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ORIGINAL ARTICLE

The differentiation between consumers of hentai pornography and human pornography



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KEYWORDS

Hentai;
Pornography;
Attractiveness;
Romantic desire;
Attachment

Summary The study aimed to investigate if hentai consumers differed from other pornography consumers regarding their attachment style, attraction to, and desire for romantic relationships with anime characters and humans. Pornography consumers were categorized into three groups. The first group consumed both hentai and human pornography (hentai consumers), the second consumed human pornography but not hentai (non-hentai), and the third did not consume hentai or human pornography (non-porn). Two hundred and eight participants completed an online study that involved self-report surveys and an image rating task. The results revealed that hentai consumers did not differ from non-hentai or non-porn consumers on avoidant attachment. However, among females, hentai consumers were higher on anxious attachment compared to non-porn consumers. For the image rating task, hentai consumers rated anime characters more attractive than non-hentai and non-porn consumers. However, there were no group differences for the image ratings of real people. Hentai consumers indicated stronger romantic desire towards anime characters compared to non-hentai and non-porn consumers; there were no group differences in romantic desire for humans. The findings highlight the importance of differentiating individuals who consume hentai and those who do not.

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Introduction

Pornography can be defined as any sexual media used to increase sexual arousal (Carroll et al., 2008). More recent definitions of pornography also seem to define pornography similarly. For example, Ashton et al. (2019) defined pornography as “material deemed sexual, given the con-

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text, that has the primary intention of sexually arousing the consumer.” Despite easy access to pornography, accurate estimates of pornography exposure and frequency of consumption drastically vary across studies (Kohut et al., 2020). For instance, one study found up to 84% of males and 54% of females, aged 16 to 69, have been exposed to pornography (Rissel et al., 2017). Accessing free pornography sites via smartphones and laptops was the most common way to consume pornography among 2,27 adults aged between 18 and 60 (Herbenick et al., 2020). Some evidence indicates that pornography use via the internet may be more popular among males, whereas reading erotic novels seem more popular among females (Bridges and Morokoff, 2011).

Pornography consumption is growing in popularity. Between 1973 to 1980 44.90% of young adult males and 28% of young adult females consumed pornographic media in the past year (Price et al., 2016). In comparison, between the years 2008 to 2012, 61.50% of young adult males and 35.70% of young adult females have reported that they consumed pornographic media in the past year (Price et al., 2016). Despite statistics on pornography use being quite varied, studies tend to find that males consume pornography more frequently than females.

However, a major limitation within the pornography literature is the lack of statistics and acknowledgment of people who consume hentai pornography, despite how popular hentai has become. One study investigating Google searches of pornography fetishes found that hentai had grown in popularity since 2004 across many age groups (Walker et al., 2016).

What is hentai exactly?

Hentai is a type of pornographic entertainment that primarily uses anime characters (see Fig. 1). Anime characters are a style of cartoon characters that originated from Japan (Cooper-Chen, 2012). Anime characters are often characterized by having a humanoid appearance and being synonymous with a wide range of hair colors (Cooper-Chen, 2012). Anime characters are commonly used in popular entertainment, including tv shows, movies, video games, novels, music, and gambling (Masuda et al., 2019). In hentai, anime characters are used to engage in erotic scenarios that are often more diverse than human pornography (Surtees, 2015). Hentai can depict sexual acts that resemble human intercourse. Hentai can also more easily depict sexual acts that are biologically uncommon or impossible than human pornography. For example, hentai often features fantasy creatures, like giant demons, with inhuman-sized genitals having intercourse with human-looking characters (Paasonen, 2017). Hentai is also commonly consumed through various media, including virtual reality, 3D animation, 2D animation, ASMR, video games, and doujinshi (Freedman, 2020; Hernandez, 2019; Rubin, 2015).

Official global statistics on hentai viewership are still lacking. Although, hentai has been reported to be the second most searched term globally on Pornhub for three consecutive years since 2017 (Pornhub Insights, 2018a, 2018b, 2019). Pornhub was a website that had around 115 million visits daily back in 2019 (Pornhub Insights, 2019), and Pornhub is just one website out of many that provide hentai.



Figure 1 Illustration of anime characters. Note: Examples of anime characters include Neptune from Megadimension Neptunia VII (Idea Factory and Compile heart, 2015) and Yu Narukami from Persona 4: Dancing All Night (Atlus, 2015).

Anime characters from non-pornographic media appear to be having enormous impacts on hentai consumption. One example of this occurred when a highly anticipated non-pornographic action video game called Final Fantasy Remake was released globally on the 10th of April in 2020 (Pornhub Insights, 2020). In just three days, Pornhub reported a 7631% increase in pornography searches (i.e., over a million new searches) for hentai of those anime characters from the Final Fantasy Remake video game (Lai, 2020; Pornhub Insights, 2020).

Despite multiple meta-analyses on the effects of pornography (Ferguson and Hartley, 2020; Grubbs et al., 2019; Manning, 2006), the investigation of hentai consumption has been neglected in scientific research. One possible reason out of many could be due to a lack of differentiation between hentai and human pornography. A study by Ashton et al. (2019) investigated the many different definitions of pornography studies have used between 1980 and 2017. Many of the definitions of pornography Ashton et al. (2019) examined, including recent ones, have used broad words to define pornography. For example, in a meta-analysis (Wright et al., 2016), “pornography was defined as sexually explicit media intended to arouse the consumer.” Words like “sexually explicit media” do not clarify if it’s referring to human pornography or hentai. While some studies have specified real people in their definitions, other studies have not (Ashton et al., 2019). In turn, some studies (Baltieri et al., 2016) have used broad words (e.g., explicit images, sexual acts, etc.) in their pornography measures. Thus, it is unclear if some researchers are referring to only human pornography or and hentai. This is important because hentai has become one of the most popular types of pornography globally within the past few years (Pornhub Insights, 2019; Walker et al., 2016). Yet, a number of recent studies

have not explicitly mentioned hentai in their definitions or measures.

In addition, researchers have found that exposure to pornography could influence different populations of people differently (e.g., males vs. females) (Bridges and Morokoff, 2011). According to a meta-analysis by Ferguson and Hartley (2020), few studies have found that exposure to pornography was linked with varying influences on behavior (e.g., consuming pornography influencing sexually aggressive behavior). Furthermore, cross-sectional and longitudinal studies have found males who believed pornography as immoral but consumed it were more likely to experience symptoms of depression; however, this was not the case for females (Perry, 2018). Despite possible indications of pornography having different influences on different populations, researchers have not clearly differentiated hentai consumers from people who only consume human pornography.

This raises a very important issue; if previous studies have not differentiated hentai from human pornography, how generalizable are the recent pornography findings for hentai consumers? Both hentai and human pornography intend to elicit sexual arousal, but they are both very visually different. Other communities, ranging from the pornography industry to schoolchildren as young as 13 years old (Spišák, 2016), differentiate hentai from human pornography. This lack of explicit differentiation between hentai and human pornography implies studies have not differentiated them. This is important because hentai commonly portrays sex that is not possible in human pornography without computer graphics. Thus, for studies to imply that hentai and human pornography have the same influences on people's behavior and attitudes may not be appropriate. Despite this, previous studies have differentiated consumers on salient characteristics like sex. Additionally, several studies (Ferguson and Hartley, 2020) have differentiated different types of pornography (i.e., violent pornography from non-violent pornography). However, the same is not being commonly done for hentai and human pornography in the literature.

Currently, there are not many studies that have investigated hentai. The few studies that have mentioned hentai have only noted the growing popularity of hentai (Quayle, 2020; Taylor, 2021) but have not attempted to identify the general characteristics of the consumers. Moreover, some studies (Corneau et al., 2021) have included hentai in their analyses but have not differentiated hentai from human pornography or have investigated hentai through case studies (Abel et al., 2008). Implications from these studies do not capture the characteristics of the hentai consumers on a group level. Thus, much remains unknown if hentai consumers characteristically differ from people who do not consume hentai. A variety of questions concerning hentai consumers would be of interest, and we attempted to answer a few in this study concerning attachment, attraction, and romantic desire.

Adult attachment

Adult attachment theory by Hazan and Shaver's (1987) is about how adults view, behave, and interact with another person romantically. Adult attachment is based on Bowlby's

attachment theory explaining how an individual's early relationships with their caregivers during infancy can influence their future relationships throughout life (Hazan and Shaver, 1987). There are different models to classify adult attachment. Bartholomew (1990) developed the two-dimensional four-category scheme that categorized adult attachment into four different typologies: secure, preoccupied, fearful, and dismissing. Others have classified adult attachment via a more parsimonious two-dimensions model of attachment (Brennan et al., 1998). By measuring adults only on attachment anxiety and avoidance, adults can be classified as being more secure, anxious, or avoidant (Brennan et al., 1998). It is possible to score high on both attachment anxiety and avoidance scales (Brennan et al., 1998).

Secure adult attachment is characterized by an adult being comfortable with emotional intimacy in a romantic context. Secure adults are generally comfortable with intimacy and do not have an excessive fear of being abandoned by their partners (Campbell and Marshall, 2011). Specifically, secure adult attachment is distinguished by low levels of attachment anxiety and avoidance (Brennan et al., 1998). It is theorized adults higher on secure attachment are more comfortable with intimacy due to having a secure attachment with their caregiver during early life (Schoenmaker et al., 2015).

Anxious adult attachment is characterized by being more likely to exaggerate their negative emotions to draw their partner's attention when emotional comfort is needed (Mikulincer and Shaver, 2007). It is argued anxious adults overly rely on their partner because they have an excessive fear of being abandoned by those close to them (Mikulincer and Shaver, 2005).

Adults higher on avoidant adult attachment are known to deactivate their attachment system. To a greater extent, avoidant adults repress their negative feelings when faced with distress (Boden and Baumeister, 1997). It is argued that avoidant adults repress their emotions to distance themselves emotionally and physically from their partner because they prefer emotional independence (Mikulincer and Shaver, 2007). This preference for independence has been argued to come from avoidant adults having caregivers whom they believed to be emotionally unreliable and unresponsive towards them (Collins and Feeney, 2004).

Adult attachment and pornography

In recent years studies have found associations between attachment styles and pornography use. One study found that avoidant and anxious attachment were both positively associated with pornography use among adult males (Szymanski and Stewart-Richardson, 2014). In another study, pornography use correlated with anxious attachment but not avoidant attachment among adult females (Gewirtz-Meydan et al., 2021). Furthermore, another study (Gouvernet et al., 2017) found avoidant and anxious adults were more adversely impacted by pornography use. These studies indicated that pornography might have some influence on how people romantically attach to other people. These studies have also demonstrated the importance of differentiating different populations of pornography consumers as various groups of people were impacted by pornography differently.

However, previous studies that have investigated the relationship between pornography and attachment have not made it clear if they only investigated human pornography only or and hentai. It is unclear if the link between pornography use and insecure attachment applies to human pornography only or and hentai.

Attraction

According to evolutionary psychologists, attraction towards another person is an evolved mechanism that helps people identify a healthy mate of the same species to reproduce with (Stephen and Wei, 2015). A meta-analysis (Feingold, 1990) has found attractiveness was positively linked with romantic popularity among heterosexual males and females. In seeking an ideal partner, attractiveness is a key characteristic that many adults look for (Feingold, 1990). Thus, physical appearance is an important factor for a person's desire to be with another person romantically. However, human attraction towards atypical things, such as anime characters (an example of fictophilia), seems poorly understood.

Fictophilia is a type of paraphilia. Paraphilia involves individuals having atypical sexual arousal towards atypical things or objects. Paraphilia exists across many different cultures, but the exact prevalence of people who experience paraphilias is unknown (Bhugra et al., 2010). Paraphilia-related studies have argued males, compared to females, are more likely to develop atypical sexual interests (Bhugra et al., 2010; Långström and Seto, 2006). Various factors (e.g., biological or social) seem to influence the sex disparity found in paraphilia (Baldwin and Baldwin, 1997; Bhugra et al., 2010). How exactly these factors influence the sex disparity in paraphilia is still unknown.

On the internet, a person's attraction/romantic desire towards anime characters is known as having a waifu or husbando. Waifu often refers to a person's attraction/romantic desire towards a female anime character and husbando being the male counterpart (Reysen et al., 2020). There is currently little quantitative research on people's attraction and romantic desire towards anime characters (Karhulahti and Välsälo, 2021). However, a survey study conducted among anime fans by Reysen et al. (2020) found that both male and female anime fans reported sexual attraction towards anime characters. Anime fan's sexual attraction towards anime characters was greater for opposite-sex characters (Reysen et al., 2020). This was probably due to many anime fans being heterosexual (Reysen et al., 2020).

The current study

Empirical research on pornography has not strongly acknowledged the importance of differentiating human pornography from pornography that primarily uses fictional characters (e.g., hentai). Therefore, the differences between individuals who consume hentai and individuals who do not consume hentai are not well known. Previous studies have found that various factors (e.g., attachment, sex, etc.) seem to impact the influence pornography has on individuals. Consumers of hentai could also differ in how they romantically perceive and desire real people and anime characters compared to

people who do not consume hentai. Therefore, the first aim of the study was to compare hentai consumers to those who consumed human pornography but not hentai in the past year (non-hentai consumers) and those who did not consume both hentai and human pornography in the past year (non-porn consumers). These three groups were compared on adult attachment style, attraction to, and desire to be in a romantic relationship with an anime character and a real person. The second aim of the study was to investigate if hentai consumers had a stronger preference for hentai over human pornography.

It was hypothesized that hentai consumers would score higher on attachment avoidance than both non-hentai and non-porn consumers (Hypothesis 1). It was also hypothesized hentai consumers would score higher on attachment anxiety than both non-hentai and non-porn consumers (Hypothesis 2).

In terms of attraction to and romantic desire for an anime character, it was also hypothesized that hentai consumers would rate the images of anime characters more attractive compared to both non-hentai and non-porn consumers, whereas the attractiveness ratings made on the images of humans would not differ between the three pornography consumer types (Hypothesis 3). It was also hypothesized hentai consumers would have a stronger desire to be in a romantic relationship with an anime character than non-hentai and non-porn consumers (Hypothesis 4).

In terms of the second aim of the study, it was lastly hypothesized hentai consumers would have a stronger preference for consuming hentai compared to human pornography (Hypothesis 5).

Method

Participants

An initial sample of 281 participants completed the online study. However, 73 participants were removed due to not correctly answering the validity question or due to missing responses. The final sample consisted of 208 participants with an average age of 20.90 years ($SD=5.67$). The sample consisted of 75 males and 133 females. Almost half of the participants (44.2%) were Caucasian, 39.9% were Asian, 7.7% were other, 6.7% were Middle Eastern, 1.0% were Hispanics, and .5% were Black. The majority of participants (81.3%) were heterosexual, 16.3% bisexual, and 2.4% were homosexual. One hundred and nineteen participants have previously been in a serious romantic relationship, while 89 participants have not been in a serious relationship before. In terms of participant's consumption of pornography in the past year, 28.8% were hentai consumers, 38.0% were non-hentai consumers, and 33.2% were non-porn consumers.

It should be noted that among the hentai consumers all but seven participants consumed hentai and human pornography in the past year. Therefore, those seven participants who only consumed hentai were included in the hentai consumer group. Also, two participants identified themselves as hentai consumers but did not consume any hentai in the past year, but both did consume human pornography. Those two hentai consumers were placed in the non-hentai consumer group. Also, originally there were 210 partici-

pants; however, two participants were removed due to being the only two who identified their sex as being “other.” Those two participants were removed because this was not appropriate for further analyses. Thus, the final sample included 208 participants.

Participants were recruited using three methods. The first method was via a screener survey on pornography consumption that all first-year Macquarie University psychology students completed. Students who either indicated that they consumed hentai or not were invited to participate in the study. The second method was via an advertisement on Macquarie University’s study recruitment webpage accessed only by psychology students. The third method was contacting individuals via the Sydney University Anime Society Facebook webpage, a social group of anime enthusiasts. Macquarie University psychology students received course credit for completing the full study; all other participants could enter a draw to win one of three \$50 gift cards. Macquarie University students also had the choice of opting for the draw instead of receiving course credit. All participants gave informed consent to participate in the study, and the study was approved by Macquarie University’s Human Sciences Ethics committee.

Measures

Brief demographics questionnaire

This self-report asked for the participant’s age, ethnicity, sexual orientation, sex, and previous romantic relationship status. Participants were also asked if they consumed hentai and, if so, how many years. Furthermore, participants were asked how frequently they consumed pornographic material in the past 12 months. Based on [Carroll et al. \(2008\)](#) pornography use scale, the study also asked how often participants consumed hentai and human pornography over the past 12 months, respectively. The scale responses were 1 (none), 2 (once a month or less), 3 (2 or 3 days a month), 4 (1 or 2 days a week), 5 (3 to 5 days a week), and 6 (every day or almost every day).

Experience of close relationship scale (ECR)

The 36-item ECR self-report assessed adult attachment ([Brennan et al., 1998](#)). The ECR captured adult attachment via two subscales: the first measured avoidant adult attachment (avoidant attachment), and the second measured anxious adult attachment (anxious attachment). The avoidant attachment included items such as, “Just when my partner starts to get close to me I find myself pulling away.” The anxious attachment included items such as, “I worry about being abandoned.” Items were rated via a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Total scores for the subscale were calculated by summing response option scores. The total theoretical score range for both subscales was 18 to 126; higher scores reflected greater attachment avoidance and attachment anxiety, respectively. A previous study by [Kor et al. \(2014\)](#) obtained strong reliability for both attachment anxiety, $\alpha = .84$, and avoidance attachment, $\alpha = .83$. The current sample demonstrated high internal reliability for both the avoidant subscale, $\alpha = .92$, and anxiety subscale, $\alpha = .92$.

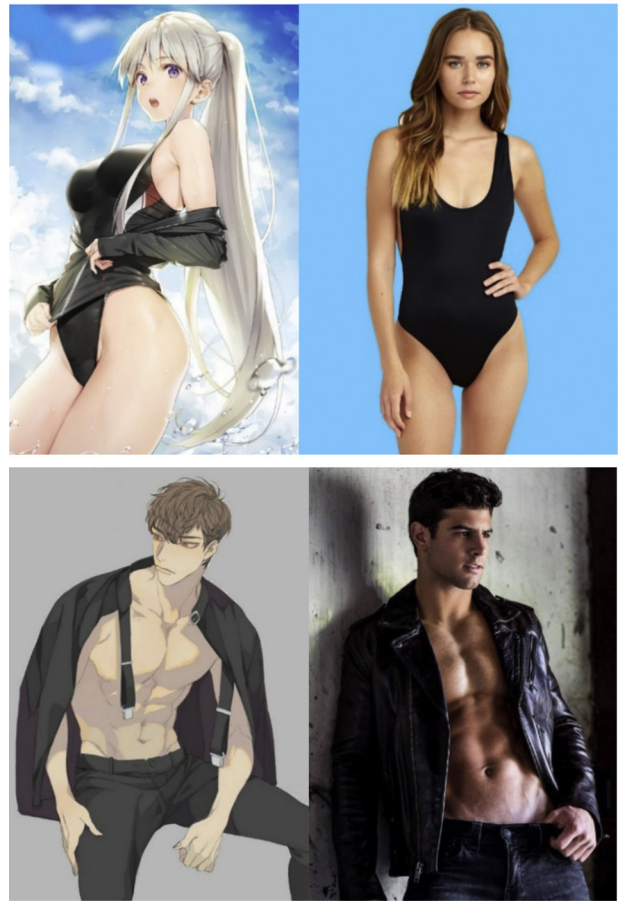


Figure 2 Images of the anime character and humans for rating task. Note: The image on the left is a fan art by the artist [Tokki \(2018\)](#) of the anime character Enterprise from the video game Azur lane ([Manjuu and Yongshi, 2017](#)). The image on the right is an image of a swimsuit model from the RVCA shopping website ([RVCA, n.d.](#)). Note: The image on the left is a depiction of an anime character drawn by the artist [Haribo \(2018\)](#). The image on the right is of the model Frankly Cammarata ([Cammarata, 2018](#)).

Anime and human image rating task

Participants were presented with nine images of 2D anime characters and nine images of real humans. All images consistently showed the face and torso of the anime character or human (see [Fig. 2](#)). All anime characters were youthful in appearance, but none of the anime characters were loli anime characters (i.e., anime characters that looked like children). All images of the humans were of celebrities or clothing models. Each anime character roughly matched an image of a human in terms of their clothing and pose. Additionally, none of the images of the anime characters matched a person cosplaying as an anime character because the participant’s attractiveness ratings may have been confounded by the design of the anime character as well as their attraction to the person cosplaying. For each image, participants rated how attractive and how familiar the anime character or human was to them. Participants rated male or female anime characters and humans based on their sexuality. Ratings were made using a 9-point Likert scale ranging from 1 (not at all) to 9 (very). The images were presented in

a quasi-random order (e.g., anime, human, anime, human, etc.), with the first image being randomly selected. Both the attractiveness ratings of the images that depicted females, $\alpha = .89$, and males, $\alpha = .90$, demonstrated strong internal reliability.

Two dependent variables were calculated for the attractiveness and familiarity ratings (one for anime characters and one for humans) by calculating the average ratings. Specifically, for the attraction ratings, the first variable was the average attractiveness rating of the anime characters (termed attraction to anime characters). The second variable was the average attractiveness ratings of humans (termed attraction to humans). For the familiarity ratings, the first variable was the average familiarity rating of the anime characters (termed familiarity of anime characters). The second variable was the average familiarity rating of the humans (termed familiarity of humans). Higher scores reflected higher attraction and familiarity.

The desire for romantic relationship scales

The romantic desire scales were constructed to tap into the participant's desire to be in a romantic relationship with an anime character (desire for anime relationship) or real person (desire for human relationship). Both scales had 10-items where four of the items were reversed coded for both scales. Ratings were made via a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). An example of an item was, "not being in a relationship makes me want me to be in a relationship with an anime character more." The desire for human relationship scale had the same 10-items, but the words "anime character" were replaced by the words "another person." The total theoretical score range was 10 to 50. A higher score reflected a greater desire to be in a romantic relationship with an anime character or real human. Both the romantic desire for an anime character, $\alpha = .94$ and human, $\alpha = .92$, demonstrated high internal reliability.

Pornography Consumption Inventory (PCI)

The PCI is a 15-item scale that assesses four different motivations for pornography use (Reid et al., 2011). The four subscales included: emotional avoidance (pornography use to avoid negative feelings), sexual curiosity (pornography use to learn about sex), excitement seeking (pornography use to escape to a fantasy world), and sexual pleasure (pornography use for sexual arousal). An example of an item was "pornography provides an opportunity to be distracted from life." The current study modified the PCI into two separate versions, one specifically on hentai (hentai PCI) and the other for human pornography (human PCI). Ratings were made using a 5-point scale, 1 (does not describe me) to 5 (describes me extremely well). The total theoretical score range was 15 to 75, higher scores implied greater motivation to consume hentai or human pornography for the reasons specified in the subscales. Reid et al. (2011) sample obtained strong internal reliability for the overall PCI $\alpha = .83$. The current sample obtained strong internal reliability for the overall hentai PCI, $\alpha = .85$ and mostly high internal reliability for the subscales: emotional avoidance, $\alpha = .92$, sexual curiosity, $\alpha = .91$, excitement seeking, $\alpha = .81$, and sexual pleasure, $\alpha = .90$. The current sample also obtained high

internal reliability for the overall human PCI, $\alpha = .94$, and for the subscales: emotional avoidance, $\alpha = .92$, sexual curiosity, $\alpha = .95$, excitement seeking, $\alpha = .87$, and sexual pleasure, $\alpha = .97$.

Procedure

All participants completed the study online. All participants first completed a short brief demographic questionnaire, followed by the anime and human image rating task, desire for romantic relationship scales, ECR, pornography use scales, and then the PCI scales. However, only hentai consumers completed the hentai PCI and human PCI, while those who did not consume hentai completed the human PCI only.

Data analysis

The results were organized into three broad categories:

- attachment and relationship experience;
- attraction and romantic desire and;
- pornography consumption preferences.

For each broad category, the hypotheses were tested using univariate, bivariate, and using sex as a covariate because many pornography studies have found sex differences. All analyses were performed via SPSS version 25 (IBM).

The bivariate analyses used Spearman rho because not all variables were normally distributed. For hypotheses testing, analyses that contained variables that violated normality were also analyzed via non-parametric bootstrapping with 1000 resamples when possible.

Results

Attachment and relationship experience

Attachment-related measures included the attachment subscales and romantic relationship experience. The family-wise error rate was adjusted for two comparisons; alpha was set at .025 (i.e., .05/2).

Hypothesis 1 and 2) Do Hentai consumers have different attachment styles compared to the other pornography consumer types?

An ANOVA was conducted with pornography consumer-type as the IV, attachment avoidance as the DV, and sex as a covariate (see Table 1 for descriptive statistics). There was no significant correlation between avoidant and anxious attachment, $r = .12$, $P = .09$. There was no significant effect of pornography consumer type on attachment avoidance, $F(2, 204) = .75$, $P = .475$, $\eta^2 = .01$. The results indicated no significant difference between the three pornography consumer types on attachment avoidance.

The next ANOVA was run with pornography consumer-type as the IV, attachment anxiety as the DV, and sex as a covariate. There was a significant effect of pornography consumer type on attachment anxiety, $F(2, 204) = 4.42$, $P = .013$, $\eta^2 = .04$. The results indicated a significant dif-

ference between the three pornography consumer types on attachment anxiety. Contrast testing revealed that hentai consumers ($M=80.65$, $SD=18.93$) scored significantly higher on attachment anxiety than the non-porn consumers ($M=71.61$, $SD=20.23$), $t(127)=2.61$, $P=.010$, $d'=.46$. The non-hentai consumers ($M=75.18$, $SD=22.64$) did not significantly differ from the non-porn consumers on attachment anxiety, $t(146)=1.01$, $P=.317$, $d'=.17$. Hentai consumers also did not significantly differ from the non-hentai consumers on attachment anxiety, $t(137)=1.51$, $P=.133$, $d'=.26$.

However, further analyses indicated that, only among females, hentai consumers ($M=87.21$) scored significantly higher on attachment anxiety than the non-porn consumers ($M=70.94$), $t(83)=3.17$, $P=.002$, $d'=.84$. The non-hentai ($M=77.69$) did not significantly differ from the non-porn consumers on attachment anxiety, $t(112)=1.69$, $P=.094$, $d'=.32$. Hentai consumers also did not significantly differ from the non-hentai consumers on attachment anxiety, $t(65)=1.64$, $P=.106$, $d'=.46$.

Attraction and romantic desire

The attraction-related measures included the attraction task, desire for a romantic relationship with an anime character, and romantic desire for a romantic relationship with a human. The family-wise error rate was adjusted for four comparisons; alpha was set at .0125 (i.e., .05/4).

Hypothesis 3) Do Hentai consumers find anime characters more attractive than non-hentai consumers?

For the final analysis, 32 images were analyzed instead of 36. The reason for this was because two of the male anime characters were different depictions of the same anime character. Thus, one of the anime depictions and its human counterpart were removed. Also, one of the female human images and one of the female anime images contained smiling. Thus, those two images were removed to avoid inflating the attractiveness scores. Meaning images of eight anime characters and eight humans were analyzed for each participant instead of nine anime characters and nine humans.

A 3 (pornography consumer types; hentai consumers, human only consumers, non-porn consumers) \times 2 (image type: anime characters, humans) mixed ANOVA analysis was run to investigate differences between pornography consumer types on attraction to anime characters and humans (see Tables 2 and 3 for descriptive statistics and correlations). For assumptions, sphericity was met, however homogeneity of variance was violated. The analysis indicated a significant effect of pornography consumption type by image type on attractiveness ratings, $F(2.00, 205.00)=35.39$, $P<.001$, $\eta^2=.26$, (see Fig. 3). The interaction remained significant when the sex of participants and familiarity of all the images were accounted for, $F(2.00, 202.00)=7.68$, $P=.001$, $\eta^2=.07$.

Visual inspection of the interaction graph indicated a parallel interaction between the humans-only and non-porn consumers (see Fig. 3). Contrasting testing revealed non-hentai consumers compared to non-porn consumers had significantly higher attractiveness ratings on the anime character images ($M=3.83$) vs. ($M=2.83$), $t(146)=3.19$,

$P=.002$, $d'=.53$, and on the human images ($M=5.33$) vs. ($M=4.43$), $t(146)=3.27$, $P=.001$, $d'=.54$, respectively. However, changes in image type (i.e., humans to anime characters) did not have a significant different effect on attractiveness ratings for non-hentai ($M=1.50$, $SD=2.03$) and non-porn consumers ($M=1.61$, $SD=1.94$), $t(146)=-.32$, $P=.749$, $d'=.06$. Therefore, for contrast testing, non-hentai and non-porn consumers were collapsed into one new group called the non-consumers for contrast testing.

Contrast testing indicated that image type had a differing effect on attractiveness ratings for hentai consumers ($M=-.94$, $SD=1.80$) compared to non-consumers ($M=1.55$, $SD=1.98$), $t(206)=-8.43$, $P<.001$, $d'=1.32$. In particular, attractiveness ratings of the anime characters were significantly higher for hentai consumers ($M=6.16$, $SD=1.42$) than for non-consumers ($M=3.36$, $SD=1.97$), $t(150.36)=11.47$, $P<.001$, $d'=1.63$. Whereas, attractiveness ratings of humans were not significantly different between hentai consumers ($M=5.22$, $SD=1.71$), and non-consumers ($M=4.91$, $SD=1.72$), $t(206)=1.17$, $P=.243$, $d'=.18$.

Hypothesis 4) Do hentai consumers desire romantic relationships differently compared to other pornography consumer types?

An ANOVA was run with pornography consumer type as the IV, desire for anime relationship as the DV, and sex as a covariate. A significant effect of pornography consumer type was found, $F(2, 204)=40.85$, $P<.001$, $\eta^2=.29$. This indicates there was a significant difference between the pornography consumer types on desiring a romantic relationship with an anime character. Contrast testing indicated that hentai consumers ($M=23.88$) had a significantly stronger desire to be in a romantic relationship with an anime compared to both non-hentai consumers ($M=12.66$), $t(78.24)=7.41$, $P<.001$, $d'=1.32$, bootstrap BCa 95% CI [8.33, 14.09], and non-porn consumers ($M=11.57$), $t(72.16)=8.32$, $P<.001$, $d'=1.51$, bootstrap BCa 95% CI [9.63, 15.06], respectively. There was no significant difference between the non-hentai and non-porn consumers on desiring a romantic relationship with an anime character, $t(146)=1.46$, $P=.147$, $d'=.24$, bootstrap BCa 95% CI [-.35, 2.49].

Exploratory analyses: hentai and desire for human relationship

Another ANOVA was run, with desire for a human relationship as the DV and sex as the covariate. There was no overall significant effect of pornography consumer type, $F(2, 204)=.11$, $P=.900$, $\eta^2=.001$. There was no significant difference between the pornography consumer types on desiring a romantic relationship with a real person.

Pornography preference

Only hentai consumers completed both the pornography use and PCI scales for hentai and human pornography. Human pornography-related scales were completed by all participants. The alpha level was set at .05.

Table 1 Descriptive statistics of attachment related scales by sex and pornography consumer type.

Variables	Females					
	Hentai (<i>n</i> = 19)		Non-hentai (<i>n</i> = 48)		Non-porn (<i>n</i> = 66)	
	M	SD	M	SD	M	SD
Avoidant attachment	50.79	18.84	49.52	16.45	52.06	19.68
Anxious attachment	87.21	18.58	77.69	22.40	70.94	20.00
Variables	Males					
	Hentai (<i>n</i> = 41)		Non-hentai (<i>n</i> = 31)		Non-porn (<i>n</i> = 3)	
	M	SD	M	SD	M	SD
Avoidant attachment	53.20	19.47	49.19	15.82	61.33	15.95
Anxious attachment	77.61	18.53	71.29	22.82	86.33	23.80

Table 2 Descriptive statistics of attractiveness and desire.

Variables	Pornography Consumer Type					
	Hentai (<i>n</i> = 60)		Non-hentai (<i>n</i> = 79)		Non-porn (<i>n</i> = 69)	
	M	SD	M	SD	M	SD
Attraction to anime characters	6.16	1.42	3.83	1.97	2.83	1.83
Attraction to real human	5.22	1.71	5.33	1.59	4.43	1.75
Desire anime relationship	23.88	10.88	12.66	5.04	11.57	3.90
Desire human relationship	37.15	9.11	35.63	8.98	34.75	11.40

Table 3 Spearman's rho matrix of attraction related measures (*n* = 208).

Variables	1.	2.	3.	4.
1. Attraction to anime characters	—	.39**	.61**	.11
2. Attraction to real humans		—	.14	.28**
3. Desire for anime relationship			—	.04
4. Desire for human relationship				—

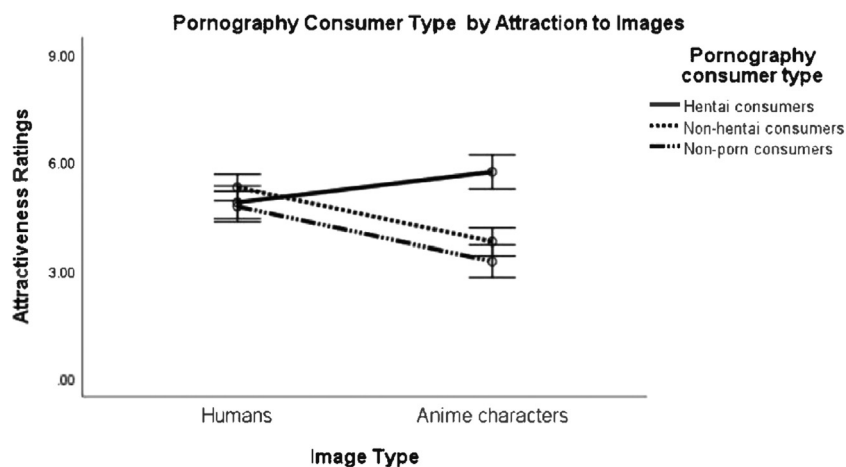
** *P* < .01.**Figure 3** Error bars represent standard errors.

Table 4a Descriptive statistics of hentai use in the past year by sex.

Frequency of consumption	Hentai overall (n = 62)					
	Everyday/almost everyday	3 to 5 days a week	1 to 2 days a week	2 or 3 days a month	Once a month	None
Sex						
Males	13	7	11	5	5	2
Females	1	2	2	6	8	0

Table 4b Descriptive statistics of human pornography use in the past year by sex.

Frequency of consumption	Human pornography overall (n = 208)					
	Everyday/almost everyday	3 to 5 days a week	1 to 2 days a week	2 or 3 days a month	Once a month	None
Sex						
Males	10	26	20	8	4	7
Females	5	6	14	17	22	69

Table 5 Descriptive statistics of PCI among hentai consumers by sex.

Variables	Males (n = 41)		Females (n = 19)	
	M	SD	M	SD
Hentai				
Emotional avoidance	10.73	6.05	9.63	5.49
Sexual curiosity	9.15	5.02	11.95	5.32
Seeking excitement	10.20	3.55	8.42	3.69
Sexual pleasure	12.68	2.80	10.89	3.93
Hentai PCI	42.76	11.11	40.89	13.41
Human pornography				
Emotional avoidance	9.83	5.98	10.00	6.79
Sexual curiosity	9.71	5.50	13.11	5.53
Seeking excitement	7.34	3.80	8.16	4.46
Sexual pleasure	11.73	3.76	10.74	4.69
Human PCI	38.61	13.89	42.00	17.73

PCI: Pornography consumption inventory.

Table 6 Spearman's rho matrix of PCI and its respective subscales (n = 60).

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Hentai EA	—	.14	.30*	-.04	.61**	.66**	.15	.28*	-.04	.45**
2. Hentai SC		—	.39**	-.02	.63**	.24	.62**	.41**	.24	.46**
3. Hentai SE			—	.24	.77**	.37**	.35**	.61**	.32*	.57**
4. Hentai SP				—	.33**	-.16	.05	.17	.69**	.19
5. Hentai PCI					—	.55**	.49**	.60**	.42**	.72**
6. Human EA						—	.36*	.59**	.18	.73**
7. Human SC							—	.60**	.40**	.76**
8. Human SE								—	.51**	.86**
9. Human SP									—	.61**
10. Human PCI										—

EA: emotional avoidance; SC: sexual curiosity; SE: seeking excitement; SP: sexual pleasure.

* $P < .05$.

** $P < .01$.

Hypothesis 5) Do hentai consumers prefer hentai more than human pornography?

A paired sample test was conducted among only hentai consumers ($n=60$) to investigate if they were more motivated in consuming hentai than human pornography (see Tables 4a, 4b–6 for descriptive statistics and correlations). The analysis revealed there was no significant difference in overall motivation for consuming hentai ($M=42.17$, $SD=11.80$) vs. human pornography ($M=39.68$, $SD=15.14$), $t(59)=1.81$, $P=.08$, $d'=.23$, BCa 95% CI $[-.19, 5.12]$.

Exploratory analyses: hentai and PCI subscales

A further explorative analysis was conducted on the four dimensions of PCI (emotional avoidance, sexual curiosity, excitement seeking, and sexual pleasure). The analyses indicated a significant difference for only excitement seeking, consuming pornography as a way to seek excitement, between hentai ($M=9.63$, $SD=3.66$), and human pornography ($M=7.60$, $SD=4.00$), $t(59)=4.65$, $P<.001$, $d'=.60$, bootstrap BCa 95% CI $[1.20, 2.89]$. Indicating hentai consumers were more motivated in seeking excitement for hentai compared to human pornography. When the sample was split by sex, the difference between hentai ($M=10.20$) and human pornography ($M=7.34$) for excitement seeking remained significant for males, $t(40)=5.45$, $P<.001$, $d'=.86$, bootstrap BCa 95% CI $[1.85, 3.81]$. The difference between hentai ($M=8.42$) and human pornography ($M=8.16$) for excitement seeking was not significant for females, $t(18)=.41$, $P=.69$, $d'=.09$, bootstrap BCa 95% CI $[-.87, 1.56]$.

Discussion

Adult attachment and hentai

The first aim of the current study was to determine whether hentai consumers differ in terms of their attachment style, attraction, and romantic desire compared to non-hentai and non-porn consumers. The results did not support the first hypothesis; hentai consumers did not significantly score higher on attachment avoidance than non-hentai and non-porn consumers. However, the second hypothesis was partially supported; female hentai consumers scored higher on attachment anxiety than females in the non-porn consumer group.

The current findings are consistent with previous research on the relationship between insecure attachment and pornography use. More specifically, the link between pornography and insecure attachment could also extend to hentai because hentai is also a type of pornography. A study by Kor et al. (2014) found a small significant correlation between problematic pornography use and insecure adult attachment. Similarly, Gouvernet et al. (2017) found pornography use had a negative impact on sexual satisfaction among avoidant and the most anxious attached adults in their sample. In contrast, pornography use did not have a negative impact on sexual satisfaction among secure adults (Gouvernet et al., 2017).

Additionally, the current findings also support previous studies that have found sex differences in adult attachment. For example, a meta-analysis found that females

typically score higher on anxious attachment compared to males among community and college samples (Del Giudice, 2011). More recently, a meta-analysis (Li et al., 2019) found females scored higher on attachment anxiety than males, but the difference was not significant.

The exact reason for the association between insecure attachment and pornography use is still unknown due to little research on the topic (Gewirtz-Meydan et al., 2021). However, one possible explanation for the current findings is that hentai consumption could heighten anxious attachment. The study by Kor et al. (2014) also found that problematic pornography use was associated with other adverse mental health symptoms (e.g., depression, anxiety, etc.). Pornography, in particular hentai, often exaggerate aspects of sexual behavior in an attempt to increase arousal and reaction out of the consumer. Perhaps the consumption of exaggerated pornography like hentai could exacerbate the insecurities females who are higher on anxious attachment may have on sex and romantic relationships. For example, pornography could elicit females, who are more vulnerable to developing anxious attachment, to worry about not meeting their partner's sexual expectations (Gouvernet et al., 2017). However, the results showed that female non-hentai consumers did not significantly differ on insecure attachment compared to female non-porn consumers. Although, female non-hentai consumers were higher on anxious attachment compared to non-porn consumers.

Attraction, romantic desire, and hentai

The results supported the third hypothesis; specifically, hentai consumers rated the images of anime characters more attractive than the non-consumers (i.e., non-hentai and non-porn consumers). However, there were no group differences in attractiveness ratings on the images of humans. The results also supported the fourth hypothesis; hentai consumers had a stronger desire to be in a romantic relationship with an anime character than non-hentai and non-porn consumers.

One possible explanation of the current findings is that different types of pornography could have different influences on people's schemas (i.e., beliefs and behaviors) in relation to attraction and romantic relationships. The current findings did somewhat support a study that found, among heterosexual male adults, pornography consumption via different mediums had different effects on perceived sexual arousal (Simon and Greitemeyer, 2019). In particular, males perceived pornography to be more sexually arousing when they consumed pornography via a virtual reality headset compared to a desktop computer (Simon and Greitemeyer, 2019). Thus, consuming pornography via different mediums could elicit different levels of sexual arousal. As mentioned earlier, hentai differs from human pornography in many ways. Thus, consuming hentai may be one possible factor influencing people to perceive anime characters to be more attractive.

The current findings could also be explained by previous studies that have investigated the consumption of romantic anime-related video games. A study by Song and Fox (2016) found greater identification with one's video game avatar in an anime dating simulation video game mediated the rela-

tionship between playing romance dating video games and the development of idealized romantic belief.

Additionally, exposure to pornography may also impact one's desire to be with a human or anime character romantically. [Staley and Prause \(2013\)](#) investigated if experimental exposure to pornography could influence heterosexual couple's desire for intimacy. They found that exposure to pornographic films increased the couple's desire to be closer to one another ([Staley and Prause, 2013](#)). Thus, exposure to media, including hentai, that involves romance and anime characters could perhaps influence people's beliefs on attractiveness and romantic relationships towards anime characters.

However, consuming hentai may not change people's attraction and desire towards real humans. The scores on attractiveness and romantic desire towards real humans did not significantly differ across all three pornography consumer types. Thus, developing stronger attraction and romantic desire towards anime characters may be unique to hentai but not human pornography.

Hentai vs. human pornography for hentai consumers

Partial support for the last fifth hypothesis was also found; specifically, male hentai consumers were more motivated to consume hentai for seeking excitement compared to human pornography. There was no significant motivational difference in consuming hentai and human pornography across the other types of motivations, including avoiding negative emotions, satisfying sexual curiosity, and facilitating sexual pleasure.

The current findings indicate that motivations for consuming different types of pornography could depend on an individual's characteristics. The current findings somewhat support recent findings. [Brown et al. \(2017\)](#) found that among the least frequent users of pornography in their sample tended to be motivated to use pornography out of sexual curiosity. Furthermore, moderate frequent users of pornography tended to be motivated by sexual pleasure, while the highest frequent pornography users tended to be motivated by sexual pleasure and sexual curiosity ([Brown et al., 2017](#)). For the current study, sex may have been one such characteristic that could have influenced motivational differences in pornography use between male hentai consumers and female hentai consumers.

Implications and limitations of the current study

One of the limitations of the current study was the lack of representation of males in the non-porn group. Only three male participants identified themselves as non-porn consumers, whereas 66 females indicated the same. Therefore, the findings relating to this group (e.g., hentai consumers scoring higher on anxious attachment than the non-porn consumers) may only be attributable to females. However, the unbalanced number of males for the non-porn consumers in the current study seems to be representative of the population. The literature has ([Herbenick et al., 2020](#); [Lim et al., 2017](#); [Rissel et al., 2017](#)) consistently shown that many males sampled across multiple studies have consumed pornogra-

phy. For example, among a representative sample of 1075 adult American males, 94% of males have consumed some type of pornographic material in their lifetime ([Herbenick et al., 2020](#)). Similarly, [Carroll et al. \(2008\)](#) found that 87% of males reported pornography use in the past 12 months. The current results do not contradict what has been consistently found in the literature regarding male pornography use. Future studies could obtain more balanced samples to investigate if the current findings among female hentai consumers can be generalized to males.

Another limitation relates to the attraction task. Specifically, the image background colors were not standardized. Therefore, it could be possible that the background colors could have influenced the attraction ratings. Future studies should standardize the background colors to ensure background color does not influence attraction ratings. Also, some of the images of the anime characters were from the same anime franchise. Future studies could compare hentai consumer's attraction towards erotic depictions of anime characters that involve their favorite anime characters against novel ones. It is recommended researchers consult several hentai consumers to select anime characters that hentai consumers will probably find attractive. Also, the exact poses, clothing, hair color, and facial expressions in the images were not controlled for. However, controlling for the exact hair color and facial expression may not be appropriate because many anime characters do not have proportionate human features or have missing facial features (e.g., inhuman-sized eyes or not having a philtrum, etc.).

Additionally, all the real humans were of Caucasian appearance; also, all the anime characters were light-skinned. The reason for this is because most anime characters in media, including hentai, are light-skinned. Also, the depiction of race in anime is controversial. For example, it is common for anime characters to have Caucasian characteristics (e.g., blond hair) and still be ethnically Japanese or to be of a non-existent race ([Lu, 2009](#)). Also, many anime characters in media possess non-human features (e.g., animal ears, elf ears, etc.). Future studies could use anime characters with a range of human and non-human features against multiple races of real people. It should also be noted that the current study used images of 2D anime characters in color only. Future studies could also investigate attractiveness using anime characters in 3D or doujinshi form (i.e., black and white-colored anime characters).

Furthermore, the desire for a human relationship scale may have unwittingly captured a person's desire for infidelity. Specifically, the scale used the phrase "another person" to tap into the participant's desire for a human relationship. Participants may have interpreted the words "another person" as testing their infidelity desires, especially among participants in relationships. Therefore, it is unclear if the desire for a human relationship scale was reflecting participant's desire for a romantic relationship in general or their desire to be in another romantic relationship in addition to their current one. However, the scale did demonstrate high reliability indicating the scale was accurately measuring some construct related to desiring a human romantic relationship. Future studies could investi-

gate the discriminant and convergent validity of the desire for a human relationship scale to clear this ambiguity.

This study has two important implications for pornography research. First, the findings indicate that hentai consumers differ from non-hentai and non-porn consumers on several characteristics, especially on attraction and romantic desire towards anime characters.

Second, studies on pornography, including recent meta-analyses (Ferguson and Hartley, 2020), do not differentiate hentai from human pornography. This lack of differentiation of hentai vs. human pornography is crucial because it is unknown if the effects of pornography on people are related to human pornography or hentai. For an important clinical example, the link between pornography use and depression (Bridges and Morokoff, 2011) might depend on the type of pornography that is consumed. Thus, future investigations of problematic use of pornography or addictions may benefit from differentiating hentai from human pornography for accurate interventions. Overall, it may not be appropriate to assume that hentai has the same effects as human pornography on people's behaviors, emotions, and attitudes just because they both elicit sexual arousal.

Conclusion

The current study found that individuals who consumed hentai in the past year did not seem to differ from the other pornography consumer types in terms of their attraction towards humans and their desire for a human romantic relationship. However, hentai consumers did differ from other pornography consumer types in terms of how they perceived anime characters physically and romantically. Therefore, future studies are encouraged to differentiate hentai from human pornography.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. Ethics approval was received from Macquarie University's Human Sciences Subcommittee.

Consent to participate

All participants gave consent prior to beginning the study.

Consent for publication

All authors named consent to the publication of this manuscript.

Availability of data and material

The data is not available due to confidentiality reasons.

Code availability

Not applicable.

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Non-financial conflict of interest

I, Jonathan Park, consume both hentai and human pornography.

Author's contributions

Jonathan I. Park was responsible for developing the scales, conceptualizing the study, writing up the manuscript, and the data analysis. Mehmet K. Mahmut was responsible for developing the scales, conceptualizing the study, editing the manuscript, and supervising the project. Anna Blomkvist was responsible for the revision and editing of the manuscript.

Disclosure of interest

The authors declare that they have no competing interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.sexol.2021.11.002>.

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