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**Pornography – a supernormal stimulus of the modern age**  
A correlation study about problematic pornography consumption and  
personal self-concept

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# **Pornography – a supernormal stimulus of the modern age**

## **A correlation study about problematic pornography consumption and personal self-concept**

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Sometimes called the drug of the new millennium, pornography with its intensity, privacy and availability, has all the conditions for being problematic and even addictive. The purpose of this study was to investigate problematic pornography consumption (PPC) and how it might be connected to self-concept. In total 248 participants took part in the study, with 130 being men and 118 being women. The age span was between 18 and 63, but 87% of the participants were between 20–30 years of age. A cross-sectional design with mediator analyses was used to explore the correlation between PPC and self-concept and to see if guilt and/or general anxiety mediated the correlation. For women the results showed a significant correlation between PPC and self-concept and for men there was significance when guilt was accounted for, but not when general anxiety was accounted for. No correlation was found for the total sample and PPC was higher among men and general anxiety was higher among women. The conclusion is that PPC and self-concept show signs of correlation, but that neither general anxiety nor guilt were good mediators. Furthermore, the correlation is seen as an important aspect for future research surrounding pornography as a phenomenon.

Pornhub's yearly review of 2019 showed that there were over 42 billion visits to the site, equalling an average of 115 million visits per day and 80 032 visits every minute (Pornhub 2019). 6.83 million new videos were uploaded, which is equal to 2.8 hours of content every minute. To get some perspective – if you put all the new video content of 2019 together and started watching them back in the year of 1850, you would still be watching today (Pornhub 2019). Despite these facts, the possible individual, social and biological effects of pornography consumption tend to be trivialized, and the subject's sensitive nature has stopped objectively open discussions of taking place (Watts & Hilton, 2011). The phenomenon is now being discussed as a growing problem in our internet era by many researchers (Bóthe et al., 2018; Cotigă & Dumitrache, 2015; De Alarcón et al., 2019; Duffy et al., 2016; Gola et al., 2017; Hilton, 2013; Kamaruddin et al., 2018; Privara & Bob, 2023; Sniewski & Farvid, 2020; Wang et al., 2022; Watts & Hilton, 2011). Previous studies have for example connected problematic pornography consumption (PPC) with addiction-like brain changes (Caselli & Spada, 2011; De Alarcón et al., 2019; Markert 2021; Sniewski et al., 2018), increased anxiety (Duffy et al., 2016) and increased shame and guilt (Sniewski & Farvid, 2020). Pornography has been referred to as the “drug of the new millennium” (Cotigă & Dumitrache, 2015) and a supernormal stimulus (Hilton, 2013).

Pornography is a phenomenon that refers to the stimulation of sexual arousal, desires and orgasm using images or audio-visual materials that includes sexual and erotic content (Cotigă & Dumitrache, 2015). There seems to be differences among the genders when it comes to the phenomenon and young men has specifically been found to be a risk group when it comes to problematic consumption (Privara & Bob, 2023; Sirianni & Vishwanath, 2016). Problematic pornography consumption (PPC) can be defined as the use of any type of pornography that leads to significantly negative social, relational, occupational or personal consequences for the user (Sniewski et al., 2018). One way to measure problematic pornography consumption (PPC) is with the scale Problematic Pornography Consumption Scale (PPCS), where high scores on

the scale indicate more problematic consumption (Bóthe et al., 2018). It should be made clear that although PPC, as Sniewsky et al. (2018) are writing, is often made synonymous with addiction, we are staying away from classifying addiction to pornography in our study. This is because of the difficulty when it comes to the definition of pornography addiction, which is something that is widely debated in the literature (De Alarcón et al., 2019; Duffy et al., 2016; Gola et al., 2017; Sirianni & Vishwanath, 2016; Watts & Hilton, 2011). Sirianni and Vishwanath (2016) drew the same conclusion in their study.

On the one hand there is a growing acceptance of behavioural/process and natural addictions such as food, gambling and pornography (Hilton, 2013; Sniewski et al., 2018). There is also a new definition of Compulsive Sexual Behaviour Disorder (CSBD) where pornography is included, that has been added as a mental disorder by World Health Organisation in 2018 (WHO, 2021) and there are reported consequences by many users (De Alarcón et al., 2019; Sirianni & Vishwanath, 2016; Sniewski & Farvid, 2020). On the other hand however, we need more scientific data and publications surrounding pornography addiction (Sirianni & Vishwanath, 2016; De Alarcón et al., 2019). Additionally, debates regarding the differences and connections to sex addiction are being held, making pornography addiction more complex to define (Duffy et al., 2016). With this said, based on the closed relatedness of the terms “problematic pornography consumption” (PPC) and “pornography addiction” (Sniewski et al., 2018), we assume that the consequences (brain changes for example) of pornography addiction also occur during PPC.

Self-concept is a psychological phenomenon that is of great importance for the well-being of the individual (Xiang et al., 2023). The term self-concept is quite complex and contains several dimensions, but in short it refers to how the individual sees him or herself (Goñi et al., 2011). Body image and PPC has been studied with a found correlation (Loehle et al., 2017), but self-concept as a wider construct is unexplored when it comes to PPC. In this study we therefore aim to investigate the possible correlation between PPC and self-concept. Specifically, it is *personal self-concept* that will be explored, which excludes the social dimension and instead refers to the part of self-development that are more private, specific and individual.

## **The underlying mechanisms of pornography**

It is important to point out that the consumption of pornography does not turn problematic for everyone. However, it is vital to be aware of the potential risks and consequences (Bóthe et al., 2018). To better understand how problematic pornography consumption (PPC) can influence different psychological phenomenon, it is important to grasp the underlying mechanisms of PPC. It is important to understand the way dopamine works, how pornography is connected to sex and what happens in the brain. Starting with dopamine, it is a neurotransmitter that drives and motivates us, as it tells our brains what we should do more of (Costumero et al., 2013). Dopamine is at the core of most addictions (Watts & Hilton, 2011).

Activities with a high release of dopamine such as pornography tells our brains that this activity is particularly important and good for us (Costumero et al., 2013). Pornography also plays into sex as an activity that is important for the survival of the species (Hilton, 2013). Add to this the availability and privacy of pornography and the fact that it is free, and it makes for perfect conditions for problematic use and even addiction (Sirianni & Vishwanath, 2016). Pornography offers endless novel stimuli which is something that spikes the dopamine release (Kamaruddin et al., 2018). Novelty and shock value increases dopamine, and it reaches its peak just before the reward itself (Han et al., 2021). This means that jumping from one novel

picture/video to another during a pornography session keeps your dopamine levels at its very peak all the way through, and it is done with a simple click (Sayin, 2019).

In real sexual encounters between people there are a lot of factors that are involved, such as touching, smelling, and reacting to hormone (Cotigă & Dumitrache, 2015). Along the history of mankind this has been the way we have gotten our sexual release. During a pornography session all this is excluded and a very simple alternative path for pleasure and sexuality is being offered to the brain, one that completely excludes the other person (Cotigă & Dumitrache, 2015). Another thing to consider is that pornography can be classified as a supernormal stimulus, an exaggeration of the real thing, something that is often preferred due to its intensity (Hilton, 2013). Similarities have also been found between PPC and other addictions such as substance and alcohol abuse when it comes to related brain changes (Caselli & Spada, 2011; De Alarcón et al., 2019; Markert, 2021; Sniewski et al., 2018). The four main brain changes during PPC are being discussed further below.

*Sensibilization* is when the brain creates so called neurological pathways to a substance or a behaviour which makes the person form a stronger connection to it. The urge to seek out the substance or behaviour increases (Frankowska et al., 2009; Walton et al., 2017). *Desensitization* on the other hand is when there is a decrease of sensitivity to other life activities such as food or real sex (Cotigă & Dumitrache, 2015). These and other life activities may seem less enjoyable as your brain compares the dopamine amount from these activities with the intense rush of dopamine it gets from viewing pornography. Desensitization can also lead to an escalation of the substance or behaviour, since you need more and more dopamine to satisfy your needs (Cotigă & Dumitrache, 2015). *Hypofrontality* refers to the weakening of the brains so called braking system in the prefrontal cortex. This is where the executive functions that are responsible for regulating our thoughts, actions and emotions are located. This makes it harder to resist the urge to watch pornography (Watts & Hilton, 2011). PPC can also lead to an *altered stress system*, which for example can affect the body's own regulation of the stress hormone cortisol (Chatzittofis et al., 2016).

## **Self-concept**

Research about how we view ourselves is one of the most common themes in social science (Schwartz et al., 2011). Many famous theorists devoted a large chunk of their efforts to what and who people think they are and the way that it might affect psychological properties such as distress, well-being and personal relationships (Schwartz, et al., 2011). Beliefs that people have about themselves is central to their psychological experiences and can be determining factors to their feelings, thoughts and actions (Xiang et al., 2023). In their study, Xiang et al., (2023) found that having clarity over one's self-concept was correlated with subjective well-being among adolescents in China. Based on what is mentioned above, self-concept and the way that you view yourself is seen as a highly important aspect of Psychology and one worth exploring further.

Since the term self-concept is wide and complex, this study focuses more concretely on personal self-concept, which excludes the social dimension (Goñi et al., 2011). Personal self-concept is the collection of beliefs and perceptions that individuals have about themselves. It encompasses various aspects of identity, including physical appearance, abilities, values, roles, and social relationships and is independent from psychical and social environments. This is the dependant variable in our study and is measured in four dimensions which summarizes previous research (*Self-fulfilment, Emotional Self-concept, Autonomy, and Honesty*) (Goñi et al., 2011).

*Self-fulfilment* measure how the participants see themselves succeeding in achieving their goals. It measures personal growth and improvement.

*Emotional self-concept* is defined by an individual's perception and understanding of their own emotions. It encompasses how a person identifies, labels, and evaluates their emotional experiences, as well as the degree to which they accept and integrate these emotions into their overall sense of self. Emotional self-concept is a crucial aspect of one's overall self-awareness and plays a significant role in shaping behaviour, interpersonal relationships, and mental well-being. Emotional self-concept can be described by emotional awareness, expression, regulation, understanding, acceptance and consistency.

*Autonomy* refers to the ability to make independent decisions. The capacity to have control over one's own actions and life choices. It involves a sense of self-governance and the freedom to act in accordance with one's own values, preferences, and goals. Autonomy is a fundamental aspect of human agency and is crucial for personal development, well-being, and a sense of fulfilment.

*Honesty* is a fundamental ethical and moral principle that involves truthfulness, integrity, and transparency in one's actions, words, and intentions. It is the quality of being truthful and straightforward, presenting information and oneself without deception or manipulation (Goñi et al., 2011).

## **Anxiety (GAD) and Guilt**

Anxiety can be defined as a feeling of unease such as worry or fear (NHS, 2022; Spitzer et al., 2006). Feelings of anxiety is something that almost everyone experiences at some point in their life. You might for example feel worried about a job interview or a presentation at school. For some people it is very hard to control their worries, as feelings of anxiety are more present in their lives. This can lead to the diagnosis called GAD (general anxiety disorder) where the individual feels anxious most days and often find it hard to remember the last time that they felt relaxed (NHS, 2022). Studies has shown that PPC correlates with high feelings of anxiety in individuals (De Alarcón et al., 2019; Duffy et al., 2016). Because of this it is possible that anxiety works as a confounding variable that may affect any examined correlation between PPC and other psychological constructs, as it might be unclear whether it is PPC or anxiety that is causing the effect. Therefore, general anxiety is considered in the analysis as a mediating variable between PPC and self-concept and in this way, we can better isolate the correlation of PPC and self-concept. Controlling for levels of general anxiety and analysing the effect that it might have on the correlation, helps to achieve this. The anxiety is general in the sense that it is stable over time, which is how the measurement scale *GAD-7*, which is used in the study, measures it.

Individuals with high levels of guilt-proneness (GP) expect to experience feelings of guilt if they engage in wrongful behaviour (Cohen et al., 2016). In contrast, those with low levels of guilt-proneness do not anticipate such negative emotions associated with their actions. This distinction highlights the varying predispositions individuals have towards experiencing guilt based on their GP levels (Cohen et al., 2016). People with PPC tend to feel more guilt and that feeling makes it more difficult to seek help, which is a problem (Cordero Jr, 2021). Guilt-proneness is also being considered as a mediating variable in the analysis and this is for the same reasons that general anxiety is being considered. It is a possible confounding variable that might disturb the examined correlation.

## The present study

The purpose of this study is to investigate PPC and how it might be connected to different psychological aspects of an individual. Since self-concept is relatively unexplored when it comes to PPC, this is where we aim to contribute to the research field. We pose two specific research questions. First: *Is there a correlation between problematic pornography consumption (PPC) and self-concept?* Second: *Is this relationship mediated by general anxiety and/or feelings of guilt?* Based on the previously presented literature our hypotheses are:

### Hypothesis 1:

Problematic pornographic consumption (PPC) correlates with self-concept.

### Hypothesis 2:

The correlation between problematic pornographic consumption and self-concept is mediated by general anxiety.

### Hypothesis 3:

The correlation between problematic pornographic consumption and self-concept is mediated by feelings of guilt.

## Method

### Participants

The study involved 248 women and men, between the ages of 18 and 63 ( $m = 26, s = 7$ ), 130 men ( $m = 26, s = 7$ ), 118 women ( $m = 25, s = 7$ ). Most of the participants were between 20 and 30 years of age (87.7% of total participants). The inclusion of both genders suggested a commitment to understanding potential variations in responses and experiences based on gender. The study excluded people who identify as something other than man or woman to simplify the analyses, as too many confounding variables regarding gender might have made it too complex. A total of 6 individuals were excluded because they choose “other” on the question about gender. Those under 18 years were excluded because of the sensitivity of the topics and questions being investigated. Minors may also give less reliable answers.

### Material

Our study investigated the relationships between four key variables: problematic pornography consumption (PPC) (independent variable), self-concept (dependent variable), general anxiety (mediating variable) and guilt (mediating variable). The order of the four question blocks that served to measure each variable were not randomized due to several reasons. For one, it was not desirable to have the dependent variable influenced by the independent variable. We also had concerns that the variable of PPC may be perceived as more sensitive than the other variables. Because of these two reasons, PPC (the independent variable) was more suitable to be placed last in the survey to avoid influencing the remaining scales. Not randomizing the blocks could have introduced a potential disadvantage due to order effects, however this was deemed a lesser concern compared to the issues that could have occurred with randomization.

Opting for English in a survey administered in Sweden is justified by using the scales original language (English), preserving the reliability and validity of the instruments and reaching non-Swedish speakers. The use of the scales in their original language ensured that

the respondents' interpretations aligned with the intended meanings of the items and contributed to the overall validity of the study by minimizing the potential for translation-related errors in the measurement instruments (Danielsen et al., 2015). Additionally, the introduction of a control variable for English proficiency (if the respondent had studied English on high school level) helped account for language-related variations in responses, ensuring accurate interpretations of the collected data. This approach enhanced the comparability of our results with existing research that utilized the same validated scales in their original language. The four measurement-scales that were used (1 for each variable) were all validated (Bóthe et al., 2018; Cohen et al., 2016; Goñi et al., 2011; Spitzer et al., 2006). Higher scores on each of the scales indicates more negative levels of the measured construct.

The Problematic Pornographic Consumption Scale (PPCS) utilized in this study is a condensed version, featuring 6 questions as opposed to the original 18-question format (Bóthe et al., 2018). Different measurements of pornography consumption were compared and in accordance with (Chen & Jiang, 2020), PPCS was chosen due to having higher reliability and validity. Participants were informed that they should reflect on the past 6 months while responding to the questions. A 7-point scale, ranging from "never" to "all the time" was employed for participant responses. To enhance clarity, the term "leisure" was clarified in this study with "spare time" in parentheses, as "leisure" was considered a potentially ambiguous term. Example of questions from the survey "I felt that porn is an important part of my life" and "I felt that I had to watch more and more porn for satisfaction.". The reliability test McDonald's Omega showed a score of (0.884).

The personal self-Concept questionnaire comprised 18 questions categorized into four dimensions: Self-fulfilment (6 questions), Emotional self-concept (5 questions), Autonomy (4 questions) and Honesty (3 questions) (Goñi et al., 2011). Participants were instructed to respond based on their level of agreement or disagreement with each statement. Notably, one question included the term "sacred", with the word "holy" added in the survey in parentheses to enhance clarity considering that interpreting and understanding the word "sacred" might be difficult for the participants. The introduction to the questions emphasized the importance of responding based on individual agreement levels. Example of questions from the survey "If I'm feeling down, I find it hard to snap out of it" and "My promises are sacred (holy)". The reliability test McDonald's Omega showed a score of (0.709).

To measure guilt, the Five-Item Guilt Proneness Scale (GP-5) was used (Cohen et al., 2016). The scale comprised five statements where participants responded on a 1-5 scale, ranging from "extremely unlikely" to "extremely likely". The questions were introduced with an explanation that participants would read scenarios and then assesses if they would react in the way the statements suggested. Example of questions from the survey "You secretly commit a felony. What is the likelihood that you would feel remorse about breaking the law?" and "Out of frustration, you break the photocopier at work. Nobody is around and you leave without telling anyone. What is the likelihood you would feel bad about the way you acted?". The original scale, which consisted of 16 statements, included shame as an additional dimension. By utilizing the bounded version that solely measures guilt, the number of questions was reduced and therefore providing a more focused approach to the study. This offered the advantage of a shorter survey and mitigating the risk of participant fatigue. It could have been a challenge using both guilt and shame as a single variable. By only using guilt and excluding shame, a more precise examination of the targeted constructs was assured. The reliability test McDonald's Omega showed a score of (0.666).

The generalised anxiety disorder scale (GAD-7) consisted of seven questions with four response options, ranging from "not at all" to "nearly every day" (Spitzer et al., 2006). Participants were informed that the questions pertain to how they have felt in the past two

weeks. Example of questions from the survey “Trouble relaxing?” and “Being so restless that it is hard to sit still?”. The reliability test McDonald’s Omega showed a score of (0.887).

## **Approach**

This was a correlational study with a cross-sectional design. It involved the comparison of two groups: men and women. We aimed to examine men and women so other genders were excluded from the study. The participants for this paper were gathered through a multi-faceted recruitment approach. Initially, recruitment took place within the university and campus community in Gothenburg. Moreover, a QR code was strategically placed in public areas to facilitate easy access to the survey. The study leveraged the power of social networks by sharing of the survey link within friend groups and social circles, both in person and through various social media platforms. This comprehensive recruitment strategy aimed to reach a diverse participant pool and maximize the study’s external validity. The participants were separated based on gender and age, with a cutoff age of 18 and above.

## **Data-analysis**

The data-analysis could be separated into two parts, descriptive statistics and regressions-analysis. The descriptive part presented mean, standard deviation, number of participants and minimum/maximum values for all four variables and was separated based on gender. It presented reliability test in form of McDonald’s Omega and a Kolmogorov Smirnov test for evaluating normal distribution. In the regression analysis bootstrapping was used since only self-concept showed normal distribution in the Kolmogorov Smirnov test. Bootstrapping does not make assumptions about the distribution of the population, but instead generates repeated random samples from the already existing sample. These are then analysed and with the statistical uncertainty can then be estimated without relying on assumptions of normal distribution. This is beneficial when analysing complex data sets and real-world problems (Efron & Tibshirani, 1993).

The regression analysis was executed two times, one with the mediator general anxiety and one with the mediator guilt by a mediating regression model (Field, 2018, s. 497-508). The data output from the regression analyses gives different effect-outputs. Direct effect is the independent variable’s influence on the dependent variable with acknowledgment to the mediator. Indirect effect shows how much of the effect that the mediator mediated from the independent variable to the dependent variable. The results are presented with confidence interval instead of *p*-value (Field, 2018, s. 497-508).

## **Results**

### **Descriptive statistics and data checking**

The index for all variables were created by taking the mean for each variable and then adding every question for the measurement instrument and following this with dividing the total number of questions in that instrument. McDonald’s Omega is a reliability measurement which were used instead of Cronbach’s alpha. The closer the number is to 1 the better the



reliability is. The following McDonald's omega was found. Self-concept (0.709), General anxiety (0.887), Guilt (0.666), PPC (0.884). PPC, General anxiety and Self-concept had high reliability and guilt had acceptable numbers. Question 15 "I am an emotionally strong person" in the self-concept scale led to a decrease of reliability and was therefore excluded. The items from the measurement instruments are found in the appendix at the end of the paper.

The Kolmogorov-Smirnov test showed that three of the indexes was not normally distributed (PPC ( $p < 0.001$ ), General anxiety ( $p < 0.001$ ) and Guilt ( $p < 0.001$ )). However, the index for Self-concept was normally distributed ( $p = 0.275$ ). Table 1 for descriptive statistics show each measurement for men and women. Minimum and maximum value from each measurement, their respective means and their standard deviation are presented.

**Table 1**

*Descriptive statistics for each variable, men and women separately.*

<i>Descriptive statistics</i>	<i>Gender</i>	<i>General anxiety</i>	<i>Guilt</i>	<i>Self-concept</i>	<i>PPC</i>
<i>Mean</i>	<i>Men</i>	1.88	3.56	2.33	2.74
	<i>Women</i>	2.23	3.77	2.46	1.63
<i>Standard deviation</i>	<i>Men</i>	0.683	0.761	0.366	1.31
	<i>Women</i>	0.778	0.738	0.386	0.708
<i>Minimum value</i>	<i>Men</i>	1.00	1.00	1.29	1.20
	<i>Women</i>	1.00	1.20	1.12	1.20
<i>Maximum value</i>	<i>Men</i>	4.00	4.80	3.12	7.00
	<i>Women</i>	4.00	4.80	3.24	5.60

## Hypothesis testing

Two separate mediator analyses with general anxiety and guilt as mediators in one each were conducted in order to answer the research questions: *Is there a correlation between problematic pornography consumption (PPC) and self-concept* and *Is this relationship mediated by general anxiety and/or guilt-proneness?* Under this section the results for the total sample will be presented and during the next section our explorative analyses with the genders separately will be presented. Because only self-concept was normal distributed, the mediator analysis was made through a bootstrapping-procedure with a bootstrapping value of 1000, which means that 1000 samples were created. In the mediator analyses, the direct effect shows the correlation between PPC and self-concept and the indirect effect shows this correlation when it is being mediated by the specific mediator, in other words when general anxiety or guilt are being considered (individually). The results of the analyses are summarized at the bottom of the descriptions.

The results from the mediator analyses with general anxiety as the mediator are presented as follows: The indirect effect of PPC on self-concept was not significant,  $b = 0.00412$ , 95% *BCa* CI [-0.02199, 0.278]. The direct effect between PPC and self-concept when general anxiety was included in the model was not significant,  $b = 0.03005$ , 95% *BCa* CI [-0.00579, 0.0670]. PPC and general anxiety were not significantly correlated  $b = 0.0151$ , 95%

*BCa CI [-0.07552, 0.1010]*, but general anxiety and self-concept showed a significant positive correlation  $b = 0.499$ , *95% BCa CI [0.3958, 0.625]*

The results from the mediator analyses with guilt as the mediator are presented as follows: The indirect effect of PPC on self-concept was not significant,  $b = -1.00116$ , *95% BCa CI [-0.00625, 0.00256]*. This indicates that the effect of PPC on self-concept was not mediated by guilt. The direct effect between PPC and self-concept when guilt was included in the model was not significant,  $b = 0.03533$ , *95% BCa CI [-0.00652, 0.07248]*. PPC and guilt were not significantly correlated  $b = -0.0440$ , *95% BCa CI [-0.12419, 0.0260]* and the same was true for guilt and self-concept  $b = 0.0264$ , *95% BCa CI [-0.04014, 0.0880]*.

**Summary:** In the mediator analysis with guilt there was no significant correlation between PPC and self-concept and guilt did not serve as a significant mediator. In the mediator analysis with general anxiety there was no significant correlation between PPC and self-concept and anxiety did not serve as a significant mediator.

## Explorative analyses

Further analyses were made on the separate gender groups. The results from the mediator analysis with general anxiety as the mediator are presented as follows and they are presented with the genders separately. When only women were included in the analyses the indirect effect of PPC on self-concept was not significant,  $b = 0.0371$ , *95% BCa CI [-0.02676, 0.0943]*. The direct effect between PPC and self-concept when general anxiety was included in the model was significant,  $b = 0.0720$ , *95% BCa CI [0.0399, 0.1792]*. PPC and general anxiety were not significantly correlated,  $b = 0.1426$ , *95% BCa CI [-0.10275, 0.348]*, but general anxiety and self-concept showed a significant positive correlation,  $b = 0.2602$ , *BCa CI 95% [0.18675, 0.337]*.

When only men were included in the analyses the indirect effect of PPC on self-concept was not significant,  $b = 0.0238$  *95% BCa CI [-0.00337, 0.0487]*. The direct effect between PPC and self-concept was not significant,  $b = 0.0432$ , *95% BCa CI [-0.0739, 0.072]*. PPC and general anxiety were not significantly correlated,  $b = 0.0951$ , *95% BCa CI [-0.01170, 0.1925]*, but general anxiety and self-concept showed a significant positive correlation,  $b = 0.2500$ , *95% BCa CI [0.16088, 0.3404]*.

**Summary:** There was a significant positive correlation between PPC and Self-concept for women, but not for men with general anxiety as the mediator. Both men and women showed a positive correlation between self-concept and general anxiety. PPC and general anxiety were not correlated and there was no significance for general anxiety acting as a mediator.

The results from the mediator analysis with guilt as the mediator are presented as follows and they are presented with the genders separately. When only women were included in the analyses the indirect effect of PPC on self-concept was not significant,  $b = 0.000277$ , *95% BCa CI [-0.0151, 0.0182]*. The direct effect between PPC and self-concept when guilt was included in the model was significant,  $b = 0.109$ , *95% BCa CI [0.0341, 0.2209]*. PPC and guilt were significantly correlated,  $b = -0.11336$  *95% BCa CI [-0.3351, -0.0336]*. Guilt and self-concept were not significantly correlated,  $b = -0.00245$ , *95% BCa CI [-0.1091, 0.00944]*.

When only men were included in the analyses the indirect effect of PPC on self-concept was not significant,  $b = 0.000613$ , *95% BCa CI [-0.00389, 0.00585]*. The direct effect between PPC and self-concept when guilt was included in the model was significant,  $b = 0.0664$ , *95% BCa CI [0.01395, 0.10862]*. PPC and guilt were not significantly correlated,  $b = 0.0222$ , *95% BCa CI [-0.0847, 0.1072]*. Guilt and self-concept were not significant correlated,  $b = 0.0276$ , *95% BCa CI [-0.0473, 0.0989]*.

**Summary:** There was a significant positive correlation between PPC and Self-concept for both men and women separately. PPC and guilt were not correlated, and neither were guilt and self-concept. There was no significance for guilt acting as a mediator.

## Discussion

### Findings and conclusions

The purpose of this study was to investigate problematic pornography consumption (PPC) and the possible correlation with self-concept. Now we will first go through the findings for the total sample based on the hypotheses, and then in the second paragraph go through the findings of our explorative analyses with both genders separately. **Hypothesis 1** (*Problematic pornographic consumption (PPC) correlates with self-concept*) was not supported for the total sample and neither was **hypothesis 2** (*The correlation between problematic pornographic consumption and self-concept is mediated by general anxiety*) or **hypothesis 3** (*The correlation between problematic pornographic consumption and self-concept is mediated by feelings of guilt*). Three interesting findings that were found for the total sample as well as for the genders separately was: One, general anxiety was highly connected to self-concept (positive correlation). Second, guilt was not correlated with PPC in contrast to previous research (Sniewski & Farvid, 2020) and third, neither was general anxiety (Duffy et al., 2016).

When the genders were analysed separately the results were a bit different. **Hypothesis 1** was supported for women in both mediator analyses and for men it was supported with guilt as the mediator but not with general anxiety as the mediator. In all cases where a correlation was found, it was negative self-concept that PPC was connected to. Higher scores on PPC related to higher scores on the self-concept scale, meaning that higher PPC was connected to a more negative self-concept. This shows a positive correlation. **Hypotheses 2 and 3** were not supported in any of the mediator analyses for either men or women, as neither general anxiety nor guilt served as significant mediators of the correlation.

Another interesting finding was that women scored higher on levels of general anxiety and men scored higher on PPC. The latter is in line with previous research that show that men, and especially young men, are a risk group for PPC (Privara & Bob, 2023; Sirianni & Vishwanath, 2016). This does not mean however that the phenomenon is non-existent among women (Sirianni & Vishwanath, 2016). We theorise that these gender-based differences in the scores on the measurement scales, in part can explain the lack of a significant correlation between PPC and self-concept in the total sample with both genders. The differences between the genders appear to cancel out the effect. It is important to note that both the biological and social differences between the genders can have a big impact on both the way that PPC presents itself and for the underlying mechanisms of the phenomenon.

In summary, the study showed a significant correlation between PPC and self-concept for the genders separately, except for the men in the mediator analysis with general anxiety as the mediator. There was no significance for the total sample with the genders together and we can conclude that no significant results were found here. However, the findings do indicate that the correlation seem to exist for the genders separately. These indications, combined with the unexplored nature of self-concept in regards to PPC, the importance of self-concept to mental health (Goñi et al., 2011; Schwartz et al., 2011; Xiang et al., 2023) and pornography as an important topic that needs further investigating (Cotigă & Dumitrache, 2015; De Alarcón et al., 2019; Duffy et al., 2016; Sniewski & Farvid, 2020; Wang et al., 2022; Watts & Hilton,

2011), makes us draw the conclusion that further research on PPC and self-concept is desirable and of great importance.

## **Possible explanations**

We have established that PPC and self-concept were significantly correlated in some cases, but it is important to note that it was not true in every case and that more research is needed. With that said, it could be of interest to understand the possible explanations for the correlation, since the study showed strong indications of significance for the genders separately. Based on the literature, the following might be relevant for deeper knowledge. Firstly, the sexual satisfaction that you get from pornography excludes many dimensions such as closeness, human connection, touch, smell and the release of hormones, all of which have been present during sexual satisfaction through the whole history of mankind (Cotigă & Dumitrache, 2015). This could lead to the individual feeling unfulfilled and confused. It might make the person feel like a failure as they are unsuccessful in having real sexual experiences with other people. The person might not feel good enough as he or she opts for the easy fake stimulation. Secondly, sex as an activity necessary for survival which pornography taps into (Hilton, 2013), can also contribute to confusion. The brain can be led to believe that the individual has succeeded in finding multiple partners, since it can have a hard time in telling the difference between a screen and real life, all though you can.

Thirdly, as Costumero et al. (2013) are writing, there is a high dopamine release that occur during pornography consumption and Hilton (2013) is even writing that it is often called a supernormal stimulus. This might lead to a decrease of enjoyment for other life activities, such as spending time with friends or watching a movie. That might in turn affect the individual's self-concept since he or she might start to internalise the reasons for the lack of enjoyment, energy and motivation in life. He or she might start to draw conclusions that it is because something is wrong him or her. Desensitization, where you get less sensitive to other stimulus because of the intense dopamine release from your addictive behaviour, substance, activity or behaviour, can help explain the decrease of enjoyment for normal life activities (Cotigă & Dumitrache, 2015; Walton et al., 2017).

Lastly, self-concept could be affected by the feeling of failure to control your pornography consumption. As one question in the problematic pornography consumption scale (PPCS) is addressing, individuals with PPC might have unsuccessfully tried to quit their habit of watching pornography. They could have a sense of loss of control and show symptoms of addiction. Destructive, negative thoughts about yourself can be a result of these failed attempts of quitting, affecting your self-concept. The findings for the genders separately in this study are coherent with previous research about pornography use and body image, where problematic consumption was connected to a negative body image (Loehle et al., 2017), by showcasing indications for a positive correlation between PPC and negative self-concept.

## **Limitations and future research**

A limitation to the study is possible confounding variables that can affect the correlation between problematic pornography consumption (PPC) and self-concept. After careful consideration we tried to control for two of the most important ones (anxiety and guilt, which were not good mediators in the end), but there are others such as internet addiction, relationship status, religious beliefs and shame that might play a big role. Another limitation is that the respondents were often seated in groups when presented with the QR-code, making it possible

that they answered the survey together. This might affect the answers through group pressure and social desirability. This is especially true when it comes to sensitive topics such as pornography.

The age distribution of our participants may pose an issue for generalizing to the population, with the vast majority falling within the 20–30-year age range (87,7%). A more even age distribution and a more varied spread of places for data collection (this study was mostly confined to universities) would have led to higher external validity in the aspect of generalizing to the population. Future research could focus on age specific groups to exclude age as an affecting factor. Like Sirianni and Vishwanath (2016) noted, the gender differences is also a field for future research. Another limitation is that only the self-concept scale was normally distributed, which can affect the validity of the study. This was handled by not assuming a normal distribution but instead using bootstrapping.

The use of GAD to measure anxiety may have been problematic as GAD assesses a sustained anxiety experienced over time (general anxiety). A possible risk with this is that the measure is too robust to be influenced by a single factor such as PPC. General anxiety and self-concept also appear to be strongly correlated which might affect the correlation between PPC and self-concept in the mediator analysis since PPC and general anxiety was not correlated. In future research it should be considered to employ an instrument that measures anxiety that could be more susceptible to the effects of PPC. The same issue applies to the guilt scale. Future research could benefit from exploring the correlation between PPC and self-concept through an experiment where causality can be studied, and stronger conclusions could be drawn. Possible causes for PPC would also be of interest for further investigation.

In summary, the field of pornography and its different dimensions and possible risks still has room for more exploration, as even more research is needed (De Alarcón et al., 2019; Sirianni & Vishwanath, 2016; Watts & Hilton, 2011). There are many potential directions for future research. Among them is the correlation between PPC and self-concept that this study found some support for, and maybe the most important one, pornography as a source of addiction. Reaching a clearer consensus around the addictive nature of pornography and its potential harmful effects, has the potential for several benefits: more available help, weakening of the stigma and shame, opened discussions, increased information and awareness and more people seeking and getting help, to name a few. It is becoming increasingly clear that the phenomenon that is pornography should not be underestimated and that it would benefit from increased awareness, attention and scrutiny under a critical spotlight.

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## Appendix 1



Thank you for helping us with our essay in Psychology by answering this survey. Your participation contributes a lot and we appreciate your time.

The survey is aimed at men and woman aged 18 and over. The purpose is to investigate pornography consumption and its connection to different psychological phenomenon.

There are no right or wrong answers, and we encourage you to be as honest as you can. We want to emphasise that your participation is completely anonymous (your answers cannot be connected to you in any way) and you can stop the survey at any time. The collected data will only be used for the purpose of the study. The estimated time to complete the survey is 5-10 minutes.

### **Introduction questions:**

I give my consent to participate in this study

**Answers alternative:** I give my consent to participate in this study, I do not give my consent to participate in this study

Qsex I identify as a

**Answers alternatives:** man, woman, other

QAge Enter your age here:

**Answers alternatives:** A slider was used as a scale ranging from 18 to 100

QLanguage I have studied english at high school level

**Answers alternatives:** yes, no

### **Questions about self-concept**

Self-concept scale (QS Please answer the following questions, rating them by how much you agree or disagree)

**Answers alternatives:** Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree

QS1R I am satisfied with what I am achieving in my life

QS2 If I'm feeling down, I find it hard to snap out of it

QS3R So far, I have achieved every important goal I have set myself

QS4R I am a trustworthy person

QS5 In order to do anything, I first need other people's approval

QS6 I consider myself to be a very uptight and highly strung person

QS7 I have yet to achieve anything I consider to be important in my life

QS8R I am a man/woman of my word

QS9 I find it hard to embark on anything without other people's support

QS10 I am more sensitive than the majority of people

QS11R I have always overcome any difficulties I have encountered in my life

QS12 When taking a decision, I depend too much on other people's opinions

QS13R If I could start my life over again, I would not change very much

QS14 I find it difficult to take decisions on my own

QS15R I am an emotionally strong person

QS16R I feel proud of how I am managing my life

QS17 I suffer too much when something goes wrong

QS18R My promises are sacred (holy)

### **Questions about anxiety**

QAintro Over the last two weeks, how often have you been bothered by the following problems?

**Answers alternatives:** Not at all, Several days, more than half the days, nearly every day

- QA1 Feeling nervous, anxious, or on edge?
- QA2 Not being able to stop or control worrying?
- QA3 Worrying too much about different things?
- QA4 Trouble relaxing?
- QA5 Being so restless that it is hard to sit still?
- QA6 Becoming easily annoyed or irritable?

QA7 Feeling afraid, as if something awful might happen?

## Questions about guilt

QGintro You will now read about five situations that people could encounter in day-to-day life, followed by reactions to those situations. As you read each scenario, try to imagine yourself in that situation. Then indicate the likelihood that you would react in the way described.

**Answer alternatives:** Extremely Unlikely, Unlikely, About 50% Likely, Likely, Extremely Likely

QG1 After realizing you have received too much change at a store, you decide to keep it because the salesclerk doesn't notice. What is the likelihood that you would feel uncomfortable about keeping the money?

QG2 You secretly commit a felony. What is the likelihood that you would feel remorse about breaking the law?

QG3 At a coworker's housewarming party, you spill red wine on their new cream-colored carpet. You cover the stain with a chair so that nobody notices your mess. What is the likelihood that you would feel that the way you acted was pathetic?

QG4 You lie to people but they never find out about it. What is the likelihood that you would feel terrible about the lies you told?

QG5 Out of frustration, you break the photocopier at work. Nobody is around and you leave without telling anyone. What is the likelihood you would feel bad about the way you acted?

## Questions about problematic pornography consumption

QPintro Please think back to the past six months and indicate on the following 7-point scale how often or to what extent the statements apply to you. There is no right or wrong answer. Please indicate the answer that most applies to you.

**Answer alternatives:** Never, Rarely, Occasionally, Sometimes, Often, Very often, All the time

QP1 I felt that porn is an important part of my life

QP2 I released my tension by watching porn.

QP3 I neglected other leisure (spare time) activities as a result of watching porn.

QP4 I felt that I had to watch more and more porn for satisfaction.

QP5 When I vowed not to watch porn anymore, I could only do it for a short period of time

QP6 I became stressed when something prevented me from watching porn