Universiteit Utrecht

**The Reciprocal Relationship Between Frequent and Compulsive use of Sexual Explicit Internet Material & Sexual Preoccupation Among Adolescents in The Netherlands**

**Name:** Nynke Hommes

**Student number:** 6920519

**Master:** Youth Studies

**Supervisor:** Regina van den Eijnden

**Second assessor**: Tom ter Bogt

**Date:** February 18th, 2021

**Abstract**

Exposure to Sexual Explicit Internet Material (SEIM) could have beneficial outcomes for adolescents' sexual development. However, it might also put adolescents at risk as they may develop compulsive use of SEIM. It is furthermore argued that sexualized media environments can promote sexual preoccupation among adolescents. Because research on compulsive SEIM use and sexual preoccupation among adolescents is largely lacking, the aim of this study is to address this gap in the literature by investigating the bidirectional relation between both frequent and compulsive SEIM use, and sexual preoccupation among adolescents. It was also investigated whether these relations differed between gender and age groups. Longitudinal data from 371 Dutch adolescent students were used ($M_{age} = 14{,}4$ years, range 12-18). Results showed that frequent and compulsive SEIM use did not predict an increase in sexual preoccupation. However, sexual preoccupation did predict an increase in compulsive SEIM use over time, but only among boys. These findings suggest that sexual preoccupation is involved in the development of adolescents' compulsive SEIM use, especially for boys. These results emphasize the need of open communication between parents, teachers, experts and adolescent boys about SEIM use in order to identify early signals of sexual preoccupation and compulsive SEIM use.

   *Keywords***:** Adolescents, Compulsive use, Frequent use, Sexual Explicit Internet Material, SEIM, Sexual preoccupation

**Samenvatting**

Blootstelling aan seksueel expliciet internet materiaal (SEIM) kan gunstige gevolgen hebben voor de seksuele ontwikkeling van adolescenten. Echter kunnen adolescenten ook het risico lopen om compulsief gebruik van SEIM te ontwikkelen. Voorts wordt tevens betoogd dat geseksualiseerde mediaomgevingen seksuele preoccupatie bij adolescenten kan promoten. Omdat onderzoek naar compulsief SEIM gebruik en seksuele preoccupatie bij adolescenten grotendeels ontbreekt, is het doel van deze studie om deze leemte in de literatuur op te vullen door longitudinaal onderzoek te doen naar de wederkerige relatie tussen frequent en compulsief SEIM gebruik en seksuele preoccupatie bij adolescenten. Verder werd onderzocht of deze relaties verschilden voor geslacht- en leeftijdsgroepen. Longitudinale data van 371 Nederlandse adolescente scholieren werden gebruikt ($M_{leeftijd} = 14{,}4$ jaar, bereik 12-18). Resultaten indiceerden dat frequent en compulsief SEIM gebruik geen toename voorspelden in seksuele preoccupatie. Echter, seksuele preoccupatie voorspelde wel een toename in compulsief SEIM-

gebruik. Dit gold enkel voor jongens. Deze bevindingen suggereren dat seksuele preoccupatie een rol speelt bij de ontwikkeling van compulsief SEIM gebruik door adolescenten, vooral bij jongens. Deze resultaten benadrukken de noodzaak van open communicatie tussen ouders, leraren, experts en adolescente jongens over SEIM gebruik, zodat vroege signalen van seksuele preoccupatie en compulsief SEIM gebruik kunnen worden geïdentificeerd.

*Kernwoorden:* Adolescenten, Compulsief gebruik, Frequent gebruik, Seksueel Explicit Internet Materiaal, SEIM, Seksuele preoccupatie

Worldwide Internet access and the availability of mobile internet devices have rapidly developed in the past decade. Consequently, a shift in adolescents' utilization of Internet content has occurred (Doornwaard et al., 2015). Internet content that particularly obtains large attention is Sexual Explicit Internet Material (SEIM) (Wolak et al., 2007). Internet possesses several characteristics such as accessibility, affordability and anonymity, which make it an attractive platform for adolescents to consume SEIM (Cooper, 1998). As a result, nowadays, half of all adolescents aged 9-16 years old are exposed to pornographic material on the Internet (Efrati, 2020). Exposure to SEIM may have beneficial outcomes such as healthy exploration of one's own sexuality (Wolak et al., 2007) and identity development of the adolescent (Peter & Valkenburg, 2010). However, it might also put adolescents at risk as they may develop compulsive use of SEIM (Doornwaard et al., 2015). Compulsive SEIM use is generally defined as not being able to control the use of SEIM, which results in negative effects on the quality of one's life and/or on daily functioning (Stark et al., 2018). Studies have indicated that between 2% and 17% of all SEIM consumers meet the requirements of compulsive pornography use (Sniewski et al., 2018). These patterns of use can cause negative consequences for the development of adolescents, including depression, anxiety, and low self-esteem (Alarcón et al., 2019; Doornwaard et al., 2015; Sussman, 2007). It is furthermore discussed whether a sexualized media environment can lead to sexual preoccupation among adolescents (Peter & Valkenburg, 2008). Sexual preoccupation entails an obsessive and pathological propensity that becomes overpowered by thoughts about sex (Peter & Valkenburg, 2008). However, research on compulsive SEIM use and sexual preoccupation among adolescents is largely lacking. Therefore, the aim of the present study is to address this gap in the literature by investigating the bidirectional relation between the frequency of SEIM use and compulsive SEIM use on the one hand, and sexual preoccupation on the other hand among adolescents. The moderating role of gender and age in these relationships will also be investigated.

**The impact of compulsive and frequent SEIM use**

Although frequent and compulsive SEIM use are related, the two concepts differ from each other. One can be a frequent SEIM user without developing compulsive tendencies towards SEIM, e.g. because someone might simply be less susceptible to develop compulsive behavior. On the other hand, one can be a compulsive SEIM user but may not use SEIM very frequently, for example because a person is unable to do so (e.g. work, school or other obligations) or due to a lack of privacy.

It is plausible to assume that both frequent and compulsive SEIM use predict sexual preoccupation among adolescents. A possible explanation for this would be that SEIM is very

prominently present in adolescents' lives, and SEIM is known for having an intrusive visual character. As a result, the likelihood that an adolescent strongly ponders about what he or she saw in SEIM is substantial (Peter & Valkenburg, 2008). Furthermore, studies on fantasy and imagination have displayed that adolescents may become especially interested in reoccurring thoughts about a stimulus when they try to integrate that particular stimulus to their existing schemas (Klinger, 1990; Pope & Singer, 1976). Therefore, adolescents might match what they see in SEIM into their own schemas about sex (Peter & Valkenburg, 2008). Thus, frequent and compulsive consumption of SEIM might ultimately result in high cognitive affiliation with sex.

On the basis of their three-wave survey panel, Peter and Valkenburg (2008) showed that adolescents' use of SEIM indeed increased their cognitive engagement in sexual issues. The authors also showed that the more frequently adolescents used SEIM, the more often they would think about sex, and the stronger their sexual interest became. As a result, they became more frequently distracted due to their sexual thoughts. Additionally, the cross-sectional study of Donevan and Mattebo (2017) also showed that frequent pornography consumers were more likely to have strong interests in sex and pornography compared to their peers who used pornography less frequently. Altogether, it is therefore hypothesized (**H1**) that frequent and compulsive SEIM use are predictors of sexual preoccupancy among adolescents.

It should be mentioned that, at this moment, it is still unclear whether frequent, non-compulsive SEIM use will have the same effect on sexual preoccupation, and whether sexual preoccupation will have the same effect on frequent, non-compulsive SEIM use compared to compulsive SEIM use. Frequent SEIM use is considered more normative compared to compulsive SEIM use. Additionally, compulsive SEIM use has more severe long-term effects one's psychosocial wellbeing and professional functioning (Meerkerk et al., 2006). Therefore, it is crucial to differentiate between frequent and compulsive use when testing its' bidirectional relationship with sexual preoccupation. In the present study, these two concepts are used as separate (in)dependent variables. Accordingly, it is expected that (**H2**) compulsive SEIM use has a stronger effect on sexual preoccupation compared to frequent SEIM use.

**The impact of sexual preoccupation**

Adolescents who go through a stage in which there is an increase in sexual curiosity are especially at risk for developing compulsive propensities towards the use of SEIM (Doornwaard et al., 2015). Although it is important to keep in mind that sexual curiosity rises during adolescence, it is possible that adolescents develop sexual preoccupation beyond their typical, age-appropriate sexual curiosity (Peter & Valkenburg, 2008). It is therefore assumable that frequent and/or compulsive SEIM use and sexual preoccupation are reciprocally related, i.e.

sexual preoccupation could also lead to a higher likelihood to consume SEIM and to develop compulsive SEIM use. This bidirectional relation has been explicitly documented in Steele and Brown's (1995) Media Practice Model. This model assumes, among other things, that the adolescent selects sexual content that is consistent with their own ideas about sex. The model also predicts a bidirectional relationship between adolescents' use of sexual content and its effects; a specific type of SEIM could have an effect on certain sexual ideas, but the effect is not independent of the influence that these ideas have on the selection of the specific type of SEIM.

An explanation for sexual preoccupation as a predictor of compulsive and or frequent SEIM use could be that adolescents may suffer from being frequently distracted during their daily activities due to obsessive thoughts about or interests in sex. In order to function better during those activities, obsessive thoughts must be eliminated. A solution for that would be to engage in SEIM use. And when SEIM consumption becomes more frequent or compulsive, the adolescent probably will become more sexually preoccupated. Previous research showed that excessive sexual interest among adolescent boys predicted compulsive use of SEIM (Doornwaard et al., 2015). Other studies also found that the strongest predictor of problematic SEIM use was sexual desire (Twohig., 2009; Svedin et al., 2011). Taking the above into account, it is hypothesized that there is a bidirectional relation between sexual preoccupation and both frequent and compulsive SEIM use. In addition to hypothesis 1, it is therefore expected (**H3**) that sexual preoccupation will also be a predictor and an outcome of frequent and compulsive SEIM use among adolescents.

**The role of gender and age**

With regards to SEIM use, many studies point out that men consume SEIM more often compared to women (Hald, 2006). Additionally, research consistently shows that men react more positively towards SEIM than women do (Peter & Valkenburg, 2010). This has also been confirmed among adolescents (Peter & Valkenburg, 2010) and could be explained by the Social Construction-of-Sexuality perspective, which poses that cultural and social processes shape how both male and female adolescents approach sexuality. This perspective emphasizes that males and females go through a different sexual socialization (Gagnon & Simon, 1973). Based on this theoretical perspective, it can be assumed that it is more normalized for boys to watch pornography than it is for girls in today's society. Therefore, it is hypothesized (**H4**) that the bidirectional relationships between frequent and compulsive SEIM use on the one hand, and sexual preoccupation on the other hand are stronger for adolescent boys than for adolescent girls.

Besides gender, age may also be considered an important moderator. Adolescents' bodies significantly change as they get older, including hormonal changes. As a result, their sexual curiosity, sexual urges and psychosexual development increases. It can be considered a healthy phenomenon to develop more and/or different sexual needs as one grows older. Developing a sexual identity during adolescence is a step-by-step process in which age-appropriate behaviors are being explored, including SEIM use. According to a study by Wolak et al., (2007), the likelihood of using pornography for boys and girls increase with age. These findings are also supported by Sevicíková and colleagues (2014), who found similar results. Therefore, it is hypothesized (**H5**) that the bidirectional relationships between frequent and compulsive SEIM use on the one hand, and sexual preoccupation on the other hand will be stronger for older adolescents compared to younger adolescents.

**Figure 1**

*Research model*
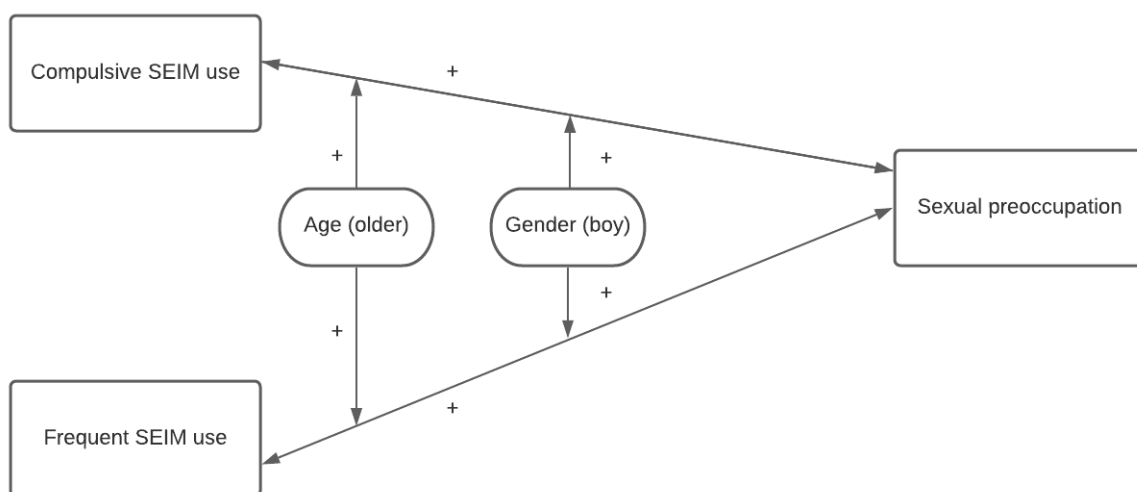


**Method section**

**Design and procedure**

Data for the current study were collected as part of a larger longitudinal research project conducted in the Netherlands called Project STARS (Studies on Trajectories of Adolescent Relationships and Sexuality). This study investigated the romantic and sexual development of Dutch adolescents in four different waves. A total of 1,297 Dutch adolescents participated within this study. The times of measurement were spread over a period of 1,5 years with half-year intervals. The first measurement wave was conducted in the fall of 2011. Participants were

recruited from primary and secondary schools throughout the Netherlands. Adolescents and their parents/caretakers received information about the study through letters, brochures and flyers, including an informed consent. Adolescents who participated, received book gift certificates afterwards. Participants finished the online questionnaire anonymously using computers at their school during regular school hours. Students' confidentiality was assured, as well as the option to quit the survey at any time. Researchers and assistants were present to supervise during the data collection. Data has been handled confidentially and data were stored safely within the department of Social Sciences.

**Sample**

For the present study, data from the last two waves (T3 and T4) were used , which will further be referred to as T1 and T2. In T1, 560 boys and 535 girls participated ($N = 1095$). After selecting participants who finished both the T1 and T2 questionnaires that measured the dependent and independent variables of interest, a total of 371 students remained ($N = 371$). Students who indicated they did not watch pornography, automatically skipped the questionnaire about compulsive SEIM use. A total of 317 participants were male and 54 participants were female. The mean age of this sample at T1 was 14,4 ($SD = 1,29$; *range* 12-18). A number of 164 students followed high school at Vmbo-level, 97 students at Havo-level, and 108 students at a higher educational level. Participants were also asked whether they were religious or not. A total of 270 students indicated they were not religious and 90 students indicated they were religious. Out of the whole sample ($N = 371$), 297 students indicated they never had sex before and 74 reported they did have had sex before.

**Measures**

*Frequency SEIM use*

Adolescents use of SEIM was measured using one item. The question goes as followed: '*How often do you use the Internet to view a porn Web site (a Web site with pictures or movies that show nudity or people having sex)?*'. This was rated on a six-point scale: 1 = *never*, 2 = *less than once a year*, 3 = *less than once a month*, 4 = *one to three times a month*, 5 = *once or twice a week*, 6 = *three times a week or more*. Because the distribution of the frequency of SEIM use was very skewed, the scale was dichotomized into two groups: non-(or barely) users and frequent users.

*Compulsive SEIM use*

Compulsive use of SEIM was measured using six items from the Compulsive Internet Use Scale (Meerkerk et al. 2006). This scale was modified to the current study to assess symptoms of compulsive searching for or viewing SEIM. The six items reflect the five core

criteria for compulsive SEIM use; item 1 measures lack of control over one's use, items 2 and 4 measure preoccupation with the use, item 3 measures adverse consequences as a result of one's use, item 5 measures the experience of unpleasant emotions when one cannot use, and item 6 measures use to cope with or escape from negative feelings. Items could be rated on a 6-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *regularly*, 4 = *often*, 5 = *very often*) to indicate how frequently they experienced each symptom. Cronbach's alpha for this measurement at T1 is .899, and at T2 .926.

### Sexual preoccupation

Sexual preoccupation was measured using four items from the Sexual-Preoccupation subscale of Snell and Papini's (1989) Sexuality Scale. Adolescents rated, using a 6-point scale, the extent to which they agreed with each of the statements about their sexual interests (e.g. 'I probability think about sex more than other people'). Rating options varied from 1 = *completely disagree* to 6 = *completely agree*. Cronbach's alpha for this measurement is .899 at T1 and .994 at T2.

### Sexual experience

Sexual experience was used as a control variable. In order to assess adolescents' experience with sexuality, participants were asked whether they had ever French kissed somebody and whether they ever had sex before. Possible answers were *yes* (=1) and *no* (= 0). Participants who reported *yes* on the second question, received follow-up questions about their experiences with four different sexual behaviors: 1) naked touching or caressing,  2) performing or receiving manual sex, 3) performing or receiving oral sex, and 4) vaginal or anal intercourse. This could also be rated with *yes* (= 1) and *no* (= 0).

### Religion

Religion was also used as a control variable. Participants were asked whether they were religious or not and could be answered with *yes* (=1) and *no* (=2). When participants indicated they were religious, they were asked about their and their parents' religion, and whether it was important to them.

## Data analyses

STARS data were made available by the DANS data repository. Neither the original data collectors nor DANS bear any responsibility for the analyses performed with these data, or interpretations presented here. Statistical analysis were conducted in IBM SPSS statistics 26. Firstly, descriptive analyses, gender differences and correlations among the variables of interest were calculated using an independent samples T-test and two correlation matrixes. Because

frequent SEIM use was measured dichotomously, Spearman correlation was used for the correlation matrixes.

Secondly, assumptions were checked. The Shapiro-Wilks test was used to test the normality of distribution. A scatterplot was created to test linearity between the dependent and independent variables. Although Shapiro-Wilks was significant ($p = < .001$) for the relation between compulsive SEIM use and sexual preoccupation, and distributions were not quite normal, they were also not totally skewed and therefore linear regression analyses were carried out. Because age and gender are included as moderators, interaction terms were created between independent variables and moderators. Thirdly, four linear regression analyses and one logistic regression analysis were conducted. The first regression analysis was conducted to test the predictive role of frequent SEIM use on sexual preoccupation. The second regression analysis was conducted to test whether compulsive SEIM use predicts sexual preoccupation. The third linear regression analysis was conducted to check whether sexual preoccupation predicts an increase in compulsive SEIM use. The final linear regression analysis was conducted with both frequent and compulsive SEIM use as independent variables and sexual preoccupation as the dependent variable. A logistic regression analysis was calculated to test whether sexual preoccupation was a predictor of frequent SEIM use. For all four regression analyses, three different steps were conducted in SPSS using the Enter Method. In the first step, control variables age, gender and the dependent variable at T1 were added. In the second step, the independent variable at T1 was added. In the third step, interaction terms were added to check for moderation effects.

## Results

### Descriptive analyses

Table 1 and Table 2 present the descriptive statistics of the variables of interest and gender differences. As expected, not many students reported having compulsive tendencies related to their SEIM use or being sexually preoccupated. To test whether students ever consumed SEIM, they were asked about the frequency of their use. A total of 173 students reported they have never used it or hardly used it, and 196 students reported they use once or twice a week or three times a week or more.

As shown in Table 2, at the first measure wave, only for frequent SEIM use at T1, a gender difference was found ($t = 5.7$; $p < .001$). Boys had a higher mean score (*Mean* = .59; *SD* = .49) than girls (*Mean* = .22; *SD* = 42). For sexual preoccupation at T1, a marginally significant gender difference ($t = 1.9$; $p = .06$) was found. At T2, gender differences were found for

frequent SEIM use ($t = 7$; $p = <.001$) and for sexual preoccupation ($t = 2.4$; $p = .02$). For frequent

SEIM use and sexual preoccupation, boys had a higher mean score.

**Table 1**

*Descriptive statistics of variables of interest*

|  | N | Mean | SD |
|---|---|---|---|
| Gender | 371 | .15 | .35 |
| Age | 367 | 14.42 | 1.29 |
| Frequent SEIM use T1 | 370 | .53 | .50 |
| Frequent SEIM use T2 | 384 | .67 | .47 |
| Compulsive SEIM use T1 | 291 | 8.03 | 4.03 |
| Compulsive SEIM use T2 | 384 | 8.44 | 4.80 |
| Sexual preoccupation T1 | 368 | 7.89 | 3.40 |
| Sexual preoccupation T2 | 384 | 8.80 | 4.42 |

**Table 2**

*Independent samples T-test for gender differences*

|  |  | N | Mean | SD | p |
|---|---|---|---|---|---|
| Frequent SEIM use T1 | Boys | 316 | .56 | .49 | < .001 |
|  | Girls | 54 | .22 | .42 |  |
| Frequent SEIM use T2 | Boys | 317 | .72 | .45 | < .001 |
|  | Girls | 54 | .26 | .44 |  |
| Compulsive SEIM use T1 | Boys | 262 | 8.06 | 4,00 | .74 |
|  | Girls | 29 | 7.97 | 2.00 |  |
| Compulsive SEIM use T2 | Boys | 317 | 8.54 | 4.98 | .42 |
|  | Girls | 54 | 7.96 | 3.93 |  |
| Sexual preoccupation T1 | Boys | 314 | 8.03 | 3.35 | .06 |
|  | Girls | 54 | 7.07 | 3.58 |  |
| Sexual preoccupation T2 | Boys | 317 | 9.07 | 4.34 | .02 |
|  | Girls | 54 | 7.48 | 3.54 |  |

**Correlations**

Table 3 and 4 present the correlations between the variables of interest. Because the hypotheses in this study are bidirectional, two separate correlation matrixes were conducted with dependent variables at T2 and independent variables at T1.

**Table 3.**

*Bivariate correlations between variables of interests, with frequent and compulsive SEIM use at T1 and sexual preoccupation at T2 (N = 291)*

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Compulsive SEIM use T1 |  | .198** | .234** | -.159 | -.024 | .075 | .015 |
| 2. Frequent SEIM use T1 |  |  | .164** | -.197 | .219** | .257** | .008 |
| 3. Sexual preoccupation T2 |  |  |  | .054 | .016 | -.129* | -.024 |
| 4. Sexual experience |  |  |  |  | .310** | .020 | -.199 |
| 5. Age |  |  |  |  |  | -.042 | .132* |
| 6. Gender |  |  |  |  |  |  | -.060 |
| 7. Religion |  |  |  |  |  |  |  |

*\*Correlation is significant at the .05 level (2-tailed)*
*\*\*Correlation is significant at the .01 level (2-tailed)*

**Table 4**

*Bivariate correlations between variables of interest, with frequent and compulsive SEIM use at T2 and sexual preoccupation at T1 (N = 384).*

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Compulsive SEIM use T2 |  | .202** | .167** | -.002 | -.018 | -.044 | -.016 |
| 2. Frequent SEIM use T2 |  |  | .109* | -.011 | .146** | .344** | -.002 |
| 3. Sexual preoccupation T1 |  |  |  | .113* | .090 | -.126* | .002 |

| | | | |
|---|---|---|---|
| 4. Sexual experience | .389** | .102 | .045 |
| 5. Age | | -.042 | .132* |
| 6. Gender | | | -.060 |
| 7. Religion | | | |

*Correlation is significant at the .05 level (2-tailed)*
*Correlation is significant at the .01 level (2-tailed)*

Tables 3 and 4 both show that the associations between the independent and dependent variables are positive and statistically significant, which support hypotheses 1 and 3. As Table 3 shows, age significantly correlates with frequent SEIM use at T1, and gender with frequent SEIM use at T1 and sexual preoccupation at T2. Table 4 shows that age also significantly correlates with frequent SEIM use at T2 and that gender significantly correlates with frequent SEIM use at T2 and sexual preoccupation at T1. With other words, these demographic variables correlate with both the predictor variables and outcome variables. Hence, age and gender were taken into account as control variables in the regression analyses.

**Sexual preoccupation based on compulsive and frequent SEIM use**

The first linear regression was conducted to predict sexual preoccupation (T2) by frequent SEIM use (T1). Results are shown in Table 5. In the first step, control variables age, gender and sexual preoccupation T1 were added. In the second step, the independent variable frequent SEIM use T1 was added. In the third step, interaction terms with age and gender were added. Results show no significant effects, indicating that frequent SEIM use does not predict an increase in sexual preoccupation. Again, no moderating effects were found, suggesting that the effect did not differ between gender and age groups.

**Table 5**

*Linear regression analysis to predict sexual preoccupation (T2) based on frequent SEIM use (T1)*

| | | $B$ | $\beta$ | $p$ |
|---|---|---|---|---|
| Step 1: | | | | |
| | Age | -.12 | -.36 | .44 |
| | Gender | -1.00 | -.08 | .09 |
| | Sexual preoccupation T1 | .57 | .45 | < .001 |
| Step 2: | | | | |
| | Frequent SEIM use T1 | -.13 | -.02 | .78 |

| | | B | ß | p |
|---|---|---|---|---|
| Step 3: | | | | |
| | Frequent SEIM use * age | -.37 | -.06 | .36 |
| | Frequent SEIM use * gender | -.27 | -.03 | .58 |

The second linear regression analysis was calculated to predict sexual preoccupation (T2) based on compulsive SEIM use (T1). Results are presented in Table 6. In the first step, control variables age, gender and sexual preoccupation T1 were added. In the second step, the independent variable compulsive SEIM use T1 was added. In the last step, interaction terms with age and gender were added. No significant effects were found, indicating that compulsive SEIM use does not predict sexual preoccupation. Also, no significant moderating effects were found, suggesting that the effect did not differ between age and gender groups.

**Table 6**

*Linear regression analyses to predict sexual preoccupation (T2) based on compulsive SEIM use (T1)*

| | | B | ß | p |
|---|---|---|---|---|
| Step 1: | | | | |
| | Age | -.11 | -.03 | .56 |
| | Gender | -.63 | -.04 | .43 |
| | Sexual preoccupation T1 | .59 | .45 | < .001 |
| Step 2: | | | | |
| | Compulsive SEIM use T1 | .05 | .05 | .41 |
| Step 3: | | | | |
| | Compulsive SEIM use * age | -.05 | -.15 | .80 |
| | Compulsive SEIM use * gender | -1.26 | -.04 | .43 |

An additional linear regression analysis was conducted to predict sexual preoccupation (T2) by frequent (T1) and compulsive SEIM use (T1) together. The correlation matrixes showed no signs of multicollinearity, hence the analysis could be carried out. Control variables age, gender, and sexual preoccupation T1 were added in the first step. Next, the two independent variables frequent and compulsive SEIM use T1 were added. In the third step, all interaction terms with age and gender were added. Results in Table 7 suggest that there are no significant

relations. Again, this indicates that frequent and compulsive SEIM use did not predict an increase in sexual preoccupation, and also did not differ between age and gender groups.

**Table 7**

*Linear regression analysis to predict sexual preoccupation (T2) based on frequent and compulsive SEIM use (T1)*

|  | $B$ | $\beta$ | $p$ |
|---|---|---|---|
| Step 1: | | | |
| Age | -.11 | -.03 | .56 |
| Gender | -.63 | -.04 | .43 |
| Sexual preoccupation T1 | .57 | .45 | < .001 |
| Step 2: | | | |
| Frequent SEIM use T1 | -.31 | -.03 | .57 |
| Compulsive SEIM use T1 | .06 | .05 | .37 |
| Step 3: | | | |
| Frequent SEIM use * age | -.49 | -.09 | .33 |
| Frequent SEIM use * gender | -.50 | -.06 | .41 |
| Compulsive SEIM use * age | .00 | -.00 | .99 |
| Compulsive SEIM use * gender | -.88 | -.03 | .59 |

**Frequent and compulsive SEIM use predicted by sexual preoccupation**

A logistic regression was conducted to investigate whether sexual preoccupation (T1) predicts frequent SEIM use (T2). In the first model, control variables age, gender and frequent SEIM use T1 were added. In the second model, the independent variable sexual preoccupation T1 was added. In the third model, interaction terms with age and gender were added. Results can be found in Table 8.

**Table 8**

*Binary logistic regression to predict frequent SEIM use (T2) based on sexual preoccupation (T1)*

|  |  | *Exp (B)* | *95%   CI*  *Lower* | *95%   CI*  *Upper* | *p* |
|---|---|---|---|---|---|
| Model 1: |  |  |  |  |  |
|  | Age | 1.06 | .86 | 1.30 | .59 |
|  | Gender | .20 | .09 | .42 | < .001 |
|  | Frequent SEIM use T1 | 8.96 | 5.17 | 15.52 | < .001 |
| Model 2: |  |  |  |  |  |
|  | Sexual preoccupation T1 | .96 | .88 | 1.04 | .27 |
| Model 3: |  |  |  |  |  |
|  | Sexual preoccupation * | .85 | .63 | 1.14 | .28 |
|  | age | .82 | .62 | 1.09 | .17 |
|  | Sexual preoccupation * gender |  |  |  |  |

No significant effects were found between sexual preoccupation and the frequency of SEIM use ($R^2$ = .38) and no moderating effects were found for gender and age ($R^2$ = .39). This indicates that sexual preoccupation did not predict an increase in frequent SEIM, and the effect was not stronger for boys or older adolescents.

The final linear regression analysis was calculated to predict compulsive SEIM use (T2) based on sexual preoccupation (T1). In the first step, control variables age, gender and compulsive SEIM use T1 were added. In the second step, the independent variable sexual preoccupation T1 was added. In the third step, interaction terms with age and gender were added. Results are displayed in Table 9. There seemed to be a marginally significant effect of sexual preoccupation (T1) on compulsive SEIM use (T2), indicating that adolescents who are sexually preoccupated at T1 show an increase in compulsive SEIM use at T2. This effect was moderated by gender. The interaction effect is illustrated in Figure 2. This illustration suggests that boys with a high level of sexual preoccupation show more compulsive symptoms towards their SEIM use compared to boys with a low level of sexual preoccupation. Among girls, there is no difference between low level sexual preoccupated girls and high level sexual preoccupated girls in the development of compulsive symptoms towards their SEIM use.
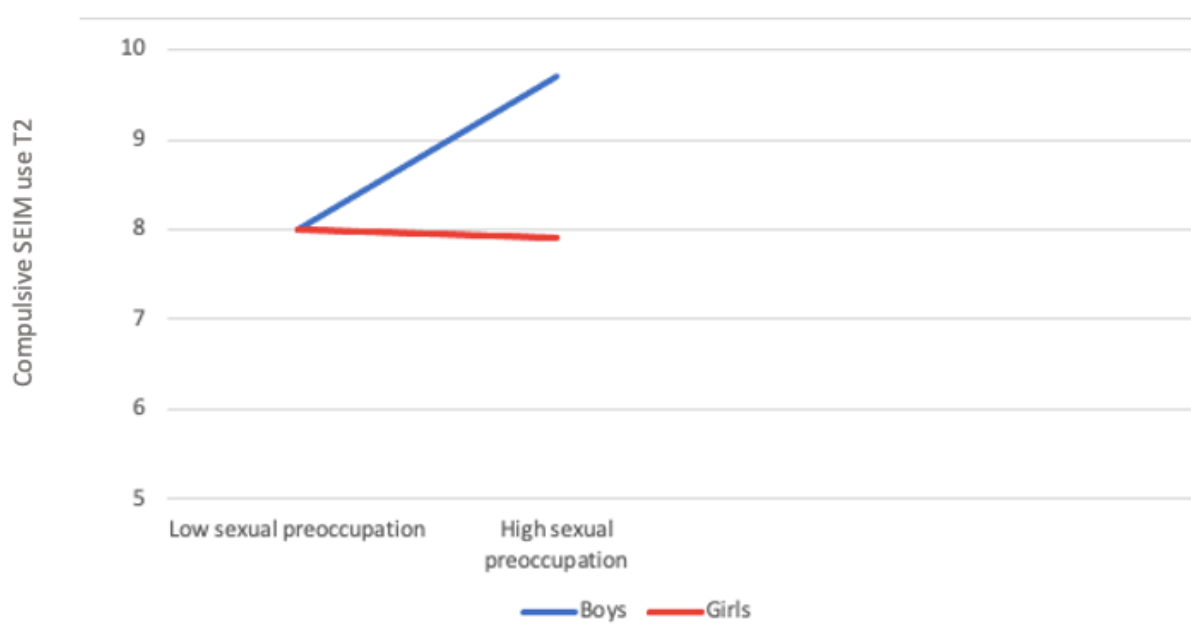
**Table 9**

*Linear regression analysis to predict compulsive SEIM use (T2) based on sexual preoccupation (T1)*

|  | B | ß | p |
|---|---|---|---|
| Step 1: | | | |
| Age | -.12 | -.03 | .55 |
| Gender | .12 | .01 | .89 |
| Compulsive SEIM use T1 | .53 | .45 | < .001 |
| Step 2: | | | |
| Sexual preoccupation T1 | .14 | .11 | .06 |
| Step 3: | | | |
| Sexual preoccupation * age | .01 | .00 | .96 |
| Sexual preoccupation * gender | -.75 | -.16 | .00 |

**Figure 2**

*Interaction effect between sexual preoccupation and gender*



**Discussion**

      Experts and researchers have indicated that compulsive sexual behavior on the Internet can have serious consequences on adolescents' overall development. Few longitudinal studies have examined the relation between adolescents' SEIM use and sexual preoccupancy.

Therefore, the current study addressed this gap in the literature by investigating the bidirectional relation between frequent and compulsive SEIM use on the one hand, and sexual preoccupation on the other hand. Furthermore, it was examined whether these relationships differed between gender and age groups. The present study showed that boys tend to consume SEIM more often than girls, and that boys are slightly more sexually preoccupated than girls are. However, this study hardly provided any evidence for bidirectional relations between frequent and compulsive SEIM use and sexual preoccupation. Only one marginally significant effect was found whereby sexual preoccupation predicted an increase in compulsive SEIM use one year later. This relationship, however, was only found for boys. More specifically, boys with a higher level of sexual preoccupation were more at risk of developing symptoms of compulsive SEIM use, compared to boys with a lower level of sexual preoccupation, and compared to girls with either a lower or higher level of sexual preoccupation. Among girls, sexually preoccupated girls did not predict changes in compulsive SEIM use over time. These results imply that adolescent boys with excessive sexual interests, are more likely to develop compulsive symptoms towards their SEIM use.

**The predictive role of frequent and compulsive SEIM use on sexual preoccupation**

It was hypothesized that frequent and compulsive SEIM use would predict an increase in sexual preoccupation. Results showed that frequent SEIM use, compulsive SEIM use and sexual preoccupation correlate with one another. However, there was no evidence of frequent and compulsive SEIM use promoting sexual preoccupation among adolescents. These findings therefore contradict the theories that described it would be expected for frequent and compulsive SEIM use to predict an increase in adolescents' sexual preoccupation. A methodological explanation could be that the amount of students who reported having compulsive symptoms regarding was very small, which made it more difficult to find significant longitudinal results. Future research should include a bigger sample adolescents with compulsive symptoms towards their SEIM use. A theoretical explanation might be that by consuming SEIM frequently or compulsively, excessive thoughts about sex are reduced because by consuming pornography, adolescents' needs are met, and they thus do not have to think about it as much for the rest of the day.

The current study's findings are an extension of the studies by Peter and Valkenburg (2008) and Donevan & Mattebo (2017), who found that frequent consumption of SEIM increases cognitive engagement in sex, but did not found the opposite like the current study did. In addition, Donevan and Mattebos' study is cross-sectionally in nature. Therefore, the current

study adds to the literature given that few studies have longitudinally examined these relationships.

**The predictive role of sexual preoccupation on frequent and compulsive SEIM use**

The opposite was also hypothesized, suggesting that sexual preoccupation would be a predictor of both frequent and compulsive SEIM use. This hypothesis was also not completely supported by the results, which showed that there is no effect of sexual preoccupation on the frequency of SEIM use. However, results did show an effect of sexual preoccupation on compulsive SEIM use, although this effect was only shown for boys. These findings are in line with results from Doornwaard et al. (2015), which suggest that excessive sexual interest among adolescent boys predicted compulsive use of SEIM. The results are also supported by findings from a study by Twohig (2009) and Svedin (2011), which indicate that sexual desire was the strongest predictor of problematic SEIM use. It is thus possible that adolescent boys are distracted by their obsessive sexual thoughts, which are standing in the way of their day-to-day activities. A theoretical explanation could be that they may engage in SEIM use (and masturbation) in order to find some relief from their (temporary) sexual preoccupation. The more an adolescent is sexually preoccupied, the more compulsive their SEIM use becomes.

**The role of gender and age**

It was also hypothesized that gender would moderate the bidirectional relation between frequent and compulsive SEIM use and sexual preoccupation. This hypothesis was partly supported since gender moderated the effect of sexual preoccupation on compulsive SEIM use, meaning that boys with a high level of sexual preoccupation are more likely to develop compulsive tendencies towards SEIM use.

This finding is consistent with previous studies that found gender differences in SEIM use (Peter & Valkenburg, 2010; Hald, 2006). It also supports the social construction-of-sexuality perspective, which emphasizes that males and females go through a different sexual socialization because of the influence that cultural and social processes have on how male and female adolescents approach sexuality (Gagnon & Simon, 1973). Boys may experience less restraints, and as a consequence it could be that they are therefore more occupied with thoughts about sex, which makes them more vulnerable to consume SEIM compulsively. It might also be possible that girls underreported on these topics because it still is considered to be a taboo for girls to watch pornography or have sexual thoughts.

At last, it was hypothesized that age would be a moderator of the bidirectional relation between frequent SEIM use and sexual preoccupation, and between compulsive SEIM use and sexual preoccupation. The hypothesis was not supported by the findings since no moderation

effect has proven to be significant. A possible explanation for these findings could be that the frequency of SEIM use and motives behind the use are partly defined at the beginning of adolescence. Besides, older adolescents who show compulsive tendencies towards SEIM use probably already possessed these symptoms in early adolescence, since such behavior does not develop overnight.

The current study results are not in line with studies that indicate that the likelihood of consuming SEIM increases with age (Wolak et al., 2007; Sevicíková et al., 2014). These results are however consistent with another study by Peter & Valkenburg (2010), which show that the frequency and antecedents of SEIM use did not differ between adolescents and adults. However, it might be incorrect to make this comparison since the current study investigated age differences within the adolescents group only.

**Strengths and limitations**

An important strength within this study is the use of a longitudinal design, which allows for testing the directionality of relationships. However, there are several limitations within this study that should also be noted. First of all, even though a diverse school sample was used throughout the Netherlands, the STARS data consisted of a large group of Western adolescents compared to the general Dutch population. Therefore, results cannot be generalized into groups of adolescents with different ethnic backgrounds. Secondly, this study used self-report measurements. Although self-report measurements are commonly used to collect data on sexuality, it may be subject to response bias, especially since questionnaires were administered in a school context. The research topic can be considered as sensitive, particularly for teenagers. They might have felt embarrassed, were afraid to be rejected or were afraid of social punishment if they would report the truth about their sexual behavior. Thirdly, data from project STARS dates back to 2011. It is possible that adolescents in 2021 view the use of SEIM differently than adolescents in 2011 due to changes that occurred in our society regarding sexuality in the past ten years. It is therefore again questionable whether results can be generalized to populations of adolescents anno 2021.

**Conclusion and implications**

This study contributes to the understudied topic of (compulsive) SEIM use and sexual preoccupation among adolescents, by showing that sexually preoccupated boys are at higher risk of developing compulsive SEIM use. Results of this study might be helpful to increase awareness among parents and teachers since compulsive use of SEIM may interfere with the wellbeing of adolescents. Open communication about SEIM use between parents, teachers, experts and adolescent boys should be stimulated in order to identify early signals of excessive

sexual thoughts and compulsive SEIM use, rather than minimize adolescents' access to SEIM. Future research should also provide more insight in the occurring risk of developing compulsive SEIM use, which allows the improvement of identification of at-risk groups or individuals so specific prevention efforts can be made.

<div align="center">**References**</div>

Cooper, A. Sexuality and the internet: Surfing into the new millennium. *Cyberpsychology and behavior, 1*(2), 187-193. https://doi.org/10.1089/cpb.1998.1.187

Donevan, M., & Mattebo, M. (2017). The relationship between frequent pornography consumption, behavior and sexual preoccupancy among male adolescents in Sweden. *Sexual & reproductive healthcare, 12,* 82-87. http://dx.doi.org/10.1016/j.srhc.2017.03.002

Doornwaard, S. M., Van den Eijnden, R. J. J. M., Baams, L., Vanwesenbeeck, I., & ter Bogt, T. F. M. (2015). Lower psychological well-being and excessive sexual interest predict symptoms of compulsive use of sexually explicit internet material among adolescent boys. *J Youth Adolescents, 45,* 73-84. https://doi.org/10.1007/s10964-015-0326-9

Efrati, Y. (2020). Problematic and non-problematic pornography use and compulsive sexual behavior among understudied populations: children and adolescents. *Current addiction reports, 7,* 68-75. https://doi.org/10.1007/s40429-020-00300-4

Gagnon, J. H., & Simon, W. (1973). *Sexual conduct: the social sources of human sexuality.* Transaction Publishers.

Hald, G. M (2006). Gender differences in pornography consumption among young heterosexual Danish adults. *Archives of sexual behavior, 35,* 577-587. https://doi.org/10.1007/s10508-006-9064-0

Herbenick, D., Reece, M., Schick, V., Sanders, S. A., Dodge, B., & Fortenberry, J. D. (2010). Sexual behavior in the United States: Results from a national probability sample of males and females ages 14 to 94. *The Journal of Sexual Medicine, 7*, 255 – 265. https://doi.org/10.1111/j.1743-6109.2010.02012.x

Klinger, E. (1990). *Daydreaming using waking fantasy and imaginary for self-knowledge and creativity.* Tarcher.

Meerkerk, G., Van den Eijnden, R. J. J. M., & Garretsen, H. F. L. (2006). Predicting compulsive internet use: It's all about sex! *CyberPsychology & Behavior, 9*(1), 95-103.  https://doi.org/10.1089/cpb.2006.9.95

Peter, J., & Valkenburg, P. M. (2008). Adolescents' exposure to sexually explicit Internet
material and sexually preoccupancy: A three-wave panel study. *Media psychology,
11*(2), 207-234. https://doi.org/10.1080/15213260801994238

Peter, J., & Valkenburg, P. M. (2010). Adolescents' use of sexually explicit Internet material
and sexual uncertainty: the role of involvement and gender. *Communication
Monographs, 77*(3), 357-375. https://doi.org/10.1080/03637751.2010.498791

Peter, J., & Valkenburg, P. M. (2010). The use of sexually explicit Internet Material and its
antecedents: A longitudinal comparison between adolescents and adults. *Archives of
sexual behavior, 40,* 1015-1025. https://doi.org/10.1007/s10508-010-9644

Pope. K. S., & Singer, J. L. (1976). Regulation of the stream of consciousness: toward a
theory of ongoing thought. In Schwartz, G.E., & Shapiro, D.A. (Red), *Consciousness
and self-regulation: advances in theory and research* (pp. 101-135). Plenum.

Sevicíková, A., & Daneback, K. (2014). Online pornography use in adolescence: Age and
gender differences. *European journal of developmental psychology, 11*(6), 674-686.
https://doi.org/10.1080/17405629.2014.926808

Sniewski, L., Farvid, P., & Carter, P. (2018). The assessment and treatment of adult
heterosexual men with self-perceived problematic pornography use: A review.
*Addictive behaviors*, *77*, 217-224. https://doi.org/10.1016/j.addbeh.2017.10.010

Stark, R., Klucken, T., Potenza, M. N., Brand, M., & Strahler, J. (2018). A current
understanding of the behavioral neuroscience of compulsive sexual behavior disorder
and problematic pornography use. *Current behavioral neuroscience reports, 5,* 218-
231. https://doi.org/10.1007/s40473-018-0162-9

Steele, J. R., & Brown, J. D. (1995). Adolescent room culture, studying media in the context
of everyday life. *Journal of youth and adolescence, 24*(5), 551-576.
https://doi.org/047-2891/95/1000-0551507.50/0

Sussman, S. (2007). Sexual addiction among teens: a review. *Sexual addiction and
compulsivity, 14*(4), 257-278. https://doi.org/10.1080/10720160701480758

Svedin, C. G., Åkerman, I., & Priebe, G. (2011). Frequent users of pornography. A population
based epidemiological study of Swedish male adolescents. *Journal of adolescence,
34*(4), 779-788. https://doi.org/10.1016/j.adolescence.2010.04.010

Twohig, M. P., Crosby, J. M., & Cox, J. M. (2009). Viewing internet pornography: for whom
is it problematic, how, and why? *Sexual addiction & Compulsivity, 16*(4), 253-266.
https://doi.org/10.1080/10720160903300788

Wolak, J., Mitchell, K., & Finkelhor, D. (2007). Unwanted and wanted exposure to online

    pornography in a national sample of youth internet users. *Pediatrics, 119,* 247-257.

    https://doi.org/10.1542/peds.2006-1891

**Appendices**

**Appendix 1. Interdisciplinarity of the present study**

Interdisciplinary research is becoming more important across several research disciplines (Burgers et al., 2019). It combines ideas from different disciplines, which contributes to the development of new integrative theories with greater explanatory power than those studies based on a single discipline. This is especially valuable regarding research problems with multiple levels of analysis (Cheng et al., 2014). Litsou and Byron (2019) therefore emphasize that research in pornography can benefit from interdisciplinary research that draw on multiple perspectives in order improve understandings of pornography use.

This current study aims to investigate the bidirectional relation between compulsive SEIM use and sexual preoccupation. Hence, one main research questions were developed: *Is there a bidirectional relation between frequent and compulsive SEIM use and sexual preoccupation among Dutch adolescents?* Several disciplines have been used in order to address the research problem.

First of all, from the discipline of natural and applied science, biology has been integrated. Biology is the science of life and of living organism, which includes structure, function, growth, etc. (North Seattle College, 2021). Because this study investigates age and gender differences, biology is addressed by taking changes in the body and hormones into account as the adolescent grows older. This is also a factor that plays an important role on the chronosystem and individual level of Bronfenbrenner's ecological model.

Secondly, the discipline of society, science & technology studies has been addressed. It investigates the conditions under which utilization of scientific knowledge and technological systems emerge and what the consequences are for different groups of people (Maastricht University, 2021). SEIM is a central topic in this research and possible consequences of its use are investigated. This factor is located on the exosystem level of the model.

Thirdly, this study has addressed developmental psychology. This approach aims to explain change and consistency across the lifespan by looking at a person's thoughts, feelings and behavior (American Psychological Association, 2021). This study investigates sexual thoughts and SEIM use over the period of adolescence, in which many changes in their development occur, also with regards to sex and pornography consumption. Furthermore, the difference in SEIM use between boys, girls, and ages are also investigated. Again, this factor can also be located at the chronosystem level of the model.

Fourthly, the discipline of sexology has been applied since (compulsive) SEIM use is largely investigated in the present study. It is generally defined as the study of human sexuality,

including sexual behavior, function, and interests (Money, 1976). One's SEIM use plays a role in the individual level of the ecological model. It could also be located on the exosystem level since sexual socialization could play a role in gender differences regarding SEIM use.

Lastly, this study also used the approach of public health. The aim of public health is to make sure that the maximum benefit for the largest group of people is provided (WHO, 2021). The goal of this current study is to collect knowledge about adolescents' (compulsive) SEIM use and its consequences, so caregivers, teachers, parents or health care professionals can provide adolescents with more appropriate help or support during their sexual development.

## *References*

American Psychological Association. (2021). *Developmental psychology.*
https://www.apa.org/pubs/journals/dev

Burgers, C., Brugman, B.C., & Boeynaems, A. (2019). Systematic literature reviews: four applications for interdisciplinary research. *Journal of pragmatics, 145,* 102-109. https://doi.org/10.1016/j.pragma.2019.04.004.

Cheng, J.L.C., Birkinshaw, J., Lessard, D.R., & Thomas, D.C. (2014). Advancing interdisciplinary research: insights from the JIBS special issue. *Journal of international business studies, 45,* 643-648. https://doi.org/10.1057/jibs.2014.34.

Litsou, K., & Byron, P. (2019). Identifying the challenges of interdisciplinary research on pornography use. *Culture, health & sexuality, 22*(5), 599-613. https://doi.org/10.1080/13691058.2019.1617898

Maastricht University. (2021). *European Studies on society, science & technology.* https://www.maastrichtuniversity.nl/education/master/master-european-studies-society-science-and-technology

Money, J. (1976). The development of sexology as a discipline. *The journal of sex research, 12*(2), 83-87.

North Seattle College (2021). *Biology; discipline description.* https://northseattle.edu/programs/biology/discipline-description

WHO. (2021). *The public health approach*. https://www.who.int/violenceprevention/approach/public_health/en/

**Appendix 2: Contract data-use TED-track**

Utrecht, 2020

This letter constitutes formal confirmation of the fact that the data from the Utrecht University Youth Studies master program have been made available to Nynke Dorien Hommes of Utrecht University.

These data will not be made available to others, and the data may be used only for analysis and reporting on topics for the thesis, about which agreement has been reached with Regina van den Eijnden.

Nynke Dorien Hommes will receive access to the data from the dataset in order to answer the following research questions within the framework of the thesis:

**Research question: Is there a bidirectional relation between compulsive and frequent SEIM, and sexual preoccupation among Dutch adolescents?**

The following variables will be used:

Dependent variable: Compulsive SEIM use (5.5; 11) and SEIM use (5.5; 10) Independent variables: Sexual preoccupation (1.7; 19)

Other variables: Age (6.1; 1), Gender (6.2; 2 & 6.3; 3), Sexual experience (1.1; 5, 6 and 7), Religion.

No report based on the data from the project entitled STARS may be made public, unless permission has been obtained in advance from the Project Coordinator of STARS.

After the expiration of this contract, dated 02-08-2021 Nynke Dorien Hommes shall delete the project STARS data.

Dates and signature:

Nynke Hommes, 27-01-2021:          Regina van den Eijnden, 10-06-2021