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ORIGINAL PAPER

Porn Sex Versus Real Sex: How Sexually Explicit Material Shapes Our Understanding of Sexual Anatomy, Physiology, and Behaviour

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Abstract Given that consumption of sexually explicit material (SEM) and sexual behaviour are inextricably linked, the purpose of this study was to determine whether the frequency of SEM consumption predicts knowledge of sexual human anatomy, physiology, and typically practiced sexual behaviour. A secondary purpose was to investigate self-perceived effects of SEM consumption and whether participants report SEM as a positive or negative contributor to various aspects of life. Using a modified version of the Pornography Consumption Questionnaire and the Falsification Anatomy Questionnaire, we determined that contrary to expectations, frequency of SEM exposure did not contribute to inaccurate knowledge of sexual anatomy, physiology, and behaviour. Rather, the opposite relationship was found. However, in concert with previous literature, participants reported greater positive self-perceived effects of SEM consumption than negative effects.

Keywords Pornography · Consumption · Anatomy · Sexual behaviour

Introduction

With advancing technology, and ease of accessibility, it is perhaps unsurprising that sexually explicit material (SEM) has become so ubiquitous today. In tandem with its increased presence arises a concern over its effects on young people, and despite numerous probes, the results of such explorations have largely generated inconsistent and conflicting findings (Lo and Wei 2005). Though current research reveals a striking association between SEM consumption and sexual attitudes and behaviours (Braun-Courville and Rojas 2008), the debate over SEM consumption

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and its relation to atypical sexuality and poor quality of life remains unresolved (Ybarra and Mitchell 2005). Young people are considered to be particularly at risk to the effects of SEM as a result of exposure to the messages contained therein during critical junctures of sexual development (Sinkovic et al. 2013).

With the Internet influencing nearly every aspect of the human experience, it is not surprising that the majority of SEM exposure and consumption occurs via the Internet (Haggstrom-Nordin et al. 2005; Stulhofer et al. 2010). Today, approximately 75% of households in North America have Internet access (U.S. Bureau of the Census 2009), with 93% of young people online and "sex" as the most frequently researched topic (Braun-Courville and Rojas 2008). The exponential growth of the Internet had led to a corresponding increase in the accessibility, anonymity, and convenience of SEM (Braithwaite et al. 2015). Exceeding 13 billion dollars in revenue in the U.S. alone (Ropelato 2007), it is estimated that world revenues of SEM now exceed 93 billion dollars. A recent study reported that about 28,000 people actively seek out SEM on the Internet every second, and over 244 million pages are operated within the United States (Doran 2009).

The proliferation of SEM on the Internet has led sexologists and developmentalists to question its impact on our understanding of human sexual anatomy, physiology, and behaviours. Interestingly, evidence indicates that adolescents and young adults have limited knowledge of foundational aspects of sexual reproduction, such as anatomy and physiology, despite 95% of youth between the ages of 13 and 18 years having been exposed to some form of sexual education (Ammerman et al. 1992). Likewise, Rashid and Jagger (1996) reported that the average 16- to-70-year-old citizen in the U.K. is uninformed about basic human anatomy, and Blum (1978) reported that female participants asked to draw several different familiar anatomical structures—such as the vagina, clitoris, uterus, fallopian tubes and ovaries—reproduced inadequate drawings and could not answer basic questions about anatomical form and function. Indeed, physicians are unable to confirm whether adolescents know what is meant when they discuss sexuality or use sexual vocabulary that is considered "basic" (Ammerman et al. 1992), and evidence indicates that while sexual education focuses on the health of anatomical structures, it fails to address accuracy of knowledge around the function of anatomy in sexual activity.

It is unclear why such widespread inadequate sexual knowledge remains (Trostle 2003), nor is it clear to what extent, if any, media such as SEM—that flaunts a bevy of misrepresentations of sex—is responsible for these misunderstandings. Given the ubiquitous and proliferating nature of SEM, it seems pertinent to question whether or not heightened exposure to such materials contributes to a similarly heightened distortion in people's understanding of sexuality. That SEM is often criticized as perpetuating unrealistic sexual ideals, it seems likely that exposure would result in a shift in accurate sexual knowledge. For example, men who appear in SEM tend to have large penises (approximately 8–10 inches in length), relative to the average sized penis ranging between 4.6 and 6 inches in length. Moreover, women in SEM tend to exhibit above average sized breasts, and vulvas that appear relatively indistinguishable from one another (Lever et al. 2006). Could this gross exaggeration of male and female genitalia influence the perception of human

anatomy? Although SEM may not influence every person in the same way—and certain populations, such as developing adolescents—may be prone to uncritical interpretations of SEM, overall the effects of SEM on sexuality is determined by an intersection of demographic differences and sexual contexts (Hald et al. 2013a, b), which certainly may include frequency of exposure and previous sexual experience.

Theoretical Frameworks

There is considerable concern surrounding the growing accessibility of SEM and its impact on knowledge and sexual behaviours (Nathan 2007). Although this topic remains greatly understudied, theoretical concepts used to explore the influence of SEM (Braithwaite et al. 2015) suggest that the amount consumed, and the types viewed, are habitually associated with performance during intercourse and the development of sexual identity. Additionally, empirical evidence suggests that after viewing SEM, individuals tend to mimic the sexual practices illustrated in the media being consumed (Morgan 2011). Simply put—second to sexual stimulation—SEM conditions the sexual behaviours of its viewers. Researchers often explain such findings by referencing Cultivation Theory, which holds that repeated exposure to messages and images commonly portrayed in the media inspire and impact attitudes and beliefs (Gerbner et al. 1994). This theory coincides nicely with Gagnon and Simon's (1973, 1986, 2005) cognitively-based Sexual Scripts Theory, which proposes that as actors, our sexual encounters and behaviours are read from deeply ingrained sexual scripts informed by cultural, historical, social, and individual experiences. Both Cultivation and Sexual Scripts Theory reject the notion that sex is a biological construct driven by inherent desires. Rather, sexuality is socially constructed and greatly influenced by media, societal norms, and preexisting values and attitudes (Braithwaite et al. 2015). Similarly, the Media Practice Model (Brown 2000; Steele 1999; Ward 2003) and the Sexual Socialization Theory (Aubrey et al. 2003) further consider that people tend to actively seek out media that best reflects their sense of self and personal interests. That is, individuals seek out media they feel best reflects themselves, and in turn, that media guides the development of their sexual identity, both shaping it and changing it.

In light of both previous research and current models of sexuality, it has therefore been posited that repeated exposure to the explicit imagery, social messages, and normalized outlandish sexual performances found in SEM must certainly influence the perceptions, emotions, and behaviours of its viewers (Mulya and Hald 2014).

Inconsistencies Within the Literature

Traditionally, researchers have proposed that exposure to sexually explicit material significantly contributes to a variety of adverse effects such as permissive sexual attitudes, greater acceptance of premarital sex, and a tendency to see sex without love as more important than sex with love (Zillmann 1998). Further, opponents of SEM have determined that regular consumption is associated with greater engagement in high-risk sexual behaviours such as anal sex, a greater number of sexual partners, and a lowered age of first intercourse (Albright 2008; Braun-

Courville and Rojas 2008; Manning 2006; Morgan 2011). Some opponents have raised concerns that young people exposed to SEM during pivotal stages of sexual development may be susceptible to changes that alter their sexual behaviours and attitudes in harmful ways (Brown and L'Engle 2009; Peter and Valkenburg 2011). These negative sexual adaptations could potentially lead to complications, such as greater risks of acquiring sexually transmitted infections and the endorsement of permissive sexual norms (Luder et al. 2011). Wingwood et al. (2001) explored the sexual attitudes and behaviours of African-American women and found that those who had been exposed to X-rated sexually explicit recordings were more likely to hold negative attitudes toward the use of condoms, engage in higher-risk sexual behaviours—such as having a higher number of sexual partners—and test positive for chlamydia infection. Notably, it has also been suggested that prolonged exposure to SEM can lead to exaggerated beliefs about the ease of access to sexual activity, the frequency of sex among peers, and to heightened negative attitudes towards sexual partners (Braun-Courville and Rojas 2008). Indeed, some experimental studies examining insensitivity towards victims of sexual violence have found that exposure to violent SEM may be a contributing factor to men's aggressive behaviour against women (Donnerstein et al. 1987; Malamuth et al. 2000; Zillmann 1998; Zillmann and Bryant 1989).

In contrast, proponents of SEM refute such findings on the basis of methodological flaws and inherent bias. Rather, they argue that exposure to SEM plays a constructive role in various aspects of sexuality, and more often than not, has positive influences on sexual attitudes and behaviours (Stulhofer et al. 2010). Supporters postulate that exposure is *not* associated with sexual risk taking (Martyniuk et al. 2015), and that SEM enhances sexual knowledge, perceptions of sexual intercourse, and overall well-being (Hald and Malamuth 2008). Particularly, individuals report that exposure to SEM cultivates more positive affect towards sexual intercourse and one's sexuality, which result in an increased global quality of life assessment (Hald and Malamuth 2008). SEM has also been reported to successfully treat sexual dysfunction (Morokoff and Heiman 1980), aid in sexual and relationship satisfaction (Maddox et al. 2011; Manning 2006), reduce misogyny, aggression, and violence against women (Kohut et al. 2016; Martyniuk et al. 2015), increase excitement, and expand one's sexual repertoire by introducing novel ideas (Olmstead et al. 2012; Weinberg et al. 2010). Research has also shown that even within a culture of strict anti-SEM legislation, a sample of adults living in Indonesia reported beneficial and positive effects resulting from viewing SEM (Mulya and Hald 2014).

Focus of the Present Study

Given mixed findings regarding the influence of SEM on sexuality, and previous research suggesting widespread inaccuracies in sexual knowledge, the goal of the present study was to investigate whether SEM consumption contributes to inaccurate knowledge of human sexual anatomy, physiology, and typically practiced sexual behaviours. Specifically, this study examined whether predictors such as age, gender, perceived realism of SEM, frequency of consumption, and

sexual experience determine participants' level of sexual knowledge. This study is the first to investigate the presence of such a relationship and hinges upon the assumption that—should SEM influence sexuality to the extent that some research indicates—it should also influence knowledge of sexual anatomy, function, and behaviour. A secondary purpose of this study was to evaluate whether SEM exposure is perceived as having positive or negative effects on attitudes, behaviours, and general quality of life.

Given that *amount* of exposure to SEM may be critical in the influence it has on sexual attitudes and behaviours—with frequent consumers and those whose sexuality is not well established being especially vulnerable (Hald et al. 2013a, b; see also Brown and L'Engle 2009; Peter and Valkenburg 2011), several predictions regarding frequency of exposure were generated. First, it was hypothesized that frequency of SEM exposure would predict knowledge of sexual anatomy, with *greater exposure* resulting in *poorer knowledge*. Second, it was hypothesized that frequency of SEM exposure would predict knowledge of sexual physiology—what sexual intercourse commonly entails and how sexual bodies typically function—again, with frequent SEM exposure associated with less knowledge. Further, these relationships were anticipated to be linear; that is, participants who indicated the greatest consumption of SEM would report the poorest knowledge of anatomy and physiology.

Third, the variables of gender, age, perceived realism, and sexual experience were also hypothesized to predict anatomy and physiology knowledge. These predictors were selected given evidence identifying them as most relevant to knowledge attainment (Ammerman et al. 1992) and associated with SEM consumption (Hald 2006; Mulya and Hald 2014; Sinkovic et al. 2013).

Finally, it was hypothesized that all participants would report positive effects of their SEM consumption, further supporting the findings of previous research (Hald and Malamuth 2008; Hald and Mulya 2014; Hald et al. 2012).

Methodology

Participants

The sample was comprised of 337 participants (females; $n = 259$) recruited through several online forums (i.e., Facebook and Twitter) and via the research participant pool of a university located in a large Western Canadian city. As an incentive to recruit, student participants were eligible to receive course credit. The majority of the sample were heterosexual, female undergraduates, who had completed at least some undergraduate study (Table 1). Participants ranged in age from 15 to 58 years ($M = 23.00$; $SD = 6.35$).

Design and Procedure

Participants were directed via recruitment posters to complete a 20-min, anonymous, online survey (www.qualtrics.com). Following completion of basic

Table 1 Distribution of demographic characteristics by gender

	Males $n = 78$ $M_{age} = 24.17$ $SD = 6.79$	Females $n = 259$ $M_{age} = 23.00$ $SD = 6.35$
1. Sexual orientation		
(a) Straight	69 (88.5%)	228 (88.0%)
(b) Gay	7 (9.0%)	5 (1.9%)
(c) Bisexual	2 (2.6%)	26 (10.0%)
2. Education		
(a) Some high school	NA	2 (.8%)
(b) Completed high school	17 (21.8%)	19 (7.3%)
(c) Some undergraduate	52 (66.7%)	206 (79.5%)
(d) Completed undergraduate	8 (10.3%)	25 (9.7%)
(e) Graduate school or above	1 (1.3%)	7 (2.7%)
3. Relationship status		
(a) Not in a relationship	29 (37.2%)	91 (35.1%)
(b) Casually dating	18 (23.1%)	30 (11.6%)
(c) Committed relationship but not cohabitating	18 (23.1%)	92 (35.5%)
(d) Committed relationship and cohabitating	13 (16.7%)	44 (17.0%)
(e) Divorced	NA	2 (.08%)

demographics, validated measures of anatomy knowledge, frequency of SEM exposure, sexual experience, and perceptions of both the positive and negative aspects of SEM were presented to participants in equivalent order. This study employed a hierarchal multiple regression analysis, with age, gender, perceived realism of SEM, frequency of consumption, and sexual experience (i.e., frequency of intercourse and the number of vaginal, oral, and anal sexual partners) as predictor variables. A paired samples t- test was conducted to assess mean differences in positive and negative effects of SEM consumption by gender. Given that researchers exploring the influence of SEM often rely on interviews with participants—ultimately creating a "third person" effect (i.e., ascribing greater effects of SEM usage to others than to oneself) (Hald and Malamuth 2008)—we adopted an approach rarely used and often overlooked in SEM research; we examined self-perceived effects of SEM consumption using a comprehensive questionnaire.

Measures

Falsification Anatomy Questionnaire (FAQ; Hesse 2015)

The 17-item FAQ was designed for the current study and used to measure participants' understanding of anatomical appearance and sexual acts commonly found in SEM. The FAQ utilizes a 4-point Likert scale to assess the degree to which

participants endorse various statements regarding sexually explicit form and function such as that observed in video footage of SEM. Scores range from 1 (*strongly disagree*) to 4 (*strongly agree*), with higher scores indicating better knowledge of sexual intercourse and male and female anatomy.

Questions on the FAQ include, "Most women entirely remove their pubic hair" and "Men usually last a long time while having sex". Questions were selected for inclusion based on evidence of misconceptions between what constitutes "real sex" relative to "SEM sex". For instance, "SEM sex" gives the impression that women can orgasm easily, quickly, and in any position. Evidence from "real sex" indicates that most women are unable to orgasm through vaginal penetration alone and often require various forms of stimulation or varied periods of time (Fugl-Meyer et al. 2006). As another example, SEM tends to provide viewers the impression that all women remove their pubic hair, though evidence indicates that the majority of women keep at least some of their pubic hair and total removal is much less common than that presented in SEM (Herbenick et al. 2010). We used the terms "most" and "usually" in several FAQ questions in order to provide respondents the opportunity to interpret variation relative to their own perspectives with regard to the frequency with which these events occur. The FAQ is included in Appendix 1.

Face and content validity of the FAQ was determined by having scale questions evaluated by a panel of eight human sexuality researchers, and by administering the FAQ to a sample of 32 respondents in a pilot study. Concurrent validity was assured by confirming that FAQ total scores positively correlated with demographic variables theoretically related to the scale, including education and age. In the present study, Cronbach's alpha for the FAQ was established at .82, indicating very good internal consistency.

Modified Pornography Consumption Questionnaire (MPCQ)

For the current study, 63 questions were extracted from among the 139-item Pornography Consumption Questionnaire (PCQ; Hald 2006). Questions were selected from among the four PCQ subscales to assess participant exposure levels to SEM (e.g., "Age at first exposure") and frequency of SEM use (e.g., "On average, how often have you watched pornographic materials during the last 6 months?"). To yield a better overall estimate of frequency of SEM consumption, and in accordance with procedures previously reported by Mulya and Hald (2014), indicators of consumption (frequency of consumption, duration of consumption) were collapsed into a SEM consumption composite measure, using the average standardized score of the indicators. Higher scores indicated greater frequency of SEM consumption.

Further, participants were asked to indicate the extent to which they believe that SEM consumption had effected them both positively and negatively in relation to five dimensions; sexual knowledge, attitudes towards sex, sexual behaviours, perception of and attitude toward the opposite gender, and overall life-quality. For instance, questions asked, "Has pornography been a positive supplement to your sex life?" and "has pornography given you performance anxiety when you are sexually active with others?" In accordance with scoring procedures provided by Hald

(2006), responses ranged from 1 (*not at all*) to 7 (*to an extremely large extent*), where higher scores indicated more positive and more negative self-perceived effects of SEM exposure, when collapsed into separate positive and negative composites. In the current study, internal consistency reliabilities for the positive effect and negative effect composites were computed $\alpha = .96$ and at $\alpha = .92$ respectively. The MPCQ, including the positive and negative effects scale, is attached in Appendix 2.

For all intended purposes, the questionnaire provided participants with an operational definition of SEM, which stated "any material aimed at creating or enhancing sexual feelings or thoughts in the recipient and, at the same time (1) containing explicit exposure and/or descriptions of the genitals and (2) clear and explicit sexual acts, such as vaginal intercourse, anal intercourse, oral sex, masturbation, bondage, sadomasochism, rape, urine sex, animal sex etc. (Hald 2006). Participants were asked to refer to this definition throughout completion of the questionnaires and were informed that material such as Playboy/Playgirl—where nudity is present but sexual activity is absent—should be disregarded as SEM. Because research suggests that men use playboy/playgirl as a significant source of SEM—while women do not (Hald 2006)—providing a standardized, robust, operational definition of SEM controlled for potential confounds related to gender differences.

Demographic Information

Participants were asked to indicate their age, gender, sexual orientation, relationship status, and highest level of education. Gender differences in demographic information are presented in Table 1. Further, participants were asked to indicate the extent to which they believe that SEM portrayed a realistic or unrealistic depiction of sex, with responses ranging from 1 (*extremely realistic*) to 7 (*extremely unrealistic*). Higher scores indicated a greater endorsement for the perceived "unreality" of SEM.

Statistical Analyses

A hierarchal multiple regression analysis of predictors—with age, gender and perceived realism of SEM partialled out—was conducted to explore the contribution of both frequency of exposure to SEM and sexual experience to anatomical, physiological, and sexual behaviours knowledge. Assumptions of multicollinearity, homoscedasticity, independent error, and linearity were all met. Further, both Mahalanobis distance and Cook's distance suggested no significant effect of outliers or influential cases. Missing values were treated with mean replacements before any statistical analyses were performed. Descriptive statistics for outcome and predictor variables, stratified by gender, are presented in Table 2.

Table 2 Distribution of predictor and outcomes variables by gender

	Males $n = 78$ $M_{age} = 24.17$ $SD = 6.79$	Females $n = 259$ $M_{age} = 23.00$ $SD = 6.35$
1. Anatomy knowledge	2.97 (.43)	2.99 (.32)
2. Positive SEM	2.93 (1.08)	2.04 (.98)
3. Negative SEM	1.85 (.85)	1.51 (.65)
4. Frequency of intercourse	4.32 (2.89)	3.77 (2.94)
5. Number of oral partners	3.06 (3.07)	2.15 (2.66)
6. Number of anal partners	.86 (1.65)	.51 (1.08)
7. Number of vaginal partners	3.13 (3.33)	2.27 (2.92)
8. Time spent watching SEM[a]	4.85 (1.77)	2.39 (1.55)
9. Time spent watching SEM[b]	5.14 (17.74)	1.21 (2.98)

Standard deviations in parentheses

[a] In the last 6 months

[b] Hours per week

Results

Correlations and Multiple Regression Analysis

For our investigation of predictors of anatomy and sexual behaviours knowledge, both correlational analyses and hierarchal multiple regression analysis were employed. Results of the correlational analysis presented in Table 3 illustrate that several significant relationships were found. For instance, the SEM consumption composite and three of the four sexual experience items (number of vaginal, anal, and oral partners) were significantly positively correlated with the positive effects of SEM composite, suggesting that both frequency of exposure to pornography—and greater sexual experience—are related to overall increased sexual knowledge, overall improved life-quality, and more positive attitudes towards sex, sexual behaviours, and the opposite gender. Anatomy knowledge was significantly positively correlated with increasing age and education level, but unexpectedly negatively correlated with the positive SEM composite.

Interestingly, the SEM consumption composite was also significantly positively correlated to sexual orientation (where orientation was dummy coded at 1 = straight, 2 = bisexual, and 3 = gay, indicating increased consumption among gay participants, but negatively correlated with gender (where males = 1 and females = 2), suggesting—as expected—that males consume SEM with greater frequency than females. Significant negative correlations also suggest that males report greater numbers of oral, anal, and vaginal intercourse partners—a finding consistently reported in the literature (see Chandra et al. 2011)—and report both more positive and more negative self-perceived effects of SEM exposure, a finding similar to that relayed by previous researchers (Hald and Malamuth 2008; Johansson and Hammaren 2007; Mulya and Hald 2014).

In order to explore further the links among these variables, a hierarchal multiple regression analysis was conducted to assess the contribution of SEM consumption and sexual experience on participants' understanding of anatomy, physiology, and

Table 3 Correlations among demographic, predictor, and SEM consumption variables

		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Gender	–	−.08	.11	−.06	.06	−.47**	−.12*	−.12*	−.14*	−.08	.02	−.35*	−.20**
2.	Age		–	.36**	.01	.27**	.08	.45**	.24**	.38**	.18**	.19**	.07	−.04
3.	Education			–	.01	.21**	−.12*	.14**	.10	.13*	.13 *	.13*	.01	−.05
4.	Sexual orientation				–	−.01	.22**	−.03	.05	.04	.07	.11*	.12*	.01
5.	Relationship status					–	−.04	.25**	.13**	.22**	.60**	.05	.04	.01
6.	SEM Consumption Composite						–	.16**	.11	.17**	.05	.09	.53**	.08
7.	Number of vaginal partners							–	.06**	.87**	.41**	.05	.11*	.02
8.	Number of anal partners								–	.52**	.25**	−.05	.14*	.06
9.	Number of oral partners									–	.42**	.06	.15**	.04
10.	Frequency of intercourse										–	.10	.09	−.11
11.	Anatomy knowledge (average)											–	−.16**	−.09
12.	Positive SEM (average)												–	.23**
13.	Negative SEM (average)													–

* $p < .05$; ** $p < .01$

typical sexual behaviours. To control for individual differences—and based on previous research—gender, age, and perceived realism of SEM were entered into the analysis as a block on the first step. The frequency of SEM exposure composite and sexual experience scores from the MPCQ were entered as a block on the second step. Table 4 presents the results of these analyses.

In the first step of the analysis, the combined influence of gender, age, and perceived realism accounted for 22% of the variance in anatomy and sexual behaviours knowledge, $F(3, 320) = 29.42$, $p < .001$. On the second step however, the model accounted for 26% of the total variance in anatomy and sexual behaviours knowledge, $F(8, 315) = 13.71$, $p < .001$. The unique contribution of the frequency of SEM consumption composite was the only statistically significant additional predictor ($R^2\Delta = .04$, $p = .001$), above and beyond those entered in the first step.

Paired Sample *T* Test

As shown in Table 5, a paired samples *t*-test indicates that both genders reported significantly greater positive ($M_{males} = 2.93$, $SD = 1.06$; $M_{females} = 2.02$, $SD = .97$) than negative ($M_{males} = 1.85$, $SD = .86$; $M_{females} = 1.51$, $SD = .65$) effects of SEM consumption on sexual knowledge, attitudes towards sex, sexual behaviours, perception of and attitude toward the opposite gender, and overall life-quality.

Table 4 Summary of hierarchal regression analysis for variables predicting anatomy knowledge

Predictor variables	β	*Sig.t*	*p*	95% confidence interval estimates	
				Lower	Upper
Step 1					
Gender	.041	1.01	.001*	−.04	.12
Age	.011	3.86	.000*	.01	.02
Realism	.088	8.67	.000*	.07	.11
Step 2					
Gender	.130	2.77	.001	.04	.22
Age	.013	4.09	.000	.01	.02
Realism	.093	9.07	.000	.07	.11
SEM consumption composite	.062	3.65	.000*	.03	.10
Number of vaginal partners	−.016	−1.33	.185	−.04	.01
Number of anal partners	−.018	−1.12	.264	−.05	.01
Number of oral partners	.011	.862	.389	−.01	.04
Frequency of intercourse	.006	1.02	.310	−.01	.02

Standardized coefficients reported. Step 1 = $F(3, 320) = 29.42$, $p < .001$; Step 2 = $F(8, 315) = 13.71$, $p < .001$

Table 5 Comparison of mean differences in positive and negative effects of SEM consumption by gender

	$MD_{Positive-negative}$		*t-test for paired samples*		95% confidence interval of the difference	
	M	*SD*	*t*	*df*	Lower	Upper
Males	1.08	1.28	7.223*	73	.7825	1.3791
Females	.51	1.07	7.500*	245	.3777	.6469

* $p < .001$

Discussion

The purpose of this study was to expand on existing literature by exploring the role of SEM consumption to knowledge of sexual anatomy, physiological function, and typically practiced sexual behaviour. Our main goal was to determine whether frequency of SEM exposure would predict knowledge of sexual anatomy, physiology, and behaviour—a hypothesis based on the assumption that SEM provides unrealistic perceptions that could, with frequent exposure, result in inaccurate knowledge among viewers.

Contrary to this hypothesis, frequency of SEM exposure did not predict poorer knowledge. Rather, the opposite relationship was found. Specifically, frequency of SEM exposure predicted *more accurate* knowledge of anatomy, physiology, and sexual behaviour. Although this finding was unanticipated, it is possible that SEM is utilized as a tool for procuring sexual knowledge, to replace or supplement information acquired elsewhere. For example, research indicates that sexuality education courses focus mainly on female internal organs—such as the uterus, fallopian tubes, and ovaries—and on men's uncontrollable erections (Orenstein 2015). Females are defined by their periods and males are characterized by their unstoppable sex drive (Orenstein 2015). These attempts at explaining human sexuality to young people—who are often left to interpret information as best as possible—do not address sexual exploration, sexual pleasure, self-knowledge, or the nuances of male and female anatomy. Seventy-five percent of students admit that their sexual education at school is "less than fair" and declare that issues pertinent to their sexuality are not covered in class (Young-Powell 2015). Indeed, a recent meta-ethnographic study covering 25 years of sexual education (Pound et al. 2016) reveals that young people report their sexual education as generally negative, gendered, and heterosexist—and indicate that it fails to discuss issues relevant to the lives of the sexually active. Perhaps then, young people use SEM in conjunction with their less-than-ideal educational programs and preexisting norms to grasp the vastly complicated concepts illustrated in SEM. Certainly, surveys indicate that 60% of respondents acquire sexual knowledge through watching SEM—despite 75% of them acknowledging that SEM conveys unrealistic expectations of sexual intercourse (Young-Powell 2015). Other studies suggest that, because conventional programs of sexual education are severely lacking, SEM and other forms of media

have come to serve as primary sources of sexual information acquisition (Brown and L'Engle 2009; Handelsman et al. 1987; Pound et al. 2016).

Another possibility for the finding that frequency of SEM exposure predicted greater sexual knowledge is that participants with significant preexisting sexual knowledge were more attracted to viewing SEM in the first place. Perhaps the opportunities, personality variables, or sexual liberalism that facilitated their acquisition of knowledge also contributed to their appreciation and propensity for watching SEM. Indeed, evidence does suggest that sexual openness and liberalism are associated with viewing sexually explicit internet sites (Barak et al. 1999), increased comfort with sexual issues (Fisher et al. 1988), and the seeking out of sexual information and knowledge (Fisher et al. 1988; Guerra et al. 2012; Kohut et al. 2016;). What may certainly be concluded from the unanticipated results of our study is that frequency of SEM consumption is just one variable, among several, that may influence sexual knowledge and attitudes (Hald et al. 2013a, b).

Aside from the variable of perceived realism that has previously been identified as a predictor of sexual beliefs and attitudes (see Mulya and Hald 2014)—only age and gender explained additional variance in sexual knowledge—that is, being female and being of older age. One possible explanation for this findings is evidence indicating that knowledge improves with age across multiple domains, and that females generally tend to score higher on measures of erotophilia, which is associated with greater sexual information seeking (Fisher et al. 1988; Rye et al. 2011). This explanation may account for why the effect of gender became more powerful in the second step of our hypothesized model. This gender effect is nonetheless consistent with other research in this area (see Hald et al. 2013a, b; Mulya and Hald 2014; Peter and Valkenburg 2011; Sinkovic et al. 2013), which finds that the additional explained variance of SEM-related variables on outcome variables is generally modest when relevant non-SEM variables have been controlled for. This suggests that anatomy knowledge may be more associated with factors other than SEM-related variables—and with gender in particular. We suggest that future researchers employ study designs and methodologies to further explore this possibility.

Contrary to our second hypothesis, sexual experience did not predict sexual knowledge. Our rationale for including sexual experience as a predictor of sexual knowledge was based on the simple premise that with more sexual experience comes more sexual knowledge. That is, with greater numbers of sexual opportunities and sexual partners, the imagery depicted in SEM become that much more obviously unrepresentative of typical activities and people. Thus, we are uncertain how exactly to interpret this finding, though we recall that several studies have found a significant gap in the average number of sexual partners reported by men and women (Clark et al. 2011; Phillis and Gromko 1985; Weiderman 1997). Evidence indicates that men grossly inflate their number of sexual encounters, perhaps in fear of being considered inexperienced, while women underreport their encounters in fear of presenting as promiscuous (Clark et al. 2011; Lottes 1993; Oliver and Hyde 1993; Wiederman 1997). Because our sample was comprised of predominately female participants—and because being female was a predictor of better knowledge—our results may reflect an under-reporting of true sexual

experiences on the part of our female participants and an over-reporting of false sexual experience by our (actually) less knowledgeable male participants. Our evidence suggests this may be the case, given that our male participants consistently reported more oral, anal, and vaginal partners, and more frequent sexual intercourse, than their female counterparts.

Finally, in support of our third hypothesis, participants did indeed report greater positive self-perceived effects of SEM than negative effects, as has been indicated in previous research (e.g., Braun-Courville, and Rojas 2008; Hald et al. 2012; Hald and Malamuth 2008; Mulya and Hald 2014). In general, both male and female participants reported greater positive aspects of SEM relative to negative with regard to its role in developing their sexual knowledge and repertoire of sexual behaviours, and improving their attitudes towards sex, the opposite gender, and their overall quality of life.

Limitations and Future Directions

Our data was collected from a non-random, self-selected, convenience sample of primarily undergraduate students in a large Western Canadian city, as well through snowball sampling via online forums. The sample was comprised of predominately heterosexual females and therefore, the results should be considered with caution due to concerns about generalizability (e.g., non-heterosexuals, non-students). That the sample was self-selected should especially invoke caution. Multiple studies indicate that self-selected human sexuality participants are significantly different from non-participants on several variables, including more positive attitudes toward both sex and SEM, more liberal political views, more sexual experience, and greater sexual permissiveness (see Morokoff 1986; Strassberg and Lowe 1995; Wolchik et al. 1985). It is therefore reasonable to expect this self-selected sample to differ from non-participants in their anatomy knowledge, further impacting the generalizability of the findings. Clearly, SEM researchers should focus their efforts on accessing more diverse and representative samples—particularly recruiting males—to address issues around self-selection and given that males consume significantly more SEM than females (Hald 2006; Sinkovic et al. 2013).

Secondly, the measures used to gauge sexual knowledge and SEM consumption relied on self-report. It is therefore possible that participants over–or–underestimated their involvement in these behaviours due to the sensitive nature of the questions or social desirability bias (Tourangeau and Yan 2007). In addition, when conducting human sexuality research, participation bias is also of concern. People who participate in human sexuality research are more sexually liberal, open, and positive in regard to their own sexuality and sexual issues in general (Strassberg and Lowe 1995). Finally, it is worth noting that although our sample evaluated the effects of SEM to be more positive than negative, perhaps this is attributed to attention bias, where participant arousal and desire in response to the topic under study contributed to them focusing on the positive aspects of SEM (Hald and Malamuth 2008).

Despite these limitations, our results contribute to the extant literature on predictors that influence sexual knowledge, enhancing the ability to draw together

findings from among several studies, as conclusions from research in this area is highly contentious. Future researchers should include additional predictors to sexual knowledge in their analyses, such as with whom participants are watching, the types of SEM being watched (e.g., erotica versus hard-core SEM) (Hald et al. 2013a, b) and sources from where participants have generally received sexual information (i.e., parents, peers, professionals, media; see Bleakley et al. 2009; Handelsman et al. 1987; Somers and Gleason 2001).

Further investigations should also examine how cultural or religious beliefs influence sexual knowledge. For instance, Hald and Mulya (2014) examined positive and negative self-perceived effects of SEM consumption in an Indonesian population—where anti-porn laws remain active—to determine results similar to ours in that participants indicated more positive self-perceived effects of SEM. However, Hald and Mulya did not examine sexual knowledge specifically, so future investigators should incorporate religious or spiritual demographic questions in order to develop a more precise understanding of whether religion plays a role in the relationship between SEM exposure and sexual knowledge.

Finally, sexual orientation influences on sexual knowledge were not explored in this study, providing another avenue for future research. Although our sample was predominately straight, our results indicated a relationship between sexual orientation, sexual knowledge, and positive self-perceived effects of SEM consumption. That is, greater knowledge and more positive perceptions of SEM were both positively related to non-heterosexual identification. These results indicate that, while certainly SEM is accessed by heterosexuals, it may be more so by bisexuals and to an even greater degree, gay men and lesbian women. Clearly, more research is needed to disentangle the influence of sexual orientation on frequency of SEM consumption and sexual knowledge.

This study was, to our knowledge, the first to explore knowledge of sexual anatomy, physiology, and sexual behaviours in relation to frequency of SEM consumption. It was established that frequency of SEM consumption plays a significant role in our understanding of anatomy, physiology, and sexual behaviours, but that sexual experience (frequency of sexual intercourse and number of sexual partners) does not. However, the confluence of several factors such as age, gender, perceived realism, and SEM consumption levels have strong predictive validity and social relevance. These results suggest the need for sexual health educators to incorporate a SEM component into preexisting programs to better focus on issues that directly relate to sexual exploration and to lean away from only teaching about pregnancy prevention and male erections (Orenstien 2015). Sexual health educators need to tailor their programs to focus more on activities, behaviours, and actions typical of sexual intercourse so people are not only aware of the realities of sexual intercourse, but are confident in their sexual exploration with themselves and their partners. The current study extends the knowledge of SEM consumption, and from this we can conclude that SEM does play a role in sexual discoveries. By revamping the efficacy of existing programs or initiating the development of new programs aimed at adolescents and young adults, we can better inform about the ideals and attitudes proliferated by SEM. Not only will this enhance the ongoing scientific debate about the effects of SEM consumption, it will provide evidence for the

necessity of a sexually explicit material component to the sexual education programs of school curriculum.

Appendix 1: FAQ Questionnaire (Hesse 2015)

Please indicate the extent to which you disagree or agree with each statement below. Remember, we are only interested in your thoughts and opinions.

1. The average breast is cup size D	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
2. The average penis is 7 inches in length	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
3. Women orgasm every time they have vaginal sex	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
4. Most women remove their pubic hair entirely	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
5. Women's vaginas look relatively the same	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
6. Most women are easily aroused and ready for sex immediately	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
7. Men do not generally last long while having sex	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
8. Most women routinely engage in same-gender sexual behavior (e.g., girl-on-girl)	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
9. Most women enjoy swallowing semen	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
10. Sexual intercourse usually involves anal sex	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
11. It is common for sex to involve more than two people (e.g., threesomes)	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)

Appendix 2: Modified Porn Consumption Questionnaire (MPCQ; Hald 2006)

This questionnaire contains questions about pornography and sexuality. The questionnaire is part of a research project which has been approved by both The Danish National Committee on Biomedical Research Ethics and the Danish Data Protection Agency.

Although the questions may sometimes seem very personal, please answer as honestly as possible. Please remember that you will never be held responsible for your answers or confronted with them again. In other words, your answers are 100% confidential and will be used for research only.

The following definition should be referred to whenever the term "pornography" is used in the following questions. Pornography refers to any kind of material that has:

1. The intention of creating or increasing sexual emotions or sexual thoughts and at the same time contains
2. Exposure or descriptions of sexual organs and involves
3. Clear and obvious sexual acts (e.g., vaginal sex, oral sex, anal sex, masturbation, etc.)

Materials such as pinup girls, Playboy/Playgirl, various ads, etc. do not contain: "clear and obvious sexual acts" and are therefore NOT considered pornography.

1. Have you ever been exposed to pornography	Yes	No
2. Has your exposure to pornography been during the past 12 months?	Yes	No
3. Has your exposure to pornography been during the past 6 months?	Yes	No
4. Has your exposure to pornography been during the past month?	Yes	No
5. Has your exposure to pornography been during the past week?	Yes	No
6. Has your exposure to pornography been during the past 48 h?	Yes	No
7. Has your exposure to pornography been during the past 24 h?	Yes	No

8. Age at first exposure (approximately)? (years)
9. On average, how much time *per week* have you spent watching some kind of pornography over the last 6 months? Per week: _____hours and _____minutes
10. On average, how often have you watched pornographic materials during the last 6 months?

Never	Less than once a month	1–2 times a month	1–2 times a week	3–5 times a week	More than 5 times a week

11. How many different people have you had vaginal intercourse with?

None	1–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	21 or more

12. How many different people have you had anal intercourse with?

None	1–2	3–4	5–6	7–8	9—10	11–12	13–14	15–16	17–18	19–20	21 or more

13. How many different people have you had Oral Sex with?

None	1–2	3–4	5–6	7–8	9–10	11–12	13–14	15–16	17–18	19–20	21 or more

14. How often do you masturbate?

Do not masturbate	Once every 6 months or less	Once every third month	Once every second month	Once a month	Twice a month	Once a week	2–3 times a week	4–5 times a week	Once a day or more

15. How often, approximately, do you have sex, including intercourse?

Have not had sex including inter-course	Once every 6 months or less	Once every third month	Once every second month	Once a month	Twice a month	Once a week	2–3 times a week	4–5 times a week	Once a day or more

Below is a series of questions. Please indicate your answer to each question using the following scale:

1	2	3	4	5	6	7
Not at all	To a very small extent	To a small extent	To a moderate extent	To a large extent	To a very large extent	To an extremely large extent

1. Has taught you new sexual techniques?
2. Has made you less tolerant towards sex?
3. Has influenced positively your outlook on sex?
4. Has adversely affected your views of the opposite gender?
5. Overall, has had a harmful effect on your life?
6. Overall, has been a negative supplement to your sex life?
7. Has led you to view the opposite gender more stereotypically?
8. Has added to your knowledge of vaginal sexual intercourse?
9. Has taught you something new about your sexual desires?
10. Has made you less satisfied with your life?
11. Overall, has made a valuable contribution to your life?
12. Overall, has improved your sex life?
13. Has reduced your sexual activities?
14. Has added to your knowledge of anal sex?
15. Has positively affected your view of the opposite gender?
16. Has added to your knowledge of sexual foreplay?
17. Has made your life more problematic?
18. Has made you more tolerant in relation to sex?
19. Has made you less sexually liberal?
20. Has made you more respectful towards the opposite gender?
21. Has made you experiment more in your sex life?
22. Overall, has made your sex life worse?
23. Has added to your knowledge of masturbation?
24. Has made you more content with your life?
25. Has reduced your quality of life?
26. Has had a negative influence on your attitudes toward sex?
27. Has increased your sexual activity?
28. Overall, has been a positive supplement to your sex life?
29. Has improved your knowledge of sex?
30. Has improved your quality of life?
31. Has had a positive influence on your attitudes toward sex?
32. Has adversely affected your outlook on sex?
33. Has added something positive to your sex life?
34. Has made you experiment less in your sex life?
35. Has made you less respectful towards the opposite gender?
36. Has made you friendlier towards the opposite gender?
37. Has adversely influenced your opinions of sex?
38. Has led you to view the opposite gender less stereotypically?
39. Has improved your knowledge of oral sex?
40. Has led to problems in your sex life?
41. Has given you more insight into your sexual fantasies?
42. Has made your life less problematic?
43. Has positively influenced your opinions of sex?
44. Has added something negative to your sex life?
45. Has made you more sexually liberal?

46. Generally, has given you performance anxiety when you are sexually active on your own (e.g., during masturbation)?
47. Generally, has given you performance anxiety when you are sexually active with others (e.g., during intercourse, oral sex, etc.)?

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