksema et al., 2008). It is related to worry and other forms of repetitive thought, but is distinct particularly due to its lack of problem-solving orientation and its specific focus on stressors or other contributors to low mood (Watkins & Roberts, 2020). This content of focus often includes negative events that occurred in the past, thus there is little opportunity to productively plan and change outcomes (unlike with worry, which is often anticipatory). Rumination has been conceptualized as including both a longer-term, more stable cognitive tendency that may be learned early in life through parenting and other environmental influences (Nolen-Hoeksema, 1991; Nolen-Hoeksema & Davis, 1999; Watkins & Roberts, 2020), as well as shorter-term moments of heightened repetitive cognition that may arise in response to stressors (Hoebeke et al., 2022). In the general population, rumination both maintains and predicts the onset of depression and anxiety symptoms (Abela & Hankin, 2011; Nolen-Hoeksema, 1991, 2000; Treynor et al., 2003; Watkins & Roberts, 2020), and is related to other negative outcomes such as physical health problems (Brosschot et al., 2006; Thomsen et al., 2004; Watkins, 2008), suicidality (Miranda & Nolen-Hoeksema, 2007), and reduced response to intervention (Watkins & Roberts, 2020). Due to its association with mental health concerns, repetitive negative thinking already serves as a treatment target in depression interventions in the general population (e.g., Rumination Focused-CBT; Hvenegaard et al., 2015).

There is reason to believe that repetitive thought processes may be even more common in autistic people (Crane et al., 2013; Gotham et al., 2014) – and similarly related to internalizing symptoms in autistic populations as in the general population (Gotham et al., 2014; Williams et al., 2021). There are many potential causal explanations for this elevated rate of repetitive thought within autistic people, and these proposed contributors likely interact to explain the phenomenon. One explanation may be that autism is defined diagnostically by repetitive behavior (such as in speech, interests, and other manifest behavior; American Psychiatric Association, 2022), and the manifest behavioral and cognitive domains of repetition appear to be interrelated. For example, insistence on sameness is likely to involve both a more rigid cognitive style as well as related routine-protecting behaviors, such as insisting on taking the same route home from school each day (Chen et al., 2008). In this proposed view, a more repetitive, inflexible, or detail-focused cognitive style may underlie both repetitive thinking in autistic individuals as well as many of the observable repetitive behaviors associated with autism (Geurts et al., 2009; Hollocks et al., 2022; Williams et al., 2021).

It is also possible that greater reported repetitive thinking in autistic adults is related to the elevated rates of stressors that autistic people face. Marginalized individuals across a variety of identities appear to engage in more ruminative processes, as a maladaptive method of coping with their increased rates of stressors (Hatzenbuehler, 2009; Meyer, 2003; Snidman et al., 2022). Thus, ableism and other forms of oppression related to intersectional autistic identities may increase autistic adults' risk of rumination. Regardless of the cause(s) of this heightened tendency, repetitive thinking may be a cognitive characteristic of autism and/or commonly co-occurring behavior that, when

focused on negative events or beliefs, contributes to depression through means similar to rumination (Gotham et al., 2014; Williams et al., 2021).

In addition to engaging in more repetitive cognitive patterns overall, cross-sectional evidence suggests that autistic adults engage in more repetitive *negative* thinking than their non-autistic peers (Crane et al., 2013; Gotham et al., 2014). These higher rumination scores are also associated with depression symptom endorsement in autistic adults (Gotham et al., 2018). Importantly, only one prior longitudinal study has investigated potential links between rumination and depression in an autistic sample, finding that rumination prospectively predicts depression in children on the autism spectrum (Rieffe et al., 2014). To our knowledge, this longitudinal work has not been evaluated within an autistic adult sample outside of previous waves of the current study. In our early waves of data collection (McKenney et al, 2023), we found that a baseline tendency towards rumination was predictive of cross-semester sadness and anxiety. While these relationships were observed across neurotypes, students with higher self-reported autistic traits on the Social Responsiveness Scale (SRS-2) tended to experience greater repetitive negative thinking, depression symptoms, and anxiety symptoms (McKenney et al., 2023). A more immediate predictive relationship between ruminative thought at one time point and sadness/anxiety at subsequent time points was not observed.

Satisfaction with Social Connectedness. Satisfaction with social connectedness is a subjective conceptualization of how well one feels their need for belonging, involvement, and support are being met (Adams et al., 2024; Ambrey et al., 2017; Berry & Welsh, 2010). Instead of relying on objective measures such as the amount of time one

spends with others, satisfaction with social connectedness reflects the understanding that two people can have the same amount of time with peers and yet still experience different levels of satisfaction and sense of belonging from these interactions. For example, research has shown that responses to the loss of in-person socialization due to COVID-19 were experienced very differently by adolescents depending on how they perceived the quality of online peer interactions (Scott et al., 2022). For adolescents who strongly preferred offline interactions, they were likely to see online interactions as less satisfying and thus feel less connected to peers. However, for other adolescents who perceived less of a drop in friendship quality through the change to online modalities, satisfaction with social connectedness did not decrease as much (Scott et al., 2022). Therefore, we can see that social connectedness is not a simple function of time spent with others or modality of interaction. Rather, social connectedness is a much more complex equation rooted in the balance of one's expectations, preferences, and how fulfilling they find their interactions. In the general population, satisfaction with social connectedness has been shown to relate to positive outcomes such as life satisfaction (Blau et al., 2016) and decreased depressive and anxiety risk (Wickramaratne et al., 2022).

Where social connectedness describes a positive subjective experience of feeling cared for and included, loneliness is in some ways its opposite. Loneliness is a subjective experience of distress associated with feeling isolated from others, whether or not an individual is actually alone (Hawkley & Cacioppo, 2010). In the general population, loneliness is associated with many negative physical and mental health consequences (Hawkley & Cacioppo, 2010), including an increased risk of suicide (Goldsmith et al., 2002) and increased depressive symptoms (Cacioppo et al., 2006; Wei et al., 2005).

While the relationship between depression and loneliness is likely somewhat bidirectional (Segrin, 1999), there is evidence that loneliness prospectively predicts depression in one-year intervals (Cacioppo et al., 2010). In these same intervals, depression does not predict increased loneliness (Cacioppo et al., 2010). This may suggest loneliness plays some causal role in depressive symptoms, at least under some circumstances.

Autistic individuals appear to be negatively affected by lack of satisfaction with social connectedness and loneliness similarly to – or more so than – the general population. Cross-sectional evidence suggests that social dissatisfaction is related to depression in autistic adults (Han et al., 2019; Mazurek, 2014) as it is in the general population. Autistic adults also tend to report more loneliness than their non-autistic peers (Ee et al., 2019; Grace et al., 2022; Quadt et al., 2023). For autistic adults, barriers to socialization may include differences in social communication style that create difficulties in non-autistic majority spaces and past negative interpersonal experiences, in addition to environmental and sensory factors (Crompton et al., 2020; Ee et al., 2019; Milton, 2012).

Based on a systematic review, Smith and White (2020) suggest that it is the individualized and idiosyncratic discrepancy between desired and achieved social interaction that leads to loneliness and eventual depression in autistic adolescents and adults, rather than an objective ideal level of social connection needed to achieve social satisfaction. Under this social motivation model of depression, autistic individuals who have high social motivation and low social success may be more at risk of depressive symptoms due to increased loneliness and dissatisfaction with social connectedness; see *Figure 1* (Smith & White, 2020). There has been some supporting evidence for this. For

example, Han and colleagues (2019) found that autistic adults with high social motivation

were more likely to be lonely if they had more autistic traits and greater social

difficulties; loneliness, in turn, was the strongest predictor of depression in this study

(Han et al., 2019). However, Smith and White (2020) also hypothesized that, under their

model, those with low social motivation would be less likely to develop loneliness. This

has not been well-supported to this point: Autistic adults with low social motivation still

tend to report high levels of loneliness, which are strongly related to depressive

symptoms (Ee et al., 2019; Han et al., 2019). Therefore, the evidence for this social

motivation model of depression is mixed, and further longitudinal research is needed to

better investigate how social motivation – and concordant versus discrepant social

opportunity – may affect satisfaction with social connectedness and depressive

symptoms. Notably, autistic college students who do not feel as socially connected or

supported tend to report lower subjective well-being and greater difficulty balancing the

demands of school (Bailey et al., 2020)

Figure 1

Social Motivation Model for Development of Depression in Autistic Individuals Proposed

by Smith and White (2020)
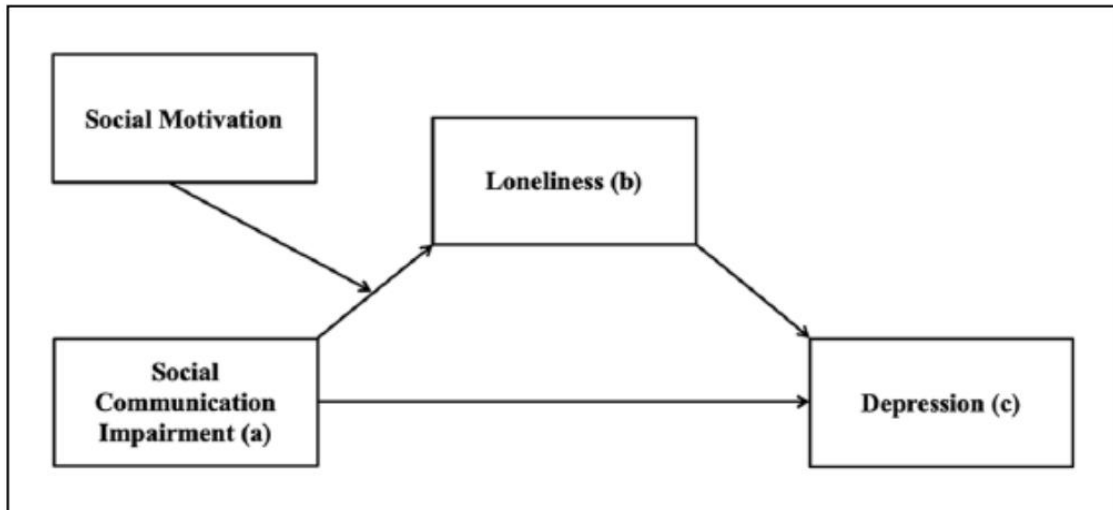
Unwanted or Distressing Sexual Experiences. In the general population, sexual

trauma is an important and often-identified risk factor for long-lasting psychiatric and

physical health concerns (Graham et al., 2021; Rothman et al., 2021; Waigandt et al.,

1990). There are few environments where these concerns are more salient than an

undergraduate campus, especially during the transition to college. In the general

population, the first semester of college is a known period of heightened sexual assault

risk, particularly for women, often referred to as the "red zone" (Kimble et al., 2008).

While accurate prevalence has been difficult to calculate due to shame and fear

surrounding reporting, the rate of sexual assault in undergraduates overall has been

estimated to be approximately 20% (Mellins et al., 2017; Rosenberg et al., 2019) and

appears to relate to numerous declines in wellbeing. In college women, negative

consequences of sexual assault have included nearly immediate decreases in academic

functioning, as well as greater psychological difficulties and anxiety symptoms nine years

later (Rothman et al., 2021). These negative health effects seem to be particularly salient

for gender and sexual minority students, though sexual violence increases the risk of

depression and PTSD symptoms for college students of all genders and sexual

orientations (Kammer-Kerwick et al., 2021). Evidence suggests it is not only rape and

other forms of nonconsensual sexual experiences that can lead to negative outcomes: for

many individuals, consensual but regretted sexual experiences may also contribute to

decreased emotional wellbeing (Wesche et al., 2021). Taken together, these data identify

that distressing and unwanted sexual experiences can greatly affect college students'

wellbeing across time in the general population.

Research on the prevalence and risk factors of unwanted sexual experiences in

undergraduates has rarely extended to or explicitly included autistic students. This is a

damaging oversight, given that autistic individuals appear to be at an increased risk of

distressing and unwanted sexual experiences in their lifetime in general (Dike et al.,

2022; Pecora et al., 2019; Sevlever et al., 2013; Weiss & Fardella, 2018) and potentially

during their college years as well (Brown et al., 2017). This risk may be especially high

for autistic women: In a sample of 132 women between the ages of 18-30, 56.8% of the

autistic women endorsed engagement in unwanted sexual behaviors, compared to 31.5%

of the non-autistic women (Pecora et al., 2019). These unwanted sexual experiences

likely relate to negative health outcomes in autistic people, similar to (or possibly even

worse than) what has been observed in the general population: While the longitudinal

physical health concerns of autistic adults who have experienced sexual trauma have not

been clearly studied, autistic individuals appear to be at greater risk than their non-autistic peers of developing PTSD symptoms following traumatic events (Rumball et al., 2020).

Given the high prevalence of mental health problems in autistic adults, particularly in the college setting, and the relative lack of understanding of prospective predictors of and causal contributors to these symptoms, we aimed to conduct a short-term, fully online longitudinal study of potential predictors of depression and anxiety in incoming autistic and non-autistic college students, for the purpose of identifying treatment targets to guide future intervention efforts. This research is a continuation of existing longitudinal data collection across the first semester of college (titled "2m2x" due to participants completing a 2-minute survey twice per week).

Primary Objectives of 2m2x

Aim 1: **To establish data on predictive relationships between a) repetitive negative thinking, b) social dissatisfaction, c) distressing or unwanted sexual experiences, and subsequent depressive and anxiety symptoms in incoming neurodiverse (autistic and non-autistic) college students.** Hypothesis 1a: Incoming college students who report greater repetitive negative thinking at baseline and throughout the semester will report increased depression and anxiety symptoms over the course of their first semester compared to those with lower baseline repetitive thinking. Hypothesis 1b: Students who report higher social motivation and lower cross-semester satisfaction with social connectedness will report increased depressive symptoms over time compared to those with higher social satisfaction, and to those with similar social satisfaction but lower baseline social motivation. Hypothesis 1c: Students who rate sexual events as more distressing/unwanted will exhibit elevated depressive and anxiety

symptoms over the subsequent weeks of the semester. This relationship will be stronger if they engage in heightened repetitive negative thinking or report dissatisfaction with social connectedness post-event.

Aim 2: To compare the prevalence and trajectory of these potential emotional health factors and internalizing symptom outcomes across levels of autistic traits. <u>Hypothesis 2a:</u> No difference in the model of these mechanisms (i.e., strength of association between predictors and outcomes) will be observed across levels of autistic traits. <u>Hypothesis 2b:</u> Students with greater autistic traits will be more likely to exhibit greater repetitive negative thinking, lack of satisfaction with social connectedness, and exposure to both unwanted and distressing sexual experiences, as well as greater depression and anxiety scores on average.

Findings are expected to inform prevention and intervention efforts for depression, anxiety, and sexual trauma in autistic college students, and autistic adults more broadly, by identifying treatment targets backed by longitudinal evidence of a prospective, predictive relationship. These aims thus serve priorities identified by key stakeholders, including autistic individuals and their families, by advancing our understanding of co-occurring mental health conditions and our ability to support wellbeing in adulthood.

Methods

Participants

Leading up to the Fall semester in 2020, 2021, 2022, and 2023, we enrolled incoming college students (N=398 total) from four Northeastern United States university systems (Rowan University, Montclair State University, Stony Brook University, and the City University of New York system) to participate in this fully online study. Enrolled participants completed a baseline questionnaire battery about their diagnostic and mental health history, a brief survey that took approximately two minutes to complete, twice per week (hence, "2m2x") throughout their first semester on campus, and then an endpoint battery. Each university recruited both autistic and non-autistic students, using emails to incoming first-year student listservs, flyers posted in common gathering spaces, and invitations sent through offices of disability and/or accommodations. Eligible participants were required to be 18 years or older and in their first semester enrolled as an undergraduate student at each respective campus (prior experience at other universities was permitted). Exclusion criteria included history of psychosis or bipolar disorder, or current concerns of significant substance use disorders, as these may obscure comparisons across our cohorts of interest. Additional demographic information on participants is shown in *Table 1*.

We first enrolled all eligible autistic students – this includes both those who self-reported a formal autism diagnosis, as well as those who indicate an affirmative response to the screener survey question, "Have you or others around you ever suspected that you were autistic/had an autism spectrum disorder?" The inclusion of these participants was intended to better represent historically underrepresented groups of autistic adults who

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have lower access to formal diagnoses (Wiggins et al., 2020); however, primary analyses

of the effects of autism traits relied on Social Responsiveness Scale, Second Edition

(SRS-2) scores (Constantino & Gruber, 2012), not this self-assigned autism status (see

Statistical Analyses section). Then, we matched non-autistic students as closely as

possible on university, age, gender, and race/ethnicity. This matching was done through a

one-to-one match, prioritizing approximate age in years and university (e.g., matching

18-year-old autistic Rowan University students to 18-year-old non-autistic Rowan

University students, etc.), when exact matches were not possible. Given the increased

prevalence of depression in autistic individuals, we oversampled non-autistic participants

to increase the likelihood of having a comparable number of students within each

diagnostic cohort who would go on to develop clinically significant symptoms of

depression during the semester. When enrolling these additional students, we attempted

to oversample non-autistic students who are older than 18, nonbinary, and/or transgender

to better match the demographic characteristics of the autistic community (Murphy et al.,

2020; Shattuck et al., 2012). Otherwise, students were enrolled in order of screener

survey response date.

As shown in *Table 1*, there were some statistically significant differences between

groups. For example, overall distribution of gender differed by autism status.

Additionally, difference in number of men ($p=.01$) and women ($p=.001$) (but not

nonbinary/other students, $p=.09$) was statistically significant between groups, such that

there were fewer men and women in the autistic group than in the non-autistic group.

(Numerically, there were more non-binary students in the autistic group, thus explaining

these ratios. However, the number of non-binary students was not *statistically*

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significantly different between the two groups.) The distribution of sexual orientation also

varied between both groups, with additionally statistically significant differences in

number of heterosexual students ($p<.001$, with more heterosexual students in the non-

autistic group) and pansexual students ($p=.002$, with more pansexual students in the

autistic group). Other differences in individual sexual orientations were not statistically

significant. Finally, there was a significantly higher portion of Asian students in our non-

autistic group ($p=0.005$).

Table 1

Baseline Demographics of Autistic and Non-Autistic Participants in 2m2x

Mean*(SD)* Range	Entire Sample N=398	Autistic Sample n=166	Non-autistic Sample n=232	Group Differences
Age in years	18.98*(2.84)* 18-43	19.02*(2.94)* 18-43	18.93*(2.76)* 18-39	$F(1,393)=.092$, $p=.762$, $d=0.03$
Gender:				
% Men	37.6%	36.3%	38.5%	
% Women	51.8%	47.5%	54.9%	X^2 (2 , N=386) = 9.26, $p=0.01$*
% Non-binary/other	10.6%	16.2%	6.6%	
Race:				
% Native American	3.8%	5.4%	2.6%	
% Asian	16.8%	10.2%	21.6%	% Asian[▲]: X^2 (1, N=398) = 8.05, p= 0.005**
% Black	15.3%	12.7%	17.2%	
% White	57.5%	61.4%	54.7%	
% Other	12.8%	16.9%	9.9%	
Ethnicity:				
% Hispanic	26.9%	27.5%	26.5%	$X^2(1, N=386)= 0.01$, $p=0.93$
Sexual Orientation:				
% Heterosexual	56.5%	39.4%	68.6%	
% Bisexual	22.3%	29.4%	17.3%	$X^2(7$, N=386) = 44.34, $p<.001$***
% Gay/Lesbian	3.6%	5%	2.6%	
% Pansexual	6.7%	13.1%	2.2%	
% Queer/Other	10.9%	13.2%	9.3%	

Mean(SD) Range	Entire Sample N=398	Autistic Sample n=166	Non-autistic Sample n=232	Group Differences
% HS or Less	45.1%	49.4%	42.1%	
% Some College	18.4%	19.4%	17.7%	
% Associate Degree	5.4%	4.4%	6.2%	$X^2(7, N = 386)$ = 10.48, p=0.16
% Bachelor's Degree	22.8%	20.6%	24.3%	
% Graduate Degree	6.4%	6.3%	6.7%	
SRS-2 Raw Scores	64.93(30.64) 3-158	76.18(30.53) 11-158	56.75(28.08) 3-133	F(1.371)=40.460, p<.001, d=0.67
BDI-II Raw Scores	14.08(11.34) 0-58	16.22(11.49) 0-51	12.55(11.00) 0-58	F(1,378)=9.852, p=.002, d=0.33
GAD-7 Raw Scores	6.81(5.45) 0-21	8.10(5.53) 0-21	5.89(5.22) 0-21	F(1,376)=15.731, p<.001, d=0.41

Note. SRS-2=Social Responsiveness Scale, Second Edition (Constantino & Gruber, 2012); BDI-II=Beck Depression Inventory (Beck et al., 1996); GAD-7=General Anxiety Disorder-7 (Spitzer et al., 2006). ▲ = Categories of race/ethnicity were not mutually exclusive, such that some participants selected multiple categories. As assessed by chi-square and asymptotic significance, only the differences in percentages of participants endorsing Asian identity were significant between groups at the *p*<.05 level. Description of specific group differences per post hoc tests are described in Participants section.

Procedures

Interested students were first asked to complete a brief eligibility screener through Research Electronic Data Capture (REDCap), a survey and data management platform developed specifically for use in electronic acquisition and storage of sensitive clinical data (Harris et al., 2009, 2019). In this screener, students provided the university they attend, their age, year in school, gender, and relevant diagnostic history. We used this survey to match participant groups and ensure all participants met eligibility criteria, as previously described. Participants deemed eligible were then given access to the baseline packet one week prior to the start of their semester and had approximately three weeks to complete it; baseline packets thus could be completed through the end of the second week of the semester. As the timeline was based around each university's semester calendar, the initial date of survey participation differed by one week between New York and New Jersey participants. The baseline packet took approximately 45 minutes to complete. Participants had the option to complete the baseline packet all in one session or to complete a portion and then return to it at a later time, using the same link.

Following the baseline packet, a link to a single brief survey was texted to participants' smartphones every Sunday and Wednesday evening throughout the semester, for a total of 24 timepoints. This biweekly survey, securely hosted on REDCap, was comprised of 15 questions and took approximately 2 minutes to complete on a smartphone (see Measures for more details). In week 15 of their semester (generally the last week of classes before final exams), participants received a REDCap link to a final battery of surveys, similar to baseline and were asked to complete it within two weeks.

The full timeline for participants from each university is shown in *Figure 2*. Each measure is described in more detail below.

Participants received up to a total of $75 in ClinCard gift codes for completing the majority of study procedures. These gift codes can be used much like a credit card and were emailed as $15 each after completing the baseline and endpoint survey batteries, and $40 for completing at least 75% (i.e., 18 out of 24 possible) of the brief biweekly surveys throughout the semester. Participants who completed all these steps received an additional $5 incentive for full participation, for a total of $75 per participant. Those with a biweekly response rate lower than 75% overall received $2 per completed survey at the semester's end. Support for participant funding came from the New Jersey Governor's Council for Medical Research and Treatment of Autism Predoctoral Fellowship (CAUT23AFP).

Figure 2

Timeline of "2m2x" Participation for Each University in Fall 2023
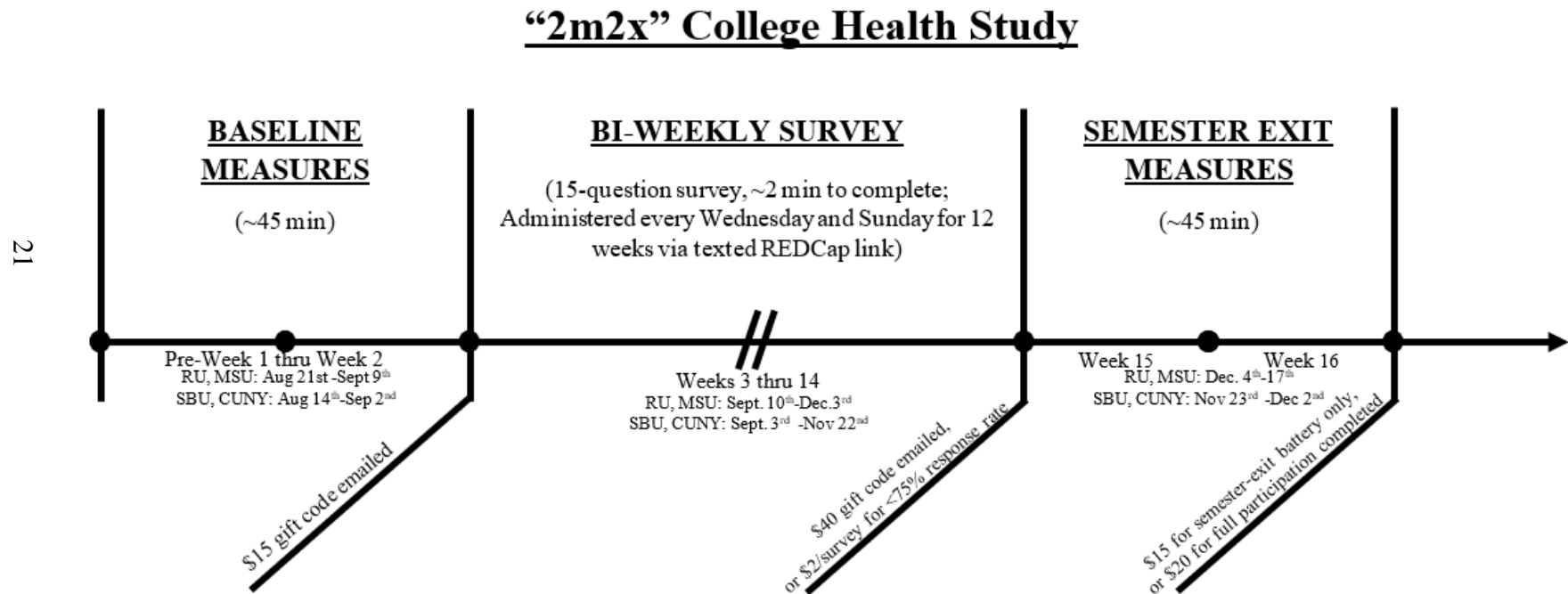
Note. RU = Rowan University, MSU = Montclair State University, SBU = Stony Brook University, CUNY = City University of New York system

Measures

  Baseline. The initial battery of surveys, which was completed by participants within two weeks of the start of their semester, collected baseline data about key constructs related to emotional, social, behavioral, and physical health, as well as demographics. The packet included a series of fill-in and multiple-choice questions and took about 45 minutes to complete.

  Baseline instruments are listed in *Table 2*, organized by the constructs they measure. Three of these measures assess autistic traits (Social Responsiveness Scale, 2nd edition; Constantino & Gruber, 2012; Adult Repetitive Behaviors and Interests Questionnaire; Z. Williams, personal communication, 2021; Interests Scale; Constantino & Gruber, 2012; Bodfish, 2003) in order to describe our sample and make comparisons across cohorts. Five others provide information on baseline mental health (Beck Depression Inventory 2nd Edition; Beck et al., 1996; General Anxiety Disorder 7-Item Scale; Spitzer et al., 2006; Brief Fear of Negative Evaluation Straightforward version; Leary, 1983; Rodebaugh et al., 2004; Mini Social Phobia Inventory; Connor et al., 2001; Perceived Stress Scale; Cohen, 1994), including depression, general anxiety, and social anxiety symptoms and perceived stress. Prior history of trauma leading up to the current age was assessed through the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003). Additionally, there were measures corresponding to our primary hypotheses: Baseline repetitive thinking was assessed via 11 items taken from a short form of the Penn State Worry Questionnaire (PSWQ; Berle et al., 2011; Meyer et al., 1990) and a novel repetitive thinking questionnaire (hereafter called RepT), which was a precursor to the Index of Negative Repetitive Thinking (INeRT; Williams et al., in prep) based on

several years of our lab's federally-funded research on repetitive thinking in autistic adults. Baseline social motivation and participation were assessed through the Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS; Gooding & Pflum, 2014) and the NIH Toolbox Friendship Measure (Cyranowski et al., 2013). The ACIPS examined participants' experiences of pleasure within a variety of social situations, using 17 Likert scales. The NIH Toolbox Friendship Measure asked participants about their day-to-day social relationships, in an effort to quantify participants' baseline social connectedness. Finally, conceptualizations of consent were assessed through novel questions and a slightly modified version of the Sexual Consent Scale, Revised (SCS-R; Humphreys & Brousseau, 2010). Small modifications were made to the SCS-R scale, following focus group feedback from autistic adults, to ensure readability. For example, in the item "I think that consent should be asked before any kind of sexual behavior, including kissing or petting," petting was replaced with "fondling" due to notes that the word "petting" was confusing. The Childhood Modeling of Consent Questions are 11 items created by our lab to assess how often participants were exposed to conversations about consent as children and how often consent was modeled by adults in their childhood through demonstrations of bodily autonomy. More information on each of these measures, including discussion of validation in autistic samples where applicable, is available in Appendix A.

Table 2

Measures Included in Baseline "2m2x" Survey Battery, Organized by Construct

Construct(s)	Measures
Autism screening	Social Responsiveness Scale, 2nd edition (SRS-2; Constantino & Gruber, 2012); Adult Repetitive Behaviors and Interests Questionnaire (ARBI-Q; Z. Williams, personal communication, 2021); Two items from the Interests Scale (IS; Bodfish, 2003)
Mental health	Beck Depression Inventory (BDI-II; Beck et al., 1996); General Anxiety Disorder 7-Item Scale (GAD-7; Spitzer et al., 2006); Brief Fear of Negative Evaluation Straightforward version (BFNE-S; Leary, 1983; Rodebaugh et al., 2004); Mini Social Phobia Inventory (Mini-SPIN; Connor et al., 2001); Perceived Stress Scale (PSS; Cohen, 1994)
Trauma history	Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003)
Repetitive thinking	Repetitive Thinking (RepT) survey battery, short form (Williams & Gotham; personal communication, May 2021); Three-item Penn State Worry Questionnaire (PSWQ; Berle et al., 2011; Meyer et al., 1990)
Social motivation and participation	Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS; Gooding & Pflum, 2014); NIH Toolbox Friendship Measure (Cyranowski et al., 2013)
Perceptions of consent	Sexual Consent Scale Revised (SCS-R; Humphreys & Brousseau, 2010); Childhood Modeling of Consent Questions (CMCQ)

Biweekly Survey. Next, participants were asked to complete the brief 13-15

question survey twice per week for 12 weeks (approximately equivalent to the remainder

of the semester) in order to track changes in key constructs throughout each participant's

semester. Developed by our lab, this brief survey prompted participants to provide

information about their mood, thinking patterns, social satisfaction, and feelings towards

recent sexual experiences over the "last few days" (i.e., since the previous biweekly

survey). Most items were rated on a 5-point Likert scale (1=*Almost never*, 5=*Almost

always*). Example items include "In the last few days, how often have you been feeling

down, sad, or empty?" and "In the last few days, how often have you been brooding, or

thinking repetitively, about problems or negative experiences?" Some items, such as

those measuring social satisfaction, had a different scale format. For example, a visual

analogue scale was used to allow participants to more fully respond to "How satisfied do

you feel with your level of social belonging or closeness?" (lowest anchor = *Extremely

dissatisfied*, highest anchor = *Extremely satisfied*). Participants were asked whether they

had a sexual experience since the last survey, and, for those who answered in the

affirmative, two questions on recent sexual experiences then similarly used a visual

analogue scale to assess degree of interest leading up to the experience and feelings of

distress/happiness after the experience (hence, total questions range from 13-15 in 2022

and 2023; in prior years questions on sexual experience were not included). Feelings of

how much one wanted a sexual experience before it occurred (WSE) was assessed

through the item: "Immediately prior to this sexual experience, how would you describe

your feelings towards it?" where 0= "Strongly did NOT want this experience," 100= "I

strongly wanted this experience." The midpoint of this scale was noted as "I was unsure

or ambivalent." Feelings after the sexual experience (FSE) was assessed through the item, "After this recent sexual experience, how did you feel about what occurred?" Responses could range from 0 to 100 and included the labels of "Extremely distressed" (0), "Neutral/ambivalent" (50), and "Extremely happy" (100).

Endpoint. Finally, participants completed an end-of-semester online survey battery similar to the battery they completed at the start of the semester. The measures were the same as baseline, with a few exceptions. Most importantly for the present study, the endpoint battery in 2022 and 2023 included several questions on experiences with sexual activities over the course of the semester, in order to track emotions related to sexual experiences that were not noted on the biweekly survey – either due to participants not completing a survey in a particular week or due to participants' feelings about a particular encounter changing over time. Participants were first asked, "In the last semester, have you had sexual experiences with another person, such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex?" If they answered yes, then they were asked to rate their agreement with two items relating to having unwanted and regretted sexual experiences. Unwanted sexual experiences were assessed via agreement with, "I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I did not want at the time." Regretted sexual experiences were assessed via agreement with "Over the last semester I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I may or may not have wanted at the time, but I later regretted."

In consideration of participant burden, we did not repeat the 65-item SRS-2 in the endpoint battery, because these scores were expected to be more trait-like and not change

significantly over the course of a semester (Wagner et al., 2019). Additionally, the end-point survey contained a brief Autistic Burnout Scale developed by our lab. This was based on qualitative work that describes burnout as a state of impaired functioning and exhaustion in many domains of life, conceptualized as being related to the stress of being an autistic person in a neurotypically-focused society (Raymaker et al., 2020). The endpoint survey also included brief questions on satisfaction with academic accommodations, created in collaboration with Helen Rottier (personal communication, January 4, 2021); these questions were exploratory in nature but may help to identify the potential relationship, hypothesized on the basis of qualitative work, between stressful or ableist experiences requesting accommodations and decreased emotional wellbeing (Rottier, 2020). More information on the measures included in the endpoint packet is available in Appendix A.

The current study and measures received approval from the Rowan University School of Osteopathic Medicine Institutional Review Board (study ID Pro2020001172) as the IRB of Record covering most participating universities, as well as Stony Brook University IRB (IRB2021-00266).

Statistical Analyses

Similarly to prior analyses on a subset of the current data (McKenney, Brunwasser, et al., 2023; McKenney, Cucchiara, et al., 2023; McKenney et al., 2024), generalized least squares (GLS) regression with a first-order autoregressive correlation structure was used, via the *rms* (Harrell Jr., 2022) and *nlme* (Pinheiro et al., 2022) packages in R for longitudinal analyses. GLS was chosen because it accounts for the fact that repeated measurements from the same individual are typically correlated. In the GLS

AR1 model, repeated measures from a participant are assumed to be correlated, and the correlation is assumed to weaken as time increases between measurements (e.g., the measure at time 1 is more related to time 2 than to time 8). Note that mixed-effects modeling is an alternative strategy that provides both individual and marginal effects. However, we were primarily concerned with marginal effects rather than individual deviations around average effects; therefore, we chose to avoid the added assumptions required when including random effects parameters (McNeish et al., 2017; Pekár & Brabec, 2016).

Effect sizes were calculated as the "proportion of variance explained by the given effect relative to the proportion of outcome variance unexplained" (Lorah, 2018, p. 5). This is notated as f^2 and interpreted as follows: 0.02 is considered a small effect, 0.15 is considered medium, and ≥ 0.35 is large (Selya et al., 2012). Outcome trajectories were permitted to take a flexible, nonlinear shape by modeling the effect of time (in weeks) using a restricted cubic spline with 3 knots placed at the 0.10, 0.50, and 0.90 quantiles (Gauthier et al., 2020). Restricted cubic splines require *k-1* degrees of freedom, where k is the number of knots, so the time effects in our models required *df*= 2 (J. Harrell, 2015).

We examined how the predictors of repetitive negative thinking (as operationalized by RepT and biweekly rumination item scores), social motivation and satisfaction (as operationalized by baseline ACIPS scores and biweekly satisfaction with social connectedness item scores), and unwanted or regretted sexual experiences (as measured biweekly via wantedness ahead of the sexual experience and post-sexual experience feelings of distress items) affect the starting point and slope of depression and anxiety symptom growth as measured biweekly and in the baseline and endpoint packets.

This technique allows us to additionally capture how prior depression and anxiety symptom scores affect future scores. Furthermore, an interaction effect was tested, in order to evaluate whether the effect of distressing sexual experience on depression/anxiety symptoms depends on post-event ruminative tendencies and/or satisfaction with social connectedness. In each of these primary analyses, time (based on survey number) was included as a fixed predictor to capture the underlying symptom trajectory. Baseline BDI-II scores were held constant in primary analyses to investigate changes in mood beyond the continuation of baseline mood.

We assessed for interaction effects between baseline hypothesized predictors (RNT, SSC) of mood and time in predicting anxiety, sadness, and anhedonia to assess if there was evidence of these relationships changing in magnitude over time. In this approach, the model (*full* which included the interaction effect vs *reduced* which only included main effects) with the lower BIC was taken as preferred (Konishi & Kitagawa, 2008). Larger differences between the BIC of reduced and full models are taken as stronger evidence in favor of selecting a particular model (Bauldry, 2016). However, in regards to the role of time, the reduced model was preferred in each case and thus interaction effects of time were not included in final models. Had there been unclear evidence, such as a BIC difference of less than 2 (Bauldry, 2016), we would have selected the reduced model in order to minimize risk of overfitting.

We tested how the prevalence of anxiety, depression and predictors of interest vary by levels of autistic traits (as measured by SRS-2 scores). We also evaluated for evidence of an interaction between SRS-2 scores and predictors of interest on outcome

variables, using a comparison of likelihood ratio tests and Bayesian Information Criterion (BIC) values in full and simplified models as previously described.

Finally, we compared aggregate results from each year to examine if there were differences in overall baseline mood or predictors of interest by year using a general linear model. Given the various stages of COVID-19 and related guidelines during data collection (Fall 2020, 2021, 2022, and 2023), we expected some history effects, in terms of differences in sample-wide depressive or anxiety scores by year. (These history effects were not found in a preliminary analysis of Fall 2020 and Fall 2021 data, but were observed when incorporating Fall 2022 data; McKenney et al., 2023).

Results

Repetitive Negative Thinking

Repetitive Negative Thinking and Sadness. Overall baseline repetitive negative thinking (RNT) was predictive of sadness endorsement across the semester's biweekly survey: A one-unit increase in baseline RNT was predictive of 0.016 units increase [95% CI: 0.01, 0.02, f^2=0.02] in subsequent sadness levels, holding constant time and baseline BDI-II scores (see *Table 3*). We also assessed for interaction effects between this baseline RNT score and time – thus, assessing whether these relationships changed in magnitude over time. Interaction effects in all models between baseline predictors of interest (RNT and SSC scores) and time in predicting anxiety, sadness, and anhedonia were non-significant and the reduced models were preferred in each case (as indicated by lower AIC and BIC), meaning there is no evidence of these relationships changing in magnitude over the course of the semester.

When testing the lagged relationship between RNT and sadness (i.e., RNT from the previous biweekly survey as a predictor of subsequent timepoint sadness), prior timepoint RNT did not significantly predict subsequent timepoint sadness (b=0.012, 95% CI: -0.01, 0.03, f^2=0.0005). However, synchronous sadness and RNT (i.e., measured at the same timepoint) were significantly related to one another (see *Figure 3)*, such that a one-unit increase in repetitive thinking was associated with a 0.543 unit increase in sadness (95% CI: 0.52, 0.57, f^2=0.57).

Figure 3

Sadness Over Time by Biweekly RNT
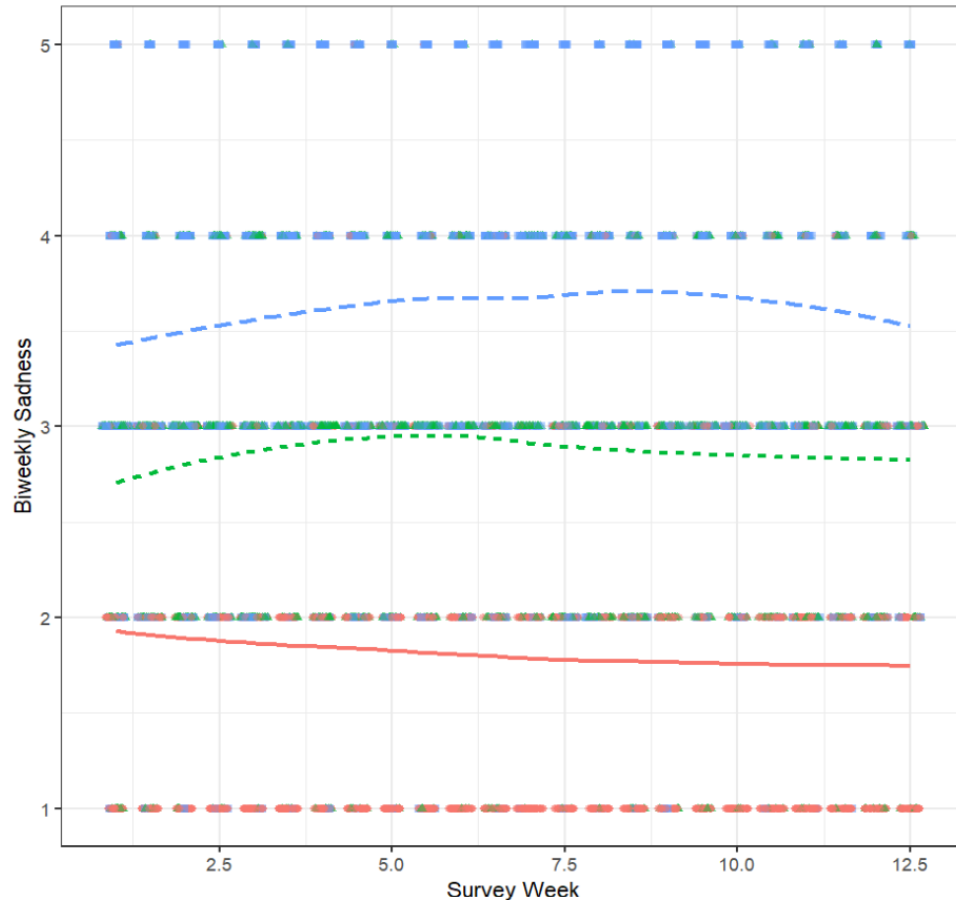
Note. The red, solid line indicates participants who were in the lowest tertile of baseline biweekly RNT scores. The dashed green line represents participants within the middle tertile of RNT. The dashed blue line represents those in the highest tertile of biweekly RNT scores.

Table 3

Relationships Between Repetitive Negative Thinking (RNT) and Mood

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Baseline RNT*	Sadness	0.016 [0.01, 0.02]	0.004	3.65 (3, 4894)	<0.001***	0.02
Baseline RNT*	Anhedonia	0.008 [-0.001, 0.02]	0.004	1.72 (3, 4893)	0.09	0.01
Baseline RNT*	Anxiety	0.011 [0.002, 0.02]	0.004	2.50 (3, 4894)	0.01**	0.01
Lagged RNT*	Sadness	0.012 [-0.01, 0.03]	0.01	1.22 (6, 4978)	0.22	0.0005
Synchronous RNT*	Sadness	0.543 [0.52, 0.57]	0.01	49.01 (6, 4978)	<0.001***	0.57
Lagged RNT*	Anhedonia	0.009 [-0.01, 0.03]	0.01	0.89 (6, 4977)	0.37	0.0003
Synchronous RNT*	Anhedonia	0.503 [0.48, 0.53]	0.01	42.86 (6, 4977)	<0.001***	0.44
Lagged RNT*	Anxiety	0.011 [-0.01, 0.03]	0.01	1.07 (6, 4978)	0.29	0.0004
Synchronous RNT*	Anxiety	0.531 [0.51, 0.55]	0.01	47.86 (6, 4978)	<0.001***	0.57

Note. *= Variable was included in a model covarying baseline BDI-II scores.

Repetitive Negative Thinking and Anhedonia. Overall repetitive thinking tendencies measured at baseline were not significantly related to anhedonia across the semester (b=0.008, 95% CI: -0.001, 0.02, f^2=0.01), after controlling for baseline BDI-II scores and time. Prior timepoint RNT did not significantly predict subsequent timepoint anhedonia either, after controlling for baseline BDI-II scores and time (b=0.009, 95% CI: -0.01, 0.03, f^2=0.0003). A significant synchronous relationship between RNT and anhedonia was observed (b=0.503, 95% CI: 0.48, 0.53), with a large effect size (f^2=0.44).

Repetitive Negative Thinking and Anxiety. We found that the baseline measure of RNT was related to anxiety across the biweekly reports (b=0.011, 95% CI: 0.002, 0.02, f^2=0.01). As with RNT and sadness, prior timepoint RNT did not significantly predict subsequent timepoint anxiety (b=0.011, 95% CI: -0.01, 0.03, f^2=0.0004), but there did appear to be a significant synchronous relationship between RNT and anxiety (b=0.531, 95% CI: 0.51, 0.55, f^2=0.57).

Satisfaction with Social Connectedness

Satisfaction with Social Connectedness and Sadness. Baseline SSC (via NIH Toolbox Friendship Measure) was negatively associated with later sadness endorsement across the semester's twice-weekly survey: A one-unit decrease in baseline SSC was associated with a 0.019 units increase [95% CI: -0.03, -0.01, f^2=0.02] in subsequent sadness levels. When testing the lagged relationship between biweekly SSC and sadness (i.e., SSC from the previous biweekly survey as a predictor of subsequent timepoint sadness), prior timepoint SSC did not significantly predict subsequent timepoint sadness when controlling for baseline BDI-II scores and time (b=0.0003, 95% CI: -0.001, 0.001, f^2=0.001). However, there was a significant synchronous relationship between SSC and

sadness within a timepoint (b=-0.016, 95% CI: -0.02, -0.01, f^2=0.13). Finally, we assessed whether there may be a significant interaction effect between baseline social motivation (ACIPS) and biweekly SSC on synchronous, biweekly sadness levels. Some evidence of an interaction effect was found, with a negligible effect size (b=0.0001, 95% CI: 0.00005, 0.0002, f^2=0.003). See *Table 4* for full results of all SSC analyses.

Table 4

Relationships Between Satisfaction With Social Connectedness (SSC) and Mood

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Baseline SSC*	Sadness	-0.019 [-0.03, -0.01]	0.005	-4.13 (6, 4933)	<0.001***	0.02
Baseline SSC*	Anhedonia	-0.020 [-0.03, -0.01]	0.005	-4.23 (6, 4932)	<0.001***	0.02
Baseline SSC*	Anxiety	-0.003 [-0.01, 0.01]	0.004	-0.57 (6, 4933)	0.57	0.01
Lagged SSC*	Sadness	0.0003 [-0.001, 0.001]	0.001	0.63 (6, 4975)	0.53	0.001
Synchronous SSC*	Sadness	-0.016 [-0.02, -0.01]	0.001	-23.29(6, 4975)	<0.001***	0.13
Lagged SSC*	Anhedonia	0.0003 [-0.001, 0.001]	0.001	0.61 (6, 4974)	0.54	0.001
Synchronous SSC*	Anhedonia	-0.015 [-0.02, -0.01]	0.001	-21.42 (6, 4974)	<0.001***	0.12
Lagged SSC*	Anxiety	-0.001 [-0.002, 0.0002]	0.001	-1.61 (6, 4975)	0.11	0.00
Synchronous SSC*	Anxiety	-0.011 [-0.01, -0.01]	0.001	-15.68 (6, 4975)	<0.001***	0.07

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Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
ACIPS x SSC*	Sadness	0.0001 [0.00005, 0.0002]	0.0000	2.91 (8, 4928)	0.004**	0.003
ACIPS x SSC*	Anhedonia	0.0000 [-0.0001, 0.0001]	0.0000	0.01 (8, 4927)	0.99	0.00
ACIPS x SSC*	Anxiety	0.0002 [0.0001, 0.0003]	0.0000	4.09 (8, 4928)	<0.001***	0.01

Note. *****= Variable was included in a model covarying baseline BDI-II scores. Effect sizes are described by f^2 and interpreted as follows: 0.02 is considered a small effect, 0.15 is considered medium, and $\geq$ 0.35 is large. **=p<.05, **=p<.01, ***=p<.001*

Satisfaction with Social Connectedness and Anhedonia. The relationship between SSC and anhedonia appears similar: there was a significant negative relationship between baseline SSC and biweekly reports of anhedonia, such that a one-unit decrease on the NIH Friendship measure was associated with 0.020 units increase [95% CI: -0.03, -0.01 f^2=0.02] in subsequent anhedonia levels, holding constant time and baseline BDI-II scores. The predictive relationship between biweekly SSC at one timepoint and subsequent anhedonia was not significant (b=0.0003, 95% CI: -0.001, 0.001, f^2=0.001). However, the synchronous relationship within biweekly timepoints was significant (b=-0.015, 95% CI: -0.02, -0.01, f^2=0.12). We did not observe a significant interaction effect between baseline ACIPS scores and biweekly SSC on self-reported anhedonia (b=0.000, 95% CI: -0.0001, 0.0001, f^2=0.00).

Satisfaction with Social Connectedness and Anxiety. Similarly to the previously described SSC results, there was a significant, negative relationship detected between baseline SSC scores and biweekly anxiety, although with a minimal effect size (b=-0.003, 95% CI: -0.01, 0.01, f^2=0.01). The predictive relationship between biweekly SSC and subsequent anxiety was not significant (b=-0.001, 95% CI: -0.002, 0.0002, f^2=0.00). The synchronous relationship between SSC and anxiety within biweekly timepoints was significant (b=-0.011, 95% CI: -0.01, -0.01, f^2=0.07). We assessed whether there may be a significant interaction effect between baseline social motivation (ACIPS) and biweekly SSC on synchronous, biweekly anxiety levels. A significant interaction effect was found, with a minimal effect size (b=0.0002, 95% CI: 0.0001, 0.0003, f^2=0.01).

Emotions Associated with Sexual Experiences

As previously described, we tested both self-reported feelings of wanting ahead of a sexual experience (WSE; answers to 'Immediately prior to this sexual experience, how would you describe your feelings towards it?') and feelings after the sexual experience (FSE; answers to 'After this recent sexual experience, how did you feel about what occurred?') as predictors of mood and anxiety. Both items were measured on 0-100 sliding scales, where 0 indicated greater distress and 100 indicated greater happiness/desire. Participants' reported WSE ranged from 0-100, with 95.6% rating their WSE at 50 or above, *M*=85.13, *SD*=19.69. There were 17 participants who reported WSE below 50 at least once; about 18% of these instances were reported by participants in our autistic group. Reported FSE ranged from 0-100, *M*=81.57, *SD*=22.30; 91.42% of FSE scores were 50 or above. There were 33 participants who reported FSE below 50 at least once; about a quarter of these instances were reported by participants in our autistic group.

WSE and FSE were strongly related to one another, with a statistically significant positive Pearson correlation of approximately 0.71 (*t*=23.064, *df*=538, *p*<.0001). This indicates a robust association between self-reported wantedness of the sexual experience and reported feelings after the sexual experience.

To supplement these analyses, we also assessed participants' self-reported experiences with non-consensual and regretted sexual experiences at endpoint. A total of 78 participants reported engaging in sexual activities such as "making out, sexual touching, sexual intercourse, or oral/anal/manual sex" over the course of the semester. Given that sexual wellbeing-related questions were only included in the last two waves of

data collection, this is about 47% of participants who had access to this item. Of these 78 participants, about 19% indicated they agreed (n=11) or strongly agreed (n=4) with the item "Over the Fall 2022 [or 2023, depending on year] semester, I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I did not want at the time." Among respondents, 76% indicated they disagreed (n=10) or strongly disagreed (n=49).

Similarly, about 18% agreed (n=10) or strongly agreed (n=4) with the item "Over the last semester I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I may or may not have wanted at the time, but I later regretted them." Among total respondents to this item, 73% disagreed (n=12) or strongly disagreed (n=45).

Wantedness of Sexual Experience

Wantedness of Sexual Experience and Sadness. No significant main effect relationships were found between how much participants reported wanting the sexual experience (WSE) and subsequent sadness: reported WSE was not significantly related to reports of sadness at subsequent timepoints (b=-0.001, 95% CI: -0.005, 0.002, f^2=0.003) or sadness within the same timepoint (b=-0.004, 95% CI: -0.01, 0.002, f^2=0.08; see *Table 5*).

Upon examining the interaction effect between WSE and baseline repetitive thinking on feelings of sadness, we identified statistically significant findings, with a small effect size (b=0.001, 95% CI: 0.0002, 0.002, f^2=0.02). However, this relationship was not as hypothesized. As shown in *Figure 4,* the negative relationship between WSE and sadness appears strongest for those who endorse *lower* RNT at baseline. In the

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biweekly measure of RNT, there was a similar interaction effect, with individuals with lower biweekly RNT endorsing the strongest negative relationship between WSE and sadness (b=0.007, 95% CI: 0.004, 0.01, f^2=0.04). No significant interactions were found between baseline (b=0.001, 95% CI: -0.0001, 0.002, f^2=0.01) or biweekly SSC (b=0.0000, 95% CI: -0.0002, 0.0002, f^2=0.0001) and WSE on sadness.

Finally, we assessed the relationship between agreement with the endpoint item "Over the Fall 2022 [or 2023, depending on year] semester, I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I did not want at the time" and BDI-II scores at endpoint, controlling for baseline BDI-II scores. We found a significant relationship, such that greater endorsement of unwanted sexual experiences was related to higher depression scores, $F(1, 74)$=28.96, p>.001.

Figure 4

Relationship Between Wantedness of Sexual Experience (WSE) and Sadness by Baseline

Repetitive Negative Thinking
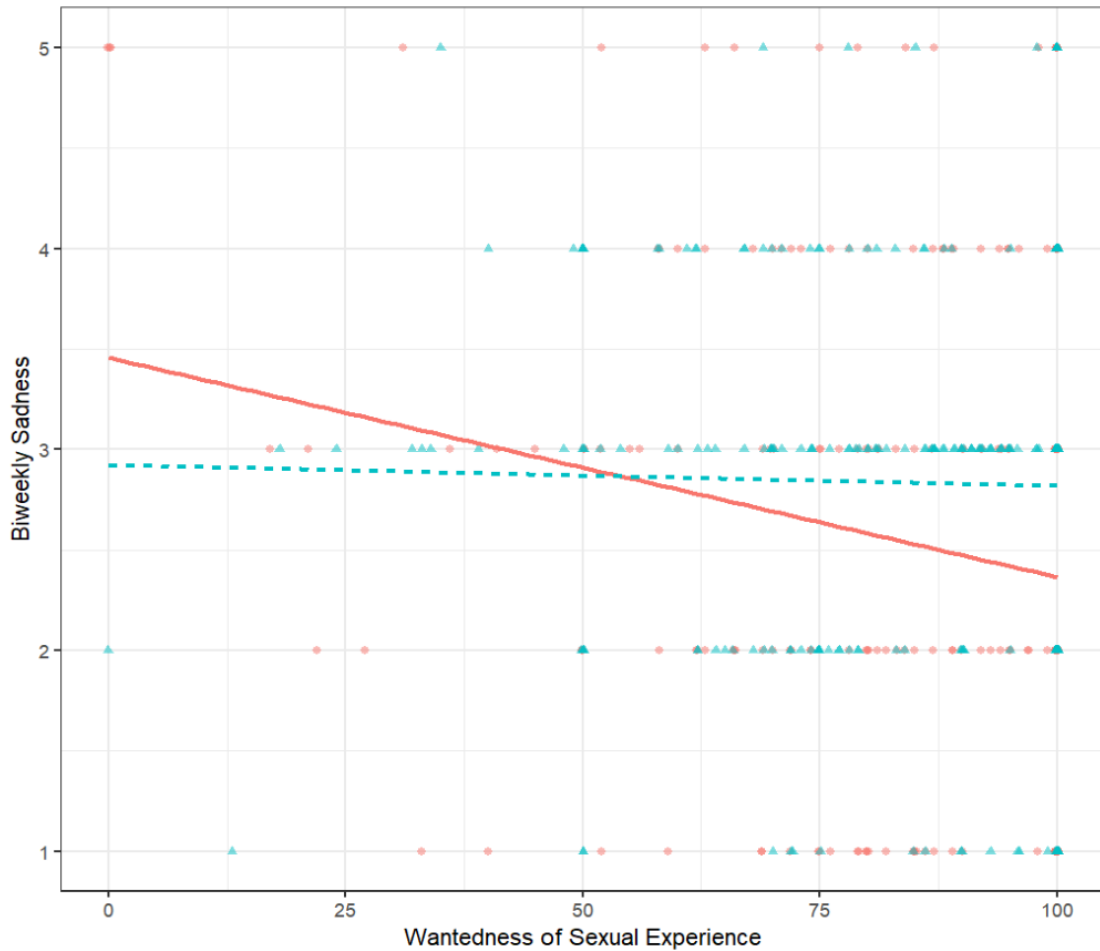
Note. The red, solid line indicates participants who were in the lower half of baseline repetitive negative thinking scores. The dashed blue line represents those in the higher half of repetitive negative thinking scores.

Wantedness of Sexual Experience and Anhedonia. No significant relationship between WSE reported at one timepoint and anhedonia in subsequent weeks was found (b=-0.002, 95% CI: -0.005, 0.002, f^2=0.02). However, a synchronous relationship between WSE and anhedonia reported within timepoint was detected (b=-0.012, 95% CI: -0.02, -0.01, f^2=0.02), such that less positive feelings ahead of sexual experiences were associated with higher anhedonia scores at the same timepoint.

No interaction effects with baseline (b=0.0004, 95% CI: -0.0003, 0.001, f^2=0.003) or synchronous (b=0.001, 95% CI: -0.002, 0.004, f^2=0.002) RNT were found. There does appear to be a significant interaction of baseline SSC (b=0.001, 95% CI: 0.001, 0.002, f^2=0.02), such that those with the lowest SSC at baseline had the strongest negative relationship between WSE and anhedonia, see *Figure 5*. A similar significant interaction was found for synchronous biweekly SSC, although with a minimal effect size (b=-0.0002, 95% CI: -0.0004, -0.00003, f^2=0.01).

Figure 5

Relationship Between Wantedness of Sexual Experience (WSE) and Anhedonia by

Baseline Satisfaction With Social Connectedness
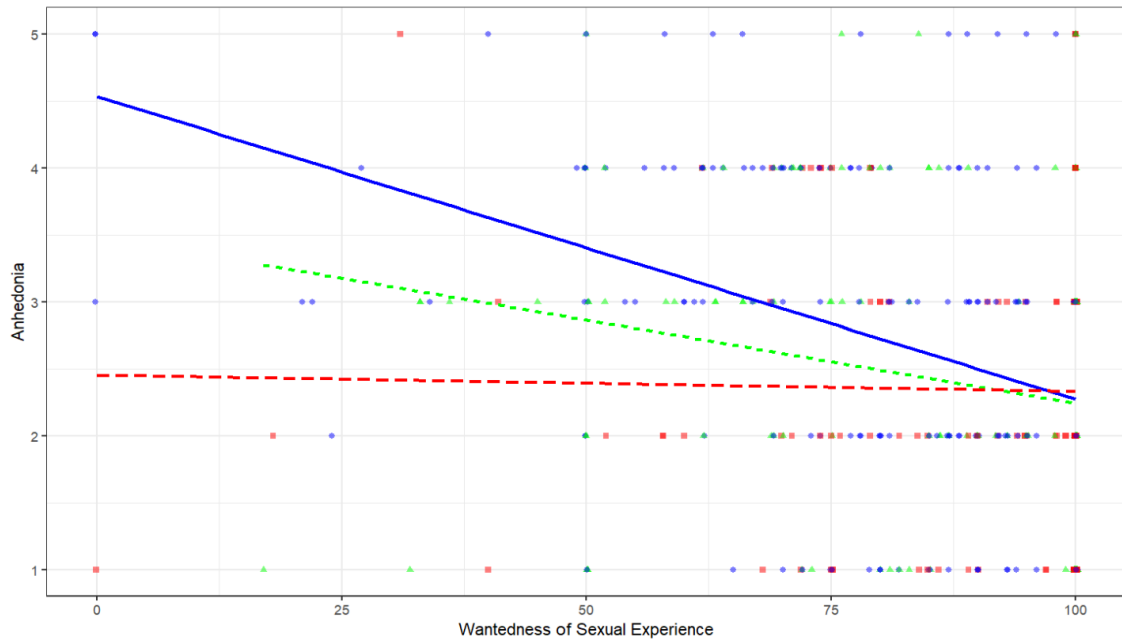
Note. The blue, solid line indicates participants who were in the lowest tertile of baseline

satisfaction with social connectedness. The dashed green line represents participants

within the middle tertile of baseline satisfaction with social connectedness. The dashed

red line represents those in the highest tertile of baseline satisfaction with social

connectedness.

Wantedness of Sexual Experience and Anxiety. There was no evidence of a

lagged relationship between WSE reported at one timepoint and later biweekly-reported

anxiety (b=-0.001, 95% CI: -0.004, 0.003, f^2=0.01). There was evidence of a significant

synchronous, negative relationship between RNT and WSE reported within biweekly

timepoints (b=-0.009, 95% CI: -0.01, -0.004, f^2=0.01). Significant interaction effects of

baseline (b=0.001, 95% CI: 0.0004, 0.002, f^2=0.03) and synchronous (b=0.004, 95% CI: 0.001, 0.01, f^2=0.01) RNT were detected. However, in the case of baseline RNT, this relationship was not as hypothesized. Those with lower baseline RNT scores showed a stronger negative relationship between WSE and anxiety. In contrast, those with higher biweekly RNT scores showed the stronger relationship between WSE and anxiety.

Additionally, there was a significant interaction effect of baseline SSC (b=0.002, 95% CI: 0.001, 0.002, f^2=0.03), such that those with the lowest SSC at baseline had the strongest negative relationship between WSE and anxiety. No significant interaction effect of synchronous, biweekly SSC was found (b=0.0001, 95% CI: -0.0001, 0.0003, f^2=0.003).

Finally, we assessed the relationship between agreement with the endpoint packet item "Over the Fall 2022 [or 2023, depending on year] semester, I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I did not want at the time" and GAD-7 scores at endpoint. We found a significant relationship, such that participants with greater endorsement of unwanted sexual experiences reported more anxiety symptoms, $F(1, 71)$=4.89, p=.03.

Table 5

Relationships Between Wantedness of Sexual Experience (WSE) and Mood

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Lagged WSE*	Sadness	-0.001 [-0.005, 0.002]	0.002	-0.72(6, 679)	0.47	0.003
Synchronous WSE*	Sadness	-0.004 [-0.01, 0.002]	0.003	-1.37(6, 493)	0.17	0.08
Lagged WSE*	Anhedonia	-0.002 [-0.005, 0.002]	0.002	-0.96 (6, 679)	0.34	0.02
Synchronous WSE*	Anhedonia	-0.012 [-0.02, -0.01]	0.003	-4.18 (6, 493)	<0.001***	0.02
Lagged WSE*	Anxiety	-0.001 [-0.004, 0.003]	0.002	-0.32 (6, 679)	0.75	0.01
Synchronous WSE*	Anxiety	-0.009 [-0.01, -0.004]	0.003	-3.35 (6, 494)	<0.001***	0.01
Baseline RNT x WSE*	Sadness	0.001 [0.0002, 0.002]	0.0003	2.69 (8, 469)	0.01*	0.02
Baseline RNT x WSE*	Anhedonia	0.0004 [-0.0003, 0.001]	0.0003	1.14 (8, 469)	0.26	0.003
Baseline RNT x WSE*	Anxiety	0.001 [0.0004, 0.002]	0.0003	3.13 (8, 469)	0.002**	0.03
Synchronous RNT x WSE*	Sadness	0.007 [0.004, 0.01]	0.002	4.39 (8, 491)	<0.001***	0.04

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Synchronous RNT x WSE*	Anhedonia	0.001 [-0.002, 0.004]	0.002	0.72 (8, 491)	0.47	0.002
Synchronous RNT x WSE*	Anxiety	0.004 [0.001, 0.01]	0.002	2.66 (8, 491)	0.01*	0.01
Baseline SSC x WSE*	Sadness	0.001 [-0.0001, 0.002]	0.0004	1.80 (8, 480)	0.07	0.01
Baseline SSC x WSE*	Anhedonia	0.001 [0.001, 0.002]	0.0004	3.21 (8, 480)	0.001**	0.02
Baseline SSC x WSE*	Anxiety	0.002 [0.001, 0.002]	0.0004	3.76 (8, 480)	<0.001***	0.03
Synchronous SSC x WSE*	Sadness	0.0000 [-0.0002, 0.0002]	0.0001	0.09(8, 491)	0.93	0.0001
Synchronous SSC x WSE*	Anhedonia	-0.0002 [-0.0004, -0.00003]	0.0001	-2.21 (8, 491)	0.03*	0.01
Synchronous SSC x WSE*	Anxiety	0.0001 [-0.0001, 0.0003]	0.0001	0.75 (8, 492)	0.45	0.003

Note. ***** = Variable was included in a model covarying BDI-II scores. Effect sizes are described by f^2 and interpreted as follows: 0.02 is considered a small effect, 0.15 is considered medium, and $\geq$ 0.35 is large. **=p<.05, **=p<.01, ***=p<.001;* RNT= Repetitive Negative Thinking; SSC=Satisfaction with Social Connectedness; FSE= Feelings after Sexual Experience

Feelings After Sexual Experiences

Feelings After Sexual Experience and Sadness. When controlling for baseline BDI-II scores, no significant relationship between feelings after sexual experience at one time point and sadness at subsequent time points was found (b=-0.0001, 95% CI: -0.003, 0.003, f^2=0.003). However, there was evidence of a significant negative relationship between FSE and sadness reported within the same biweekly survey; individuals who reported less favorable feelings after a sexual experience tended to endorse more sadness (b=-0.005, 95% CI:-0.01, -0.0004, f^2=0.07).

We assessed whether this synchronous relationship between FSE and sadness may depend on tendencies towards repetitive thinking or satisfaction with social connectedness. We found that there was a significant interaction effect, such that the relationship between FSE and sadness varied both by levels of baseline repetitive negative thinking (b=0.001, 95% CI:0.0001, 0.001, f^2=0.03) and synchronous repetitive negative thinking reported on the biweekly survey (b=0.006, 95% CI:0.003, 0.01, f^2=0.04). However, in both cases this interaction effect was in the opposite direction hypothesized – participants who endorsed less brooding had the strongest negative relationship between FSE and sadness (see *Figure 6)*. There were no significant interaction effects detected between baseline (b=0.0003, 95% CI:-0.0005, 0.001, f^2=0.001) or biweekly (b=0.0001, 95% CI:-0.0001, 0.00003, f^2=0.005) satisfaction with social connectedness and FSE on sadness.

We also assessed for a relationship between agreement with the endpoint item "Over the last semester I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I may or may not have wanted

at the time, but I later regretted them" and endpoint BDI-II scores. A positive relationship was found, such that greater endorsement of regret after sexual experiences was associated with higher BDI-II scores at endpoint even after controlling for baseline BDI-II scores, $F(1,74)=10.43$, $p=.002$.

Figure 6

Relationship Between Feelings After Sexual Experience (FSE) and Sadness by Baseline

Repetitive Thinking
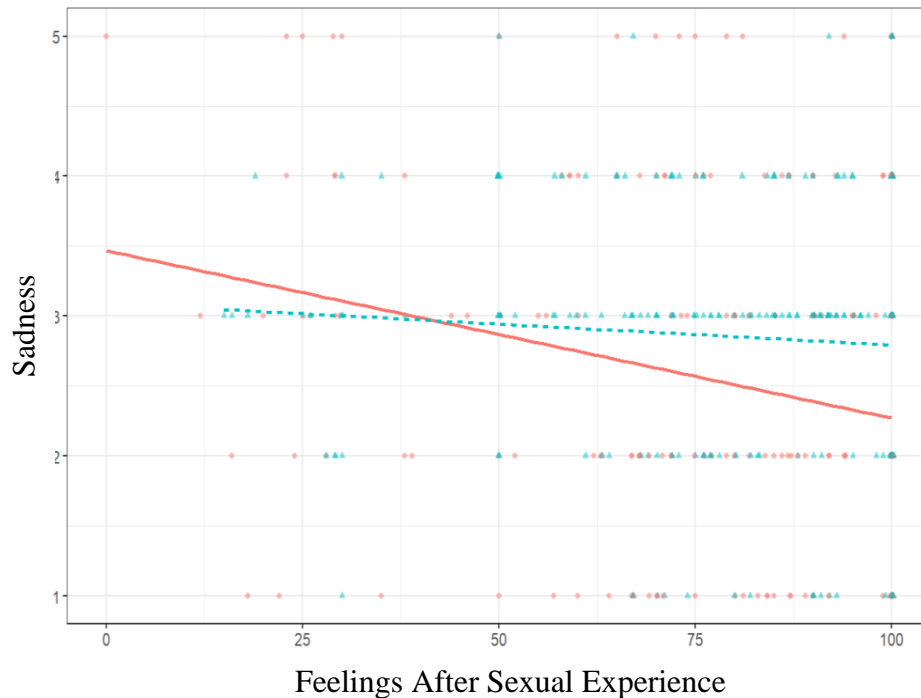
Note. The red, solid line indicates participants who were in the lower half (at or below

50th percentile) of baseline repetitive negative thinking scores. The dashed blue line

represents those in the higher half of repetitive thinking scores (above 50th percentile).

Feelings After Sexual Experience and Anhedonia. Similarly to the pattern of

previously described findings, there was no significant lagged relationship detected

between FSE reported at one time point and subsequent anhedonia at the next time point

(b=-0.0005, 95% CI: -0.004, 0.003, f^2=0.02), after controlling for baseline BDI-II scores.

There was a significant synchronous relationship between feelings after sexual

experience and anhedonia reported within the same biweekly timepoints (b=-0.009, 95%

CI: -0.01, -0.004, f^2=0.03), such that individuals who reported worse feelings after a sexual experience tended to report more anhedonia.

Additionally, a significant interaction effect of baseline RNT was detected, with a minimal effect size. Contrary to hypotheses, this interaction was such that the relationship between FSE and anhedonia was strongest for those with *lower* baseline RNT (b=0.001, 95% CI: 0.0001, 0.001, f^2=0.01). No other significant interaction effects of repetitive negative thinking or satisfaction with social connectedness on the relationship between FSE and anhedonia were found (see *Table 6*).

Feelings After Sexual Experience and Anxiety. There was no significant lagged relationship detected between FSE reported at one time point and subsequent anxiety at the next time point (b=-0.0004, 95% CI: -0.004, 0.003, f^2=0.01), after controlling for baseline BDI-II scores. There was evidence of a synchronous relationship between FSE and anxiety within timepoints (b=-0.006, 95% CI: -0.01, -0.001, f^2=0.01).

When evaluating the role of baseline RNT on the relationship between FSE and anxiety, no significant interaction effect was found (b=0.004, 95% CI: -0.0002, 0.001, f^2=0.01). There was evidence of a synchronous interaction between RNT and FSE on anxiety, with a small effect size (b=0.005, 95% CI: 0.002, 0.01, f^2=0.02). However, this relationship was not as hypothesized – as shown in *Figure 7,* it appears that only those in the *lowest* tertile of biweekly repetitive negative thinking showed a relationship between FSE and anxiety. For these individuals, it was a negative relationship (as anticipated), such that lower FSE scores (greater distress) were associated with higher anxiety scores.

When evaluating the role of satisfaction with social connectedness (SSC), there was evidence of an interaction effect of baseline SSC on the relationship between FSE

and anxiety, with a minimal effect size (b=0.001, 95% CI: 0.0002, 0.002, f^2=0.01). As shown in *Figure 8,* this interaction effect was such that those with the lowest SSC at baseline had the strongest, negative relationship between FSE and anxiety. Synchronous biweekly SSC did not appear to significantly affect the relationship between FSE and anxiety, with a minimal effect size (b=0.0001, 95% CI: -0.0001, 0.0003, f^2=0.005).

We also assessed for a relationship between agreement with the endpoint item "Over the last semester I have had sexual experiences (such as making out, sexual touching, sexual intercourse, or oral/anal/manual sex) that I may or may not have wanted at the time, but I later regretted them" and GAD-7 scores. No significant relationship was found, F(1,71)=2.77, p=.10.

Figure 7

Relationship Between Feelings After Sexual Experience and Anxiety by Biweekly

Repetitive Negative Thinking
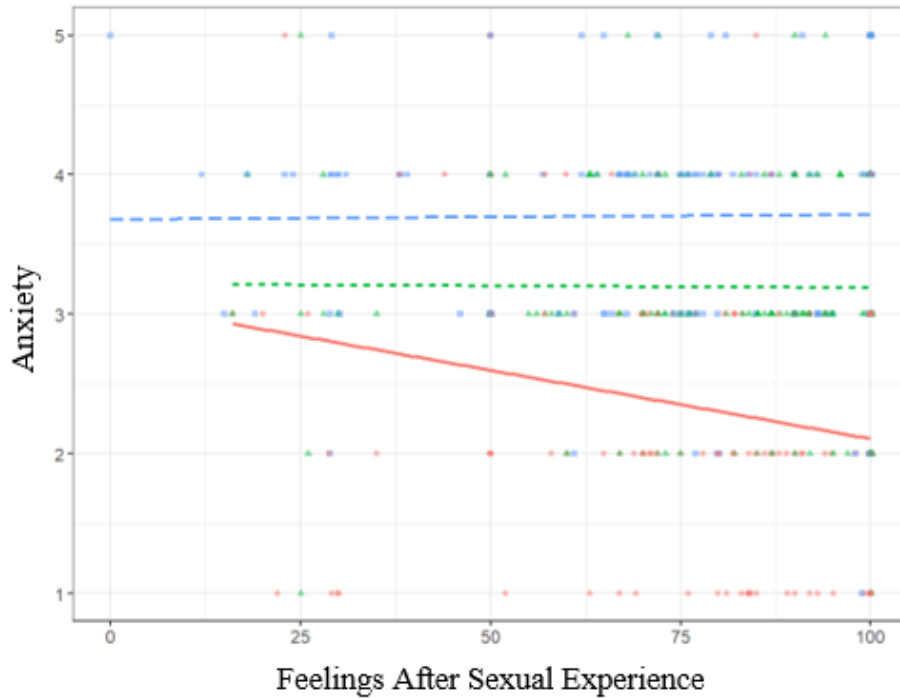
Note. The red, solid line indicates participants who were in the lower tertile of biweekly

repetitive negative thinking scores. The dashed green line (middle) represents participants

within the middle tertile of biweekly repetitive negative thinking. The dashed blue line

represents those in the highest tertile of biweekly repetitive thinking scores.

Figure 8

Relationship Between Feelings After Sexual Experience and Anxiety by Baseline

Satisfaction With Social Connectedness
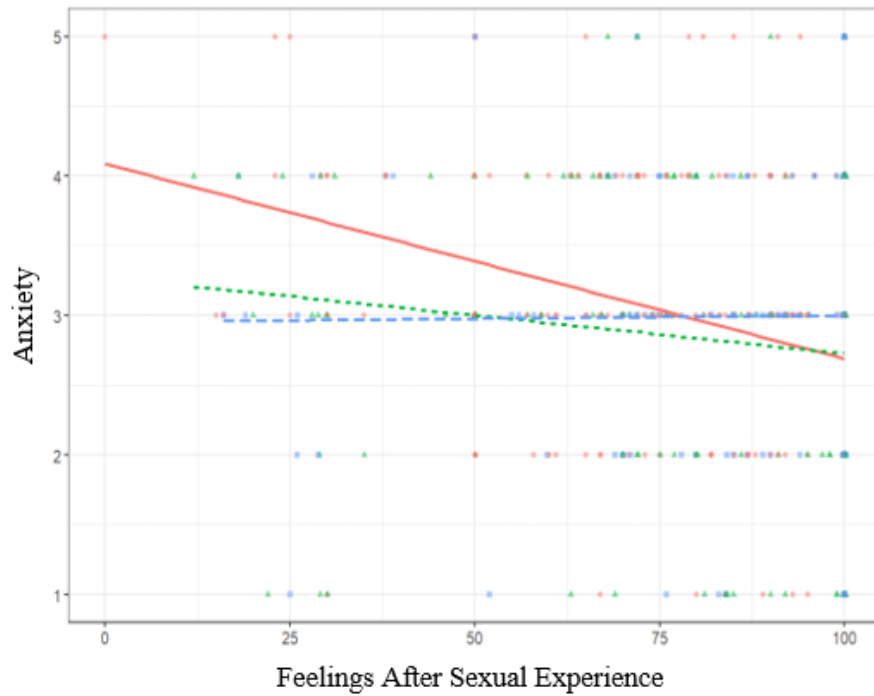
Note. The red, solid line indicates participants who were in the lower tertile of baseline

satisfaction with social connectedness. The dashed green line represents participants

within the middle tertile of baseline satisfaction with social connectedness. The dashed

blue line represents those in the highest tertile of baseline satisfaction with social

connectedness.

Table 6

Relationships Between Feelings After Sexual Experiences (FSE) and Mood

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Lagged FSE*	Sadness	-0.0001 [-0.003, 0.003]	0.002	-0.09(6, 681)	0.93	0.003
Synchronous FSE*	Sadness	-0.005 [-0.01, -0.0004]	0.002	-2.11(6, 494)	0.04*	0.07
Lagged FSE*	Anhedonia	-0.0005 [-0.004, 0.003]	0.002	-0.32 (6, 681)	0.75	0.02
Synchronous FSE*	Anhedonia	-0.009 [-0.01, -0.004]	0.002	-3.82 (6, 494)	<0.001***	0.03
Lagged FSE*	Anxiety	-0.0004 [-0.004, 0.003]	0.002	-0.23 (6, 681)	0.82	0.01
Synchronous FSE*	Anxiety	-0.006 [-0.01, -0.001]	0.002	-2.35 (6, 494)	0.02*	0.01
Baseline RNT x FSE*	Sadness	0.001 [0.0001, 0.001]	0.0003	3.15 (8, 470)	0.002**	0.03
Baseline RNT x FSE*	Anhedonia	0.001 [0.0001, 0.001]	0.0003	2.14 (8, 470)	0.03*	0.01
Baseline RNT x FSE*	Anxiety	0.0004 [-0.0002, 0.001	0.0003	1.41 (8, 470)	0.16	0.01
Synchronous RNT x FSE*	Sadness	0.006 [0.003, 0.01]	0.001	4.16 (8, 492)	<0.001***	0.04

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Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
Synchronous RNT x FSE*	Anhedonia	0.002 [-0.001, 0.005]	0.002	1.09 (8, 492)	0.28	0.004
Synchronous RNT x FSE*	Anxiety	0.005 [0.002, 0.01]	0.001	3.14 (8, 492)	0.002**	0.02
Baseline SSC x FSE*	Sadness	0.0003 [-0.0005, 0.001]	0.0004	0.73 (8, 481)	0.46	0.001
Baseline SSC x FSE*	Anhedonia	0.001 [-0.0002, 0.001]	0.0004	1.38 (8, 481)	0.17	0.004
Baseline SSC x FSE*	Anxiety	0.001 [0.0002, 0.002]	0.0004	2.43 (8, 481)	0.02*	0.01
Synchronous SSC x FSE*	Sadness	0.0001 [-0.0001, 0.0003]	0.0001	1.10(8, 492)	0.27	0.005
Synchronous SSC x FSE*	Anhedonia	-0.001 [-0.0003, 0.0001]	0.0001	-1.32 (8, 492)	0.19	0.0004
Synchronous SSC x FSE*	Anxiety	0.0001 [-0.0001, 0.0003]	0.0001	1.07 (8, 492)	0.28	0.005

Note. *= Variable was included in a model covarying BDI-II scores. Effect sizes are described by f^2 and interpreted as follows: 0.02 is considered a small effect, 0.15 is considered medium, and $\geq$ 0.35 is large. *=p<.05, **=p<.01, ***=p<.001; RNT= Repetitive Negative Thinking; SSC=Satisfaction with Social Connectedness; FSE= Feelings after Sexual Experience

Role of Autistic Traits

We evaluated whether there was evidence of an interaction between SRS-2 scores and predictors of interest (repetitive negative thinking, satisfaction with social connectedness, and distress associated with sexual experiences) on mood. In all cases the models without the interaction effect were preferred over those including it, as indicated by non-significant likelihood ratio tests and smaller Bayesian Information Criterion (BIC) values. Therefore, as predicted, we concluded that there is no evidence of a difference in the model of these mechanisms (i.e., strength of association between predictors and outcomes) by SRS-2 scores.

Then we assessed for differences in prevalence of predictors of interest and internalizing symptoms by SRS-2 scores. Cross-sectional analyses showed significant effects of SRS-2 on depression and anxiety at baseline: Participants with higher SRS-2 scores, indicating more autistic traits, reported significantly higher BDI-II ($F(1, 370)=217.91$, $p<.001$, $r^2=0.37$) and GAD-7 scores ($F(1, 370)=180.25$, $p<.001$, $r^2=0.33$). Additionally, students with higher SRS-2 scores reported higher repetitive thinking tendencies at baseline, $F(1, 358)=265.32$, $p<.001$, $r^2=0.43$. Participants with higher SRS-2 scores also tended to report lower NIH Toolbox Friendship scores, $F(1, 362)=106.72$, $p<.001$, $r^2=0.23$.

When looking at biweekly internalizing symptoms, results from GLS regressions showed that students who reported more autistic traits at baseline endorsed significantly higher sadness ($b=0.011$, 95% CI: 0.01, 0.01, $f^2=0.08$; see *Table 7*), anhedonia ($b=0.012$, 95% CI: 0.01, 0.01, $f^2=0.09$), and anxiety ($b=0.009$, 95% CI:0.01, 0.01, $f^2=0.05$) on average throughout the semester. Students with higher SRS-2 scores also endorsed more

RNT (b=0.011, 95% CI: 0.01, 0.01, f^2=0.07) throughout the semester. Contrary to hypotheses and baseline observations, students with more autistic traits reported no significant difference in social satisfaction (b=-0.049, 95% CI: -0.11, 0.01, f^2=0.002) throughout the semester. No significant differences in feelings ahead of (b=-0.03, 95% CI: -0.16, 0.05, f^2=0.03) or distress after sexual experiences (b=-0.077, 95% CI: -0.17, 0.02, f^2=0.01) by SRS-2 scores were detected.

Table 7

Relationships Between SRS-2 Scores and Biweekly Outcomes of Interest

Hypothesized Predictor	Outcome	Estimate [95% CI]	Estimated Standard Error	t Value (df)	Pr(>|t|)	f^2
SRS-2 Scores	Sadness	0.011 [0.01, 0.01]	0.001	9.69 (5, 5282)	<0.001***	0.08
SRS-2 Scores	Anhedonia	0.012 [0.01, 0.01]	0.001	9.73 (5, 5281)	<0.001***	0.09
SRS-2 Scores	Anxiety	0.009 [0.01, 0.01]	0.001	7.61 (5, 5282)	<0.001***	0.05
SRS-2 Scores	RNT	0.011 [0.01, 0.01]	0.001	9.05 (5, 5282)	<0.001***	0.07
SRS-2 Scores	SSC	-0.049 [-0.11, 0.01]	0.03	-1.61 (5, 5279)	0.11	0.002
SRS-2 Scores	WSE	-0.03 [-0.16, 0.05]	0.04	-0.76 (5, 534)	0.45	0.03
SRS-2 Scores	FSE	-0.077 [-0.17, 0.02]	0.05	-1.59 (5, 536)	0.11	0.01

Note. Effect sizes are described by f^2 and interpreted as follows: 0.02 is considered a small effect, 0.15 is considered medium, and $\geq$ 0.35 is large. *=p<.05, **=p<.01, ***=p<.001; RNT= Repetitive Negative Thinking; SSC=Satisfaction with social connectedness; WSE=Wantedness ahead of sexual experience; FSE= Feelings after sexual experience

Exploratory Analyses

Predictors of WSE and FSE. We had intended to explore predictors of unwanted or distressing sexual experiences, such as satisfaction with sexual education and understandings of consent. However, due to the low number of participants who endorsed any feelings of sexual experiences being unwanted or distressing, we consider these analyses to be preliminary and likely unable to be fully explored within the current data. Within the preliminary exploration, we found no relationship between satisfaction with childhood consent education (via the Childhood Modeling of Consent Questions) and emotions associated with sexual experiences during the semester (WSE: $F(1, 262)=0.58$, $p=.45$, $r^2=.002$; FSE: $F(1, 263)=1.05$, $p=.31$, $r^2=.0002$).

Related and better powered analyses are discussed more in Chapter 2, where we evaluate consent understandings, satisfaction with sexual education, and experiences of sexual abuse in a combined sample from both 2m2x and ACCS.

Differences by Year. We assessed for differences by years of data collection (2020, 2021, 2022, and 2023), controlling for SRS-2 scores to account for potential variation in proportions of autistic participants by year. As shown in *Table 8*, differences by year in BDI-II scores were approaching significance after controlling for SRS-2 scores, $F(1,369)=3.77$, $p=.05$, such that BDI-II scores increased relative to 2020 in later years and were highest in 2022. Differences by year were not significant for GAD7 scores, $F(1,369)=2.87$, $p=.09$. There were differences in both baseline repetitive negative thinking ($F(1,357)=9.10$, $p=.003$) and NIH Friendship Scores by year ($F(1,361)=8.04$, $p=.005$), after controlling for SRS-2 scores. RNT tended to increase by year (indicating

greater repetitive negative thinking over time), while SSC decreased (indicating less

satisfaction with social connectedness over time).

Table 8

Differences by Year in Baseline Mood and Risk Factors

Mean*(SD)* Range	2020 n=42	2021 n=109	2022 n=128	2023 n=120	Differences by Year, Controlling for SRS-2 Scores
BDI-II	11.20*(9.91)* 0-46	12.00*(9.96)* 0-38	17.40*(12.80)* 0-58	13.40*(10.60)* 0-51	$F(1,369)=3.77$, *p*=.05, r^2=.37
GAD7	5.32*(5.04)* 0-16	6.02*(5.25)* 0-21	8.20*(5.62)* 0-21	6.48*(5.32)* 0-18	$F(1,369)=2.87$, *p*=.09, r^2=.33
RNT	21.70*(9.38)* 8-36	24.20*(7.72)* 8-39	26.0*(7.94)* 8-40	25.20*(8.30)* 8-40	$F(1,357)=9.10$, *p*=.003**, r^2=0.43
SSC	28.90*(8.53)* 10-40	28.40*(7.37)* 8-40	27.10*(7.17)* 8-40	26.00*(8.28)* 8-40	$F(1,361)=8.04$, *p*=.005**, r^2=.23

Note. BDI-II=Beck Depression Inventory (Beck et al., 1996); GAD-7=General Anxiety Disorder-7 (Spitzer et al., 2006); RNT=

Repetitive negative thinking; SSC=Satisfaction with social connectedness

Discussion

Current results continue to suggest a temporal trend that has been seen in prior years of data collection (McKenney, Brunwasser, et al., 2023; McKenney et al., 2024). In most analyses, it appears that hypothesized predictors tend to primarily contribute to depression and anxiety symptoms during the transition to college through a) a baseline tendency that seems to have some persisting, longer-term influence throughout the semester and b) a synchronous, short-term risk that may contribute to symptoms in the moment. Contrary to hypotheses, there were *no* significant relationships found in lagged predictors, such that levels of a predictor (repetitive negative thinking, satisfaction with social connectedness, wantedness ahead of a recent sexual experience, and feelings after sexual experience) measured at one biweekly time point did not relate significantly to sadness, anhedonia, or anxiety at subsequent time points. (Each of these relationships is described in more detail by predictor of interest in following paragraphs.) Furthermore, our lack of significant interaction effects of time suggests that there is no evidence (at least with our current power) that the effect of any predictor or its magnitude changed over time (e.g., the relationship between baseline RNT and mood on biweekly measures was not shown to differ significantly by biweekly timepoint). Relationships also appeared primarily linear, such that there were not observable short-term changes in RNT that predicted short-term changes in mood or anxiety.

The lack of a lagged relationship between risk factors at one time point and subsequent mood may be explained numerous ways, which future research may help to further disentangle. One possible explanation is that there are general tendencies over time that are detected through the more extensive baseline instruments – these

instruments ask questions about general tendencies towards things like repetitive thinking over the last several weeks, rather than experiences with these behaviors in the moment – and that these tendencies have a stronger effect on health over time than the more brief moments of maladaptive behavior or circumstances that may be detected on the biweekly measure. In other words, an individual may be affected by repetitive negative thinking in the moments that it is occurring (similar to our generally significant synchronous effects within timepoint), but it is less likely to affect them long-term if it is not a repeated and broader tendency they experience over and over again (such as the types of tendencies likely measured at baseline). Future research could benefit from greater exploration of these temporal relationships, particularly over longer periods of time, and with more robust measures than the 1-5 Likert scale used on the biweekly survey in the present study.

Furthermore, evidence suggests that the relationship between these predictors and mood outcomes does not differ by autistic traits: in other words, when present, repetitive negative thinking, (dis)satisfaction with social connectedness, and negative feelings about recent sexual experience are likely to relate similarly to mood regardless of autistic trait levels. However, autistic students may be *more at risk* of high levels of some of these predictors of interests.

Repetitive Negative Thinking

Repetitive negative thinking at baseline was related to sadness and anxiety (but not anhedonia) in later biweekly measures, as well as synchronously related to sadness, anhedonia, and anxiety, after controlling for baseline depression scores and time.

However, effect sizes did vary, with the strongest effect sizes being seen in the cases of synchronous relationships.

Importantly, students with greater autistic traits appeared to engage in more RNT at both baseline and throughout the semester. In the case of baseline RNT rates, the effect size was markedly high. Therefore, this supports prior evidence RNT may be one important contributor to the increased depression and anxiety ratings within the autistic community (Crane et al., 2013; Gotham et al., 2014). Given that rumination was associated with sadness and anxiety in our sample, but not with anhedonia, further research may continue to explore whether RNT-associated depression has unique presentation features compared to depression following other risk factors. For example, some research has suggested that perseverative cognition may explain much of the link between mood concerns and physical health outcomes, such that individuals who have this more activated, ruminative cognitive style may be at greater risk of cardiovascular, autonomic, and endocrine system concerns (Ottaviani et al., 2016).

Satisfaction with Social Connectedness

Baseline scores on the NIH Toolbox Friendship Measure were predictive of biweekly sadness and anhedonia (but not anxiety) scores throughout the semester. Additionally, there were significant synchronous relationships between biweekly SSC and all three mood outcomes (sadness, anhedonia, and anxiety). Students with greater autistic traits tended to report lower SSC at baseline, suggesting autistic students may be having greater social difficulties or less rewarding social experiences prior to and during the very beginning of their first semester of college. Interestingly, this effect did not

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persist across the semester: on biweekly surveys, no significant differences in SSC by SRS-2 scores were detected.

This is contrary to some other findings in the literature (Ee et al., 2019) and could be explained by a number of factors related to the college transition, the historical context of the study, or the measurement tool itself. It is possible that the transition to college has the potential to be a particularly positive influence on SSC for autistic students – it may be the case that for at least some of these individuals, starting college was one of the first opportunities to find friends who are neurodiversity-affirming and/or autistic themselves, which led to greater increases in perceived SSC. Future work is needed to disentangle which aspects of college life may be beneficial versus deleterious for mental health within the autism spectrum. It is also possible that this unexpected finding was influenced by differences in which aspects of social interaction and support autistic and non-autistic college students consider when they complete their biweekly SSC ratings. For example, certain forms of social interaction (e.g., virtual interactions that became prevalent in response to COVID-19) have been found to be rated as more satisfying by autistic versus non-autistic students (Maljaars et al., 2023; Stewart et al., 2023). In the current study, only perceived social belonging was assessed, without queries on how this social belonging was achieved, so future work may explore the context and frequency of satisfying social interactions.

There was some evidence of interaction effects such that the relationship between SSC and mood (in the case of sadness and anxiety) may depend on baseline social motivation (ACIPS scores). However, the effect sizes here were minimal. Taken together, findings suggest that, while motivation for social interaction may play some role in

affecting the relationship between SSC and mood, it is likely not as impactful as

hypothesized. Previous research has suggested differing ways social motivation may

influence the relationship between SSC and mental health outcomes in autistic

individuals: While the social motivation model of depression suggests that those with

both greater desire for social connection and lower social communication skills would be

at greatest risk for depression (Smith & White, 2020), other evidence has suggested

autistic individuals with lower levels of desire for social connection still experience high

levels of loneliness and corresponding negative impacts on mental health (Han et al.,

2019; Umagami et al., 2022; Himelstein et al., under review). The present study's

findings add further data to this discussion by noting that, while some significant

interaction effects were observed, the effect sizes were quite minimal and main effects of

SSC were larger on mood. Furthermore, there were no interaction effects of autistic traits

on the relationship between SSC and mood. Therefore, it is likely worth emphasizing

that, although social motivation may play some role, autistic individuals appear to be

similarly affected by (dis)satisfaction with social connectedness as non-autistic students.

These findings contradict the harmful and longstanding myth that autistic individuals do

not benefit from or desire friendships (see Bennett et al., 2018, for description of the

history of this myth). This myth has historically influenced intervention priorities and

beliefs about autism in ways that may be detrimental to supporting autistic people's

mental health across the lifespan (Bennett et al., 2018). Present findings warrant a re-

evaluation of intervention priorities, adding to a body of recent evidence that dispels

these historical notions by affirming not only that many autistic people do explicitly

report desire for social connection, but that one's SSC influences the development of depressive symptoms regardless of the level of this desire.

Behavioral activation, a standard treatment for depression (Bal et al., 2022; Dimidjian et al., 2014), relies on increasing healthful and meaningful activities irrespective of motivation. Current findings suggest social activities support the mental health of autistic college students, and thus increasing social activities may be a valuable treatment target to prevent or treat depression, a prevalent condition in both the autistic and college student populations. Additional research is needed to tailor interventions to the nuanced issue of balancing personal preference for social interaction, while also increasing not only the amount but the quality of social interaction for individuals who may lack social support.

Wantedness Ahead of and Feelings After Sexual Experiences

How much someone reported feeling that they wanted the sexual experience before engaging in it (WSE) and their feelings after the sexual experience (FSE) were measured as two distinct, although related, aspects of potential distress associated with sexual encounters. This was to account for the ways that sex can be consensual or desired but still regretted or distressing, as well as to allow for gray areas of ambivalence. In our current sample, the vast majority of reports of both WSE and FSE (over 90% in both cases) were over 50 on their respective 0-100 point scales, indicating that most participants felt that sexual experiences were mostly "wanted" and were more "happy" than not that they occurred. While positive in many ways, this profoundly limits our ability to explore the effect of negative sexual experiences on mental health. However,

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some relationships were still detected which suggest a correlation between the emotions associated with sexual experiences and mood symptoms.

In both cases (WSE and FSE), emotions associated with sexual experiences showed a synchronous relationship with anxiety and anhedonia, such that more negative feelings about the sexual encounter were related to worse mood symptoms in the moment. FSE was additionally associated with sadness synchronously (but WSE was not). No lagged relationships were detected, such that there was not a lasting effect of reaction associated with a sexual experience on mood in later weeks, at least in our current data in which variability in mood associated with sexual experiences was quite limited. However, notably, data are inherently lagged to an undefined degree: participants were asked to answer questions about their feelings ahead of and after a recent sexual experience that occurred since the last biweekly survey. For some participants, this experience may have been several days prior. At endpoint, unwanted sexual experiences during the semester were associated with higher depression and anxiety scores after controlling for baseline mood. Regret following sexual experiences was associated with higher depression scores, but not anxiety, at endpoint.

Interaction effects suggest that the relationship between feelings associated with sexual experiences and some mood concerns could potentially be affected – and hopefully mitigated – by levels of social support. However, more evidence is needed to evaluate how strong this effect may be over time, particularly in samples with greater variability in distress associated with sexual experiences.

Furthermore, the role of repetitive negative thinking in maintaining or worsening mood symptoms associated with distressing sexual events is less clear from our current

data. In some cases, we do see an interaction effect such that those who engage in more repetitive negative thinking seemed to have a stronger negative relationship between emotions associated with sexual experiences and mood symptoms (e.g., the relationship between WSE and biweekly RNT on anxiety). However, in several other instances the reverse relationship is seen, such that those who engage in *less* repetitive negative thinking have the strongest relationship between WSE and mood. Given the limitations of the current sample, particularly the relative lack of individuals reporting distress associated with sexual experiences, it is difficult to form conclusions, and further research is needed.

One possibility for further investigation is that, in the context of trauma and related symptomology, a lack of rumination is not inherently indicative of healthy cognitive coping strategies. The broader PTSD-related literature has shown that cognitive responses following traumatic events can vary widely (Feeny et al., 2000; Litz et al., 2002; Thompson & Waltz, 2010). For some individuals, they may have increased repetitive thinking. Some of this is ruminative and likely to predict PTSD symptoms (Hannan et al., 2021; Michael et al., 2007). However, not all repetitive thought following trauma is equally harmful, with some having the potential to aid in problem-solving or to be experienced nonjudgmentally and thus not lead to overly increased distress (Michael et al., 2007; Watkins, 2008). Other individuals who experience sexual assault or related events may feel emotionally numb and disconnected from the events that occurred. These individuals may be more likely to engage in experiential avoidance and thus report relatively low rumination (Boeschen et al., 2001; Merwin et al., 2009). Rather than this avoidance being productive to mental health, greater experiential avoidance has often

been associated with increased PTSD symptomology following sexual trauma (Chawla &

Ostafin, 2007; Feeny et al., 2000; Merwin et al., 2009). Taken together, we see that for

some, heightened rumination following a distressing sexual experience is common and

may relate negatively to mental health. For others, they may be more likely to engage in

experiential avoidance and report low rumination, while still experiencing high distress.

It is possible that these disparate response styles and their varying short-term and long-

term effects may explain some of the seemingly contradictory results we are observing,

although additional research is needed.

Implications and Future Directions

Current findings suggest that known general population predictors of mood

concerns appear to operate similarly across neurodiverse populations. This is a useful and

important message for clinicians: Most mental health professionals are likely to have

some understanding of repetitive negative thinking, social dissatisfaction or low social

connectedness, and distressing or unwanted sexual experiences as associated with

depression and anxiety in the general population. Many clinicians do not, however, feel

competent or confident in providing services to autistic populations (Maddox et al.,

2020). This research could be one way to close that gap: by identifying common

contributors to mental health concerns that clinicians already receive training in, we may

be able to increase clinician's confidence in their ability to treat this underserved

population. Current findings provide one step towards this goal, by showing several

common mechanisms contributing to mood concerns across levels of autistic traits, and

with elevated levels of these potential contributors among autistic individuals. Future

research could further increase service accessibility in the autistic population by

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comparing the clinical efficacy of targeting these concerns in autistic and non-autistic adults through known therapeutic techniques. For example, cognitive defusion may be one tool to manage repetitive negative thinking that is similarly effective in both autistic and non-autistic adults (Maisel et al., 2019). Greater research comparing the efficacy of techniques across populations, and testing simple adaptations to improve efficacy in autistic populations as needed, may be one path to increasing clinician confidence and competence with this underserved population, thus improving access to treatment. When adapting interventions, it may be beneficial to also provide training to clinicians on not only how to adjust their existing techniques, but also in broader concepts of how to work with autistic clients and basic knowledge of neurodiversity (Dreiling et al., 2022; Kerns et al., 2016; Lipinski et al., 2022). This autism-focused education has been shown to be a useful component to increase clinician confidence and potentially to provide better care to their autistic clients (Dreiling et al., 2022).

Limitations

As noted previously, there are limitations to the current sample. We opted to operationalize autism traits dimensionally based on SRS-2 scores rather than as a categorical group for the current analyses. While the dimensional approach allowed for greater statistical power than would categorical approaches, the lack of comparison between (formally-diagnosed) autistic to non-autistic groups may limit the generalizability of findings, especially as it obscures the possible role of the social *identity* of being autistic in relationships between predictors of interest and mental health. On the other hand, it is quite possible that the inclusion of undiagnosed autistic adults in the sample might actually improve the representativeness of this sample, since autistic

adults from historically under-serviced/-recognized groups may reach adulthood and experience autism-related social and mental health difficulties regardless of formal diagnosis (Au-Yeung et al., 2019; Beck et al., 2020; Lorenz & Hull, 2024). Future research could benefit from evaluating whether predictors of mood may vary by intersecting marginalized identities.

Additionally, while the SRS-2 is a common measure of autistic traits, there is some evidence (predominantly in pediatric samples) that artificial inflation of SRS-2 scores can occur in individuals with mood or anxiety concerns (Charman et al., 2007; Havdahl et al., 2016; Hus et al., 2013; South et al., 2017). As a result, discriminant validity has been shown to be poor between autistic individuals and individuals with high anxiety (Havdahl et al., 2016; South et al., 2017). This entanglement is further complicated by the markedly high rates of both depression and anxiety in autistic populations (Hollocks et al., 2019). To further confirm present findings, replication with more discrete categories of autistic and non-autistic informed by diagnostic evaluation may be helpful.

Analyses may be limited by current sample size. In particular, this may be a concern for analyses on the effects of sexual experiences, due to a limited number of individuals who reported distress associated with sexual experiences. Research with a larger, more diverse sample and range of sexual experiences may be better able to capture both predictors of distressing or unwanted sexual experiences and subsequent effects on mental health. The lack of reports of distressing sexual experiences may also be related to limitations of the current study design. Participants were aware researchers had their contact information, thus potentially making participants less likely to disclose some

sensitive information. Furthermore, students may have had experiences that they did not label as distressing in the moment, but would have later if we were to follow-up over a longer period of time (Peterson & Muehlenhard, 2011). This short-term longitudinal design is unable to capture that nuance. Additionally, future research could benefit from exploring individual factors that may be correlated with increased risk of unwanted or distressing sexual experiences. In all cases, more research is needed to better understand the directionality and scope of this relationship over extended time periods, and clinical implications need to be further studied.

Conclusions

As hypothesized, present findings add to growing evidence that the transition to college can be a challenging timepoint for all students, but students with higher autistic traits in particular are more likely to experience mood concerns. There are likely many contributors to these increased mental health concerns – including the effects of ableism and discrimination that are beyond the scope of the current study. However, one area that we believe may be particularly fruitful to explore for intervention science is the elevated rates among autistic student populations of established mental health risk factors identified in the general population, such as repetitive negative thinking. Current evidence suggests that there is substantial overlap in these predictors of mood concerns across neurodiverse student populations, but that students with higher autistic traits may endorse greater rates of some of these risk factors, especially repetitive negative thinking. Therefore, adapting known strategies from the general population to reduce repetitive negative thinking and foster social connectedness could be key paths to promote mental health in autistic college students (Hedley et al., 2018; Hymas et al., 2022). Preliminary

evidence also suggests that reducing RNT and increasing SSC could play a role in buffering the effects of distressing or unwanted sexual experiences on mental health. Further evidence is needed to better understand the risk of sexual trauma in autistic students and neurodiverse student perspectives on sexual consent in order to improve prevention efforts.

Chapter 2

Applied Consent Communication Study

Introduction

As noted in Chapter 1, there are many potential contributors to the elevated rates of mood concerns in autistic adults. One of these potential contributors is an elevated risk of sexual trauma. Although more research is needed, existing literature suggests that autistic individuals may be at an increased risk of assault across many stages of the lifespan (Brown et al., 2017; Sevlever et al., 2013), including young adulthood: In one sample taken from nine universities, 8.2% of autistic students endorsed experiencing unwanted sexual contact on campus, compared to 5.6% of students without disabilities (Brown et al., 2017). We expect that these experiences may contribute to increased risk of both psychiatric and physical health concerns, much as they do in the general population (Graham et al., 2021; Rothman et al., 2021; Waigandt et al., 1990), although data is limited.

Heightened rates of sexual assault and other forms of unwanted/regretted sexual experiences likely have multiple explanations in the autistic community. For example, these rates may relate to intersecting minoritized and stigmatized identities, particularly since many autistic individuals also identify as LGBTQ+, a community that is known to be at increased risk of sexual assault (Flanders et al., 2021; George & Stokes, 2018b; Strang et al., 2014). However, there may also be unique risk factors such as differences across autistic and non-autistic students in sexual consent education and communication norms around sexual behavior. Risk factors such as these, if clearly identified, could

provide potential avenues to aid in preventing distressing and unwanted sexual experiences.

Prior research in the general population has shown that the consent cues – or "signs" that one uses to assess someone's willingness to engage in a sexual activity – one most strongly endorses vary by population. For example, there are gender differences in the self-reported use of verbal and behavioral indicators of consent, such that women are more likely to rely on indicators such as not moving away and caressing their partner (Muehlenhard et al., 2016). Similarly, when participants were asked to interpret the likelihood of fictional vignette characters consenting to various sexual activities, the perceived consent ratings varied by participant factors such as their student status; university students tend to endorse lower levels of perceived consent than non-students (Willis & Jozkowski, 2022). It has been theorized that this effect was related to differences in sexual consent education, due to university students receiving greater training on consent (Willis & Jozkowski, 2022). This suggestion that prior experience with sexual education affects future applications of consent may have even more robust implications when we consider the potentially varied experiences with implicit and explicit sexual education across neurotypes. Autistic students in particular have reported receiving less sexual education than their peers (Hancock et al., 2017) and feeling that the sexual education they have received is inadequate for a variety of reasons, including limited representation of diverse sexual orientations and gender identities, overreliance on non-literal or abstract language, improper timing of sexual education (Barnett & Maticka-Tyndale, 2015), and parents' discomfort with or lack of confidence in educating their autistic child on sexual activity (Ballan, 2012). Beyond the potential gaps in explicit

sexual education, autistic students may also receive more implicit messages that communicate the importance of compliance and fail to encourage bodily autonomy throughout their childhood (Harte, 2019; Späth & Jongsma, 2020; Sterman et al., 2022). These messages may vary from well-meaning attempts to teach a minimally speaking child to do a task by physically moving their body to the intentionally malicious incidents of abuse that are more commonly experienced by children with disabilities (Baladerian, 1991; Mansell et al., 1996). From a social learning theory perspective (Kunkel et al., 2006), this modeling of bodily autonomy norms (or lack thereof) in childhood may affect autistic people's later expectations and actions surrounding consent.

Autistic adults have noted difficulties in expressing and interpreting others' consent/dissent, which may then lead to romantic opportunities being missed or incorrectly pursued when they are not reciprocal (Barnett & Maticka-Tyndale, 2015; Stokes et al., 2007). In our own lab, participant responses to open-ended survey questions and focus group conversations have highlighted that autistic college students often feel unsure of or unprepared to effectively navigate consent cues, possibly due to differences in pragmatic language (Kohn et al., 2022), reliance on facial expression and body language, or uncommunicated social norms (Barnett & Maticka-Tyndale, 2015). These differences in communication of consent may not only be frustrating, but there is the potential for an increased likelihood of misunderstandings and harm.

Difficulties in communication between autistic and non-autistic adults have been observed in numerous empirical studies and personal narratives (e.g., Cummins et al., 2020; Ying Sng et al., 2018). This social communication difficulty appears to be bidirectional, such that autistic and non-autistic individuals both show difficulty with

cross-neurotype social tasks, including interpreting facial expressions (Chaidi & Drigas, 2020; Sheppard et al., 2016) and sharing information (Crompton et al., 2020). Furthermore, it has been observed that autistic people tend not to demonstrate communication deficits when speaking to other autistic people – this "deficit" only emerges in heterogeneous communication across neurotypes (Crompton et al., 2020). Thus, this research suggests the deficit cannot be inherent to autism – otherwise, autistic people interacting with other autistic people would be expected to show even greater social difficulty than an interaction between autistic and non-autistic adults. This observation that the communication impairment is a bidirectional issue and not solely on the side of autistic people is known as the double-empathy problem (Crompton et al., 2020; Milton, 2012). As a newer concept coined in 2012 (Milton), the double empathy problem literature is still developing. Therefore, its extension to particular types of interactions has been limited. In the present study, we intend to begin early exploration of whether this reciprocal communication breakdown could impede shared interpretations of sexual consent through self-reports, vignettes, and qualitative interviews.

When combining the potentially differing consent education experiences and communication styles between autistic and non-autistic students, there is a strong theoretical reason and some empirical evidence (Barnett & Maticka-Tyndale, 2015) suggesting that autistic and non-autistic adults may report different experiences with interpreting and conveying sexual consent/dissent. While autistic adults have qualitatively noted that they observe these sexual communication differences (Barnett & Maticka-Tyndale, 2015), research has been limited in this area, with no known direct comparisons of consent interpretation between autistic and non-autistic students.

The current research aims to improve understandings of neurodiverse conceptualizations and applications of consent through a mixed-methods, cross-sectional, in-person addition to the previously described research. The aims of this study are as follows:

Aim 1: To evaluate differences in perceptions of consent cues between autistic and non-autistic participants. <u>Hypothesis 1a:</u> Autistic participants will endorse lower estimates of consent following non-verbal behavioral cues from vignette characters than non-autistic participants. As additional nonverbal behavioral consent cues are provided in each vignette, non-autistic students are expected to rate characters as more likely to consent to sexual activities, such that the gap between autistic and non-autistic ratings of consent likelihood will widen. <u>Hypothesis 1b:</u> In both the in-person and online portions of the study (combined "2m2x" and "ACCS" data), autistic participants will be less likely to endorse an indirect behavioral approach to consent on the Sexual Consent Scale, Revised. <u>Hypothesis 1c:</u> In qualitative analysis, we expect that a theme of more rigid rules, such as always having sexual intercourse after a third date, will be present in autistic participants, but be less common in non-autistic participants.

Aim 2: To evaluate differences in sexual education and experiences with consent between autistic and non-autistic students. <u>Hypothesis 2a:</u> In both the in-person and online portions of the study (combined "2m2x" and "ACCS" data), autistic participants will endorse less satisfaction with sexual consent education and modeling (as measured via the Childhood Modeling of Consent Questions). <u>Hypothesis 2b:</u> Autistic students will be more likely to endorse a history of sexual abuse on the Childhood Trauma Questionnaire.

Methods

Participants

To further explore how perceptions of sexual consent cues may vary by autism status, we enrolled 55 participants (n=23 autistic adults, n=32 non-autistic adults; see *Table 9*) to participate in an in-person vignette study and interview. To hold generational similarity as constant as possible within our sample and increase generalizability to the college population, participants were required to be between the ages of 18 to 26-years old and all attended the same public university. They were recruited from previous participants in our lab's research and via student-wide email blasts and targeted advertising (e.g., through the university's Center for Neurodiversity; Neurodiversity Club on campus; Office of Disability Services). Participants were required to be able to understand and respond to verbal and written prompts in English. Similarly to "2m2x," we attempted to match demographics of autistic and non-autistic groups. As we enrolled autistic students, we attempted to enroll non-autistic students of a similar age and demographic background, prioritizing gender and sexual orientation when an exact match was not possible. Autistic participants were required to either self-report autism diagnosis (n=14) or self-identify as autistic and have an SRS-2 T-score above 65 (n=9), which represents the lower boundary of the moderate range of scores on this scale and heightened likelihood of autism. Non-autistic (n=32) participants reported both no prior history of autism diagnosis and an SRS-2 T-score below 65. Unlike "2m2x," participants were not required to be first-year students; however, we matched age across groups when possible.

Table 9

Demographics of Autistic and Non-Autistic Participant Groups in "ACCS"

	Autistic Sample n=23	Non-autistic Sample n=32	Group Differences
Age in years	Mean=20.8, SD=2.0 Range =18-25	Mean=20.3, SD=1.5, Range=18-24	$F(1,53)=1.20, p=.28$
Class year			
% First year	30.4%	18.8%	
% Sophomore	0.0%	31.3%	$X^2(1, N=55)=8.97, p=.03*$
% Junior	30.4%	25.0%	
% Senior	39.1%	25.0%	
Gender:			
% Men	26.1%	40.6%	
% Women	43.5%	50.0%	$X^2(2, N=55)=4.20, p=.12$
% Non-binary/other	30.4%	9.38%	
% Identifying as transgender	4.4%	6.3%	$X^2(1, N = 55)=.00, p =.99$
Race:			
% Asian	4.4%	15.6%	Asian: $X^2(1, N=55)=0.78, p=.38$
% Black	8.7%	12.5%	Black: $X^2(1, N=55)=0.00, p=.99$
% White	87.0%	59.4%	White: $X^2 (1, N=55)=3.70, p=.05$
% Other	4.4%	12.5%	Other: $X^2 (1, N=55)=0.32, p=.06$
Ethnicity:			
% Hispanic	21.7%	19.4%	$X^2 (1, N=54)=0.00, p=.99$

	Autistic Sample n=23	Non-autistic Sample n=32	Group Differences
Sexual Orientation:			
% Heterosexual	34.8%	43.8%	
% Asexual	13.0%	0.0%	
% Bisexual	34.8%	21.9%	
% Gay	4.4%	3.1%	$X^2=(1, N=55)<2.3, p>.10$ for all
% Lesbian	4.4%	9.4%	
% Pansexual	4.4%	9.4%	
% Queer	17.4%	9.4%	
% Other	8.7%	6.3%	

Note. The statistically significant difference in class year is largely driven by the difference in number of sophomores enrolled between the two groups, which is significant, $X^2(1, N=55)=10.00, p=0.002$.

Procedures

Potential participants were first asked to complete a brief eligibility screener through REDCap in which they provided their age, gender, sexual orientation, and relevant diagnostic history. They also completed the Social Responsiveness Scale, Second Edition (Constantino & Gruber, 2012). We used this screener to confirm eligibility and match participant groups, as previously described.

Participants came to the lab suite, where they met the student primary investigator and between zero and two research assistants, depending on day of visit. All visits except for one were led by the primary student investigator (due to scheduling constraints, one non-autistic student was interviewed by a post-baccalaureate research assistant who had observed dozens of prior participant visits). Informed consent was

collected; this included informing participants of the Certificate of Confidentiality that the study team secured from the National Institute of Health and its limitations. Participants were also asked to complete a Title IX waiver to prevent the study team from having an obligation to report to the Title IX Coordinator any unwanted sexual experiences that the participants may disclose during the course of their participation. Information was made available to all participants on reporting and finding support related to sexual and gender-based bullying, discrimination, harassment, and violence.

Participants read three vignettes describing sexual or romantic interactions, each split into 13 small segments. (These vignettes are described further in *Materials* and available in Appendix B). Order of vignettes was counterbalanced, such that the 6 distinct orders of stimulus presentation (ABC, ACB, BAC, BCA, CAB and CBA) were approximately equally used in both autistic and non-autistic participants, relative to their group sample sizes. In total, each stimulus presentation order was used 8-10 times (across 55 participants).

After each of the 13 segments, participants rated the likelihood of each character in the vignette consenting to making out, genital touching, oral sex, and penetrative sex on a 7-point Likert scale (1=*Definitely Not*, 7=*Definitely*). Each term was defined at the beginning of the vignettes. For example, making out was defined as "kissing sexually," and oral sex was defined as "sexual activity in which the genitals of one partner are stimulated by the mouth of the other." Following completion of the vignettes, the graduate student primary investigator engaged in a semi-structured interview with each participant. Participants answered several open-ended questions, such as "What made you think the characters were or were not interested in kissing and sexual activity?", "How do

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you usually figure out whether someone you're interacting with consents to sexual

activity?", and "Have you ever been in a situation where it was hard to tell what your

romantic or sexual partner was comfortable with? How did you work through that?" (see

Appendix B for additional questions). Participants then completed the Sexual Consent

Scale, Revised (Humphreys & Brousseau, 2010), and Childhood Modeling of Consent

Questions via REDCap on a lab computer. Participants were compensated with a $20 gift

card via ClinCard for their participation.

Measures

The vignettes given to in-person participants were modifications of vignettes

previously used in a latent growth curve analysis of 1,218 participants' perceptions of

consent (Willis & Jozkowski, 2022). Each vignette describes a similar scenario in which

two individuals go home together, start watching a movie, and eventually engage in

sexual intercourse. However, there are two key differences in these vignettes: the context

in which they meet and the use/acceptance of alcohol. The context in which they meet

varies in level of familiarity: in one vignette, the interaction describes two individuals

who had been friends for months, in another they had been on several dates previously,

and in a third they had just met that evening. The second category of vignette (several

previous dates) was not represented in the original research study that current

methodology is based on (Willis & Jozkowski, 2022). However, it was deemed to be a

useful addition due to committee member suggestion that some autistic young adults may

be more likely to endorse rigidity in purported societal "rules" or heuristics, such as 'after

3 dates, people have sex' (G. McQuaid, personal communication, September 29, 2022).

Use of alcohol is another key difference in the three vignettes: in one vignette one

character accepts a drink from the other character, in another they reject the offer of a drink, and in the third scenario both characters order their own drinks.

Rather than displaying a wide range of behaviors from enthusiastic consent to clear dissent, these vignettes were intentionally created to have substantial similarity in ambiguity. This was to allow researchers to a) make comparisons between differences in consent ratings after individual consent cues, with the majority of the vignette being held constant (for example, the role of alcohol can be evaluated in consent ratings, since most of the vignette is the same across conditions) and b) aggregate vignettes to compare trajectories of consent across populations of interest (such as autistic and non-autistic students), since there are the same number of consent cues and vignette segments in each vignette. In the case of the current research, each vignette had 13 segments at which participants were asked to rate likelihood of consent; in the original research each vignette had 11 segments, due to several cues being combined into one segment; see *Table 12*.

In the original research, all vignettes described interactions between a man ("Mike") and woman ("Kim") with gendered pronouns (Willis & Jozkowski, 2022). Due in part to the rich diversity in gender and sexual orientation within the autistic community in particular (George & Stokes, 2018a, 2018b), vignettes were modified to be gender-neutral, by using non-gendered names and avoiding singular pronoun use. Uncommon names were used and labeled as family nicknames, in order to avoid participants having a preconceived notion of the gender identities of individuals with those names. Participants were also instructed to try to relate to the characters, considering their own gender and that of their preferred partners as much as possible.

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Some research has suggested that the gender congruence of vignette characters and participants may not significantly affect results of vignette studies (Cohen et al., 2018; Visser et al., 2022). However, results on the importance of congruence in vignettes have been mixed, such that gender congruence may be influential for particular populations or in some circumstances such as when gender would be salient (Chen et al., 2017; Ooms et al., 2019). It might be reasonable to assume that gender is a relatively salient characteristic in a vignette surrounding romantic/sexual relationships. Furthermore, these vignettes were intended to reflect how the participants would assess/express consent in their own life, and therefore we hoped to make it possible for readers to impose their own identities on the characters easily. Facilitating ease of relation to self may be a particularly important consideration if it is believed that autistic individuals may have more difficulty relating emotionally to others – whether due to the now widely disputed (Chevallier et al., 2014; Fletcher-Watson & Bird, 2020; Milton, 2012) belief in theory of mind "deficits" (Baron-Cohen et al., 1985) or other explanations such as heightened exposure to trauma (Hume & Burgess, 2021) or co-occurring alexithymia (Brewer et al., 2015). All vignettes were reviewed by at least four lab members, including two undergraduate research assistants, to confirm that the changes to introduce gender-ambiguity did not significantly impede their readability.

The Sexual Consent Scale, Revised (SCS-R; Humphreys & Brousseau, 2010), Childhood Modeling of Consent Questions, Childhood Trauma Questionnaire (Bernstein et al., 2003), and Social Responsiveness Scale, Second Edition (Constantino & Gruber, 2012) completed by in-person participants were identical for participants in both "2m2x" and "ACCS" (see page 15 for details).

The SCS-R is a 39-item measure assessing attitudes and beliefs about sexual consent. Each of 6 subscales was used in the present study: *(lack of) perceived behavioral control*, *positive attitude toward establishing consent*, *indirect behavioral approach to consent*, *sexual consent norms*, and *awareness and discussion of consent*. The *(lack of) perceived behavioral control* subscale evaluates how easy (or difficult) an individual believes it would be to verbally ask for sexual consent, with items such as "I am worried that my partner might think I'm weird or strange if I asked for sexual consent before starting any sexual activity." Higher scores indicate greater *lack* of comfort verbally discussing consent, or greater estimated difficulty with consent conversations. In our combined sample, internal consistency was good (Cronbach α=0.82).

The *positive attitude towards establishing consent* subscale assesses a participants' belief in the importance of clear, communicated consent in a variety of sexual relationships, with items such as "I feel that verbally asking for sexual consent should occur before proceeding with any sexual activity." In our combined sample, internal consistency was good, Cronbach α=0.82.

The *indirect behavioral approach to consent* subscale assesses participants' tendency to use nonverbal, indirect indicators of consent. It includes items such as "Typically I communicate sexual consent to my partner using nonverbal signals and body language." Internal consistency was good, Cronbach α=0.81.

The *sexual consent norms* subscale assesses agreement that consent is more necessary in some contexts than others, through items such as "I that that obtaining sexual consent is more necessary in a new relationship than in a committed relationship." Items include a focus on consent being more necessary in new/casual relationships or

sexual contexts that include penetrative intercourse. Internal consistency was good, Cronbach α=0.82.

The *awareness and discussion of consent* subscale asks participants to rate agreement with items such as "I have heard sexual consent issues being discussed by other students on campus." It asks participants to rate agreement with exposure to conversations about sexual consent outside of sexual encounters. Internal consistency was questionable for this subscale in our sample, Cronbach α=0.64. (In the original validation sample for the measure, internal consistency was acceptable at α=0.71; Humphreys & Brousseau, 2010).

The Childhood Modeling of Consent Questions are 11 items created by our lab in conjunction with focus group of autistic adults, to assess how often participants were exposed to conversations about consent as children and how often consent was modeled by adults in their childhood through demonstrations of bodily autonomy. This measure asks participants to rate their agreement with a series of items on a 1-5 Likert Scale, with clarifying instructions including "Please note when we say consent, we mean the freely given verbal or non-verbal communication of a feeling of willingness to engage in an activity." Example items include "I was encouraged by my family/guardians to ask permission before hugging or touching other people (e.g., friends)" and "I was taught about consent during my K-12 education." Internal consistency for the CMCQ was good, Cronbach α=0.80. This scale also includes 2 items that seek to assess participants' *perceived* perpetrations of consent violations: "I have (intentionally or unintentionally) upset someone by touching them without permission" and "I have (intentionally or unintentionally) pushed someone to do something sexual that they were not comfortable

with." This perpetration subscale was created as a preliminary exploration of focus group feedback and some prior literature that suggests autistic people may be more likely to violate boundaries and engage in sexual-assault related behavior (Stokes et al., 2007; Weiss & Fardella, 2018).

The 28-item of the Childhood Trauma Questionnaire was used to assess for experiences of physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect (Bernstein et al., 2003). It uses a 5-point Likert scale (1=Never True, 5=Very Often True). In the present study, analyses focused on overall total CTQ score (Cronbach α=0.89 in our sample) and total sexual abuse score (Cronbach α=0.96).

Statistical Analyses

Latent growth curve modeling was used to model the pattern of change of perceptions of consent in the vignette characters across autistic and non-autistic participants, similarly to the analysis used in the original study that present methodology is based on (Willis & Jozkowski, 2022). Differences in growth trajectories were evaluated by autism status (both dichotomously and using a continuous measure of autistic traits, SRS-2 scores). While primary emphasis was on group-level differences between autistic and non-autistic participants' perceptions of consent, exploratory analyses were also conducted using general linear models and Tukey's HSD, including evaluating differences by gender and sexual orientation. We also assessed for differences in consent ratings across the three vignettes and the two characters in the vignettes.

Furthermore, relations between SCS-R *indirect behavioral approach to consent* subscale scores and vignette ratings of consent were assessed. This was viewed as an assessment of convergent validity, with the assumption that a more indirect style of

consent communication would be expected to correlate positively with higher rating of consent following nonverbal behaviors cues described by vignette characters.

Qualitative data from open-ended responses also was analyzed using thematic analysis (Braun & Clarke, 2006) in the online Delve system (Akujuobi & Zhang, 2017). We were particularly interested in themes relating to how individuals define and express sexual consent, expectations for when/how someone "should" consent, and difficulties or barriers in navigating consent/dissent. To support robust qualitative analysis (O'Connor & Joffe, 2020), each interview transcription was coded by a minimum of two researchers.

Each team member completed training via Delve's online tutorials. Transcripts were then created in Otter.ai and corrected by research assistants and the graduate student interviewer. The coders were instructed to take a hybrid inductive and deductive approach to coding, such that they coded participant comments that fall into the themes of interest, but also had the ability to add additional categories as needed through descriptive coding (e.g., identifying content such as specific consent cues participants observe) and process coding (e.g., noting actions that participants state they have taken to express or inquire about consent) (Ho, n.d.). Initial codes were created based on hypotheses prior to data collection (shown in *Table 10*). However, these codes were then revised iteratively as a team to better reflect the data. Categories that did not have sufficient evidence (i.e., minimal participant comments fell into these categories) were consolidated or eliminated. Updated codes, along with example quotations from transcripts, are shown in *Table 11*.

After the training process and discussing the coding framework, all coders independently coded the same five randomly selected transcripts. The coders then met

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and discussed any areas of disagreement or difficulty. After full agreement on all five transcripts was reached, the remaining interviews were approximately evenly and randomly divided, such that each transcript was independently coded by two people in Delve. Krippendorff's alpha was calculated as an initial assessment of agreement for each coded transcript. For all transcripts where initial agreement did not reach $\alpha > .80$, coders met and went over each code until full agreement was met. After all coding was completed, participants' key demographic information was added via the "participation information" function of Delve to increase the ease of investigating themes by group. All coders had the opportunity to contribute to interpretations of data. In a group meeting, all coders and transcribers were invited to share their interpretations and reactions to preliminary themes. The research team represented a range of identities, including lived experience of autism and minoritized sexual, gender, and racial/ethnic identities.

Finally, quantitative self-report data was combined across "2m2x" (the online study described in Chapter 1) and "ACCS" to assess for differences in consent-related beliefs on the SCS-R, satisfaction with childhood modeling of consent and sex education (CMCQ), and self-reported experiences of trauma and sexual abuse (CTQ) between autistic and non-autistic students. In all cases, we assessed differences both by dichotomous autism status and by SRS-2 scores as a continuous measure of autistic traits, using general linear models. In models of consent-related beliefs (SCS-R), we controlled for age and whether or not students reported having past sexual experiences.

Finally, we completed descriptive analyses of the CTQ in order to better understand the prevalence of sexual abuse in autistic and non-autistic groups. Prior research has created a cutoff score of 8 on the sexual abuse subscale as a tool to evaluate

the prevalence of sexual abuse within populations (Bernstein et al., 2003; Weitkämper et al., 2021). This allows for comparisons to be made, regarding how common sexual abuse-related concerns are in various populations and to make inferences on in which populations rates of abuse might be particularly elevated.

Table 10

Original Coding Framework for "ACCS" Qualitative Analysis.

Umbrella Category	Codes
How they see consent expressed by others	Verbal explicit ("must say yes")
	Verbal indirect ("hints")
	Indirect behavioral ("body language")
	Initiation of sexual behaviors
	Most important consent cue
How consent is expressed by them	Verbal explicit ("must say yes")
	Verbal indirect ("hints")
	Indirect behavioral ("body language")
	Initiation of sexual behaviors
	Most important consent cue

Umbrella Category	Codes
Rules of consent: Times consent is expected or assumed	After x number of dates
	If the people involved have had sex with each other previously
	If the people involved have had sex in general previously ("not virgins")
	Environments (if go home with them, if cuddle in bed, etc.)
	If the people involved have a labeled relationship, e.g., partners, girlfriend, boyfriend, etc.
Difficulties navigating consent/dissent	Barriers to understanding others' consent/dissent
	Barriers to expressing one's own consent/dissent
	Ease of consent process
	Discomfort/distress discussing consent in the moment
	Worry about disappointing partner, "letting someone down"
Miscellaneous	Other surprising/noteworthy findings not otherwise listed

Table 11

Updated Coding Framework for ACCS

Umbrella Category	Codes	Example from transcripts
Consent expression the participant sees/uses		
	Verbal explicit	*"I definitely ask."*
	Verbal indirect	*"Say something flirty? And if they don't seem weirded out, then maybe."*
	Indirect behavioral	*"If I was in the situation, body language would probably be a good thing to use."*
	Feelings/vibes/energies	*"If you feel that tension, then, obviously, something is up."*
	Initiation of sexual behavior	*"Just to see like, you can initiate something maybe like lay off, see how they react, see if they start initiating and take it from there."*
	Reciprocation of sexual behavior	*"Now we're kind of at a point where for like, kiss or something, one will lean in halfway, and then the other one will meet them."*
	Most important consent cue	*"You just have to ask… getting that verbal consent is the most important, because you'll never know unless you ask the person."*

Umbrella Category	Codes	Example from transcripts
"Rules" of consent: circumstance consent is highly likely/assumed OR is invalid	After x number of dates OR if labeled relationship	*"In the last one it said that they've been going out on a few dates already, so that was an indicator to me that they'd be more inclined to do stuff together"*
	If the people involved have had sex with each other previously	*"Well, if they've done it before [had intercourse with each other], and if they're okay with doing it before then they're probably likely to do all the other stuff."*
	If people involved have had sex in general previously ("not virgins")	*"I think that's a factor of deciding if this moment and this person is the right one, especially if you do keep your virginity to some kind of high standard."*
	Environments	*"...asking to go home with them and then saying, yes, that's also a sign."*
	Times consent is invalid (e.g., drinking)	*"There's a guy in a frat and this girl's extremely inebriated, and he takes her upstairs, like, at that point, there really is no – Who are you to judge the point of consent?"*
Difficulties navigating consent/dissent	Commentary of difficulty level/ease of consent process	*"I think I have a little bit harder time because I'm not the best at picking up cues cause I wasn't surrounded with kids as much as a child.*
	Personality traits or diagnostic features	*"It's difficult, because I'm a Pisces. We tend to be known as the emotional side"*
	Discomfort/distress verbally discussing consent in the moment	*"I guess they think it ruins the moment."*

Umbrella Category	Codes	Example from transcripts
Difficulties navigating consent/dissent (continued)	Worry about disappointing partner	*"But I wanted to make my partner happy."*
	Regret after sexual experiences	
	■ Effects of regretted sexual experiences	*"I'd close my eyes sometimes and envision it."*
	■ Coping with regretted sexual experiences	*"I think the thing that did it best [helped cope] was talking about it with my partner."*
	■ Length of time symptoms lasted	*"It happened in seventh grade and I still kind of think about it."*
Miscellaneous	Gender assumed of vignette characters	*"Eclipse was a female."*
	Discussion with partner about sexual expectations/experiences outside of consent expression	*"So I try to ask questions before and after, and then I think I'm just receptive to people saying they didn't like something."*

Results

Vignettes

Differences by Participant Characteristics.

Autism Status. In our growth curve model investigating the main and interaction effects of autism status, line of vignette, and consent ratings (while holding vignette constant), notable patterns emerged. There was a trend suggesting that autistic participants exhibited lower average consent rating scores compared to their non-autistic counterparts (β Difference: -0.31, *SE*=0.19, *t*=-1.66, *p*=0.05). Furthermore, a significant interaction effect was observed between line of vignette and autism status (β Interaction: 0.01, *SE*=0.005, *t*=1.97, *p*=0.02). This interaction underscores a differential growth trajectory in consent ratings over time for autistic and non-autistic individuals. Specifically, the positive growth trajectory of consent ratings was more pronounced among non-autistic participants, suggesting that the rate of increase over time is slightly greater for non-autistic participants compared to their autistic counterparts. This indicates that non-autistic students were endorsing confidence in characters' consent faster and with fewer cues. Means for each line of vignette by autism group are shown in *Table 12*.

We repeated the analyses considering continuous autistic traits instead of dichotomous autism status. We found significant main effect of autistic traits (β= 0.005, *SE*=0.003, *t*=1.82, *p*=.001). Additionally, the interaction effect between autistic traits, measured by SRS-2 scores, and time was significant (β= -0.001, *SE*=0.0001, *t*=-9.11, *p*<.001), with the gap in consent ratings widening between students with higher and lower SRS-2 scores in later vignette lines. This is visualized in *Figure 9.*

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Figure 9

The Relationship Between Line of Vignette and Rating of Likelihood of Consent for

Students With Low and High SRS-2 Scores
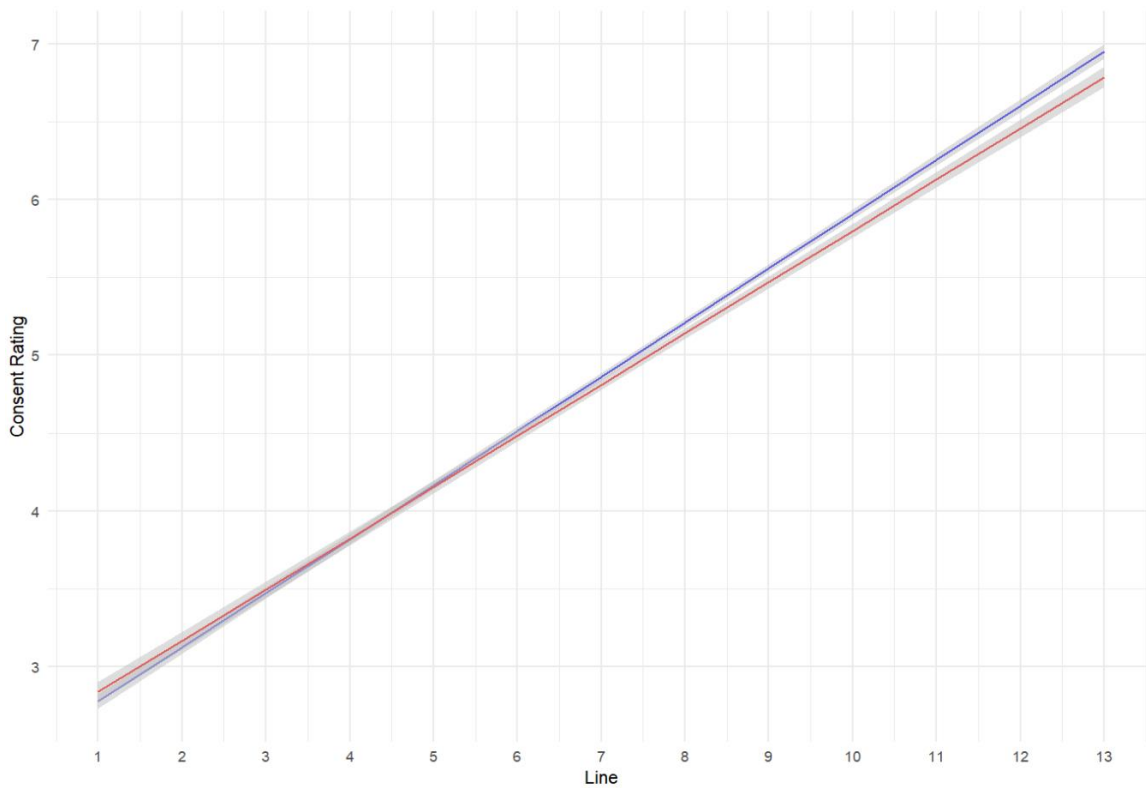
Note. "Low" and "high" SRS-2 scores in this figure are split at the SRS-2 T-scores equal

to 65, which represents the lower boundary of the moderate range of scores on this scale

and heightened likelihood of autism. The blue line represents participants with SRS-2 T-

scores below 65, suggesting lower likelihood of meeting criteria for autism. Red line

represents participants who are at or above this threshold.

Table 12

Average Consent Ratings by Line of Vignette Across Samples

Line	Consent Cue	Willis & Jozkowski, 2022 N= 1218		Current Sample N=55		Autistic subsample n=23		Non-autistic subsample n=32	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	Getting along	3.71	1.08	3.01	1.44	2.79	1.43	3.14	1.43
2	Alcohol presence or absence	*NA -- lines 1 and 2 were combined*		3.06	1.46	2.91	1.46	3.16	1.45
3	Flirtatious touching	4.30	1.06	3.33	1.49	3.19	1.51	3.43	1.47
4	Stated both are flirting	*NA -- lines 3 and 4 were combined*		3.85	1.53	3.74	1.56	3.92	1.50
5	Transition to private setting	4.82	1.06	4.24	1.56	4.05	1.61	4.34	1.52
6	Legs touching	4.92	1.02	4.40	1.58	4.21	1.60	4.52	1.57
7	Holding hands	5.14	0.96	4.52	1.54	4.33	1.54	4.66	1.53
8	Mutual making out	5.53	0.85	5.19	1.57	4.98	1.62	5.33	1.53
9	Removing shirts/Transition to bedroom	5.88	0.78	5.72	1.25	5.55	1.35	5.83	1.17
10	Removing pants	5.98	0.70	6.00	1.09	5.80	1.16	6.13	1.02
11	Butt lift for underwear removal	6.10	0.66	6.30	0.94	6.16	1.03	6.39	0.86
12	Oral-genital stimulation	6.28	0.54	6.57	0.82	6.49	0.90	6.62	0.75
13	Penetrative sex begins	6.39	0.51	6.77	0.62	6.73	0.61	6.80	0.63

Indirect Behavioral Approach to Consent. We evaluated how degree of endorsement of an indirect behavioral approach to consent (as indicated by continuous scores on the IBA subscale of the SCS-R) related to consent ratings across the vignettes. When evaluating a main effect of IBA scores on consent ratings, we found no significant effect (β=0.01, *SE*=0.01, *t*=0.95, *p*=0.34). We then evaluated for an interaction effect of

time and IBA on consent ratings, finding no significant effect (β =-0.0005, *SE*=0.0003, *t*=-1.531, *p*=0.13)

Differences by Vignette. We also assessed for differences between the three vignettes: Vignette A in which Fall and Blue have been friends for a few months, Vignette B in which Winter and Nal met for the first time, and Vignette C in which Bear and Eclipse have gone a few dates. (Vignettes are described further in *Materials.*) Compared to the reference level (Vignette A), participants tended to estimate the "just met" characters in Vignette B as having lower average consent ratings (β=-0.35, *t*=-7.67, *p*< .001), while "already dating" characters in Vignette C had higher average consent ratings (β = 0.71, *t*=15.71, *p*<.001). Additionally, interaction effects between vignette and line were observed. Participants showed a slightly steeper increase in consent ratings over time for characters in Vignette B compared to Vignette A (β= 0.04, *t*=7.47, *p*<.001), whereas characters in Vignette C exhibited a slightly shallower increase in consent ratings over time compared to Vignette A (β=-0.05, *t*=-8.87, *p*<.001; though, again, Vignette C consent ratings started from a higher point on average). See *Figure 10*.

Figure 10

Consent Ratings by Vignette
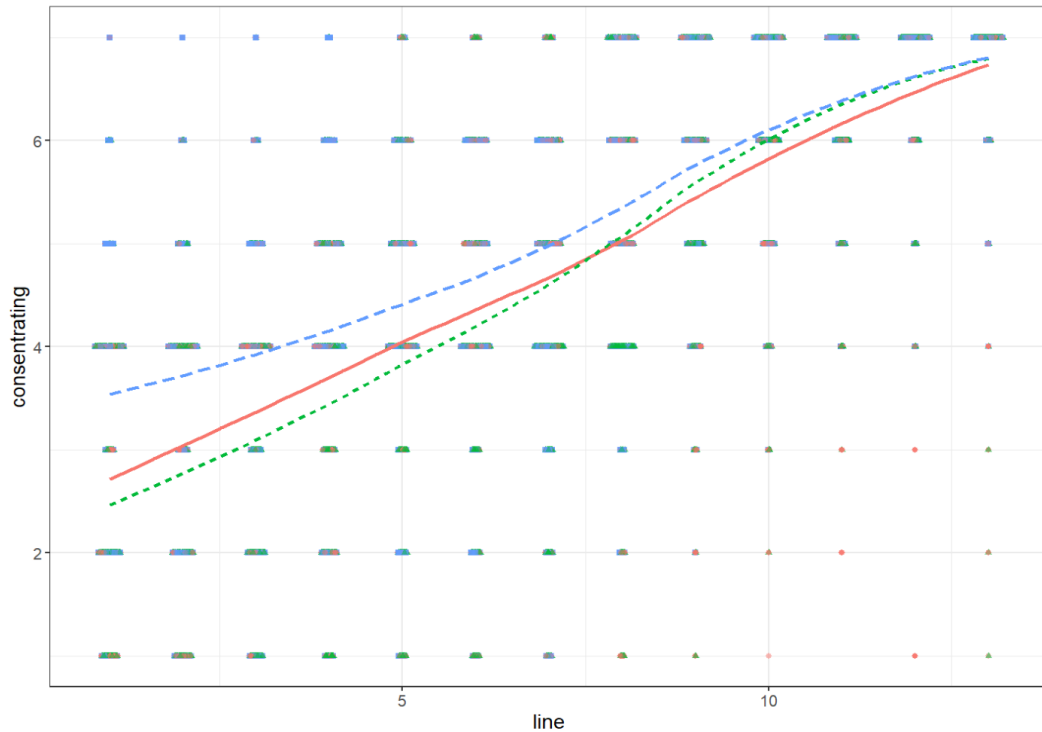
Note. Red line represents Vignette A (with long-time friend characters). Green line represents Vignette B (just met characters). Blue line represents Vignette C (few dates already).

In further analyses, we found that the difference by vignette varied by autism status. Using Vignette A as reference level, we found that the differences observed between Vignette A and B (β =0.22, t=2.38, p=0.02), as well as A and C (β=−0.20, t=−2.17, p=0.03), differed by autism status, such that the non-autistic sample tended to have greater differences in consent ratings by vignette. Furthermore, the difference in consent ratings between Vignette A and B were significant within the non-autistic group

B (β =0.07, t=2.61, p=0.02), but not the autistic group (β =0.03, t=0.87, p=0.66). Consent

ratings in each vignette by autism status are shown in *Figure 11*.

Figure 11

Consent Ratings by Vignette and Autism Status
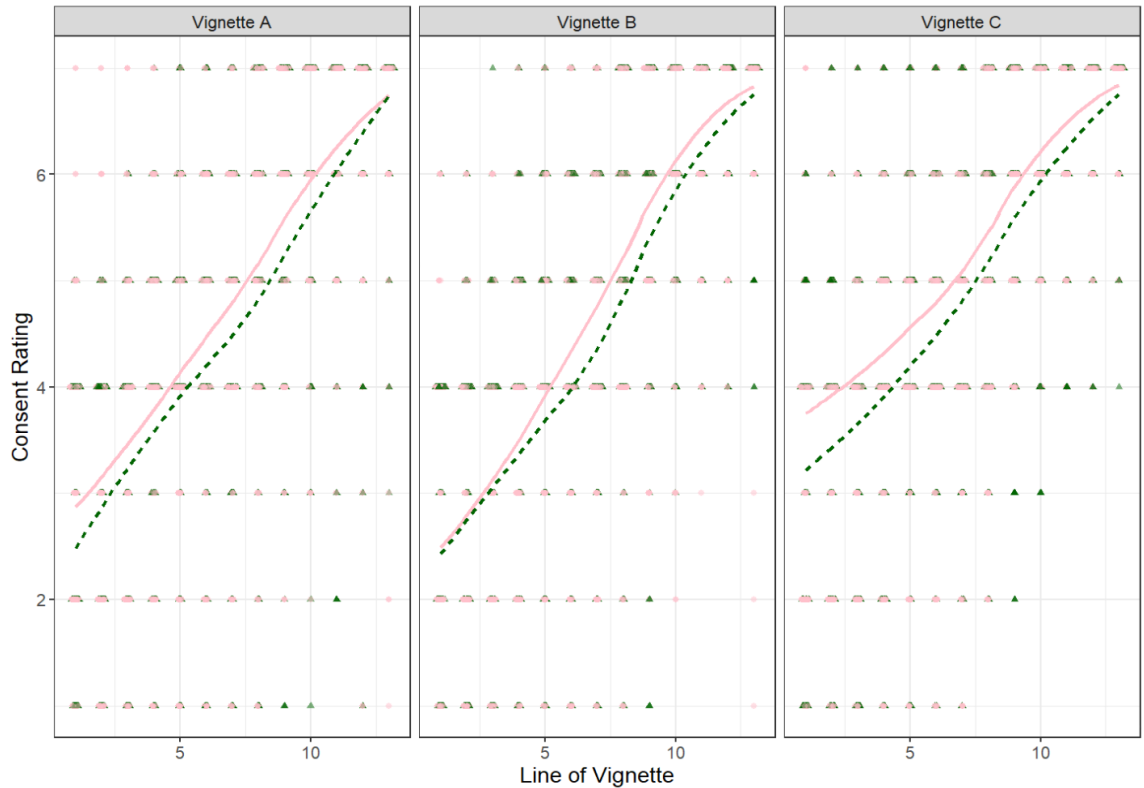
Note. Autistic students are shown in the dotted, green trend line. Non-autistic students are

shown in the solid, pink line.

Differences by Character. Holding constant the vignette and line number,

growth curve and post-hoc analyses revealed a significant difference in consent

likelihood between the two characters in each vignette. The first character named in each

vignette (the one who invited the other character to come home with them) was

associated with a higher estimated consent rating (β=0.11, *SE*=0.01, *t*=12.76, *p*< 0.0001),

indicating a greater likelihood of consenting to various sexual activities compared to the

second character. This did not appear to vary by autism status (β=−0.02, *SE*=0.08,

t=−0.28, *p*=0.78) or autistic traits (β=-0.0002, *SE*=0.0001, *t*=-1.15, *p*=0.25), as indicated

by non-significant interaction effects.

     As shown in *Figure 12,* below, the first character was often seen as male,

particularly in Vignettes A and C. We repeated this analysis looking only at Vignette B to

assess if an effect of character persisted. Statistical analysis revealed that the first

character (in this case, Winter) maintained significantly higher average consent ratings

than the second character (Nal), with an estimated difference of 0.29 (*SE*=0.03, *t*=9.61,

p<.0001), within the context of Vignette B.

Figure 12

Participant-Assigned Gender of Vignette Characters
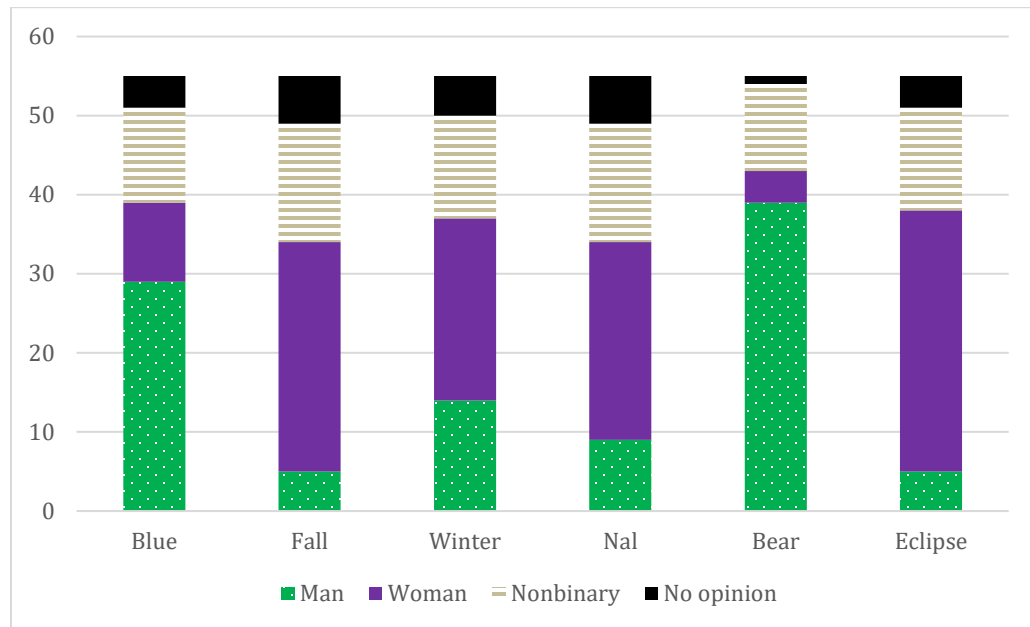
Types of Consent. Different sexual acts were perceived to carry varying likelihoods of consent. Post-hoc analyses, adjusted for multiple testing using the False Discovery Rate method, revealed significant differences in participants' estimations of consent likelihoods across various sexual activities when compared to consent to genital touching, which served as the reference point. Specifically, participants were more inclined to estimate characters would consent to making out (β=0.93, $p<$ .0001) but less likely to consent to oral (β= -0.32, $p<$ .0001) or penetrative (β=-0.59, $p<$ .0001) sexual activities. Furthermore, interaction effects indicated time-related variations, notably for making out (β=-0.068, *SE*=0.01, *t*=-11.59). This interaction reveals a steeper slope in the likelihood of characters consenting to "making out" compared to other sexual activities, as depicted in *Figure 13*.

Figure 13

Estimations of Likelihood of Characters Consenting to Various Sexual Activities
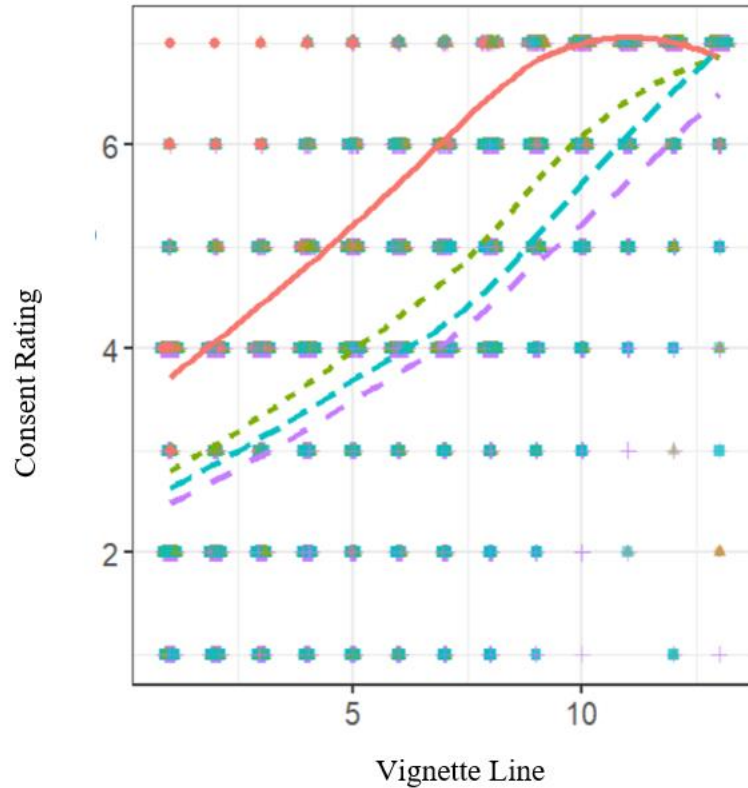
Note. Pink represents making out. Green represents genital touching. Teal indicates oral

sex. Purple indicates penetrative sex. Consent ratings were measured via 1-7 Likert scale.

Furthermore, an interaction effect of autism status was observed (β=0.05,

SE=0.03, *t*=1.86, *p*< 0.001), such that autistic participants saw consent ratings as differing

slightly *more* by type of sexual activity than non-autistic students did. Specifically,

autistic students showed a positive coefficient for the interaction term, suggesting that

they perceived a greater difference in consent ratings across different types of sexual

activities. Conversely, non-autistic students exhibited a negative coefficient, indicating a

comparatively slightly lesser variation in consent ratings based on the type of sexual

activity. A similar pattern was observed by autistic traits (β=0.02, *SE*=0.0004, *t*=4.56, *p*< 0.001). Higher levels of autistic traits were associated with a slightly greater perceived difference in consent ratings across sexual activities. A linear model of this is depicted in *Figure 14*.

Figure 14

Consent Ratings by Type of Consent and SRS-2 Scores
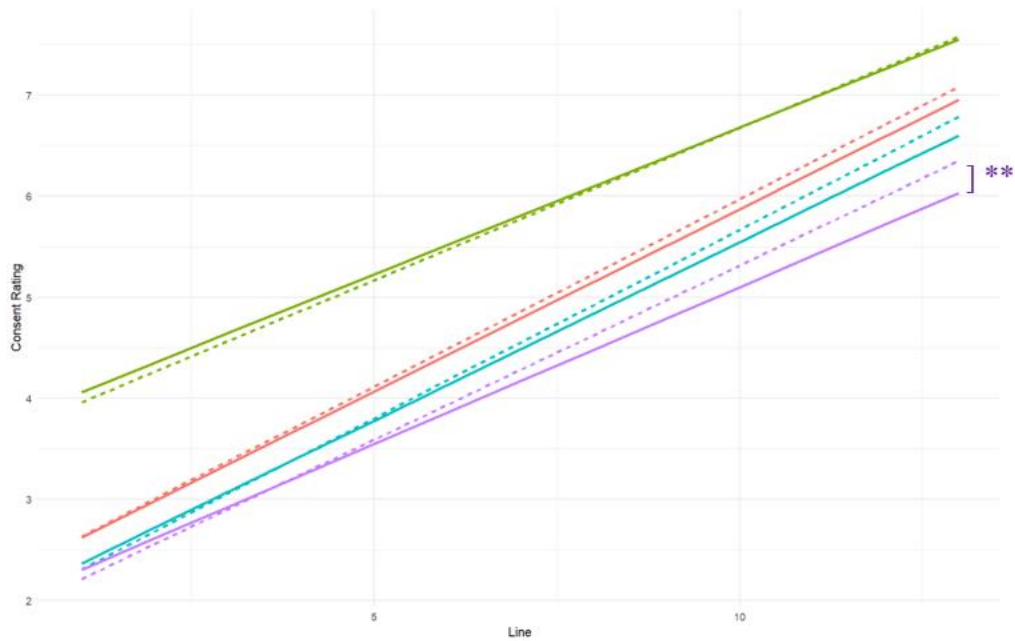
Note. Green represents making out. Pink represents genital touching. Teal indicates oral sex. Purple indicates penetrative sex. Dotted line represents participants with low SRS-2 scores (equivalent to below a T-score of 65). Solid line represents participants with SRS-2 scores equivalent to a T-score of 65 or above. Differences by SRS scores within types of consent are shown – when looking at individual sexual acts, differences by SRS-2 were only statistically significant for penetrative sex, p=.004.

Exploratory Analyses. Finally, we undertook exploratory analyses of how average consent rating varies by participant demographics. Due to exploratory nature of these analyses and repeated-measure design of the study, we limited analyses to only looking at Vignette A and penetrative sex. In each case, we controlled for autism status and randomization group to account for variation in these two factors among

demographics variables. These results are shown in *Table 13*. Notably, there were very few differences of primary and ultimate consent ratings by demographic groups. Post-hoc Tukey's HSD indicated that men had significantly lower consent ratings than women ($p=.02$) and nonbinary/other participants ($p=.04$). Differences between women and nonbinary participants were not significant ($p=.94$).

Table 13

Penetrative Consent Ratings of Vignette 1 (Lines 1 and 13) by Gender, Class Year, and Sexual Orientation

Variable	Consent Rating at Line 1 Mean *(SD)* Range	Group Differences in Consent Ratings	Consent Rating at Line 13 *Mean* (SD) Range	Group Differences in Consent Ratings
Gender				
Men	2.00(*1.21)* 1-4		6.47(*1.13*) *1-7*	
Women	2.69(*1.07*) 1-4	$F(3, 106)=7.90$, $p=$ .006**, $r^2 = 0.07$	6.73(*0.49*) 5-7	$F(3, 106)=0.07$, $p=0.79$, $r^2=0.02$
Nonbinary/other	2.80(*1.36*) 1-4		6.30(*1.22*) 3-7	
Class Year				
1 ("Freshman")	2.31(*1.41*) 1-4		6.38(*1.10*) 3-7	
2 ("Sophomore")	3.00(*1.12*) 1-4	$F(3, 106)=0.46$, $p=0.50$, $r^2=0.02$	6.85(*0.37*) 6-7	$F(3, 106)=0.02$, $p=0.89$, $r^2=0.02$
3 ("Junior")	2.53(*1.14*) 1-4		6.70(*0.53*) 5-7	
4+ ("Senior")	2.23(*1.13*) 1-4		6.41(*1.18*) 1-7	
Sexual Orientation				
Heterosexual	2.23(*1.24*) 1-4	$F(3, 106)=3.03$, $p=0.08$, $r^2=0.02$	6.64(*0.62*) 4-7	$F(3, 106)=0.79$, $p=0.38$, $r^2=0.01$
LGBQ+	2.64(*1.18*) 1-4		6.50(*1.08*) 1-7	

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Qualitative Analyses

In the initial proposal, qualitative exploration focused on type of consent cues used by autistic and non-autistic students, with the hypothesis that we would see a stronger theme of explicit verbal consent in autistic students. Additionally, we aimed to explore hypotheses that autistic students may rely on somewhat more rigid rules that may not be as often suggested by non-autistic students. These and related themes are evaluated and discussed below.

Consent Cues.

Verbal Explicit Consent. Across both autistic and non-autistic participants, there was a strong theme of a preference for verbal explicit consent cues. While many participants identified using multiple sources to assess consent – for example, evaluating for both verbal statements and any behavioral signs of hesitancy – the vast majority of participants identified that verbal explicit consent was one of the consent cues they would rely on, and in 30 out of 55 transcripts (including n=15 out of 23 autistic) it was identified as the most important consent cue. Often, this was expressed as a way to avoid ambiguity that could result in harm. Quotes such as the following illustrate these views:

> "Well, I think a lot of people right now, in our day and age are like, Oh, intimacy, you know, I don't want to have to break the intimacy. I don't want to ruin the vibe by asking them. Well, it's like, you're gonna ruin the vibe if you don't ask" (Non-autistic cisgender man, age 21).

> "I have trouble with body language. So I have set the policy and for both of my first kisses there's been an exchange of 'can I?' 'yes'" (Autistic non-binary person, age 20).

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"I'm a big communicator, I don't care if it would kill the mood. I'm

going to use my words if I'm unsure, even in the slightest" (Non-

autistic non-binary person, age 19).

"I do really like talking about it [consent] with a partner. It makes me

like feel really cared for and I would want them to feel the same way"

(Non-autistic, cisgender woman, age 22).

Thus, we saw both autistic and non-autistic students tending to prefer explicit verbal consent. Although, there may be some differences in their rationale – autistic students often expressed feeling unable to "*read body language,*" whereas the verbiage in non-autistic students was often softer, indicating a preference rather than lack of ability.

Interestingly, there was also a subtheme in which many participants expressed that they "knew" others were not as comfortable with verbally discussing consent, even though it was their preference. Only one participant specified any preference against verbal consent, which she associated with feeling introverted and unable to "*communicate face-to-face,*" at least in terms of initiating consent discussions. Most participants indicated integrating data from multiple types of consent cues – such as also interpreting body language or "vibes" to assess enthusiasm – but indicated that verbal consent was important to them in some or all contexts. This subtheme in which individuals reported prioritizing explicit verbal consent but feeling that others did not share that prioritization is discussed in greater detail in a forthcoming paper (McKenney et al., under review).

Use of "Rules." We had hypothesized that autistic students may be more likely to cite using metrics or heuristics that they learned through media or other sources to

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evaluate consent. For example, we anticipated that some students would report assuming consent was likely, if not definite, after a certain number of dates. Although both groups indicated (both through vignette consent ratings and qualitative data) that likelihood of consent increased if people were in a relationship with one another, specific heuristics of assuming consent if people had been on a number of dates or other more rigid rules were not mentioned in either group. However, other themes related to familiarity and prior experiences were common. For example, both autistic and non-autistic participants reflected that they saw characters as more likely to consent if the characters had been dating or if people had sex with each other previously. Additionally, we saw two different interpretations of how alcohol use affected the consent.

In Vignettes A and C, it was described that both characters were drinking alcohol, with no mention of quantity. In Vignette B, one character declined a drink from the other, and it is ambiguous whether either character is drinking. Both autistic and non-autistic students were likely to note that alcohol did play a role in their estimations of consent in the vignettes. A total of 17 participants out of 55 (n= 9 out of 23 autistic) noted that alcohol consumption may be a reason consent is invalid or not possible; for example, if the character was drinking "too much." Participants expressed that they may refrain from sexual activity with a partner who was drinking alcohol, due to consent concerns. This theme was true in both autistic and non-autistic students; however, autistic students often expressed stronger rules on not engaging in sexual activity when alcohol was involved. Whereas non-autistic students more often indicated it was important to *assess* the level of alcohol intoxication, autistic students tended to suggest a higher degree of caution across

all levels of alcohol. Examples of participants describing their level of caution are shown

through the following:

"Thinking about them drinking alcohol and potentially being

impaired…if I were with someone that was obviously drunk, and we

hadn't already done stuff before, I would say hell no, not while you're

drunk. You can't consent while you're drunk…. I'm not sure how I feel

about them having one drink. I mean, one drink an hour ago, that would

be out of their system based on the numbers they gave us in health

class, but if they were on the edge of tipsy or something, I'm not sure

what I would do" (Autistic, non-binary person, age 20).

"I tend to stay away from that stuff [alcohol] for a reason… it's not my

cup of tea, which is what kind of deterred me from, seeing 'Okay, well,

who's really drunk? And who's just a little drunk? Who's not drunk at

all?'…I like to avoid these types of things [having sex with people who

are drinking alcohol at all]" (Autistic, cisgender man, age 21).

"Definitely don't make any decisions after you've been drinking"

(Autistic, cisgender woman, age 18).

"If they're drinking too much, then they can't really consent. But, if

they're not actually trashed, they're just only having a little

bit…[they're okay to consent]." (Non-autistic, cisgender man, age 18).

On the other hand, there was also a theme, where 9 participants (n=3 autistic)

suggested alcohol consumption was an indication that the person who was drinking may

feel more comfortable with the other person, even to the point of potentially being *more likely* to consent. This was often described as being due to both the social signaling of accepting a drink, as well as reduced inhibitions. This is exemplified through quotes such as the following:

> "When you're under the influence you're going to consent faster but if they weren't under the influence, it's probably not going to happen" (Non-autistic, cisgender woman, age 22).

> "One of the stories, one of the partners would refuse a drink. I would take that as a step back. Like if I was thinking of starting at a neutral position, if someone is more inclined to drink that, to me, is a sign that they're more comfortable with the person that they're around" (Non-autistic cisgender woman, age 19).

> "Personally in this day and age, I'm terrified of accepting drinks from strangers. So, I don't do that...but I do realize that drinks are sometimes a bonding factor - like when they said cheers, I felt like that was a moment for them. Like, oh, - this is cute" (Non-autistic, cisgender woman, age 21).

> "They didn't…take the drinks. So, I think from that beginning, there was not that consensual feeling" (Autistic, cisgender man, age 22).

Difficulties of the Consent Process. Many autistic and non-autistic participants expressed that they found navigating consent to be relatively easy. In many cases, this

was associated with the use of explicit verbal consent, as depicted in the following quotes:

> "I think because I have a tendency just to always ask verbally, it's a bit easier"(Non-autistic, cisgender man, age 20).

> "I think it's easy as you make it. I think the more open you are about what was going to happen, the better it is" (Autistic, cisgender man, age 21).

However, there were several common barriers to consent noted, across both groups, even for participants who stated they were relatively comfortable with navigating sexual consent.

Challenges to Assessing Others' Consent. Participants noted many challenges to assessing others' consent, that usually were "dependent on the person" (according to n=17 participants) that they were interacting with. These concerns often related to 1) individual person differences, such as personality and comfort discussing sex, and 2) how well they know a person.

Participants noted that use of behavioral or indirect verbal cues of consent could be challenging. This particularly was seen as an issue in cases where the partners did not know each other well or when someone has a personality that is seen as more "flirty" without it being their intention.

> "All the touching of the arm and smiling, whatever -- Sometimes people are just naturally very touchy...It more depends on the person

because like I said, certain people are just very friendly, very flirtatious, and they don't mean to be" (Non-autistic, cisgender man, age 20).

"I think at first it's hard. Just because there's so many different personality types. And some people are, I guess flirty but, they're just friendly. But some people take it the wrong way. I think it's hard, especially if you're attracted to someone, and then they're especially friendly, because then you can take it a certain way" (Non-autistic, cisgender man, age 20).

In a similar way, 2 autistic participants stated their actions have been or may be likely to be misinterpreted as flirty.

"I like to hug people, you know, but I sort of realized that maybe it means different things to other people, especially in a autism versus neurotypical setting. To me, touching is innocent. To somebody else maybe it suggests more. And I could even potentially see myself getting in trouble with that" (Autistic, cisgender man, age 23).

"I was outside with someone, and they were visibly cold. And I was like, "do you want to continue somewhere warmer?" And they're like, "on the first date??" and I was like, "huh? Oh, sure, but you just looked cold." …it's like, every time I've implied something I didn't mean to. And then I realized I extended the invitation after I extended it" (Autistic, cisgender woman, age 21).

Challenges to Establishing One's Own Desire to Consent. Additionally, participants noted difficulties assessing what they themselves would be comfortable consenting to at times. A tension came to light between what participants wanted from others and what they felt confident in expressing themselves. When describing the consent they sought from others, participants commonly used words like "*enthusiastic*," specific, and including a sense of "*total certainty.*" The term "*enthusiastic consent*" was referenced in 7 different interviews. At the same time, participants themselves noted that they may not be sure what they were comfortable doing with a partner until they "*try it*." For example, one participant described that they are looking for an "*enthusiastic yes*" from their partner, noting:

> "It's really difficult when you're with some people, like for example,
>
> my boyfriend, it's a lot of me asking, 'Is this, okay?' And he says like,
>
> 'I'm okay with it.' And I'm like, 'okay, that doesn't sound enthusiastic.
>
> That doesn't sound like you want this.' And he's like, 'No, I mean it.
>
> Yeah, it's okay.' And I'm like, 'yes or no.' Like, that enthusiasm….is
>
> something that I want" (Non-autistic, nonbinary person age 18).

And at the same time, this participant noted relating to their partner's ambivalence and feeling uncertain about how to go about deciding what oneself is ready to consent to:

> "In terms of figuring out what you want, I'm not entirely sure because, I
>
> was thinking at first, 'obviously, you would just know. You know what
>
> you want.' But I know from personal experience that I don't know.

Because a lot can change both over time and experimentally. So, I think

that a lot of it does have to do with experimenting and figuring out

what feels good, what feels bad."

Another participant explained how they see the goal as being "*internally knowing what*

you're comfortable with and what your boundaries are," but noted that this is often

difficult to do:

"Because sometimes you think you're okay with something in theory,

but then when it happens, in reality, you're not comfortable with it at

all. And that happens all the time…. Because in your mind, that's an

idealized version, and then reality, that's reality" (Autistic, cisgender

woman, age 18).

Out of the 31 interviews where this topic of how to assess one's own consent was

discussed, 20 participants (n=8 autistic) expressed challenges determining their own level

of desire to consent. Often they expressed feeling ambivalence, noting their process of

deciding what they consent to has been "*trial and error*" (Non-autistic, cisgender man,

age 24). In comparison, 9 participants (n=3 autistic) expressed a level of confidence in

determining what they are comfortable consenting to. This was usually associated with

being "*introspective,*" "*in tune*" with their body, or having set rules they always follow

(whether due to religious values or length of time in relationship, etc.). Additionally, 2

participants (n=1 autistic) reported that they do not think about their own consent, stating

"*I've never cared about that*" (autistic, 21-year-old, cisgender man) and "*This is*

probably bad, but I usually avoid how I'm feeling just to not kill the vibe and just get it

over with" (non-autistic, 22-year-old, cisgender woman).

Distressing or Unwanted Sexual Experiences. Both autistic and non-autistic participants reported experiencing sexual experiences that were unwanted, distressing, or regretted. There was substantial overlap in the experiences of these two groups – participants on both sides reported a wide range of experiences that they felt negatively affected them for various periods of times, ranging from minutes to years.

Additionally, 5 autistic participants and 1 non-autistic student reported not realizing that their experience was nonconsensual or negatively affected them until weeks to years later. Although both autistic and non-autistic students described distressing or regretted sexual experiences, this theme of a more delayed timeframe until realizing an experience was nonconsensual, following information from an outside source, was notably more common among autistic participants, and only once observed in qualitative reports by non-autistic participants.

For example, one autistic participant explained not realizing that she would classify her experience as nonconsensual until almost a year later, when she watched a video about sexual consent in school:

> "I didn't immediately realize what had happened. It took me a couple
> months, like almost a year, to sort of realize that it had not been
> consensual. Because I kind of froze. That's also why I think it's
> important to check in and verbally say stuff, because sometimes people
> freeze… for my health class, we had to do sexual assault education.
> And then it kind of made some things fall into place…it was the
> consent is like a cup of tea video [that made it fall into place]"
> (Autistic, cisgender woman, age 18).

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Another participant similarly stated that she realized an experience was non-consensual in a high school sex education lesson.

> "I didn't realize it until like, a year later… it was my gym teacher being like, "this isn't consent." And I was like, "oh! okay" (Autistic, cisgender woman, age 18).

Other autistic students described not conceptualizing their experiences as violations of consent, until discussing them with friends months or years later:

> "And like he would do stuff in my sleep, and at the time I was just like, 'Oh my god, he's so goofy'…I didn't realize how bad it was until my friends told me. They were like, 'That's bad'" (Autistic, non-binary person, age 25).

> "Afterwards, I was just like, I don't know how I really felt about that. You know, like, I said yes. But in my mind, I was like, I don't know if that's how I really felt. And that's definitely been something that I kind of struggled with, but now….talking about it with my friends and stuff. I'm like, 'Yeah, I definitely did not feel comfortable in that situation.' My mind tried to convince me like, 'oh, you know, you did,' but now I've definitely made my peace. And I'm like, 'No, I definitely did not'…. it took a lot for me to come to terms with it" (Autistic, non-binary person, age 20).

> "One time I was talking to my ex about an encounter that I had, and she was like, 'you know that you got assaulted, right?' And I was like,

'What are you talking about?' And she was like, 'you said no. And then

they did it anyway'…I've heard that a lot from people that something

traumatic happens, and they don't realize it until a lot of time later…it

happened when I was 17 and I realized it [that it was assault] this year."

(Autistic, cisgender man, age 21).

Across both groups, coping strategies following distressing sexual experiences

varied, with the most common mentioned being seeking social support (n=13).

Self-Report Measures: Experiences and Beliefs Related to Consent

In our combined sample of self-report measures from studies described in both

Chapter 1 ("2m2x") and Chapter 2 ("ACCS"), we assessed perceptions of consent,

satisfaction with childhood sexual education and modeling of consent, and for prior

history of trauma, including sexual abuse.

Sexual Consent Scale, Revised.

Lack of Perceived Behavioral Control. We assessed for differences in the *(lack*

of) perceived behavioral control subscale of the SCS-R between autistic and non-autistic

participants. As noted previously, this subscale evaluates how difficult an individual

believes it is to verbally ask for sexual consent, with items such as "I am worried that my

partner might think I'm weird or strange if I asked for sexual consent before starting any

sexual activity." In our combined 2m2x and ACCS sample, students in the autistic group

reported a greater lack of perceived behavioral control (M=28.50, SD=12.36) than non-

autistic students (M=23.46, SD=12.31) after controlling for age and whether or not

students reported having past sexual experiences, $F(1, 270)$=12.11, p=.0006, r^2=0.05).

This finding indicates that autistic students reported feeling less comfortable verbally

discussing consent with sexual partners. The same relationship was observed by our continuous measure of autistic traits; higher SRS-2 scores were associated with greater lack of perceived behavioral control, $F(1, 270)=16.93$, $p<.0001$, $r^2=0.06$.

Positive Attitude Towards Establishing Consent. No significant differences were found between autistic ($M=68.69$, $SD=9.21$) and non-autistic ($M=69.84$, $SD=8.30$) participants in positive attitudes towards establishing consent, $F(1, 270)=1.12$, $p=.29$, $r^2=0.01$. Similarly, no significant differences by SRS-2 scores were found, $F(1, 270)=12.43$, $p=.69$, $r^2=0.01$.

Indirect Behavioral Approach to Consent. We then assessed for differences in self-reported use of an indirect behavioral approach (e.g., body language, nonverbal signals) to navigating sexual consent. No significant differences were found in endorsement of an indirect behavioral approach to consent by autism status, $F(1, 270)=2.14$, $p=.14$, $r^2=0.07$ (autistic: $M=21.75$, $SD=7.23$; non-autistic: $M=22.87$, $SD=8.02$). Differences by SRS-2 scores were also non-significant, $F(1, 270)=3.42$, $p=.07$, $r^2=0.07$.

Sexual Consent Norms. We assessed for differences in scores on the _sexual consent norms_ subscale by autism status. This subscale assesses agreement with items related to consent being most necessary in new or casual sexual relationships or for penetrative sex. Differences by autism status ($F(1, 270)=0.64$, $p=.42$, $r^2=0.004$; autistic: $M=27.15$, $SD=8.12$; non-autistic: $M=27.81$, $SD=8.26$) and SRS-2 scores were not found to be significant, $F(1, 270)=1.03$, $p=.31$, $r^2=0.002$.

Awareness and Discussion of Consent. We assessed for differences in the extent to which autistic and non-autistic students report having had conversations about sexual

consent with partners, peers, or friends outside of a sexual encounter. There were no significant differences found between autistic (M=18.60, SD=5.17) and non-autistic participants (M=18.14, SD=5.34), $F(1, 270)$=0.49, p=.48, r=0.03, indicating that both groups are similarly likely to encounter conversation about consent issues in their social settings (at least at this point in time, as college students). Similarly, significant differences by SRS-2 scores were not found, $F(1, 270)$=.03, p=.86, r=0.03.

Childhood Modeling of Consent Questions

In our combined 2m2x and ACCS sample, students in the autistic group (M=26.92, SD=6.62) reported less satisfaction with consent education and modeling in childhood than those in the non-autistic group (M=31.74, SD=7.23), as indicated by lower CMCQ scores, $F(1, 273)$=31.67, p<.0001, r=0.10. Similarly, SRS-2 scores (autistic traits) were negatively related to CMCQ scores, $F(1, 273)$=56.82, p<.0001, r=0.19.

We also assessed for differences in endorsed perpetration of violations of consent. Autistic students (M=3.93, SD=1.75) reported higher feelings of having perpetrated violations of others' consent than non-autistic students (M=3.29, SD=1.63), $F(1, 273)$=9.86, p=.002, r=0.03. Similarly, SRS-2 scores and self-reports of potential perpetration were positively related, $F(1, 273)$=15.01, p=.0001, r=0.05.

Childhood Trauma Questionnaire

Participants in the dichotomous autistic group (M=51.09, SD=17.06) reported significantly higher CTQ scores than those in the non-autistic group (M=39.97, SD=14.47), $F(1, 268)$=33.55, p<.0001, r=0.11. Higher SRS-2 scores were also associated with higher total scores on the CTQ, $F(1, 268)$=52.65, p<.0001, r=0.16.

When looking specifically at the sexual abuse subscale on the CTQ, a similar pattern was observed, although with smaller effect sizes. Participants in the dichotomous autistic group (M=7.61, SD=4.87) reported higher ratings of sexual abuse than non-autistic participants (M=6.45, SD=4.06), $F(1, 270)$=4.52, p=.03, r^2=0.01. Students with higher SRS-2 scores reported higher sexual abuse scores, $F(1, 270)$=12.67, p<.0001, r^2=0.04.

Given that the CTQ sexual abuse score has also been used to assess prevalence of sexual abuse in specific populations, through a cutoff score of 8 (Bernstein et al., 2003; Weitkämper et al., 2021), we also conducted an exploratory descriptive analysis to assess the percentage of autistic participants who would meet this cutoff. We found that 29.23% of our autistic sample and 16.20% of our non-autistic sample would meet the criteria of having experienced sexual abuse, using this threshold.

Discussion

Prior literature has suggested that autistic students may feel less confident in their abilities to navigate sexual consent, potentially due to differences in social communication norms and lack of high-quality sexual education for neurodivergent students. Our current findings suggest that both autistic and non-autistic students are likely to highly value consent, including explicit verbal consent. Additionally, there is some evidence autistic young adults may be less confident in evaluating others' likelihood of consent and feel less confident in navigating sexual consent conversations verbally compared to their non-autistic peers -- although autistic participants still highly value these conversations and qualitatively report experiencing them as important, even when challenging. Autistic students also reported elevated rates of childhood trauma,

sexual abuse, and unsatisfying education around consent. Further research is needed to bridge these gaps and find ways to improve sexual education experiences for all students.

Consent Ratings in Vignettes

We had hypothesized that autistic students would tend to rate the likelihood of vignettes characters consenting to various sexual activities as lower than non-autistic students would. In addition, we hypothesized that these gaps in ratings would get larger as vignettes provided subsequent, primarily nonverbal, information about characters' interactions. These hypotheses were largely supported. The main effect of autism status on consent ratings was at trend-level significance, such that autistic students did appear to rate characters as slightly less likely to consent, compared to their non-autistic peers. Further, a significant interaction effect by cohort was observed, indicating support for the hypothesis that this gap in ratings would widen over time as nonverbal indicators of consent accumulated. Furthermore, main and interaction effects of autistic traits were both significant.

However, it is unclear whether the change in consent ratings is meaningfully related to non-autistic individuals' tendency to rely on or comfort with indirect behavioral approaches to consent, as we had initially conceptualized. Contrary to hypotheses, scores on the *indirect behavioral approach to consent* subscale of the SCS-R (which indicates participants' tendency to use nonverbal, indirect indicators of consent, such as "body language") were not significantly related to vignette consent ratings.

This lack of relationship between *indirect behavioral approach* subscale scores and vignette ratings could be due to a number of reasons. For example, perhaps students were more fully capturing their *own* opinions and use of consent cues on survey

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measures, whereas they were trying to assess how *others* would act in the vignettes. Anecdotally, many participants reported trying to put themselves "*into the shoes*" of characters, with some going as far to note that they were trying to imagine what "*normal people*" would extrapolate, particularly if they lacked casual sexual experience. Although the current participants did have instructions to try to relate to the characters and imagine characters' genders as applicable to their own experience, it may be beneficial to conduct a conceptual replication in which one of the characters' perspectives is written in the second-person. This may help researchers to further assess if relating to a character affects results.

It is additionally possible that students are poor historians on the self-report measure and tend to inaccurately estimate how much they notice and use body language in sexual interactions, particularly if they have not had extensive sexual experience. Finally, it may be relevant that vignettes *verbally* described nonverbal body language – for example, Vignette A stated, "Fall touches Blue's arm while laughing at Blue's joke." It's possible that this explicit statement of the behaviors meant that the majority of students, regardless of everyday comfort with nonverbal communication, would perceive the cues as important and note them. Written sentences like these may have served as an inadvertent signal to participants that they should adjust their consent ratings in response to nonverbal cues, whereas they may have processed and responded to their *in vivo* counterparts differently.

There were also some differences by vignette: participants perceived the characters who had gone on a few dates as being most likely to consent to various sexual activities. The characters who had met for the first time at the bar were initially perceived

as being the least likely to consent to various sexual activities, although this vignette also had the steepest increase in confidence in characters' consent over lines. Qualitative data supports that participants felt the length of time the characters had known each other was an essential consideration, with those who had been dating being perceived as most likely to consent at least initially. This aligns well with others' findings on the role of relationship status in perceptions of consent (Beres, 2014; Humphreys, 2007). Participants also noted that the role of alcohol was important in nuanced ways, as drinking together can be perceived as a sign of bonding, but a lack of sobriety may also complicate legitimacy of consent.

Across diagnostic cohorts and in all three vignettes, participants perceived the character who invited the other one to come home with them as more likely to consent to sexual activities. This sign of initiation may have been seen as gendered to some participants – in Vignettes A and C, 53% and 71% of participants viewed this character as a man or masculine. However, gender is unlikely to fully explain this effect. In the case of Vignette B, only 25% of participants viewed this character as a man. This adds further support to the existing notion that initiation may be seen as an indicator of consent across genders and sexual orientations (Harrell et al., 2023).

There were also differences by type of sexual activity – as expected from prior literature (Humphreys & Brousseau, 2010), characters were perceived as being significantly more likely to consent to making out, compared to sexual activity that involved genital contact. There was also a significant interaction effect, such that autistic students/students with higher SRS-2 scores perceived a larger difference in consent ratings by sexual activities. However, while this relationship was statistically significant,

it is unclear whether the differences in scores between autistic and non-autistic students are practically meaningful, particularly given minimal evidence for how vignette estimations may or may not correlate to participants' own consent behaviors.

Consent-Related Beliefs

Few differences were found between autistic and non-autistic young adults' self-reported consent beliefs and behaviors. Across both groups, individuals generally felt that sexual consent was very important. There were no significant differences found in use of indirect behavioral approaches to consent, such as self-reported use of nonverbal signals and body language. Neither were there significant differences across groups in beliefs around sexual consent norms, such as the importance of consent in more casual vs. long-term relationships, or awareness and discussion of consent. This was contrary to hypotheses, as we had anticipated differences in use of indirect behavioral approach to consent, e.g., we expected autistic students may report more difficulty interpreting body language. These findings could be interpreted as promising – indicating minimal areas where targeted sexual education is needed to bridge misunderstandings or differences in consent expression across neurodiverse populations. Again, however, this lack of a significant finding should be interpreted with caution, as the *indirect behavioral approach* subscale appeared to have poor convergent validity with vignette ratings in the present sample.

There were significant differences noted in the *(lack of) perceived behavioral control* subscale. In other words, autistic students reported feeling less confident in their ability to navigate conversations about consent verbally. Further research is needed to understand why this may be the case. One possibility is that this difference is explained

by social anxiety: Social anxiety commonly co-occurs with autism (Spain et al., 2018), and explicit verbal navigation of consent could be more anxiety-inducing or feel difficult for individuals who have greater social anxiety. Alternatively, this could relate to sexual experience. While we did control for whether or not participants had any prior sexual experience, we did not control for the quantity/degree of that experience. It is possible that autistic young adults may have had fewer sexual encounters than their non-autistic peers and that confidence increases with experience.

Notably, however, autistic students qualitatively endorsed strong preference for and assigned high importance to explicit verbal consent, despite the quantitative findings for low comfort with the same. Although greater research is needed, these qualitative and quantitative findings may not be contradictory or mutually exclusive: individuals can do things that are highly valued, even if they feel uncomfortable or difficult. This discrepancy could even act as greater evidence of how valued explicit verbal consent is to our autistic participants, given that they qualitatively emphasized its importance despite their relative discomfort with it. However, the current study is not able to comment on actual consent-seeking behavior outside of self-report measures. To further understand the intersection of consent-related values, anxieties/difficulties, and behaviors in neurodivergent populations, converging evidence across multiple studies and methodologies would be essential.

Satisfaction with sexual education and modeling of consent and bodily autonomy also appeared to differ between autistic and non-autistic students. As hypothesized, autistic students reported significantly less satisfaction with their childhood sexual education experiences, aligning with prior literature (Barnett & Maticka-Tyndale, 2015;

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Hancock et al., 2017). Furthermore, our findings suggest that autistic students tend to *perceive* themselves as having violated others' physical boundaries or consent more than non-autistic students. Importantly, this may be a more nuanced issue than our current data allows us to fully understand. On one hand, it is quite possible that autistic students are at greater risk of violating others' boundaries, due to a combination of difficulty navigating neurotypical social norms and poor sexual education experiences/modeling of bodily autonomy in childhood. There has been some supporting evidence for this (Dike et al., 2022; Stokes et al., 2007). On the other hand, it may be equally true that autistic students are more aware of the possibility of violating others' boundaries than their neurotypical peers. Some literature has suggested that autistic individuals may be more likely to display an intense empathy and social justice orientation in some contexts (Gillespie-Lynch et al., 2017; Shalev et al., 2022). Although not yet empirically tested to our knowledge, this focus on justice could theoretically contribute to increased attention to consent-related issues. The combination of this social justice orientation with a belief that they may have weakness in the area of navigating complex social interactions such as consent may contribute to autistic students being almost hyper-aware of potential perpetrations of consent violations. To borrow the words of one of our autistic participants,

> "That diagnosis is defined as not being able to read subtle social cues.
> But also, there's the doubt in yourself, of your own ability to read those
> social cues that adds a whole different level. Because then you're trying
> to figure out if someone's comfortable and you're like, 'Well, fuck, I'm
> the worst person to be entrusted to do this.' Because you were told

from age eight [when diagnosed] that you can't do that" (Autistic

cisgender man, age 21).

Greater research is needed to disentangle differences in perception/awareness of

violating others' consent versus differences in actual perpetration rates.

Experiences of Trauma in Autistic and Non-Autistic Students

Current results support prior findings that autistic individuals appear to be more

likely to endorse experiences of sexual abuse and violence (Dike et al., 2022; Pecora et

al., 2019; Sevlever et al., 2013; Weiss & Fardella, 2018). Additionally, almost 30% of

our autistic sample appeared to qualify as having experienced sexual abuse based on the

cut-off of a score of 8 or above (Bernstein et al., 2003; Weitkämper et al., 2021). For

comparison, meta-analysis has suggested the sexual abuse prevalence rate is about 19%

in "developed countries," using the CTQ (Zhang et al., 2020). Given the self-report

nature of the CTQ, our current estimated rate of abuse may not be fully accurate,

particularly due to a lack of research validating this measure within autistic populations.

However, this finding does offer additional evidence that sexual abuse is an important

phenomenon to study further in autistic children and adults. Furthermore, qualitative data

revealed a theme within the autistic group in which several participants noted a months-

or years-long delay in recognizing their experience as assault or non-consensual. This

aligns with other findings, where autistic participants have named difficulties in

recognizing the problematic nature of what they experienced sexually (Douglas &

Sedgewick, 2023; Sedgewick et al., 2019), and is an important consideration for future

assessment of sexual abuse prevalence and development of prevention initiatives.

Limitations

Given the social challenges and elevated rates of sexual assault during the first year of college (Kimble et al., 2008), neurodiverse college students are a crucial population in which to evaluate differences in and concerns with sexual education and consent processes. However, the current findings are limited in scope, in that it is unknown to what extent they may generalize outside of a college context. Further evaluating consent perceptions in diverse populations, including neurodivergent adults, is an important future direction for research. Many autistic students who do not attend college could be at even greater risk of poor sexual education experiences and related negative outcomes: K-12 students who are in non-integrated special education classes may be even less likely to receive sexual education at school or from other adults in their lives (Ballan, 2012; Hancock et al., 2017). This may have longer-lasting effects on understandings of and experiences with sexual consent throughout adulthood. It is possible that degrees of social insight may also vary across the broader autistic population (Mattern et al., 2023) – for example, while our current sample may have been particularly cautious or aware of the possibility of consent violations, it is possible that some autistic individuals who lack social insight, whether innately or due to poor education on the topic, may not show this same awareness. As a result, they may be at greater risk of unknowingly violating others' boundaries. There may also be limitations in selection effects, related to who might be willing to participate in a consent-focused (ACCS) and/or mood-focused (2m2x) study.

Furthermore, greater research using multiple modalities is needed to assess how accurately neurodiverse young adults report their own sexual consent behavior and

beliefs. While prior research has found evidence for relationships between endorsed beliefs about consent and perpetration behaviors (Zinzow & Thompson, 2019), this is an inherently difficult area to gain strong empirical evidence for or against, without violating participant privacy. Outside of the context of sexual pathology and crime, relatively little is known about most populations' sexual behaviors and consequences, including partner's feelings about sexual interactions. This is further complicated in neurodivergent populations, as consent-related measures have often not been tested or validated in autistic adults. The integration of more controlled observational methodology may be beneficial. For example, this may include looking at how broader endorsement of bodily autonomy and non-sexual consent related beliefs relate to *in vivo* social behaviors (e.g., use of physical greetings, likelihood of invading personal space without permission, etc.). Methodology such as videos may also be a helpful alternative to written narratives for future vignette and vignette-adjacent research (Parks et al., 2016). While written vignettes have increased convenience and personalization potential (e.g., participants can imagine characters' genders as what is most relevant to them), they also rely on verbal processing. It is possible that the ways written vignettes necessarily explicitly point out nonverbal consent cues (e.g., "Nal pauses, looks back at the friend group, and then accepts") may cause individuals to evaluate body language as a consent cue, even if they may not notice or process that same cue as fully in vivo. Finally, future research may evaluate whether there are any meaningful differences in how autistic and non-autistic adults interpret consent and trauma-related self-report items.

Implications and Future Directions

It has been well documented through concepts like "hidden rape" that many individuals will not label their experiences as assault or nonconsensual, even if they fit the definition (Johnstone, 2016; Koss & Oros, 1982). This may occur for a variety of reasons, including a lack of knowledge on what sexual assault is and belief in myths (e.g., belief that if one did not physically resist it could not be considered rape), ambivalence on their feelings, and self-blame (Johnstone, 2016). Regardless of the reason for not labelling their experience, individuals who do not acknowledge their experience as assault still tend to be physically and psychologically affected and may also be at increased risk of revictimization (Marx & Soler-Baillo, 2005; McMullin & White, 2006). Therefore, supporting these individuals who have experienced unacknowledged sexual assault is an important priority.

Current findings and prior literature both indicate that it may be more common for autistic individuals to have a delayed response to sexual trauma (Douglas & Sedgewick, 2023; Sedgewick et al., 2019), in some cases not questioning whether their nonconsensual sexual experience was "normal" or healthy until months or years later. It is fortunate that participants in our study did report they eventually got access to accurate information on sexual consent and assault – particularly if that means they may be at reduced risk of revictimization in the future. However, many autistic students are less likely to receive high-quality sexual education or to have access to conversations about sexual wellbeing with peers (Barnett & Maticka-Tyndale, 2015; Holmes et al., 2020; Pownall et al., 2012; Treacy et al., 2018). Therefore, this could be one of many potential instances where a knowledge gap may contribute to increased risk of sexual assault and

lack of support in healthy sexual relationships for autistic adults. One potential tool to reduce this occurrence would be to provide education to all students earlier in their schooling on consent. Ideally, this education would be early, often, and accessible to a wide variety of learners (Beddows & Brooks, 2016; Roden et al., 2020).

In a sample of 167 autistic adults in the United States, the majority of participants reported that they did not receive education on sexual consent and that this would be a top priority to make sexual education more useful in the future (Kapit, 2024). Participants suggested there may be a number of ways education on sexual consent could be structured and that including multiple modes of learning – particularly including student engagement through methods like roleplay and scripts – would increase the accessibility of the material. Our current findings may support these ideas: autistic students strongly qualitatively endorsed valuing and prioritizing explicit conversations about sexual consent. Yet, they also endorsed feeling less confident actually navigating these conversations. This suggests that groups such as autistic students would find additional education and practice on how to navigate these conversations valuable.

Beyond roleplays and scripts, there are several proposed comprehensive models for how to improve sexual education for neurodiverse learners. For example, programs like *HIPTeens* apply principles of universal design to increase the accessibility of sexual health information for adolescents with intellectual and developmental disabilities (Grove et al., 2018). Several organizations have also put together sexual education guides for parents and families of autistic teenagers (e.g., Organization for Autism Research, 2021; Planned Parenthood, n.d.). Crucially, however, many of the existing resources are targeted at early adolescence and older. Our current data reminds us that education on

consent likely needs to be started from an early age and incorporated throughout

schooling often; neurodivergent students in particular may be relying on this education to

support their safety and understanding of when others are behaving inappropriately. Prior

literature suggests that bodily autonomy and consent can be appropriately taught to

neurodiverse children as young as preschool (Davies et al., 2022). As we see from the

heightened rates of sexual abuse and the qualitative findings referencing a lack of

knowledge on healthy sexual relationships, it is vital that students have access to

information on consent (in age-appropriate ways) and know the resources to go to for

help as soon as possible.

Furthermore, current findings highlight the importance of not only education on

consent necessity and legal requirements, but on nuanced processes of decision-making

related to one's own limits and desires in relation to sexual consent. Our participants'

quotes show us that students are tackling complex questions of consent, including

whether or not to consent to sexual activities when one might be feeling somewhat

interested but ambivalent. Both autistic and non-autistic students described challenges in

assessing their own comfort consenting to various activities, potentially due to trying to

compare one's emotions to an idea of "enthusiastic consent." Prior literature has shown

that it is not uncommon for individuals to experience sexual ambivalence – a sense of

both wanting and not wanting a sexual experience (Beres et al., 2014; Muehlenhard et al.,

2016; Muehlenhard & Peterson, 2005; O'Sullivan & Gaines, 1998; Pinquart, 2010). In

prior, seminal research, young adults stated that they believed their ambivalence was due

to a variety of factors, commonly including feeling uncertain about level of commitment

to or interest in a sexual partner, being unaroused, and inopportune timing (O'Sullivan &

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Gaines, 1998). Regardless of the reason for ambivalence, in past research young adults

have described challenges in determining how to move forward – for example, whether to

communicate this ambivalence, stop the sexual activity, or go along with it without

expressing concern (O'Sullivan & Gaines, 1998) – similar to the difficulties in decision-

making expressed in our current findings, over twenty years later.

Despite the complexities of sexual decision-making, one's own consent decisions

and expression have rarely been the focus of sexual education curricula. Even more

comprehensive sexual education curriculum standards, such as those created by the

Future of Sex Education (FoSE), do not appear to include any guidelines on how to make

decisions about consenting to sexual experiences. Instead, much of consent education to

date has focused on avoiding violating others' boundaries. For example, FoSE

encourages teachers to educate students on the "legal consequences of sexual behavior

without consent" (Future of Sex Education Initiative, 2020, p. 30). While this is certainly

important and worthwhile, it is empowering to consider a future for sexual education that

can go beyond this more elementary understanding of consent and allow for a nuanced

exploration of decision-making and desire. As others have pointed out, sexual education

has often failed to explore more positive aspects of sexuality and, in doing so, may be

discouraging students' consideration of one's own interests, desires, and the

corresponding boundaries (Cameron-Lewis & Allen, 2013). Future research might

consider the role of sexual education in helping students to navigate their own sexual

decision-making processes.

Conclusion

The current study contributes rich qualitative data and quantitative metrics of neurodiverse young adults' current perspectives on sexual consent. Much of these data are promising, showing large support for discussing sexual consent with partners and that many students are confident in navigating these conversations. However, findings also identify potential gaps of knowledge and areas where greater support is needed. For example, both autistic and non-autistic students expressed difficulties in decision-making on how to navigate the presence of alcohol and how to assess their own desire to consent. Current research also echoes prior findings that autistic individuals are more likely to report traumatic events, including sexual trauma and abuse.

Future research may be able to expand on the current sample to assess generalizability of students' strengths and challenges in sexual consent navigation and to create more comprehensive and useful sexual education. As others have described, comprehensive sexual education that effectively teaches students concepts like navigating sexual consent has the potential to have lasting benefits for individual and population health, including through reduced perpetuation of sexual violence, improved health of relationships, and increased knowledge of own boundaries and sense of bodily autonomy (Goldfarb & Lieberman, 2021; Torres, 2023). Given that mental health, trauma, and promoting lifespan wellbeing of autistic adults have consistently been identified as top priorities by autistic adults and other stakeholders (Roche et al., 2021), it is imperative that the future of sexual education and consent research is representative of our neurodiverse world and college communities.

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Appendix A

Description of "2m2x College Health Study" Measures

Measures with a "*" are administered during the baseline survey battery, and measures with a "^" are administered during the endpoint survey battery

- Adult Repetitive Behaviors and Interests Questionnaire (ARBI-Q)***^**: The ARBI-Q is a 24-item self-report questionnaire focused on repetitive behaviors across domains including rigidity/sameness, circumscribed interests, and sensory-motor. This measure was created with our collaborator at Vanderbilt, Zachary Williams. The subscale scores are totaled to arrive at an overall score. Items are rated on a 5-point Likert scale (0=*Very untrue of me* to 5=*Very true of me*).
- Anticipatory and Consummatory Interpersonal Pleasure Scale (ACIPS)***^** – This 17-item measure examines the extent to which one experiences pleasure within a variety of social situations. Items are rated on a 6-point Likert scale (1=*Very false for me*, 6=*Very true for me*). Example items include "I look forward to seeing people when I'm on my way to a party or get-together" and "I don't look forward to family get-togethers or gatherings" (Gooding & Pflum, 2014). The ACIPS has been used with autistic adults both inside and outside of our lab previously (Novacek et al., 2016).
- Autistic Burnout Scale**^** **-** The endpoint survey includes exploratory questions on autistic burnout, developed by our research team based on Raymaker et al., 2020. These items are rated on a Likert scale (1= *Strongly disagree*, 6 = *Strongly agree*) and represent the domains of fatigue, loss of skills, reduced sensory tolerance, and reduced social tolerance. Analyses on this scale form Fall 2021 data suggest that scale items exhibit high internal consistency (α=.91), and correlated highly with levels of autistic traits, $F(1,60)$=14.80, p<.001***.
- Beck Depression Inventory (BDI-II)***^** – This 21-item measure is one of the most widely used measures of depressive symptoms. For each item, participants are presented a novel set of four answer choices of which they must choose the statement that applies to them the most. Items are titled by their general topic (such as "Sadness" and "Self-dislike") and include four statements to choose from (for example, under "Sadness" participants choose an answer ranging from 0=*I do not feel sad* to 3=*I am so sad or unhappy I can't stand it* (Beck et al., 1996). This measure has been validated for use with autistic adults (Williams et al., 2020). In our own

sample based on Fall 2020 and 2021 data, internal consistency has been strong, Cronbach α = .92.

● Brief Fear of Negative Evaluation (BFNE)*^ – The 8-item version of this measures examines how much someone fears being evaluated unfavorably within a social setting. Items are rated on a 5-point Likert scale (1=*Not at all characteristic of me* to 5=*Extremely characteristic of me*). Example items include "I worry about what other people will think of me even when I know it doesn't make any difference" and "Other people's opinions of me do not bother me". (Leary, 1983; Rodebaugh et al, 2004). The BFNE is commonly used as a brief measure of social anxiety and has been validated for use with autistic adults (Boulton & Guastella, 2021).

● Childhood Modeling of Consent Questions* - This is a series of 11 items created by our lab. It assesses how often participants were exposed to conversations about consent as children and how often consent was modeled through basic elements of bodily autonomy.

● Childhood Trauma Questionnaire*- The 28-item short-form of this measure assess childhood experiences of physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect (Bernstein et al., 2003). It uses a 5-point Likert scale (1 = *Never True*, 5 =*Very Often True*).

● General Anxiety Disorder (GAD-7)*^ – This 7-item measure is used to examine for the presence of common Generalized Anxiety Disorder symptoms within the last two weeks. Items are rated on a 4-point Likert scale (0=*Not at all sure*, 3=*Nearly every day*). All items follow the general statement "Over the last 2 weeks, how often have you been bothered by the following problems?" and include, for example "Feeling nervous, anxious, or on edge" and "Being so restless that it's hard to sit still" (Spitzer et al., 2006). The GAD-7 been used with autistic adults both inside and outside of our lab previously (Okuda et al., 2017). In our own sample based on Fall 2020 and 2021 data, internal consistency has been strong, Cronbach α = .91.

● History Form, Baseline*: This was created within our lab to collect demographics and diagnostic, substance use, and treatment history. It includes a series of fill-in and multiple-choice questions, some of which are optional.

● History Form, Endpoint ^: This form, also created within our lab, will be used to follow up with participants about their medical and treatment history, as well as ask questions about their living situation, satisfaction with academic accommodations, substance use, and lifestyle throughout the semester.

● <u>Interests Scale (IS)</u>*^: The IS is a self-report checklist measuring severity of circumscribed interests associated with autism. For this project, we are using 2 IS items that correspond to frequency of that interest. (Bodfish, 2003).

● <u>Mini Social Phobia Inventory (Mini-SPIN)</u>*^- This 3-item measure is a brief screener for social anxiety (Connor et al., 2001). Participants rate their agreement with items related to fear of embarrassment and avoidance of attention on a Likert Scale (0=*Not at all*, 5=*Extremely*). This measure has been used previously, both inside and outside of our lab, with autistic adults (Nah et al., 2018).

● <u>NIH Toolbox Friendship measure</u>*^– This 8-item measure asks participants about the relationships they have with the people they encounter on a day to day basis, in an effort to figure out how much friendship or social support a participant receives. Items are rated on a 5-point Likert scale (1=*Never*, 5=*Always*). Example items include "I get invited to go out and do things with other people" and "I feel close to my friends" (Cyranowski et al., 2013).

● <u>Perceived Stress Scale (PSS)</u>**^** – This 10-item measure asks participants about their thoughts and feelings in order to collect data about their self-reported levels of stress. Items are rated on a 5-point Likert scale (0=*Never*, 4=*Very often*). Example items include "In the last month, how often have you been upset because of something that happened unexpectedly?" and "In the last month, how often have you felt that you were on top of things?" (Cohen et al., 1994). The PSS has been used with autistic adults in research both inside and outside of our lab previously (Hirvikoski & Blomqvist, 2015).

● <u>Repetitive Thinking (RepT) survey battery - short form</u>**^** **–** The original, extended version of the RepT survey battery includes a few items taken from each of 15 validated instruments and 1 additional novel set of questions, all of which measure concepts associated with repetitive thinking, including rumination, circumscribed interests, anticipatory worry, obsessive thoughts, posttraumatic processing, etc. Items were selected prior to this IRB application on the basis of best performance in a sample of 589 participants crowdsourced via Amazon MTurk and approximately 800 adults with autism from the SPARK national autism registry. Based on these data, an 8-item short form of this item pool was selected in order to reduce the time burden on participants. All items are rated on a 5-point Likert scale (1=A*lmost never* to 5=A*lmost always*). The 8 items are taken from the following measures:

o   Measure of Mental Anticipatory Processes (MMAP) (Feldman & Hayes, 2005)

o   Perseverative Thinking Questionnaire (PTQ) (Ehring et al., 2011)

o   Rumination and Reflection Questionnaire Negative Events (RRQ-NE) (Trapnell & Campbell, 1999)

● Sexual Consent Scale Revised*- this 39-item measure examines attitudes towards consent on a 7-item Likert scale (1= Strongly disagree, 7= Strongly agree) (Humphreys & Brousseau, 2010). Subscales assess (lack of) perceived behavioral control, positive attitude toward establishing consent, indirect behavioral approach to consent, sexual consent norms, and awareness and discussion of consent. Minor revisions were made to this measure to improve readability in our population of interest.

● Social Responsiveness Scale, 2nd edition (SRS-2)*: The SRS-2 is a 65-item self-report scale measuring the presence and severity of social impairment as it relates to autism spectrum disorder. The SRS-2 generates a total score as well as scores for each of its five subscales: social awareness, social cognition, social communication, social motivation, and restricted interests and repetitive behavior. The SRS-2 includes clinical ranges of concern for use as an autism screening instrument. Items are rated on a 4-point Likert scale (1=*Not true*, 4=*Almost always true*). Example items include "I am much more uncomfortable in social situations than when I am by myself" and "I feel self-confident when interacting with others" (Constantino & Gruber, 2012). In our own sample based on Fall 2020 and 2021 data, internal consistency has been strong, Cronbach α= .97.

● Three-Item Penn State Worry Questionnaire (PSWQ)*^ – This 3-item measure asks participants about causes of and reactions to worry. Items are rated on a 5-point Likert scale (1=*Strongly disagree*, 5=*Strongly agree*) (Meyer et al., 1990; Berle et al., 2011). The PSWQ has been used with autistic adults in research both inside and outside of our lab previously (Top et al., 2019).

● "2m2x" bi-weekly survey – This 15-item measure will be administered twice a week for 12 weeks total. Developed by our lab, this measure prompts participants to provide information about their current mood and anxiety, thinking patterns, social situation, and feelings about recent sexual experiences. Most items are rated on a 5-point Likert scale (1=*Almost never*, 5=*Almost always*). Example items include "In the last few days, how often have you been feeling down, sad, or empty?" and "In

the last few days, how often have you been brooding, or thinking repetitively, about problems or negative experiences?"

Appendix B

"ACCS" Vignettes

Instructions: You are going to read 3 fictional stories. Each of these stories describes two people meeting each other and eventually engaging in sexual activities. As you read, try your best to try to relate to the characters. For example, visualize the characters as your own gender and the gender of your preferred partners.

After most sentences, you'll be asked to rate how likely you think each character is to consent to various sexual activities (making out, genital touching, oral sex, and penetrative sex), based on the information you have so far in the story. Definitions of each of these terms (for our purposes) are below:

Consent: the freely given verbal or non-verbal communication of a feeling of willingness to engage in sexual activity
Making out: kissing sexually
Genital touching: sexual activity involving one partner touching the genitalia of another (e.g., hand jobs, fingering)
Oral sex: sexual activity in which the genitals of one partner are stimulated by the mouth of the other
Penetrative sex: insertion of a body part or other object (e.g., dildo) into a partner's anus or vagina

You may notice these stories are similar to each other – please try your best to just think about the current story you are reading and not compare it to the other stories. It might sometimes be hard to decide how likely someone is to consent to various activities – that is okay, just take your best guess. There is no right or wrong answer.

Vignette A:
Blue and Fall have been friends for a few months. They bonded over having unusual family nicknames since birth. Tonight, they are hanging out at a bar and are enjoying each other's company. Blue offers Fall a drink. Fall accepts. Both say "cheers" and sip their drinks. Fall touches Blue's arm while laughing at Blue's joke. Both are flirting with each other. Blue invites Fall to come over. Fall accepts. Once at Blue's place, they decide to watch a movie together. Blue starts the movie and then sits down next to Fall so that their legs are touching. A few minutes into the movie, Fall reaches for Blue's hand. Blue smiles and they hold hands. A while later, Fall leans in to kiss Blue. They start making out. Fall pulls Blue closer. They take off their own shirts. Blue then leads Fall to the bedroom. Fall pauses for a moment and then follows. They both take off their own pants

before getting into Blue's bed. Blue and Fall start making out again, Blue on top. Blue kisses Fall's neck and continues to kiss down from Fall's neck to stomach. Fall lifts up and Blue slides Fall's underwear down. Blue takes off Fall's underwear and starts oral sex. Fall clutches Blue's hair. Blue sits back on the bed and makes eye contact with Fall. Fall holds Blue's eye contact and smiles slightly. Blue begins to penetrate Fall **(Note: At this point please imagine what is most relevant to your own hypothetical sexual experiences: [dildo/fingers/penis/tongue] in [anus/mouth/vagina])**

Vignette B:
Winter and Nal are at a bar with friends when they meet for the first time. They begin talking and are enjoying each other's company. They bond over having unusual family nicknames since birth. Winter offers Nal a drink. Nal says, "No thanks. I'm not drinking tonight." Nal touches Winter's arm while laughing at Winter's joke. Both are flirting with each other. Winter invites Nal to come over. Nal pauses, looks back at the friend group, and then accepts. Once at Winter's place, they decide to watch a movie together. Winter starts the movie and then sits down next to Nal so that their legs are touching. A few minutes into the movie, Nal reaches for Winter's hand. Winter smiles and they hold hands. A while later, Nal leans in to kiss Winter. They start making out. Nal pulls Winter closer. They take off their own shirts. Winter then leads Nal to the bedroom. Nal follows. They both take off their own pants before getting into Winter's bed. Nal and Winter start making out again, Winter on top. Winter kisses Nal's neck and continues to kiss down from Nal's neck to stomach. Nal lifts up and Winter slides Nal's underwear down. Winter takes off Nal's underwear and starts oral sex. Nal clutches Winter's hair. Winter sits back on the bed and makes eye contact with Nal. Nal holds Winter's eye contact and smiles slightly. Winter begins to penetrate Nal **(Note: At this point please imagine what is most relevant to your own hypothetical sexual experiences: [dildo/fingers/penis/tongue] in [anus/mouth/vagina])**

Vignette C:
Bear and Eclipse meet in a class and bond over having unusual family nicknames since birth. They go out on a few dates. Tonight, they go out to a bar and are enjoying each other's company. Bear and Eclipse order their own drinks. Eclipse touches Bear's arm while laughing at Bear's joke. Both are flirting with each other. Bear invites Eclipse to come over. Eclipse accepts, mentioning a movie that the bartender recommended watching. Once at Bear's place, they decide to watch the movie together. Bear starts the movie and then sits down next to Eclipse so that their legs are touching. A few minutes into the movie, Eclipse reaches for Bear's hand. Bear smiles and they hold hands. A while later, Bear leans in to kiss Eclipse. They start making out. Eclipse pulls Bear closer. They take off their own shirts. Bear then leads Eclipse to the bedroom. Eclipse follows, without saying anything. They both take off their own pants before getting into Bear's bed. Bear

and Eclipse start making out again, Bear on top. Bear kisses Eclipse's neck and continues to kiss down from Eclipse's neck to stomach. Eclipse lifts up and Bear slides Eclipse's underwear down. Bear takes off Eclipse's underwear and starts oral sex. Eclipse clutches Bear's hair. Bear sits back on the bed and makes eye contact with Eclipse. Eclipse holds Bear's eye contact and smiles slightly. Bear begins to penetrate Eclipse. **(Note: At this point please imagine what is most relevant to your own hypothetical sexual experiences: [dildo/fingers/penis/tongue] in [anus/vagina])**

Post-vignette questions (sample):
- "As you read through the vignettes, what made you think the characters were or were not interested in kissing and sexual activity?"

- "What cues did you think were most important?"

- "How do you usually figure out whether someone you're interacting with consents to sexual activity?" (or, if you haven't engaged in sexual activity, "How do you think you would figure out whether someone you're interacting with consents to sexual activity?")

- "Have you ever been in a situation where it was hard to tell what your romantic or sexual partner was comfortable with? How did you work through that? How did you feel about your decision after?"

- "Have you ever learned afterward that your romantic or sexual partner was not fully comfortable with the experience you engaged in? What made you think that, or how did they communicate that to you? Were you surprised?"

- "Have you ever been in a situation where you felt unsure about whether you were comfortable with doing something sexually or romantically with a partner? How did you decide whether to keep going? Were you likely to keep going with the interaction while you weren't sure? [If not, "How did you communicate that you

did not feel comfortable continuing?" Or if so, "Do you think that felt easier in

some way than voicing your discomfort or uncertainty? Why or why not?"

- "How would you describe the gender and sexual orientation of the characters

described?" (vignettes will be given to participants again for reference)