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Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:131:880599

Download date / Datum preuzimanja: **2024-07-20**

Varieties of Religious and Pornographic Experience: Latent Growth in Adolescents'

Religiosity and Pornography Use

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Abstract: The relationship between adolescent religiosity and pornography use has been longitudinally tested only in the USA. Given the social relevance of hypothesized mechanisms underlying the association, this study offers a three-wave longitudinal assessment of parallel latent growth in the two constructs carried out in a South European country. Using responses of 1,041 Croatian adolescents from the capital city (M_{age} = 16.14 years, SD = .45; 64.6% of female students) and latent growth curve modeling approach, we explored links between individual trajectories of change in religiosity and pornography use over a period of 24 months. In the observed period, religiosity decreased and pornography use increased among both male and female adolescents, but their dynamics were independent of each other—pointing to other (unmeasured) processes responsible for both adolescents' sexualization and secularization. Importantly, the findings also pointed to an important role of age at first exposure to pornography for its frequency of use in middle to late adolescence.

Key Words: Adolescents; religiosity; faith; pornography use; longitudinal

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INTRODUCTION

The rise of widely available internet pornography has stoked research interest in possible associations between pornography use and various outcomes. Particularly germane to this discussion are effects on adolescents, as this is a time when, according to some sensitive period models, sexual socialization is particularly important in terms of later life influences (O'Sullivan & Thompson, 2014). In addition to outcomes, a related literature has developed regarding behavioral and attitudinal associations with internet pornography use. For example, there is a long history in the pornography literature of strong cross-sectional negative relationships between various measures of religiosity and self-reported pornography use (e.g. Carroll et al., 2008; Poulsen, Busby, & Galovan, 2013; Stack, Wasserman, & Kern, 2004). More recent research has gone beyond simply establishing cross-sectional relationships couched in OLS models and has begun to investigate the longitudinal interplay between pornography use and religiosity across time. Perry (2017) made some attempt at this by employing a two-wave survey to investigate the functional form and directionality of the pornography use and religion relationship among adults, finding a negative, though curvilinear relationship between early pornography use and later life religiosity, with high levels of use associated with somewhat greater religiosity six years later relative to those with more moderate use.

In another study carried out among adolescents and emerging adults, Perry and Hayward (2017) found a linear negative relationship between pornography use and religiosity using a three-wave survey and person-fixed effects. The strength of the relationship was the same for male and female participants but was generally stronger among adolescents than for emerging adults. Finally, Rasmussen and Bierman (2016) used three waves of data (each about two years apart) from the National Survey of Youth and Religion and found that religiosity had a buffering effect on pornography consumption, even while controlling for parental religious influence. Furthermore, they found the effect stronger for men than women in their study, despite hypothesizing that women would be affected more strongly due to higher religious internalization among women church-goers. After finding the opposite, they hypothesized that the higher pornography use among men in general may make effect sizes naturally larger among men.

In the spirit of these more recent studies, we employed a three-wave latent growth curve modeling to assess between- and within-individual interrelations between pornography use and religiosity using an independent panel sample of Croatian adolescents.

Conceptual Framework

We draw on various theoretical models to frame our analysis and discussion. First, the Susceptibility to Media Effects model (DSMM—Valkenburg & Peter, 2013) posits several sources of vulnerability to media influence: dispositional, developmental, and social. Most germane for the pornography/religion discussion here is social susceptibility to pornographic exposure and influence, which were defined by the authors as "all social-context factors that can influence an individual's selective use of and responsiveness to media." (Valkenburg & Peter, 2013: 227). Religiosity is an important source of norms about and attitudes toward sexuality as it

is often an important source of normative socialization generally for many adolescents (Smith & Denton, 2005).

There are a number of different mediating mechanisms that may explain the link between religious upbringing and the internalization of religious values and negative evaluation of pornography among young people. First, as noted above, religion establishes certain sexual norms that may incur psychological as well as social costs for violators (Patterson & Price, 2012). Second, network homophily would tend to make religious people disproportionately socially tied to other religious people (Mcpherson, Smith-Lovin, & Cook, 2001). Thus, personal networks would reinforce religion-based attitudes and norms about sexuality and pornography—and exert pressure to conform to them—even if they are not explicitly tied to religious theology or strictures.

Apart from reporting a significant association between religiosity and pornography use among adolescents, the recent longitudinal studies also explored directionality of the relationship. Using the same dataset the first study reported a buffering effect of religiosity (Rasmussen & Bierman, 2016), while the other found that pornography use diminished the frequency of church attendance and the importance of faith (Perry & Hayward, 2017). The possible influence of pornography on religiosity may be explained by Festinger's theory of cognitive dissonance (1957), which hypothesizes that the discomfort caused by holding two incongruent beliefs encourages individuals in obliviate the discomfort by reframing or modifying one of the ideas. In the case of religion and pornography this may be manifested in individuals who enjoy using pornography becoming less religiously active over time or even leaving religion altogether.

Cultural Context

Croatia presents a specific socio-religious context for adolescent development. The country experienced a substantial increase in religiosity during and in the aftermath of the post-

communist transition and the 1991-1995 war that followed the breakup of Yugoslavia. According to the European Values Survey (Luijkx, Halman, Sieben, Brislinger, & Quandt, 2016) the process resulted in Croatia becoming one of the most religious European countries. In the 2011 census, over 86% of its population identified as Roman Catholic and less than 6% were reportedly not religious. Compared to the Roman Catholic countries of the European West and South, Croatia is characterized by substantially more traditional and less permissive attitudes toward sexuality (Hodžić & Štulhofer, 2017; Štulhofer & Rimac, 2009). Although substantial increase in religiosity was also observed among younger generations, particularly during the 1990s (Marinović Jerolimov & Jokić, 2010), currently there is no evidence that young people's sexual behavior has been markedly influenced by their religiosity (Puzek, Štulhofer, & Božičević, 2012).

Study Aims

Our study contributes to the literature on the dynamic relationship between religiosity and pornography use in several ways. First, unlike the prior literature, ours addresses the variable of timing of first exposure to pornography. Again, this is relevant because of the sensitive period nature of many explanations for relationships between adolescent pornography use and outcomes or other associations. For example, Sinković, Štulhofer, & Božić (2013) found that early exposure to pornography was one of the few predictors that was found to be significantly associated with sexual risk taking for both men and women. Similarly, Hald (2006) found that younger age at first exposure was strongly associated with later life pornography consumption. However, Rasmussen and Bierman (2017) found that "initiating and accelerating pornography consumption constitute distinct processes," with distinct predictors even though they are conceptually and empirically related, and that "research on emerging adults should consider separate influences on each."

While it is plausible that early exposure to pornography leads to higher consumption later in life, it is worth noting here that causality is indeterminate: people with naturally stronger sex drives or sensation seeking may simply seek out pornography earlier (Beyens, Vandenbosch, & Eggermont, 2015). While this study does not specifically explore the issue of endogeneity, it is clear from the prior literature that age at first exposure lies at the nexus of various pornography and pornography-related behaviors and characteristics, and is therefore a warranted variable of interest in its own right in the religion/pornography literature whether age of first exposure to pornography is causally associated with later life usage or whether it is acting as a proxy for sociosexual attitudes and behaviors that later lead to pornography use. If the former, religiosity could indirectly affect overall pornography use via its buffering effect on age of first exposure.

Second, the literature is US-centric, with none of the recent longitudinal investigations of interactions between pornography use and religiosity taking place in a non-US context. Third, unlike prior studies, the time period between the assessments of religiosity in our study is 12 months, which enables a more fine-grained look at change, which is especially relevant during adolescence which is often a period of rapid personal change overall. As most of the prior literature has tested larger intervals, it is unknown how much religion is interrelated with pornography use on a year-to-year timeframe. What using a year-long interval costs in terms of total coverage it makes up for more detailed information about a transitional period (from mid to late adolescence) also characterized by increasing sexual experimentation.

Fourth, we take a trajectory-based analytical approach that goes beyond the usual examination of between-person associations between constructs of interest and enables exploration of within-person parallel growth in pornography use and religiosity. The use of latent growth curve modeling enabled estimations based on linear and non-linear changes in the constructs of interest, but also provided an insight into associations between the initial levels of

one construct and latent growth in another construct, and vice versa—which is another way of exploring the directionality issue (Duncan & Duncan, 2009).

Based on the emerging literature and the theoretical predictions discussed above, we hypothesize that individual trajectories of change in religiosity will be negatively related to trajectories in pornography use among both genders. Taking into account that women tend to be more religious than men (Miller & Stark, 2002), as well as the implication of the theory of erotic plasticity (Baumeister, 2000) regarding sociocultural influences on sexuality being stronger in women than men, we expect that the relationship between religiosity and pornography use will be more substantial among female adolescents. We also hypothesize that the initial levels of religiosity/faith will be more strongly related to subsequent growth in pornography use than vice versa. While religiosity tends to remain relatively stable throughout adolescence (Denton, Pearce, & Smith, 2008), sexual practices are heavily influenced by contexts and variables that occur during this time (Blakemore & Mills, 2014; O'Sullivan & Thompson, 2014). In the Croatian context here, the median age at first sexual intercourse is 17 for both men and women (Landripet, Štulhofer, & Baćak, 2011). Consequently, it is likely that any empirically discerned interrelations between religion and pornography use during this time largely runs from early religiosity influencing pornography use or variables conceptually intertwined with pornography use such as age at first exposure to pornography.

Finally, earlier exposure to pornography is expected to be related to higher pornography use at later age—either in terms of habit formation or as an outcome of cognitive adjustments aimed at reducing cognitive dissonance (Valkenburg & Peter, 2013: 236)—which may affect its association with religiosity (cf. Perry & Hayward, 2017).

METHOD

Participants

This study is part of the PROBIOPS research project, a longitudinal study launched in 2015 among second-grade secondary school students (16-year-olds) in two large Croatian towns (Rijeka and Zagreb). In this study, we use data collected online in the Zagreb panel. After excluding small schools (mostly private, religious and specialized art schools) due to financial restrictions, 69 of 90 high schools in the city and the surrounding county—of which 10 refused to participate—were contacted for student recruitment. Leaflets with information about the study (for sophomore students and their parents), a unique registration code, and instructions for online registration were distributed in schools. In total, 2,655 students registered (36% response rate), which enabled them to take an online survey after providing (electronically) informed consent. The study questionnaires, which could be accessed by smartphone, took about 15 minutes to complete. Data collection waves in the Zagreb panel were spaced 6 months apart.

Comparable to an earlier online panel of Dutch adolescents (Kuyper, De Wit, Adam, & Woertman, 2012), participation rate in the Zagreb panel dropped dramatically from T1 (2,241) to T2 (644)—because of the recruited students' unfamiliarity with longitudinal research and a lack of interest—but stabilized afterwards (T3 = 727, T4 = 692, and T5 = 693). As explained below, the religion question was asked in the T1, T3, and T5 waves, ergo here we use responses from members of the Zagreb panel who participated in at least two of those three waves ($n = 1041$; M_{age} = 16.14 years, SD = .45; 64.6% of female students). To assess attrition bias, multivariate logistic regression model was carried out with participation in a single wave vs participation in at least two data collection waves as dependent variable and socio-demographic indicators (gender, living in a one-parent family, father's and mother's education, academic achievement), religiosity, pornography use and the timing of first contact with pornography as independent variables. Compared to adolescents who participated only once, those who completed a survey at least twice had significantly higher odds of being women (AOR = 1.53, $p < .001$), attending a

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more prestigious type of secondary school (AOR = 1.49, *p* < .001) and reporting higher academic achievement (AOR = 1.72, *p* < .001). <u>Sociodemographic characteristics of the participants included in this study are shown in Table 1.</u>

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<u>TABLE 1 ABOUT HERE</u>

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Procedure

Before the initial online survey, parents were broadly informed about the study but informed consent was asked only of prospective participants (at the beginning of each survey). Contact information for a youth psychological health center was provided at the end of all questionnaires, in the case that participation triggered any concerns or negative emotions. Following each study wave, participants were included in a lottery with $7 (6.5€) vouchers. All study procedures were approved by the Ethical Research Committee of the Faculty of Humanities and Social Sciences, University of Zagreb.

Measures

Religiosity was measured in a standard way by asking participants about the frequency of attending religious services ("excluding baptism, wedding and funeral ceremonies"). The construct was measured at T1 (baseline measurement), T3 (the third data collection wave) and T5 (the fifth wave) Answers were recorded on a 6-point scale that ranged from 1 = never to 6 = every week or more often.

Pornography was defined as *any material which openly (i.e., not censored) depicts sexual activity; materials that show naked bodies, but which do not show sexual intercourse or other sexual activity does not belong to pornography as here defined*. A single-item measure was used to assess the frequency of pornography use in the past 6 months. Answers were recorded on an 8-

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point scale: 1 – "Not once"; 2 – "Several times"; 3 – "Once a month"; 4 – "2-3 times a month"; 5 – "Once a week"; 6 – "Several times a week"; 7 – "Every day or almost every day"; 8 – "Several times a day." Pornography use was assessed at every wave.

Finally, the timing of first exposure to pornography—which was used as a covariate of longitudinal association between religiosity/faith and pornography use—was assessed with the following question: "*How old were you when you first saw, accidentally or deliberately, a pornographic movie or a video—even if only a part of it*?" An 8-point scale ranging from 1 = never to 8 = at the age of 16 or older was used to anchor answers. The indicator was measured at baseline (T1).

TABLE 2 ABOUT HERE

Analytical Strategy

To explore possible association between adolescent religiosity/faith and pornography use over time, we used latent growth curve modeling (LGM). The approach enables the estimation of average or group changes (fixed effects), but also individual differences in growth trajectories (random effects). In the case of linear growth, two latent factors—intercept and slope—represent group average at baseline and the average growth over time, while their variances reflect individual variability in initial levels and growth rates, respectively (Duncan & Duncan, 2009). Among the advantages of LGM over the most of other longitudinal data analytic methods, a higher statistical power (Muthén & Curran, 1997), unproblematic handling of unequally spaced time points and non-normally distributed measures (Curran, Obeidat, & Losardo, 2010), as well as the reduction of bias introduced by attrition rate (Little, 2013) have been suggested. The final point reflects the fact that LGM uses full information maximum likelihood (FIML) approach to handling missing observations, in which all available information is used for model-based estimations (Graham, 2012; Little, 2013).

In the current study we used dual-domain or parallel LGM to explore relationships between religiosity and pornography use in adolescent men and women. Our analytical strategy involved several steps (cf. Bollen & Curran, 2006). Taking into account that our study included only three waves of data collection, we compared fit of the linear growth model with the one in which change was treated as cumulative (only the first and the last slope loadings were specified as 0 and 1, respectively; McArdle & Grimm, 2010; Preacher, Wichman, MacCallum, & Briggs, 2008). Because non-significant values of the chi-square difference between a more parsimonious model (linear growth curve) and a less parsimonious models (cumulative growth curve) were obtained for both constructs, their latent change was modeled as linear. Given the usual gender differences in religiosity (women seem to attend religious services more often than men) and pornography use (men are invariably higher consumers of pornography compared to women), curve testing was carried separately for each gender.

Next, we estimated a full or conditional multi-group model (with gender as groups) by controlling for the timing of first exposure to pornography. Following standard recommendations (cf. Little, 2013; Preacher et al., 2008), equality constraints were placed on residuals in all models. Model fit was evaluated by inspecting χ^2/df, CFI, and RMSEA statistics, with χ^2/df ≤ 2.0, CFI values $\geq .95$ and RMSEA values $\leq.05$ representing excellent fit to data (Byrne, 2010).

To account for cluster-based sampling, we estimated intra-class correlation in the three key indicators prior to LGM analyses. In unconditional mean multilevel models by gender and city, nestedness in schools explained 2.0% of variance in female and 3.1% of variance in male adolescents' pornography use. The school level accounted for 5.6% of variance in adolescent women's religiosity (the male model failed to converge).

Informed by these reasonably low levels of clustering, the higher level effect was omitted in LGM.

Latent growth curve analyses were carried out in IBM AMOS 23 statistical software, while IBM SPSS 23 mixed models module with restricted maximum likelihood (REML) estimator was used to explore school-level random effects.

<div align="center">RESULTS</div>

The majority of adolescents in Zagreb (7~~8~~9.~~5~~2%) were living with both parents at the time of the survey. Over a third of participants reported college educated father and/or mother ~~(40.8%)~~. A majority of students attended a 3- or 4-year vocational school (57.~~7~~3%), while the rest attended a gymnasium—a substantially more prestigious type of school that prepares students for tertiary education. At baseline, 21.3% of male and 12.9% of female participants reported the experience of sexual intercourse.

The group-level dynamics of religious attendance and pornography use are presented in Figure~~s~~ 1. A decrease in mean religiosity was observed among both male and female students. At baseline, almost identical proportion of participants acknowledged no church attendance (16.5%) and a weekly or more frequent attendance (16.8%). At the final wave, the respective percentages were 23.3 and 13.0. In contrast, the change in pornography use over time was positive. The proportion of male participants who did not use pornography decreased from 11.2% at baseline to 6.2% at T5. Among their female peers, the respective proportions were 70.8% and 47.3%. The average age at first contact with pornography was 11.5 years (*SD* = 1.47) for male and 12.5 years (*SD* = 1.75) for female students.

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FIGURE 1 ABOUT HERE</div>

Dynamics of Religiosity and Pornography Use

Table 2 presents zero-order correlations between the two constructs over time. Significant and negative associations were consistently observed between the frequencies of pornography use and attending religious services in both genders.

TABLE 2 ABOUT HERE

Multivariate analyses were carried out next. The multi-group unconditional LGM ~~model~~ of adolescent religiosity and pornography use had excellent fit ($\chi^2_{(24)}$ = 54.34, CFI = .99, RMSEA = .035, 90% CI = .023-.047). As shown in Table ~~1~~3, the initial levels and subsequent growth in both constructs were significantly different from zero in both genders. As observed at between-individual level, negative growth trajectories of religiosity characterized both male and female participants. On average, individual levels of pornography use at baseline were substantially higher among the former compared to the latter.

Expectedly, we found significant within-individual variability in religiosity and pornography use baseline levels and latent growth curves in both genders. The only exception was a non-significant variance in negative change in religiosity among adolescent men, pointing to a uniform reduction in male religiosity during the observed period.

TABLE 3 ~~1~~ ABOUT HERE

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Adding age at first contact with pornography did not significantly change model fit ($\chi^2_{(28)}$ = 56.58, CFI = .99, RMSEA = .031, 90% CI = .019-.043)[1], but we decided to leave this control in the model for the conceptual reasons (described in the introductory part and its significant associations with three of the four latent constructs). Structural associations between the key constructs were first inspected for gender differences. As presented in Figure 2, of the four possible associations between latent factors that reflect the initial levels and subsequent growth in religiosity and pornography use, only two reached statistical significance. The small to moderate relationship between baseline levels of religiosity and pornography use, which reflected a correspondence between lower baseline attendance of religious services and higher initial frequency of pornography use, was similar in two gender groups ($\beta_{\text{male adolescents}}$ = -.23, p < .001 and $\beta_{\text{female adolescents}}$ = -.21, p < .001). The second association, which was significant only among male adolescents, was likely a measurement artifact.[2] These findings simultaneously answered our first two research questions, pointing to no gender-specific patterns of association between adolescent religiosity and pornography use, but also to the absence of a dynamic relationships between the two constructs of interest.

The third research question pertained to the role of age at first contact with pornography. The timing of first contact with sexually explicit material was significantly associated with the initial levels of pornography use in both male and female adolescents (β = -.36, p < .001 and β = -.25, p < .001, respectively), with an earlier childhood exposure linked to a more frequent use at the age of 16. Among male

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[1] This is reflected in the fact that the pattern of significant covariances in the model was identical to the one observed in the unconditional model.

[2] A significant negative correlation between the latent intercept and slope of pornography use, according to which users characterized by a higher baseline frequency reported a lower increase in pornography use over time, should be considered with caution. Given that the construct was measured by an ordinal scale with a restricted range, the finding is likely an artifact of the scaling method (cf. Little, 2013: 260).

participants, the timing of first exposure was also moderately to strongly related (β = .43, p < .001) to linear growth in using pornography. Again, an earlier exposure corresponded to a higher latent growth in pornography use several years later. Among adolescent women, age at first contact with pornography use was negatively associated with baseline religiosity (β = .12, p < .01). This weak effect pointed that first contact with sexually explicit material happened at a somewhat older age for more religious compared to less religious female teenagers.

FIGURE 2 ABOUT HERE

DISCUSSION

This 3-wave longitudinal panel study aimed to provide additional evidence of the dynamic relationship between religiosity and pornography use in adolescence. While this has been investigated before, here we tested whether the findings of the prior literature held 1) within a smaller, more fine-grained time window (three surveys in three years), as opposed to the rest of the literature which has emphasized longer time spans, and 2) in an international, non-US context. Unlike prior studies, the particular sociocultural context observed here is a highly religious European one, where adolescents are likely exposed to similar, religiously inspired, anti-pornography messages as their peers in the US. Additionally, we incorporated and discussed the role of timing of the first exposure to pornography.

Using LGM approach in a reasonably large panel sample of Croatian 16-year-olds we found that, on average, individual trajectories of attending religious services displayed negative growth, which is line with other longitudinal insights (Hayward & Krause, 2013). The opposite was observed while exploring the trajectories of pornography. With these contrasting dynamics in

mind, we tested the existence of dynamic links between the two constructs. No significant

associations between the initial levels of religiosity and pornography use over time (buffering

effect of religion; Rasmussen & Bierman, 2016) or between baseline frequency of pornography

use and the growth in religiosity (secularizing effect of pornography use) were found in this

study. However, we observed a significant relationship between the initial levels of the two

constructs, which corroborated the negative religious perspective of pornography (Sherkat &

Ellison, 1997).

One of our research questions suggested that religious values might have a more

substantial role in the use of pornographic material among adolescent women compared to their

male peers. No empirical evidence was found to support this. The negative association between

baseline frequency of church attendance and pornography use had almost identical effect size in

male and female adolescents. Following Perry and Hayward (2017), we also speculated that an

earlier use of or exposure to pornographic material may lead to more frequent use at later age and

less frequent attendance of religious services among adolescents. Although no significant links

were found between the timing of the first exposure and the dynamics of religiosity, we observed

consistent and moderately strong relationships between age at first contact and male adolescents'

pornography use years later. Among adolescent women, a weak but significant association was

found between the timing of first contact with pornography and baseline levels of church

attendance.

Congruent with the findings of Rasmussen and Beirman (2016), we found increases in

pornography use across adolescence for both men and women. However, we did not find any

substantial difference in the relationship between pornography use and religiosity across gender,

unlike Rasmussen and Beirman (2016) who reported a stronger relationship among men. The

significant association between the timing of first exposure to pornography and baseline church

attendance, which was significant only among female adolescents, suggests that if religiosity has a buffering effect on the initiation to pornography in early adolescence it would be stronger in female participants—as the erotic plasticity model would predict (Baumeister, 2000). A possible explanation for the differences between our and Rasmussen and Beirman study's findings may lie in the validity of pornography use measure that the authors used ("About how many, if any, X-rated pornographic movies, videos, or cable programs have you watched in the last year?") was likely affected by memory effects (recalling frequency across a year), but also a lack of clarity about what constitutes an "X-rated" video or movie. The latter may be particularly problematic in younger generations who mostly use sexually explicit video clips rather than pornographic movies. Methodologically, our measure of pornography use has advantages over the National Study of Youth and Religion indicator used by Rasmussen and Beirman (2016) in both respects.

It should be noted that our measure of the timing of first contact with pornography carries no information about whether the use of pornography was continued or not after this first exposure. Considering the observed links between childhood exposure to pornography and the frequency of its use in middle to late adolescence suggests that future research should incorporate this indicator (to test if it replicates cross-culturally and cross-methodologically), but also explore the issue of (dis)continuity of pornography use from childhood or early adolescence to late adolescence and early adulthood. Although preliminary, our findings point that age at first exposure may play an important role in the relationship between pornography use and adolescent sociosexual development. This effect was particularly expressed in male adolescents. Conceptually, mechanisms underlying this gender-specific finding remain unknown, but it is likely that the consistently higher pornography use by adolescent men plays a role. In addition, the combination of a contact at an earlier age and the fact that mainstream SEM has been modeled after a male, rather than female, model of sexuality (Brosius, Weaver, & Staab, 1993)

may account for a larger absolute effect of the timing of first exposure to pornography on later use.

Overall, the shorter period of time under observation in this study (2 years) and its European context means that our null results do not necessarily challenge the findings of Perry (2017). It may be that more time is needed for stronger interrelationship between pornography use and religiosity to form and be observed. Culture-specific differences in the association between the two constructs are also possible.

Strengths and Limitations

Apart from its longitudinal design and analytical approach that enabled distinguishing between within- and between-individual differences over time, this study's strengths also include the use of validated and well-defined indicators of the key constructs. In contrast to earlier studies (Perry & Hayward, 2017; Rasmussen & Bierman, 2016), we controlled the target association for the timing of the first contact with pornography, as it may have an important developmental effect. Considering that early exposure to pornography usually precedes real-life sexual experiences, a possible pornography-based sexual socialization—which has been recently conceptualized as a specific sexual scripting process (Wright, 2014)—should be addressed when assessing adolescent pornography use and its ramifications.

Several limitations also need to be taken into account when weighing our findings. First, the reader should be reminded that our findings are not generalizable to adolescents from small public and private schools, as they were omitted from the recruitment for this longitudinal study. Even more importantly, it remains unknown whether the results can be extended to other socio-cultural settings.

Second, a more precise estimation of latent trajectories (e.g., using piecewise approach) was made impossible by only three available data collection waves spanning over the period of

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24 months. Considering that the previous longitudinal studies of the same topic had either two or three waves, it is essential that future explorations include more time points to allow for better modeling of latent change. On the related note, while short time spans enable a more precise analysis of the changes of interest, adding more space between assessments enables researchers to generalize better and, perhaps, employ additional analytical tools—such as moderated mediation analysis—due to a higher chance of detectable effects. However, in the context of adolescence, longer time spans may miss or obscure specific developmental phases.

Third, the religiosity measure used in this study may not be optimal for assessing adolescent religion-based values, which are usually of central importance in explorations of links between pornography use and religiosity. A more direct indicator, such as a composite measure of personal faith, adherence to religious teachings or personal importance of God/religion, may be a more precise way to assess the target relationship—particularly among young people, who may be less likely to attend religious services compared to adults (Argue, Johnson, & White, 1999). If possible, future studies should use different types of religiosity indicators, including the number of religious peers in one's social network (cf. Puzek, Štulhofer, & Božičević, 2012).

Fourth, as noted previously, there was some attrition bias that may have affected this study's results. Specifically, adolescent women and students with better grades tended to be more likely to be included in our analyses. Although the included participants did not differ from their peers in religiosity levels and pornography use, it can not be ruled out that the here reported results are more relevant for more academically successful students. In the absence of literature on the moderating effect of early educational achievement on interrelations between pornography use and other constructs, we would only note that a higher educational achievement is often associated with a stable and supportive family environment (Fan & Chen, 2001)—which has

been found to reduce adolescents' susceptibility to potentially risky sexual behaviors (Tomić, Burić i Štulhofer, 2017).

Finally, it remains unknown to what extent the findings reported here may be culture-specific. According to the findings from the European Values Survey project, Croatia is among to the most religious European countries (Luijkx et al., 2016). Traditionally a Roman Catholic country, religiosity has substantially increased in Croatia during post-communist transition and the 1991-1995 independence war. However, it remains unclear to what extent has the rising popularity of religious identification influenced young people's sexual behavior (see Puzek et al., 2012; Štulhofer, Šoh, Jelaska, Bacak, & Landripet, 2011). Given the growing popularity of pornography use—which is not restricted to youth in the developed West (Arulogun, Ogbu, & Dipeolu, 2016; Mahapatra & Saggurti, 2014; Vakilian, Mousavi, & Keramat, 2014)—cross-cultural assessment of the association between religiosity and pornography use is another task for future research.

CONCLUSIONS

In the spirit of the more cutting-edge pornography use/religiosity literature we adopted a longitudinal approach which enabled a robust between- and within-individual assessment of the dynamic relationship between religiosity and adolescent pornography use. In support of the prior literature, we found strong negative baseline correlations between pornography use and religiosity for both men and women. In contrast to the existing US-centric studies, no significant associations were observed between change in the two constructs over time, nor between the initial levels in one and subsequent latent growth in another. Although religiosity decreased in the observed period, while pornography use increased in both female and male participants, their dynamics were independent of each other—pointing to other (unmeasured) processes responsible for adolescents being increasingly more interested in sexual and less interested in religious

themes. A novel insight provided by this study is a buffering effect of delayed first exposure for male pornography use in middle and late adolescence. This potentially important effect should receive more systematic attention in future studies.

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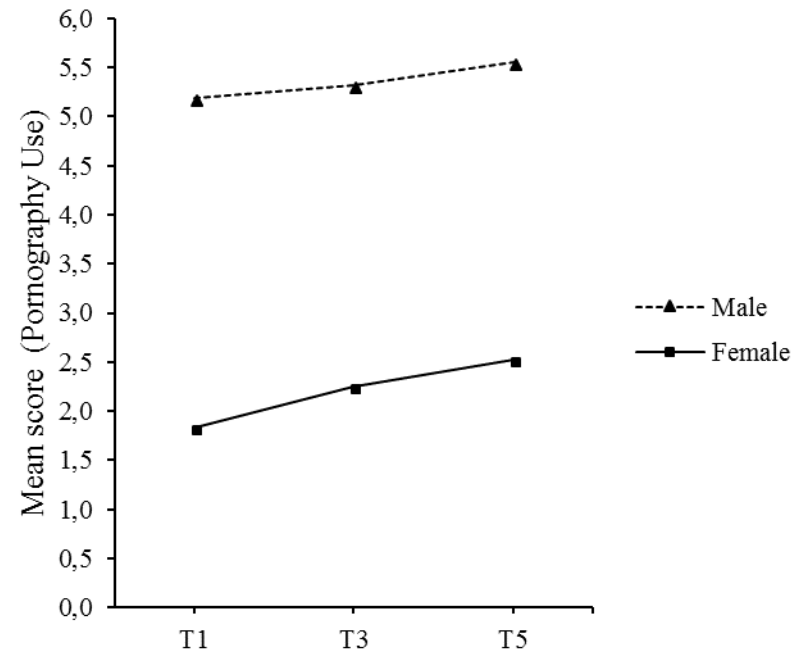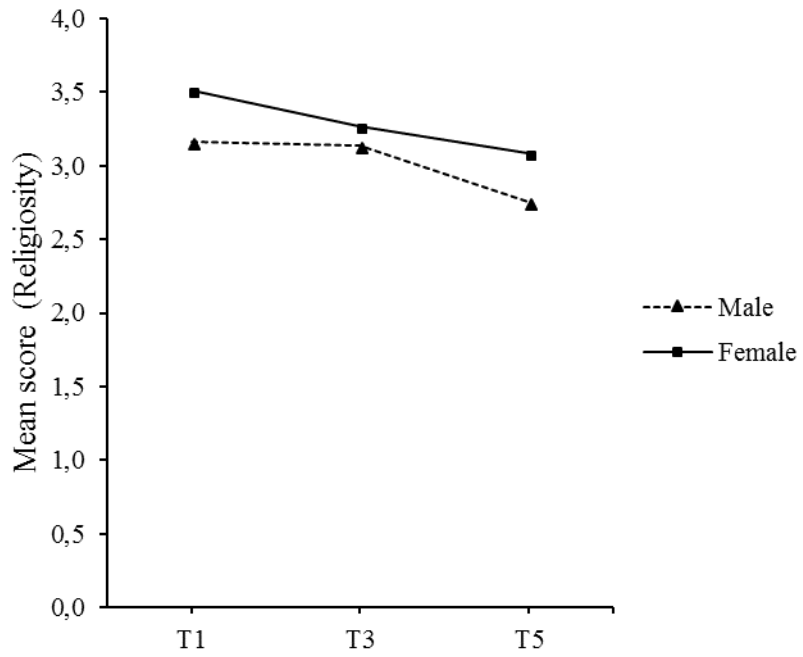   and a Theoretical Future. *Journal of Children and Media*, *8*(3), 305–312.

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Figure 1. Dynamics of Religiosity and Pornography Use by Gender among Croatian Adolescents in Zagreb Panel
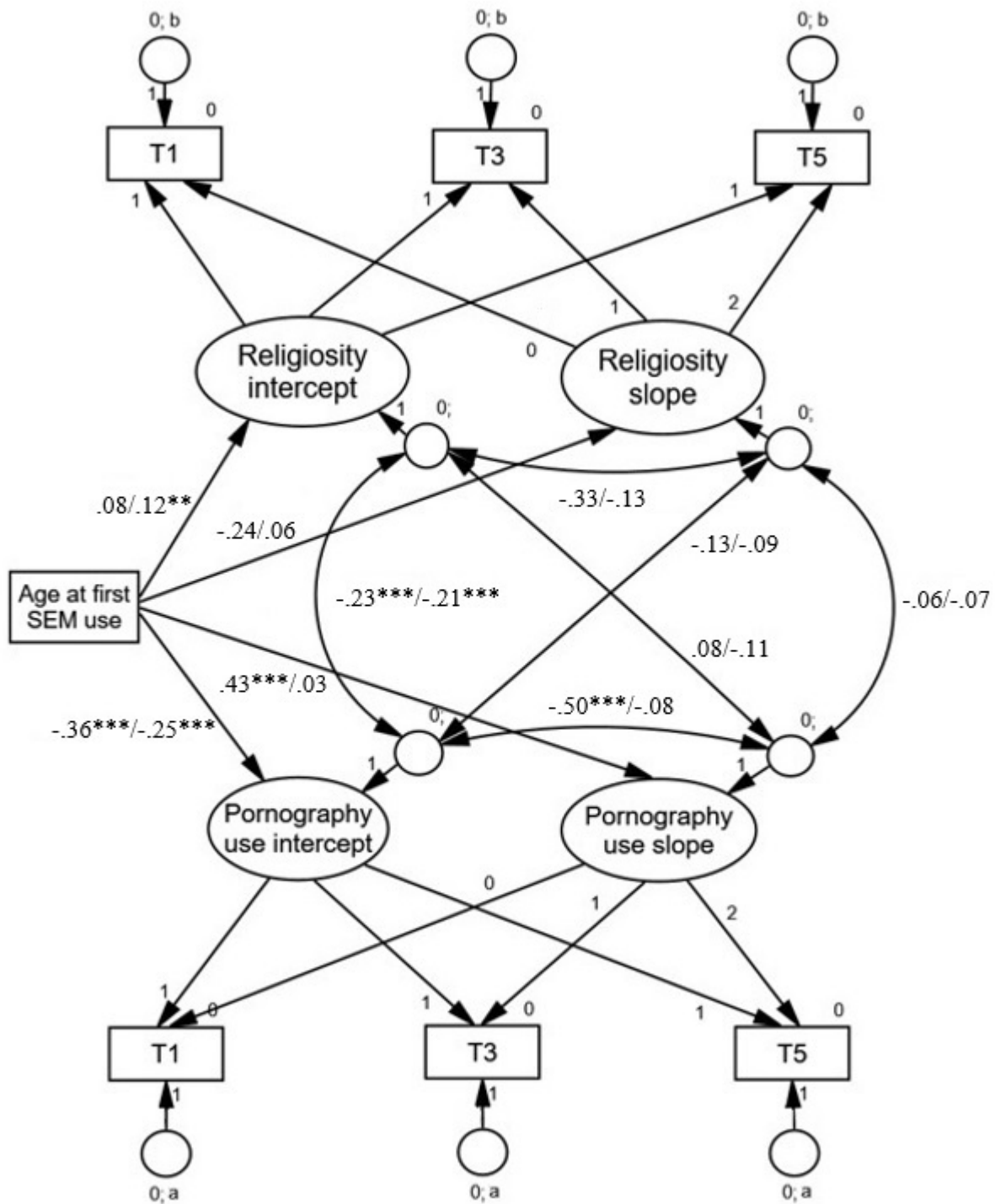
Figure 2. Latent Growth in Adolescent Religiosity and Pornography Use by Gender. Pairs of coefficients represent values from the male (left value; *n* = 368) and the female (right value; *n* = 673) participants. SEM = sexually explicit material; * p < .05. ** p < .01. *** p < .001.

Table 1

Demographic Information about the Study Participants (N = *1,041*)

	T1	T3	T5
	n (%)	*n* (%)	*n* (%)
Gender			
Male	368 (35.4)	227 (31.9)	210 (30.6)
Female	673 (64.6)	484 (68.1)	476 (69.4)
School type			
Gymnasium	440 (42.3)	316 (44.4)	304 (44.3)
Other	601 (57.7)	395 (55.6)	382 (55.7)
Family type			
Intact	817 (78.5)	573 (80.6)	541 (78.9)
Other	224 (21.5)	138 (19.4)	145 (21.1)
Mother's education			
College	435 (41.8)	291 (41.0)	297 (43.4)
High school or less	605 (58.2)	419 (59.0)	388 (56.6)
Father's education			
College	413 (40.0)	281 (39.9)	276 (40.5)
High school or less	619 (60.0)	424 (60.1)	405 (59.5)
	M (SD)	*M (SD)*	*M (SD)*
Age	16.1 (0.45)	17.1 (0.42)	18.2 (0.43)
Academic achievement	3.9 (0.57)	4.0 (0.59)	4.2 (0.56)

Table 2

Descriptive Information about and Cross-Correlations Between the Key Indicators

	Cross-Correlations						M (SD)	
	1	2	3	4	5	6	Male	Female
Pornography use (T1)		.60**	.47**	- .15**	- .21**	- .20**	5.07 (2.22)	1.81 (1.58)
Pornography use (T3)	.71**		.66**	- .22**	- .26**	- .25**	5.32 (2.06)	2.25 (1.77)
Pornography use (T5)	.52**	.73**		- .19**	- .21**	- .22**	5.55 (1.80)	2.53 (1.83)
Religiosity (T1)	- .18**	- .29**	-.11		.82**	.80**	3.24 (1.64)	3.48 (1.66)
Religiosity (T3)	- .26**	- .31**	-.17*	.82**		.88**	3.14 (1.67)	3.27 (1.70)
Religiosity (T5)	- .23**	-.19*	-.15*	.80**	.82**		2.75 (1.51)	3.08 (1.66)

Notes. Zero-order correlation coefficients in the male sample are shown below the main diagonal, while coefficients in the female sample are presented above it; * $p < .05$. ** $p < .01$.

Table 3

Baseline Levels and Latent Growth in Adolescent Religiosity and Pornography Use

	Male participants (n = 368)		Female participants (n = 673)	
	M (*SE*)	σ^2 (*SE*)	*M* (*SE*)	σ^2 (*SE*)
Religiosity				
Latent intercept	3.25 (.09)**	2.26 (.20)**	3.48 (.06)**	2.35 (.15)**
Latent slope	-.18 (.03)**	.03 (.03)	-.21 (.02)**	.06 (.02)*
Pornography use				
Latent intercept	5.06 (.12)**	3.95 (.36)***	1.83 (.06)***	1.59 (.15)**
Latent slope	.21 (.06)***	.46 (.10)***	.34 (.04)***	.30 (.06)**

* $p < .05$. ** $p < .01$. *** $p < .001$