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Brigham Young University

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Warning! Explicit Material: The Effects of Adolescent Pornography

Use on Risky Sexual Behavior Over Time

Emily Jensen-Schvaneveldt

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Science

Sarah Coyne, Chair
Brian Willoughby
Jason Whiting

School of Family Life

Brigham Young University

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ABSTRACT

Warning! Explicit Material: The Effects of Adolescent Pornography Use on Risky Sexual Behavior Over Time

Emily Jensen-Schvaneveldt
School of Family Life, Brigham Young University
Master of Science

This study explored the longitudinal effects of adolescent pornography trajectories on risky sexual behavior, as well as predictors of pornography trajectories. Data was taken from Waves V-X of the Flourishing Families Project, which included a sample of 463 families. A zero-inflated Poisson growth mixture model was run to determine class participation and growth trajectories. Findings revealed that gender and religiosity significantly predicted class participation, and class participation significantly predicted risky sexual behavior. While this study did have limitations, this study adds to the previous literature by examining adolescent pornography trajectories over an extended period of time.

Keywords: pornography, adolescents, sexuality, religiosity, gender

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Warning! Explicit Material: The Effects of Adolescent Pornography

Use on Risky Sexual Behavior Over Time

In the last year, pornography sites received more traffic than Twitter, Instagram, Netflix, Zoom, Pinterest, and LinkedIn combined (Zhukova, 2021). Currently, the pornography industry is estimated to be worth \$97 billion globally, with approximately \$12 billion of that industry coming from the U.S. (Culture Reframed, 2019; NBC News, 2015). People are accessing pornography at higher rates than ever before because it is easily accessible, affordable, and anonymous (Cooper, 1998).

Not only are people accessing pornography at higher rates but the age at which individuals are exposed to pornography has also decreased, with the average age of exposure now being 11 years old (Randel & Sanchez, 2017). However, exposure is notably different than use or pornography viewing. Within the field, most research defines pornography viewing vaguely as viewing ‘sexually explicit material’ or ‘sexually explicit material intended to arouse’ (McKee et al., 2020; Willoughby et al., 2019). Various studies indicate that pornography viewing in adolescents is fairly common, especially among adolescent boys (Bleakley et al., 2011; Chen et al., 2013).

While there are numerous cross-sectional studies on adolescent pornography use, many reviews of research have come to opposite conclusions on the effects of pornography, particularly regarding sexual behavior (Bloom & Hagedorn, 2014; Owens et al., 2012 Springate & Omar, 2013). This may be because of the unique importance of differing trajectories of pornography use. For example, trajectories where individuals view sporadic or inconsistent pornography across time tend to differ in outcomes compared to trajectories with high amounts of pornography early on but then tapers off in young adulthood who also differ from trajectories

that rapidly increases over time (Willoughby et al., 2018). Identifying pornography use trajectories helps to identify adolescents and emerging adults who view pornography in dysfunctional ways such as high-frequency or compulsive use, as well as the potential impacts these trajectories may have on risky sexual behaviors.

Several societal, personal, and demographic factors may predict differing trajectories of pornography use, including adolescents' communication with their parents about sex (Rogers, 2017; Widman et al., 2016), gender (Carroll et al., 2008; Martellozzo et al., 2016), religiosity (Rasmussen & Bierman, 2018), and self-regulation (Sirianni & Vishwanath, 2016). Exploring the predictive qualities of these factors may help researchers and clinicians alike to understand what factors may lead to problematic pornography use trajectories as well as risky sexual behavior outcomes, and likewise are the main predictors within this study.

While little research has explored the longitudinal trajectories of adolescent pornography use and how these trajectories influence risky sexual behavior, this study examines the different trajectories of individuals who view pornography and how these trajectories impact risky sexual behavior. This study seeks to address this gap in research by examining 1) how adolescent pornography use changes over an extended period of time by examining differing trajectories of pornography use, 2) how pornography use trajectories impact risky sexual behavior over time, and 3) how parent-child sexual communication, gender, religiosity, and self-regulation predict pornography use trajectories.

Literature Review

Adolescent Pornography Use

While studies of nationally represented size have not reported adolescent pornography viewing, Chen et al. (2013) reported that 58.7% of their participants reported intentionally viewing pornography, Bleakley et al. (2011) reported almost 40% of their male participants

reported intentional pornography use, and Widman et al. (2021) reported that of their study of adolescents, 89% of participants reported intentional pornography use. In fact, males are almost twice as likely to be exposed to and intentionally search for pornography than females (Carroll et al., 2008; Martellozzo et al., 2016; Peter & Valkenburg, 2011), and as such more research focuses on male pornography use than female pornography use.

However, being male is only one of many contributors to pornography risk. Adolescents who experience poor mental health and higher sensation seeking are more likely to view pornography (Dawson et al., 2019) compared to peers with positive mental health and typical sensation seeking behaviors. Likewise, an individual's attitudes and beliefs around sexuality greatly influence potential pornography use (Emmers-Sommers et al., 2013; Rasmussen & Bierman, 2018). For instance, more conservative or religious beliefs tend to act as protections against initial pornography use and associations with increased pornography use over time (Rasmussen & Bierman, 2018), whereas individuals with more open attitudes surrounding sexuality tend to be associated with viewing pornography more often (Emmers-Sommers et al., 2013).

While different trajectories exist for adolescents who use pornography (i.e., inconsistent use, consistent use, dysfunctional use), research indicates that pornography use in general introduces adolescents to a variety of risks (Koletic, 2017; Rasmussen & Bierman, 2018; Wery & Billieux, 2016). Higher adolescent pornography use is associated with various negative outcomes, including lower mental health (Koletic, 2017; Yoder et al., 2005) higher reported pornography use at later times (Rasmussen & Bierman, 2018; Wery & Billieux, 2016; Willoughby et al., 2018), and different expectations for sexual experiences (Martellozzo et al., 2016; Wery & Billieux, 2016).

Recent research has also indicated a need for future research to focus on differing trajectories of pornography use throughout adolescence (Willoughby et al., 2018). Trajectories throughout adolescence are crucial in identifying adolescents and emerging adults who view pornography in dysfunctional ways, such as compulsive use. Past research has found a few differing trajectories among those who view pornography: engager, abstainer, and experimenter (Willoughby et al., 2018); low consumption, low to moderate use, and increasing to regular use (Rasmussen & Bierman, 2018). However, these studies were either retrospective or relatively short in nature.

Using trajectories is important in understanding pornography use as pornography consumption looks vastly different among different groups. For instance, in their retrospective survey of 908 individuals in the United States, Willoughby et al. (2018) found that individuals who infrequently or inconsistently view pornography have similar outcomes as those who avoid pornography altogether; in contrast, those who engaged in consistent and elevated use of pornography reported higher pornography use in adulthood, less life satisfaction, and higher rates of dysfunctional pornography use (Willoughby et al., 2018).

Currently, longitudinal research on adolescent pornography use trajectories is very limited. While some studies have examined how adolescent pornography use changes over time (Dawson et al., 2019; Kohut & Stulhofer, 2018; Peter & Valkenburg, 2011; Wright & Stulhofer, 2019), these studies only examined pornography use over a short period, between one and two years. These studies reported either no or slight change in pornography use over time; however, it is possible that these studies found limited linear increase in pornography use due to the short time span in their studies. In fact, many of these researchers call for more longitudinal research that examines adolescent pornography use over longer periods of time (Dawson et al., 2019;

Kohut & Stulhofer, 2018). Thus, a major goal of the current study was to observe the impact of adolescent pornography use over six years to determine the trajectories and impact of pornography use over an extended period of time.

Pornography Use and Risky Sexual Behavior

Despite unrealistic depictions of sexual behavior in pornography, a recent survey found that over half of boys (53%) and over a third of girls (39%) believed that pornography was a realistic depiction of sex (Martellozzo et al., 2016). Similarly, 44% of males ages 11-16 who consumed pornography reported that online pornography gave them ideas about the type of sex they wanted to try (Martellozzo et al., 2016). Research is fairly clear that for adults, those who view higher levels of pornography also report more unrealistic attitudes about sex and have riskier sexual behavior, such as sexting, no condom use at last sexual intercourse, and higher numbers of sexual partners (Mattebo et al., 2013; Van Ouytsel et al., 2014). However, this relationship is not so clear for adolescents, mostly due to the lack of research on adolescent pornography use.

Understanding the relationship between adolescent pornography use and risky sexual behavior is an important issue not only because of the physical health risks associated with risky sexual behavior, but also the mental and emotional risks of risky sexual behavior. Some of the physical health issues associated with risky sexual behavior in general are STIs (Leigh & Stall, 1993) and unwanted pregnancies (Cooper et al., 1999). Risky sexual behavior also impacts emotional and mental health as well, and is associated with conduct disorders, depression, and anxiety (Bennett & Bauman, 2000).

Research exhibiting an association between adolescent pornography use and risky sexual behavior has been rather mixed. Some research has shown that frequent pornography use is associated with unrealistic sexual beliefs and attitudes, which is then associated with higher

levels of risky sexual behavior (Dawson et al., 2019; Mattebo et al., 2013; Van Ouytsel et al., 2014). Adolescents who frequently view pornography also report having had more and riskier sexual experiences, such as one-night stands (Mattebo et al., 2013).

However, other studies have found no association between pornography use and overall risky sexual behaviors (Luder et al., 2011; Peter & Valkenburg, 2011; Willoughby et al., 2018).

These researchers point out that theoretically, adolescents should be more susceptible to pornography as they are developing their sexual identity (Peter & Valkenburg, 2011). However, in a two-wave panel survey of a nationally representative sample of Dutch adolescents, Peter & Valkenburg (2011) found no connection between pornography use and risky sexual behavior.

While some longitudinal research on the relationship between adolescent pornography use and risky sexual behavior exists (Dawson et al., 2019; Peter & Valkenburg, 2011; Rasmussen & Bierman, 2018), most of this research has not examined this relationship over a considerable amount of time and rarely through the transition of adolescence to emerging adulthood.

Rasmussen & Bierman (2018) found that three years after first reports, adolescents ranging from 14-17 at baseline had different pornography use trajectories with different outcomes regarding risky sexual behavior. Adolescents with early and consistent pornography use were more likely to report early initiation in sexual activity and almost double the number of sexual partners.

While this research is a good start, there is still no research that examines extended longitudinal impacts of pornography use throughout adolescence and emerging adulthood. This transition is important to observe as many individuals begin or increase their sexual exploration during this transition (Morgan, 2012). As teens transition to emerging adults and leave their parents' home, they have much more freedom and autonomy. This newfound freedom extends to their sex life, so emerging adults may begin or increase their sexual exploration during this transition. This

study seeks to clarify the relationship between adolescent pornography use over an extended period (6 years), as well as throughout the transition from adolescence to emerging adulthood in order to determine the significance of adolescent pornography use on risky sexual behaviors over an important time in an individual's sexual development.

Predictors of Pornography Trajectories

Bronfenbrenner's Ecological model suggests that societal culture, family, and personal attributes all likely influence an individual's beliefs and behaviors (Bronfenbrenner, 1992). As such, this study examines several predictors that fall into each of these realms, with religiosity being with the cultural sphere, parent-child sex communication in the family sphere, and self-regulation and gender in the personal attributes sphere. Sexual script theory, which will be explored in greater detail later on, also suggests that sexuality is influenced by societal norms, familial beliefs, and personal experiences, values, and preexisting attitudes (Gagnon & Simon, 2005). Thus, the following predictors were chosen to more fully understand which spheres of influence are more likely to predict pornography trajectories:

Parent-Child Sex Communication

Parent-child communication can have a profound impact on the child's sexual behavior. Parents not only play a crucial role in conveying sexual information, they also significantly impact their adolescents' sexual attitudes, values, and beliefs (Widman et al., 2016). In fact, parent-child sex communication can have an immediate and lasting impact on adolescent sexual behavior (Blake et al., 2001). Adolescents whose parents engage in consistent and frequent parent-child sex communication over time tend to have a healthier sex life when they begin to engage in sexual activities (Padilla-Walker, 2018; Widman et al., 2016). More specifically, a meta-analysis of fifty-two articles representing 25,314 adolescents consistently found that sexual

communication with parents plays a small protective role against risky sexual behavior, particularly for girls (Widman et al., 2016). Thus, parent-child communication may play a predictive role in both pornography use and risky sexual behavior.

Religiosity

Past research has consistently found that high levels religiosity typically plays a protective role against engaging in pornography and risky sexual behavior (Patterson & Price, 2012). Individuals with higher levels of religiosity often tend to be more conservative in their outlook towards sex, and thus may be less likely to engage in viewing pornography or risky sexual behavior (Rasmussen & Bierman, 2018). However, some studies have shown that of religious individuals who reported they engaged in pornography use, these individuals report a significant increase in pornography use over time (Kohut & Stulhofer, 2018; Rousseau et al., 2021). Based on this research, religiosity will likely play an important predictive role regarding pornography trajectories and risky sexual behavior.

Gender

Pornography use in general tends to be fairly gendered, as males are much more likely to be exposed to and intentionally seek out pornography (Carroll et al., 2008; Martellozzo et al., 2016; Peter & Valkenburg, 2011), and as such more research focuses on male pornography use than female pornography use. The impact of pornography use on risky sexual behavior is also gendered, as male adolescents who view pornography are significantly less likely to have used a condom at last intercourse (Luder et al., 2011) and are more likely to have asked and received a sexting message than their female counterparts or other peers who did not view pornography (Van Ouytsel et al., 2014).

Self-Regulation

An adolescents' ability or inability to regulate their emotions, cognition, and behaviors may also relate to pornography use and risky sexual behavior over time. Little research has examined the direct relationship between self-regulation and pornography use, however, Sirianni & Vishwanath (2016) found that individuals who have poor self-regulation tend to have problematic pornography use. While this is the only study currently examining this relationship, many studies have found a relationship between poor self-regulation and problematic media use (Liu et al., 2020; Seay & Kraut, 2007). We suppose then that Sirianni & Vishwanath's (2016) findings are valid, and that poor self-regulation may be associated with problematic pornography use.

Sexual Script Theory

Sexual script theory suggests that pornography can mold an adolescents' sexuality, including their sexual beliefs, attitudes, preferences, and behavior (Gagnon & Simon, 2005; Simon & Gagnon, 2003). Sexual script theory suggests that sex is not a purely biological construct, but rather that sexuality is also socially constructed. Sexuality is influenced by societal norms, mass media, and personal experiences, values, and preexisting attitudes. Gagnon & Simon (2005) explain that "sexual scripts" are similar to scripts that actors use in a play by helping individuals know what role to play and how a scenario should run.

Wright (2011) expanded sexual script theorizing when he proposed the 3AM model, which is comprised of three components: acquisition, activation, and application of behavioral scripts. Pornography is thought to play a role in influencing and developing sexual scripts through this sequence (Braithwaite et al., 2015; Gagnon & Simon, 2005; Peter & Valkenburg, 2008). As individuals view pornography, they acquire scripts based on what they see (e.g. frequent casual,

unprotected sex is normal), which is then followed by activation (e.g. further viewing of any media that reinforces this script deepens the individual's acquire belief), and then lastly application of the script (e.g. engaging in frequent casual, unprotected sex). Because sexual acts in pornography are gendered, it is also likely that different scripts will arise for males and females, following what is portrayed in pornography.

Further, based on the influence of societal norms and personal experiences, values, and preexisting attitudes, the following will be significant predictors of adolescent pornography use and risky sexual behavior: frequency of parent-child communication about sex, self-regulation, and religiosity. Both parents and religion significantly mold an individual's personal values and attitudes, which in turn impacts the individual's script. Likewise, an individual's personal experience changes based on their ability to self-regulate, as past research has proven that individuals with low levels of self-regulations tend to engage in more problematic or addictive behaviors (Liu et al., 2020; Seay & Kraut, 2007). Thus, their personal experiences with self-regulation will likely impact the individual's sexual script as well as they may be more likely to engage in problematic sexual behavior, both with pornography and risky sexual behavior.

Based on this theory as well as Bronfenbrenner's Ecological model, and past research, one would expect that differing pornography trajectories would have significant impacts on the adolescent risky sexual behavior over time (Braithwaite et al., 2015; Leonhardt & Willoughby, 2018). An individual who was consistently exposed to pornography over time may be more likely to engage in more risky sex (e.g., casual, unprotected sex; Dawson et al., 2019; Peter & Valkenburg, 2011; Rasmussen & Bierman, 2018) due to the typical portrayal of risky sex within pornography. We theorize based on previous research and theory that we will find 3 different trajectories: abstainers, increasing, and frequent users, which will be described in detail below.

Current Study

Despite the extensive research on adolescent pornography use, little research has examined the relationship between adolescent pornography use and sexual behavior over time and, to our knowledge, no research over the transition period between adolescence and emerging adulthood. This paper seeks to address the relationship between adolescent pornography use and sexual behavior over time (particularly over the transition between adolescence and emerging adulthood) by testing the following hypotheses:

H1: Individuals who report less typical daily pornography trajectories (abstainers) will also report less risky sexual behavior over time.

H2: Individuals who report increasing levels of daily pornography trajectories over time (increasing users) will also report an experimentation with risky sexual behavior over time.

H3: Individuals who report high levels of daily pornography trajectories (frequent users) will also report significantly higher levels of risky sexual behavior over time.

H4: Low levels of self-regulation, religiosity, gender and parent-child communication about sex will likely predict higher levels of pornography trajectories (i.e. frequent users) as well as riskier sexual behavior over time.

H5: Males will be more likely to view higher amounts of pornography than females, as well as engage in more risky sexual behaviors over time.

Methods

Participants

The participants for this study were taken from the Flourishing Families Project, which is an ongoing, longitudinal study of inner family life. This project involves families whose child was between the ages of 10 and 13 (N = 500; 51.6% female) at the beginning of the study. The

data from the current study is from Waves 5–10. Wave 5 began in 2011 and each Wave followed yearly. The sample consists of 463 families (92.6% retention from Wave I) with a child within the target range (311 two-parent families and 151 single-parent families). Participant children averaged 15.3 years of age, while mothers averaged 47.2 years and fathers average 49.3 years in age. Two hundred ninety-eight families were of European American ethnicity, 56 were African American, with smaller number for Hispanics (1) and Asian Americans (4). Eighty-nine families are categorized as multi-ethnic, based on a combination of two or more ethnicities among family members. In terms of parental education, 61% of mothers and approximately 70% of fathers had a bachelor's degree or higher. Related to yearly family income, 19.8% of families reported making less than \$59,000; 19.8% reported income in the \$60,000-99,000; 22.8% reported income in the \$100,000-149,000, with another 16.2% making \$150,000 or more per year. Approximately, 29.8% of single parents reported being never-married, 46.4% divorced, 15.2% cohabiting, 4% widowed, and 4.6% not cohabiting but in a committed relationship. There was a 69.90% retention rate between Waves 5-10 in the data collection in the current paper.

Procedures

Participant families were selected from a large northwestern city and interviewed during the first eight months of 2007 for a Wave 1 data sample. Wave 5 (the first year in the current paper) took place in 2011, while Wave 10 took place in 2016. Families were primarily recruited using a purchased national telephone survey database (Polk Directories/InfoUSA). At that time, this database contained 82 million households across the United States and provided detailed information about each household, including the presence and age of children. Families identified using the Polk Directory were randomly selected from targeted census tracts that mirrored the socioeconomic and racial stratification of reports of local school districts. All

families with a child between the ages of 10 and 14 living within target census tracts were deemed eligible to participate in the project. Of the 692 eligible families contacted, 423 agreed to participate, resulting in a 61% response rate. However, the Polk Directory national database was generated using telephone, magazine, and internet subscription reports; as a result, families of lower socio-economic status were under-represented. Therefore, in an attempt to more closely mirror the demographics of the local area, a limited number of families were recruited into the study via other means (e.g., referrals and fliers; $n = 77$, 15%). By broadening the approach, the socioeconomic diversity of the sample was increased. All families were contacted directly using a multi-stage recruitment protocol. First, a letter of introduction was sent to potentially eligible families (this step was skipped for the families who responded to fliers). Second, interviewers made home visits and phone calls to confirm eligibility and willingness to participate in the study. Once eligibility and consent were established, interviewers made an appointment to come to the family's home to conduct an assessment interview that included videotaped interactions, as well as questionnaires that were completed in the home for wave 5 and then online for waves 6–10 (as children aged out of the home).

Measures

Pornography Use

(Waves 5–10). Participants were asked about their pornography use during Waves 5 through 10. Participants reported how much time they spent on a typical day viewing pornography. They responded on a 9-point Likert scale (1 = none, 2 = Less than 30 Minutes, 3 = 31–60 minutes, 4 = 1–2 Hours, 5 = 2–3 Hours, 6 = 3–4 Hours, 7 = 5–6 Hours, 8 = 7–8 Hours, 9 = More than 8 hours; Kaiser Family Foundation, 2002). These scores were recoded (0 = none, 1 = Less than 30 Minutes, 2 = 31–60 minutes, 3 = 1–2 Hours, 4 = 2–3 Hours, and 5 = 3+ Hours).

As this measure examines individuals who reported typical daily pornography use, this measure captures the difference between individuals who do not have high-frequency pornography use and those who do have high-frequency pornography use.

Risky Sexual Behavior

(Wave 10). Participants gave open responses to the following questions: *How old were you when you first had sexual intercourse?*; *How many different partners have you had sexual intercourse with?*. Participants also were asked three items about protective measures used in their last sexual intercourse encounter. Responses were dummy coded so that 0 = No protection, 1 = Protection (Turchik & Garske, 2009).

Parent-Child Sex Communication

(Wave 5). Parent-Child sex communication was measured with one item on a four-point Likert-type scale: 1 = Never, to 4 = Often. The item youth responded to was: *In the last year how often have you talked with your parents about sexual activity, in general?* (Albert, 2010).

Self-Regulation

(Wave 5). Child self-regulation was measured with thirteen items on a five-point Likert-type scale: 1 = Never True, to 5 = Always True. Scores were averaged, and reliability was .808 (Novak & Clayton, 2001).

Religiosity

(Wave 5). Child's religiosity was measured with four items on a four-point Likert-type scale: 1 = Strongly Disagree, to 4 = Strongly Agree. Items were summed, and reliability was good at .93 for the overall scale. Items included: *I pray daily, I look to my faith as providing*

meaning and purpose in my life, My faith is an important part of who I am as a person, and My faith impacts many of my decisions. Scores were averaged, and reliability was .958 (Lewis et al., 2001).

Controls

Controls in the model included gender (0= Female, 1= Male; treated as an unordered categorical variable), race (1= white (67.63%), 0 = other (32.37%)), age, and family's gross monthly income.

Analysis Plan

We conducted a zero-inflated population growth curve (using Mplus v. 8.3) to examine how pornography use changed over a 6-year period. If there is significant variance in the slope, we will then conduct a growth mixture model to observe the different trajectories of pornography use. Finally, we examine predictors and outcomes of each class using the three-step approach in Mplus. Predictors include, parent-child communication about sex, religiosity, self-regulation, and outcomes are pornography use during emerging adulthood, use of protection in sex and number of reported sexual partners.

Results

Preliminary Statistics

Males viewed more pornography than females at every wave ($p < .01$). However, females while females reported slightly higher risky sexual behavior, these differences were not significant. See Table 1 for means and standard deviations.

Main Analyses

We first examined a growth curve model of pornography use over time. Model fit was moderate [$\chi^2(16) = 80.80, p < .001$, comparative fit index = .93, Tucker-Lewis index = .934, root-mean-squared error of approximation = .08]. Analyses revealed a significant intercept ($I = .314, p < .001$), and a significant slope trending upwards over time ($S = .26, p < .001$). Figure 1 shows the estimated means. Additionally, there was significant variance in the intercept ($I = 3.574, p < .001$) and slope ($S = 0.018, p < .01$) suggesting the possibility of multiple trajectories of pornography use over time. While many researchers typically split pornography models into male and female models, our sample did not provide enough females reporting high-frequency pornography use and we were therefore not able to conduct separate models. We then conducted a growth mixture model to identify heterogeneous classes (Bollen & Curran, 2006). Two-, three-, and four-class models were estimated. To determine the number of classes, we examined two information criteria, the Akaike Information Criterion (AIC) and the Bayesian Information Criteria (BIC), as well as entropy.

Table 2 shows the fit improvement when moving between different classes. Fit statistics suggested improvement when moving from one class to two, and from two to three, but not between three and four. Thus, we settled on a three-class model as the most favorable model of the data. Figure 2 shows the growth trajectories for each class, and Table 3 shows the growth parameters for each class. Class 1 (56.7%, $n = 359.45$) showed little or no reported pornography use for most waves, with a slight increase in the last wave. We call this class “Low Stable”. Class 2 (2.7%, $n = 17.3$) showed the highest reporting of daily pornography at base with a sharp increase from time 1 to time 2 and then a slight increase throughout the following waves. We call

this class “High Stable”. Class 3 (40.5%, $n=256.22$) showed initial lower reports of daily pornography use with a slight increase over time. We call this class “Low Increasing”.

Next, the three-step approach in Mplus (v8.3) was used to determine predictors of the change patterns of pornography use and how outcome variables differ across the patterns. The three steps involve: 1. classify participants into different classes, 2. create a most likely nominal class variable C, and 3. regress class variable C on covariates to determine predictors (R3step), or regress distal outcome variables on the class variable C (DU3step) to assess how outcome variables differ across the classes. The DU3step implies that the distal outcome variables (D) are assumed to have unequal variances (U) in the third-step estimation. As the predictors and outcomes cannot be included in the third step concurrently, the predictors and outcomes were examined separately.

Interested readers may refer to Asparouhov & Muthén (2014) for more details. Predictors included frequency of parent-child communication about sex, self-regulation, religiosity, race, gender, age, and family’s income, all measured at Wave 5. Outcomes included number of sexual partners and protection at last sexual intercourse, all measured at Wave 11. The latent class membership variable was specified as a nominal variable in a multinomial logistic regression model, while the class predictors were specified as the independent variables. In this model, class 1 which had the lowest starting values and did not change much over time was set as the reference category. In terms of predictors, individuals who reported higher scores in religiosity were more likely to be in the “Low Stable” group compared with the “High Stable” ($\beta = -.50, p = .122$) group. Additionally, females were more likely to be in the “Low Stable” group compared with the “High Increasing” ($\beta = 1.264, p = .176$) group. Lastly, individuals with lower income were more likely to be in “High Stable” than the “Low Stable” ($\beta = .015, p = .906$) group. See Table 4 for predictor parameters.

For outcomes, there were no differences in use of protection during last intercourse at the final wave. However, the “Low Increasers” group showed significantly higher numbers of sexual partners than the “High Stable” ($\beta = 1.77, p = .011$) group at the final wave. See Table 5 for outcome parameters.

Discussion

This paper examined pornography use over an extended period of time. Specifically, we examined the predictive qualities of parent-child communication, religiosity, gender, and self-regulation on pornography, as well as how differing pornography trajectories impact risky sexual behavior over time. Because of the rise in pornography use over the past few years (Zhukova, 2021), it is important to know how adolescents are viewing pornography, what may predict differing pornography trajectories, and how those trajectories impact risky sexual behavior. Research has examined many of these relationships (see Bloom & Hagedorn, 2014; Martellozzo et al., 2016; Rasmussen & Bierman, 2018; Sirianni & Vishwanath, 2016; Widman et al., 2016; Willoughby et al., 2018), however, this study included the transition into emerging adulthood, which is typically associated with more sexual behavior (Morgan, 2012), to more fully understand predictors of pornography trajectories and how those trajectories impact risky sexual behavior over time.

Overall, findings revealed that over time more individuals were reporting high-frequency pornography use (See Figure 1). While the amount of overall daily pornography uses participants reported did not change much over time, we did see that more individuals switched from reporting no daily pornography use to reporting daily pornography use. Thus, we can see that over an extended period of time, more adolescents are reporting high-frequency pornography

use. This is consistent with previous research that suggests that adolescents who view pornography tend to view more pornography at a later point in time (Willoughby et al., 2018).

When examining pornography trajectories, findings revealed 3 separate classes: Class 1, called “Low Stable”, Class 2 called “High Stable” and Class 3, called “Low Increasers”. The “Low Stable” group (57%) consisted of individuals who reported little or no pornography use for most waves, with a slight increase in the last wave. Over time, they were consistently low in their pornography use. The “High Stable” group (2.7%) consisted of individuals who reported a higher amount of daily pornography use, roughly between 30 and 60 minutes and 1-2 hours of reported pornography use each day. This group remained consistently high in reported pornography use over time. Lastly, the “Low Increasers” group (40.5%) consisted of individuals who started at a lower reported use of daily pornography (less than 30 minutes a day), and gradually increased in reported pornography use over time, reporting an average of slightly more than 30 minutes each day. “Low Stable” and “Low Increasers” contained a majority of participants, and “High Stable” contained relatively few participants. As this study was on typical daily pornography use, the proportions of each sample group were relatively expected, as a small proportion of individuals typically report high-frequency usage of pornography use, particularly daily pornography use (Martellozzo et al., 2016).

Hypothesis 1 was supported, as individuals in the “Low Stable” group were not likely to have riskier sexual behavior over time. Sexual script theory (Gagnon & Simon, 2005) suggests that since these individuals reported little to no pornography over time, their reported sexual behavior would be less likely to be influenced over time as well, as they are not viewing pornography frequently and thus their sexual script is not being influenced by viewing pornography. As individuals who were in the “Low Stable” group were also more likely to be

highly religious, and therefore more likely to have conservative outlooks toward sexuality, it is likely that these social and personal beliefs also influenced their sexual script. This will be discussed further later on.

Our second hypothesis was partially supported, as the “Low Increasers” group was more likely than other groups to report more sexual partners, however they did not report less use of protection during last sexual intercourse. Thus, “Low Increasers” are engaging in riskier sexual behavior by reporting more sexual partners, however, they are just as likely as other groups to use protection during sexual intercourse. The fact that individuals are engaging with more partners but still being protected during sex may be due to sex education, which mainly focuses on using protection during sex (Breuner & Mattson, 2016), which was not included in this study. Further research should examine how sex education may moderate the relationship between pornography use and protection during sexual intercourse.

Lastly, Hypothesis 3 was not supported. The “High Stable” group was not more likely to engage in risky sexual behavior over time. It is possible that since this group had initial higher exposure to pornography, some individuals may have already been engaging in higher risky sexual behavior and thus we did not see an increase over time. Sexual script theory would suggest that as these individuals began with higher pornography use and their use remained stable, their sexual script would not be influenced simply by the amount of pornography viewed, as it remained the same (Gagnon & Simon, 2005). Comparatively, the “Low Increasers” group started with a low exposure to pornography and gradually increased over time, and as their daily pornography use increased over time their likelihood of engaging in risky sexual behavior also increased over time. The “High Stable” group also had a small proportion of the sample, which suggests that few individuals in our sample were viewing higher amounts of pornography on the typical day. It is

important to note that these reported numbers are likely to be different than reality, as reporting bias is typically evident with problematic behaviors.

However, it is important to note when comparing the “Low Stable” and “Low Increasers” group that while these two groups may be statistically significantly different from one another, there is not much practical difference between these groups. While the more individuals did fall into the “Low Increasers” group as time went on, the differences between “Low Stable” and “Low Increasers” are rather small. These differences may not be meaningful as the measure for pornography use was not clear, as will be discussed further later on.

Hypothesis 4 was partially supported as well, as only some predictors significantly predicted pornography use trajectories. Findings suggest that highly religious individuals tend to be in the “Low Stable” group. Thus, individuals with higher religiosity were more likely to be in the group that reported little to no pornography use. This is consistent with previous research, as religiosity tends to be a protective factor against initial viewing of pornography and any potential pornography use (Patterson & Price, 2012). This may be because religiosity levels could reflect attitudes regarding sexual behavior as religious individuals tend to be more conservative regarding views on pornography and risky sexual behavior (Rasmussen & Bierman, 2018). Individuals who are more religious and conservative in their views toward sex are less likely to feel comfortable engaging in both pornography and risky sexual behavior (Patterson & Price, 2012), and would likely report less of these types of behavior (Rasmussen & Bierman, 2018), avoid engagement or engage infrequently with both, especially risky sexual behavior (Willoughby et al., 2021). However, it is also important to note that some previous research suggests a group of individuals within the religious community that when they view pornography tend to have high-frequency pornography use (Willoughby et al., 2021), most likely due to shame or higher moral

struggles regarding pornography use and risky sexual behavior. Because of this, parents, religious leaders, researchers, and therapists should aim to change conversations regarding pornography—especially within religious contexts. Including discussions regarding what to do when coming across pornography, how to work through pornography issues and how to discuss pornography use with loved ones would be a good first step in helping this group of religious individuals who have a higher-frequency pornography trajectory.

Females were also more likely to fall within the “Low Stable” group. This is also consistent with previous research, as pornography use tends to be a gendered phenomenon (Carroll et al., 2008; Martellozzo et al., 2016; Peter & Valkenburg, 2011). For example, Martellozzo and colleagues (2016) found that males were almost twice as likely to seek out pornography use than females. Thus, it follows that in this sample females would be less likely to report much pornography use over time.

However, self-regulation and parent-child sex communication did not predict pornography trajectories. As self-regulation is often tied to problematic pornography use (Sirianni & Vishwanath, 2016) and we had so few individuals reporting higher pornography use, it is likely we did not find a significant relationship between the two due to few numbers of individuals reporting higher pornography use. Parent-child sex communication likely did not predict pornography trajectories as our measure only examined frequency of parent-child sex communication, not timing or quality. For example, previous research has found that timing of these conversations is important, as the effects may differ based on when parents communicate about sex with their child (i.e. before sexual activity or after sexual activity).

Lastly, hypothesis 5 was partially supported. Overall males were more likely to report higher daily pornography trajectories than females. However, there was no significant difference

in risky sexual behavior between males and females. Thus, hypothesis 5 was partially supported. Males reporting more daily pornography use is consistent with previous research (Carroll et al., 2008; Martellozzo et al., 2016; Peter & Valkenburg, 2011) as pornography use tends to be a more gendered phenomenon. These findings add to the previous literature by providing a clearer picture as to the gender differences of pornography trajectories over an extended period as well as throughout the transition into emerging adulthood.

Overall, these findings have several important implications. First, individuals who change from not reporting high-frequency pornography use to reporting high-frequency pornography use over time are more likely to engage in risky sexual behavior. Thus, it is important for parents, sex educators, and therapists to be aware of individuals who may be consistently increasing in their daily pornography use over time, particularly those who increase to high-frequency pornography use. While these individuals are just as likely to use protection during last sexual intercourse, they are more likely to report higher numbers of partners, which may lead to negative outcomes physically (i.e. STDs) and emotionally. This may point to the success of sex education, particularly in schools, as many classes in sex education focus mostly on protection during sex. Further, these individuals may be more open in their sexual attitudes which previous research suggests would impact both how they view pornography and their own sexual behavior (Rasmussen & Bierman, 2018).

Second, gender and religiosity may play important predictive roles in pornography trajectories, as females and individuals who report higher levels of religiosity tend to be more protected from high-frequency pornography use. Thus, parents, sex educators, and therapists should be aware that individuals who are not female or highly religious may be at more risk of transitioning into high-frequency pornography trajectories.

Limitations and Conclusion

This study is not without its limitations. Some of the main limitations include a few problematic measures used within this study, particularly pornography. This measure was a single item and was not defined. This could have caused reporting variability as individuals may have differing definitions of how pornography is defined. However, adolescents would be more likely to have a narrower definition of pornography and given that the respondents were adolescents it is likely that they would have more narrow definitions surrounding pornography compared to adults. This item is also limited in the fact that it does not capture many of the mid-range data, such as individuals who may use pornography once a week or once a month. Thus, there is heavy amounts of under-reporting in this measure. Therefore, this measure should only be interpreted in the light that those who are reporting daily pornography use are individuals who are high-frequency pornography users compared to those who are not.

Similarly, the parent-child communication measure is also fairly weak, as it is only one item. This item also only asks about the quantity of conversations, rather than quality or even timing of conversations.

Further limitations include sample size and timing of when the pornography measure began. While our overall sample size was acceptable, our proportion of our sample who reported viewing pornography on a typical day was rather low. Further research should aim to specifically examine individuals who view pornography more frequently, to understand this population more fully. Further, the pornography measure began when participants were in mid-adolescents. Understanding the full picture of adolescent pornography use, by beginning data collection at a younger age, would have been beneficial.

Despite these limitations, this study adds meaningful content to the current research on adolescent pornography use, such as revealing significant predictors of pornography trajectories and also how pornography use trajectories impact risky sexual behavior over time. While this study is the first to examine adolescent pornography use over an extended period of time and through the transition into emerging adulthood, further research is needed to fully understand the trajectories and implications of pornography use over time for adolescents. Future research should also specifically examine the trajectories of pornography use with a gendered approach, allowing further research to examine how these trajectories differ for males and females. However, overall, this study concludes that over an extended period of time, gender and religiosity play an important predictive role in pornography trajectories and individuals who increase in their pornography use over time are most at risk for engaging in risky sexual behavior.

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Appendix A: Tables and Figures

Table 1: Means and Standard Deviations for Sex Differences for Pornography Use

<i>Pornography Use</i>	<i>Boys</i>		<i>Girls</i>	
	M	SD	M	SD
Wave 5**	1.32	.78	1.04	.23
Wave 6**	1.5	.94	1.11	.55
Wave 7**	1.84	1.21	1.23	.72
Wave 8**	1.84	1.03	1.21	.65
Wave 9**	1.90	1.26	1.22	.69
Wave 10**	1.83	1.06	1.22	.53
<i>Age at First Intercourse</i>				
Wave 6	17.59	1.36	17.41	1.28
Wave 10	16.78	1.81	16.62	1.80
<i>Use of Protection during Intercourse</i>				
Wave 6	.93	.27	.89	.32
Wave 10	.78	.44	.77	.42
<i>Number of Partners</i>				
Wave 6	.54	1.44	.67	1.78
Wave 10	4.24	5.37	5.23	8.05

* $p < 0.05$, ** $p < 0.01$

M, mean; *SD*, standard deviation

Table 2: Relative Model Fit by Number of Classes

<i>Classes</i>	<i>N</i>	<i>Entropy</i>	<i>BIC</i>	<i>AIC</i>
1	633	---	4131.544	4082.589
2	376, 257	0.713	4139.068	4090.112
3	360, 17, 256	0.787	4023.297	3960.990
4	102, 282, 233, 16	0.633	4036.256	3960.598

The bold values represent the final solution chosen.

BIC, Bayesian Information of Criterion; AIC, Akaike Information of Criteria

Table 3: Growth Parameters by Class

<i>Class no. (percent of sample)</i>	<i>Intercept B (SE)</i>	<i>Linear Slope B (SE)</i>
1 (56.8)	.84*** (1.06)	.870*** (.214)
2 (.03)	1.004*** (.113)	.022 (.051)
3 (40.5)	.42*** (.133)	.435*** (.083)

* $p < 0.05$, ** $p < 0.01$, *** $p < .001$
SE, standard error

Table 4: Predictor Parameters by Class

	<i>Class 1</i> B (SE)	<i>Class 2</i> B (SE)
Parent-Child Sex Communication	-.20 (.12)	-.17 (.44)
Self-Regulation	-.18 (.21)	1.24 (.76)
Religiosity	.77 (.10)***	-.50 (.32)
Gender	-2.29 (.238)***	1.26 (1.35)
Age	-.12 (.09)	.12 (.29)
Income	.015 (.12)	-1.23 (.63)

* $p < 0.05$, ** $p < 0.01$, *** $p < .001$
SE, standard error

Table 5: Outcome Parameters by Class

	<i>Class 2</i>	<i>Class 3</i>
	B (SE)	B (SE)
Condom Use	-.54 (.64)	-.85 (.40)
Number of Intercourse Partners	.45 (1.50)	1.77 (.70)*

* $p < 0.05$, ** $p < 0.01$, *** $p < .001$
SE, standard error

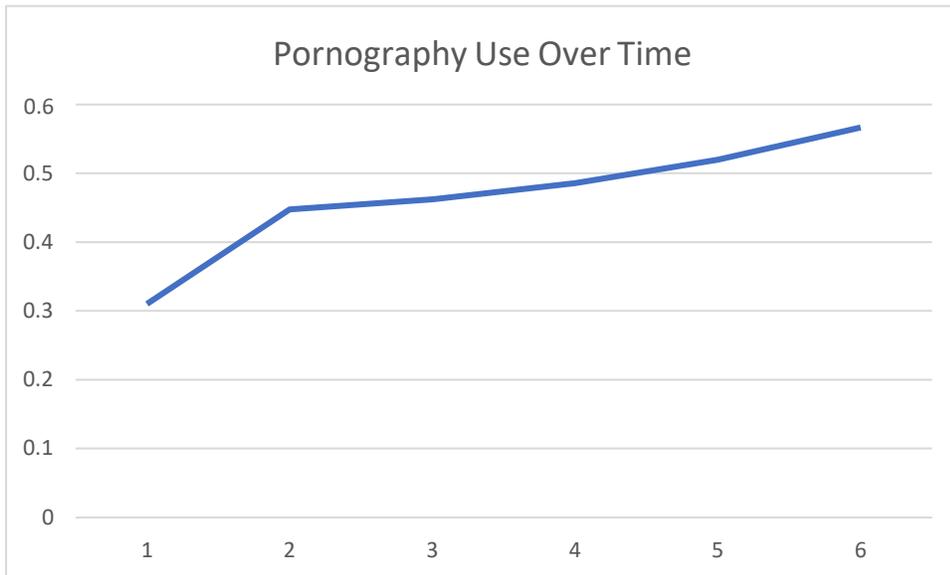
Figure 1: Estimated Means of Pornography Use Over Time

Figure 2: Estimated Means of 3 Classes of Pornography Use Over Time