Exploring the psychological characteristics of individuals who own sex dolls

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Abstract

The ownership of sex dolls has become an increasingly controversial social issue over the last five-to-ten years, with many in society (and academia) calling for the criminalization of such dolls. At the root of these calls is the implicit (and often explicit) assumption that sex doll ownership contributes to increases in social objectification of women, and sexual offense risk among doll owners. However, there are yet to be any empirical examinations of these claims. In this work we compare the psychological characteristics of sex doll owners ($n = 158$) and non-owner controls ($n = 135$). Contrary to widely held social attitudes, we found no substantive differences in sexual objectification between the two groups. Doll owners typically had more sexual fantasies related to coercion (biastophilia), but lower offense proclivity, than controls. Owners were also more likely to see women as unknowable, have less secure attachment styles, and more stable negative mood. We begin to build a psychological profile of sex doll ownership, before highlighting the need for more evidence-informed social debates about the use of sex dolls in modern society.

Key words: sex dolls, sexual offending, sexual objectification, relationships, dolls and robots

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Introduction

The ownership of realistic silicone dolls for sexual purposes ('sex dolls') is a controversial topic that is gaining an increasing amount of public and academic attention. According to some reports, the global market for sex dolls is a multi-million dollar industry (Valverde, 2012). Dolls are typically realistic and can be made as a true likeness of real models, with adult film stars already seeing this as an additional business opportunity (Langcaster-James & Bentley, 2018). While the ownership and use of toys and non-human objects for the purposes of sexual gratification is not new, the vast majority of research to date has focused on women's uses and experiences of toys in masturbation and sexuality exploration (Döring & Pöschl, 2018; Fahs & Swank, 2013; Lieberman, 2017). In this paper, we present the first analysis of the personality, sexual interest, and risk-related characteristics of sex doll owners. We feel the need to stress from the outset that our aim in this paper is not to advocate for any particular argument for doll legalization or criminalization. Instead, we hope our exploratory analyses will inform further longitudinal and experimental work in this area, such that future policy proposals and legislative developments are based on empirical evidence rather than moral positioning.

The emergence of realistic dolls, however, has led to an explosion of philosophizing about the ethics of such materials (Carvalho Nascimento et al., 2018; Danaher et al., 2017; Eskens, 2017; Facchin et al., 2017; Kubes, 2019; Lancaster, 2021; Richardson, 2019), particularly when these dolls ostensibly represent children (Chatterjee, 2020; Cox-George & Bewley, 2018; Danaher, 2017a, 2019b; Maras & Shapiro, 2017; Strikwerda, 2017). Indeed, there have been some convictions for the importation of sex dolls that resemble children (Brown & Shelling, 2019; Danaher, 2017a, 2019b; Strikwerda, 2017), with those prosecuted for such offences also commonly being found to possess child sexual exploitation material (Brown & Shelling, 2019; Cox-George & Bewley, 2018). In spite of the rapid increase in theorizing about the ethics of doll ownership, there has been no empirical exploration of the characteristics and behaviors of individuals who own sex dolls (Harper & Lievesley, 2020).

The limited evidence that is currently available suggests that motivations for sex doll ownership are overwhelmingly sexual (Danaher, 2017b, 2019b; Döring & Pöschl, 2018; Ray, 2016). In small-scale surveys of owners, up to 70% of participants suggest that sexual gratification is the primary purpose of a doll (Langcaster-James & Bentley, 2018; Valverde, 2012). However, it has been suggested that sex is just one of a number of reasons for doll

ownership among this subgroup (Ferguson, 2014; Valverde, 2012). Even discounting this non-exclusivity of motivations, these statistics indicate that approximately one-in-three doll owners have a doll for primarily non-sexual reasons. Common alternatives are often linked to relationships, such as interpersonal connection and emotional intimacy (Ferguson, 2014; Su et al., 2019; Valverde, 2012), while others own dolls purely for artistic pursuits (e.g., photography; Su et al., 2019).

A common theme within the existing literature on sex doll ownership focuses on the effects that the commercial availability of realistic sex dolls has on broad-scale social attitudes towards women (Carvalho Nascimento et al., 2018; Cassidy, 2016; Danaher, 2017a, 2017b, 2019a; Kubes, 2019; Puig, 2017; Richardson, 2019; Shokri & Asl, 2015). These arguments typically stem from scholars writing from a feminist-based philosophical position, and in legal outlets whereby claims are not always challenged by competing evidence or supported by primary data collected from doll owners about their attitudes or behavior. Such claims relate to the process by which sex dolls reinforce the objectification of women, and bolsters a culturally-constructed sexual beauty standard (Cassidy, 2016; Ciambrone et al., 2017; Danaher, 2017b; Puig, 2017; Ray, 2016; Richardson, 2019). This was the basis for the claim that we should abandon the "unsophisticated" porn star design of sex dolls and robots, and to instead create "robots that are more realistic in their representations (both physical and behavioral) of women, that represent men, and that perhaps challenge the gender binary" (Danaher, 2019a, p. 142). However, the physical features of popular sex doll models (e.g., larger breasts, combined with a waist-to-hip ratio of approximately 0.70; Kock et al., 2008; Valverde, 2012) correspond to evolutionary cues that men find sexually attractive across a range of cultures and measurement approaches (Brooks et al., 2010; Buss, 2021; Del Zotto & Pegna, 2017; Dixson et al., 2011; Griffith et al., 2016; Saad, 2008, 2017; Singh et al., 2010). In this case, there is an unresolved conflict between the origins of male sexual preferences in female body type, with constructionists and evolutionists arguing from different epistemological positions.

Irrespective of the origins of perceptions of female sexual attractiveness, there is a wealth of evidence that viewing women as sexual objects is associated with sexual aggression. For instance, this has been identified as one of five implicit theories that underpin thought patterns and post-offence justifications among individuals with sexual convictions (Polaschek & Gannon, 2004; Polaschek & Ward, 2002). Such implicit theories are considered under the umbrella of offense-supportive attitudes and cognitions, with such beliefs being empirically established as meaningful predictors of recidivism among those convicted of

sexual offenses (Brankley et al., 2019; Mann et al., 2010). In community settings, sexual objectification has been associated with higher levels of rape myth acceptance (Samji & Vasquez, 2020), lenient attitudes about rape (Bernard et al., 2015), and a proclivity towards violence towards women (Vasquez et al., 2018). Relatedly, having a lifelike doll on-hand for sexual activity and gratification can plausibly be linked to (or said to serve) a sense of sexual entitlement, which is another implicit theory found to be present among men with sexual convictions, and predictive of recidivism (Brankley et al., 2019; Pemberton & Wakeling, 2009). With these past empirical data in mind, it is important to explore whether moralistic claims about sex doll ownership are borne out in responses provided by this population to test the validity of broad-scale policy recommendations related to doll bans and criminalization.

The predominant sexual motivation for sex doll ownership (Langcaster-James & Bentley, 2018; Ray, 2016; Valverde, 2012) may be useful in formulating a theoretical model of how doll ownership is linked to sexual aggression, if such a relationship exists. While we do not advocate for or against a link at this stage, it is necessary to formulate a hypothesized path from doll ownership to sexual aggression, which can then either be statistically supported or rejected by data that are obtained using empirical methods. All major multifactorial explanatory models of sexual offending contain some reference to sexual arousal or sexual scripts (Finkelhor, 1984; Hall & Hirschman, 1991; Marshall & Barbaree, 1990; Seto, 2019; Ward & Beech, 2006; Ward & Siegert, 2002). In the most recent, and perhaps most parsimonious, of these frameworks, Seto (2019) suggested that sexual offending occurs as a result of motivational and facilitating factors. In this model, motivators provide an initial impetus or interest in a potentially criminal sexual behavior. The most commonly discussed motivator of sexual offending is pedophilia (Finkelhor, 1984; Seto, 2019; Ward & Siegert, 2002), but having a sexual arousal pattern that involves interests in coercive sex (biastophilia), watching others engaged in sexual activity (voyeurism), or exposing oneself to unsuspecting others (exhibitionism) may also translate into an interest in engaging in their accompanying behaviors. However, according to the motivation-facilitation model, these motivating sexual interests will only be translated into action or behavior when accompanied by facilitators. These can be measured at the trait level (e.g., antisociality and psychopathy, or general behavioral disinhibition) or the state level (e.g., temporary intoxication through substances, stress, or depressed mood).

Applying Seto's (2019) model to the sex doll context, it may be that any main effect (either a significant effect, or a null effect) of owning a sex doll on indices of sexual aggression is potentially moderated by other psychological factors. That is, it may be that sex

doll ownership is associated with an increased proclivity for sexual aggression (a significant direct effect), but that this effect is not present among doll owners with low levels of psychopathy, or more positive or egalitarian attitudes towards women (as examples of potential moderators). In contrast, it may equally be the case that sex doll ownership is not linked to sexual aggression proclivity when considered in isolation (a null direct effect) but becomes significant among doll owners with higher levels of psychopathy, or anti-egalitarian attitudes towards women. It is this type of question that we seek to answer in the current study.

The aim of the current study is to explore the psychological characteristics of sex doll owners, both in comparison to a control sample who do not own dolls, and in relation to any risk that they may pose in terms of sexual aggression. To our knowledge, this is the first such project examining these themes in an empirical manner. As such, we plan to run exploratory analyses to test for differences between sex doll owners and non-owners on constructs that have been identified as potentially important in previous theoretical and moralistic publications (Cassidy, 2016; Danaher, 2017b; Langcaster-James & Bentley, 2018; Puig, 2017; Shokri & Asl, 2015; Su et al., 2019; Valverde, 2012). Constructs that we specifically measured were sexual aggression proclivity, sexual objectification of women, offense-supportive cognitions (i.e., implicit theories supportive of rape), hostility towards women, aggressive paraphilias, disordered personality styles, attachment style, sexual self-esteem, and emotional reactivity. Irrespective of outcomes of these tests of between-groups differences, we also set out to test the moderating effects of potential constructs that facilitate sexual aggression (in line with Seto, 2019). In light of the exploratory nature of this project, and the lack of existing research with sex doll owners, we made no specific hypotheses at the outset of the study.

Methods

Participants

A total of 385 people clicked on the survey link through the advertisements described below (see 'Procedure' section). Of these, five did not indicate their doll ownership status. Examining doll ownership status, 22 individuals suggested that they exclusively owned child-like sex dolls. Owing to this small subsample size and anticipating a lack of power in planned analyses, we did not include these participants in any analyses, and instead focused only on owners with adult-like dolls. This also meant that we excluded 11 participants who self-declared exclusive sexual interest in children (operationalized as declaring no adult attraction,

or an age-of-attraction which did not span above 18 years). However, we did retain participants who suggested that they owned both child-like and adult-like dolls ($n = 21$) due to them owning at least one adult-like doll. We also excluded the small number of women who completed the survey ($n = 20$) due to the gendered nature of sex doll ownership, the claims made in previous theorizing about doll owners, and the subsequent framing of our measures. We then explored the qualitative responses to the free text boxes contained within the survey and excluded one person for apparent insincere responding (i.e., declaring ownership of 300 dolls for the function of "food"). A further 32 participants did not provide any sexual aggression proclivity data (our key outcome variable, see below) and were subsequently excluded from the dataset.

These exclusions left a final sample of 293 male participants. Of these, 158 were sex doll owners ($M_{age} = 38.00$ years, $SD = 12.47$) and 135 were non-owner controls ($M_{age} = 34.23$ years, $SD = 12.70$).

Materials

Demographics. We asked participants to provide information about their sex, age, educational level (years completed), sexual orientation, and relationship status. Demographic information for each sample is presented in Table 1.

Table 1. Participant demographics by group

	Doll owners ($n = 158$)	Controls ($n = 135$)
Age (in years)	38.00 ± 12.47	34.23 ± 12.70
Education (in years)	14.35 ± 4.99	14.70 ± 5.07
Location		
United Kingdom	33 (20.9%)	85 (62.9%)
United States	87 (55.1%)	22 (16.3%)
Canada	6 (3.8%)	6 (4.4%)
European Union	22 (13.2%)	7 (5.1%)
Other / unspecified	10 (7.0%)	15 (11.3%)
Sexual orientation		
Gynephilic	130 (82.3%)	104 (77.0%)
Androphilic	3 (1.9%)	16 (11.9%)
Both	25 (15.8%)	15 (11.1%)
Relationship status		
Single	88 (55.7%)	45 (33.3%)
Married	25 (15.8%)	39 (28.9%)
In a relationship (unmarried)	12 (7.6%)	46 (34.1%)
Separated / divorced	32 (20.3%)	4 (3%)
Widowed	1 (0.6%)	0 (0.0%)
Partnered sex (times per month)	2.59 ± 5.93	4.49 ± 6.41
Number of dolls	3.32 ± 9.72	-
Function of doll		
Sexual gratification	7.57 ± 2.90	-
Company / companionship	5.26 ± 3.52	-
Other	4.32 ± 3.93	-
Sex with doll (times per month)	11.17 ± 12.33	-

Doll Ownership Questions. Aside from asking about doll owning status (yes/no), we asked about how many dolls owners had. We also enquired about the function of participants' doll ownership by asking participants to rate sexual reasons (e.g., sexual gratification), emotional reasons (e.g., a surrogate relationship or companionship), and other reasons (for which participants were asked to specify their motivations) using a 1-10 scale (high scores indicating greater motivations on each respective index). We also asked participants how many times (on average) they engage in sexual activity with their doll(s). If participants suggested that they did not own a sex doll, we asked about their level of interest in doing so using a ten-point scale (high scores indicating greater interest).

Sexual Aggression Proclivity. We used an adapted version of Bohner et al.'s (1998) rape proclivity measure to tap into a construct of sexual aggression proclivity. In the original measure, five rape scenarios are presented to participants, who are asked to place themselves in the position of the perpetrator. After reading each scenario, participants are asked to rate how aroused they would be, whether they would behave in the same way, and how enjoyable the situation would be using seven-point scales (where high scores indicate greater levels of arousal, enjoyment, and behavioral propensity). We adapted this measure by writing scenarios that not only depict rape, but also non-penetrative forms of sexual assault and sexual harassment. Full wording of the scenarios is available at https://osf.io/d3c6b/. We computed an average score across all 15 responses on this measure to calculate a composite score for sexual aggression proclivity (possible score range = 1-7; $\alpha = 0.93$).

Sexual Fantasies. In addition to sexual aggression proclivity, we also wanted to measure paraphilic sexual fantasies that may be associated with such aggression. To do this we used the paraphilia questionnaire created by Seto et al. (2012), using only the items related to biastophilia (two items; e.g., "You are forcing someone into sexual activity"; $\alpha = 0.85$) and sadism (six items; e.g., "You are controlling or dominating someone"; $\alpha = 0.86$) in our analyses. Each item was rated using a seven-point scale, anchored from 'very repulsive' to 'very arousing' (scored from -3 to +3). Average scores were computed for each fantasy domain, with high scores indicating a greater presence of biastophilic and sadistic sexual fantasies, respectively.

Sexual Objectification. We used the Interpersonal Sexual Objectification Scale – Perpetrator Version (Gervais et al., 2018) to measure the extent to which participants engaged

in sexual objectification. This is a 15-item measure that asks participants to rate how often in the past year they engaged in a range of behaviors (e.g., "Stared at someone's breasts/chest when you are talking to them; $\alpha = 0.86$). Each item is rated using a five-point scale anchored from 'never' to 'almost always'. An average score across all items was calculated to provide a composite measure of sexual objectification, with higher scores indicating more objectifying behaviors.

Offense-Supportive Cognition. In line with Seto's (2019) motivation-facilitation model, it may be that any potential relationship between doll ownership and sexual aggression is moderated by other facilitating factors. Theories of sexual offending cite offense-supportive cognitions in the form of implicit theories as being potential candidates for these facilitators. To measure these, we used Butler and Bartels' (2018) implicit theory measure, which was developed to examine respondents' endorsement of the implicit theory domains established in previous work (Polaschek & Gannon, 2004; Polaschek & Ward, 2002). That is, seven items for each of the five implicit theories were rated using a five-point scale, anchored from 'strongly disagree' to 'strongly agree' (scored 1-5). An average score was calculated for each implicit theory domain:

- Women as sex objects (e.g., "If a woman wears revealing clothes, she is trying to arouse men"; $\alpha = 0.81$)
- Sexual entitlement (e.g., "I am free to do what I like with a woman in the bedroom"; $\alpha = 0.50$)
- Dangerous world (e.g., "People are so unpredictable and untrustworthy"; $\alpha = 0.83$)
- Women as unknowable (e.g., "Most women cannot be trusted"; $\alpha = 0.84$)
- Uncontrollability of the male sex drive (e.g., "The male sex drive can turn a good man bad"; $\alpha = 0.88$)

Hostility Towards Women. Participants responded to the ten-item Hostility Toward Women scale (Lonsway & Fitzgerald, 1995). Each item (e.g., "Sometimes women bother me by just being around") was responded to using a seven-point scale anchored from 'strongly disagree' to 'strongly agree' (scored 1-7). Responses to each item were averaged to create a

composite score for 'hostility towards women', with higher scores indicating more hostility ($\alpha = 0.92$).

Personality Styles Inventory. We used Hain et al.'s (2016) Personality Styles Inventory to measure traits that are associated with disordered personality traits. This is a 36-item scale within which each item is rated using a four-point scale, ranging from 'does not apply at all' to 'fully applies' (scored 1-4). An average score was calculated for each personality style. The personality styles that were measured were:

- Schizotypal (e.g., "I often have sudden inspirations"; $\alpha = 0.77$)
- Borderline (e.g., "My feelings often change abruptly and impulsively"; $\alpha = 0.84$)
- Narcissistic (e.g., "Being the center of attention really appeals to me"; $\alpha = 0.65$)
- Avoidant (e.g., "Criticism hurts me quicker than it does others"; $\alpha = 0.64$)
- Obsessive-compulsive (e.g., "Even under time pressure, I cannot stop being thorough"; $\alpha = 0.71$)
- Antisocial (e.g., "I prefer to attack, rather than letting others attack me"; $\alpha = 0.82$)

Dark Triad Personality Traits. The Short Dark Triad Scale (Jones & Paulhus, 2014) was used to measure 'dark triad' traits of Machiavellianism (e.g., "Most people can be manipulated"; $\alpha = 0.81$), narcissism (e.g., "People see me as a natural leader"; $\alpha = 0.74$), and psychopathy (e.g., "Payback needs to be quick and nasty"; $\alpha = 0.76$). There were nine-items per trait in this measure, all of which were responded to using a five-point scale ranging from 'strongly disagree' to 'strongly agree' (scored 1-5). An average score was calculated for each of the three subscales, with higher scores indicating an exaggerated presence of each trait.

Emotional Functioning. We used the Emotional Regulation Questionnaire (Gross & John, 2003) to measure participants' propensities for emotional reappraisal (e.g., "When I want to feel less negative emotion, I change the way I'm thinking about the situation"; $\alpha = 0.86$) and emotional suppression (e.g., "When I am feeling negative emotions, I make sure not to express them"; $\alpha = 0.67$). Each subscale was comprised of five items, rated on a seven-point scale anchored from 'strongly disagree' to 'strongly agree' (scored 1-7). An average

score for each emotion regulation strategy was computed, with higher scores indicating a greater use of each strategy.

We also asked participants to respond to the 20-item Positive and Negative Affect Scale (PANAS; Watson et al., 1988). This measure contains a list of emotions and asks participants to state how often they have experienced each of these within the past seven days. There were ten positive items (e.g., excited, strong, proud; $\alpha = 0.88$) and ten negative items (e.g., upset, guilty, ashamed; $\alpha = 0.86$). Each item was rated using a seven-point scale ranging from 'very slightly or not at all' to 'extremely' (scored 1-7). An average score was calculated separately for positive and negative feelings, with higher scores indicating a greater presence of each.

We also measured sexual self-esteem using this subscale of Snell and Papini's (1989) measure of sexuality. This subscale is comprised of ten items (e.g., "I am a good sexual partner"; $\alpha = .93$) scored using a five-point scale anchored from 'disagree' to 'agree' (scored 1-5). An average score was computed with higher values indicating greater levels of sexual self-esteem.

Attachment Styles. The State Adult Attachment Measure (Gillath et al., 2009) was used to examine attachment styles. This is a 21-item scale that measures the extent to which respondents exhibit traits associated with a secure attachment style (e.g., "I feel like I have someone to rely on"; $\alpha = 0.91$), an insecure-anxious attachment style (e.g., "I wish someone would tell me they really love me"; $\alpha = 0.86$), and an insecure-avoidant attachment style (e.g., "The idea of being emotionally close to someone makes me nervous"; $\alpha = 0.83$). There were seven items per attachment style, which were each rated using a seven-point scale anchored from 'disagree strongly' to 'agree strongly' (scored 1-7). An average score for each attachment style was computed, with higher scores indicating a greater presence of each style.

Procedure

Sex doll owners were invited to take part through advertisements placed on prominent online discussion forums[1] for doll owners and individuals with niche/fetishized sexual interests. Advertisements stated the aims of the survey, which was framed as a direct examination of the accuracy of social beliefs and perceptions about sex doll ownership.

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[1] To preserve participant anonymity, we have decided to refrain from explicitly naming the online forums used for data collection.

Those who were interested in taking part in the survey clicked on the link, which presented the information sheet for the study. Participants then affirmed their consent, before providing demographic information and answering questions about their doll ownership. Based on their response to the 'age' of their doll, owners then received either the sexual aggression proclivity scale (for owners of adult-like dolls), an interest in child molestation scale (for owners of child-like dolls), or both proclivity measures (for owners of both types of dolls)[2]. Following this, all other questionnaires were presented in a random order. The debrief information contained all information about the measures used in the study and provided links to help and support for people experiencing emotional wellbeing issues, or troubling thoughts about their sexuality and sexual interests.

The control sample of non-owners went through the same procedure, save for being recruited through the crowdsourcing platform *Prolific*. These participants responded to a survey task exploring psychological predictors of sexuality and sexual behavior. Doll owners were not compensated for their time, while participants in the control sample received £2.40 (approximately $3 at the time of data collection) in line with website reimbursement guidelines. This procedure was approved by the Nottingham Trent University School of Social Sciences Research Ethics Committee prior to data collection and followed the guidelines of the British Psychological Society code of ethics.

Results

We retained all previously reported participants, irrespective of the extent to which they completed the entirety of the survey[3]. To maintain clarity in the paper, the sample sizes for all completed measures, broken down by group, are provided in the statistical output files at https://osf.io/d3c6b/.

Between-Groups Analyses

To establish whether any differences existed between sex doll owners and non-owning controls, we ran a series of independent-groups *t*-tests to compare scores on each of our measured variables. Descriptive and inferential statistics can be found in Table 2.

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[2] Due to the small subsample of participants who owned child-like sex dolls, we only report data pertaining to the sexual aggression proclivity scale in this paper.
[3] This was consistent with our ethical approval and the informed consent procedure, whereby study withdrawal followed a specific process of contacting the research team and quoting a unique participant code.

Table 2. Average scores on measured variables, by doll ownership group

	Doll owner?		
	Yes	**No**	**Inferential test**
Sexual aggression			
Proclivity	1.74 (1.12)	1.82 (0.82)	$t(291) = 0.69$, $p = .492$, $d = 0.08$
Biastophilic fantasies	-1.98 (1.58)	-2.13 (1.34)	$t(245) = 1.09$, $p = .278$, $d = 0.10$
Sadistic fantasies	-1.28 (1.29)	-1.10 (1.34)	$t(245) = 0.79$, $p = .433$, $d = 0.13$
Offense-supportive cognition			
Hostility to women	3.21 (1.39)	3.90 (1.16)	$t(247) = 1.91$, $p = .057$, $d = 0.24$
Sexual objectification	1.79 (0.52)	1.75 (0.48)	$t(246) = 0.56$, $p = .573$, $d = 0.07$
Women as sex objects	2.12 (0.74)	1.89 (0.63)	$t(245) = 2.57$, $p = .011$, $d = 0.33$
Sexual entitlement	2.10 (0.52)	1.95 (0.42)	$t(245) = 2.56$, $p = .011$, $d = 0.33$
Dangerous world	2.58 (0.82)	2.59 (0.75)	$t(244) = 0.17$, $p = .868$, $d = 0.02$
Women are unknowable	2.88 (0.85)	2.63 (0.78)	$t(245) = 2.35$, $p = .019$, $d = 0.30$
Uncontrollable sex drive	2.10 (0.94)	2.00 (0.83)	$t(244) = 0.89$, $p = .374$, $d = 0.11$
Personality traits			
Machiavellianism	3.14 (0.72)	3.21 (0.65)	$t(242) = 0.79$, $p = .428$, $d = 0.10$
Narcissism	2.53 (0.64)	2.50 (0.63)	$t(241) = 0.42$, $p = .673$, $d = 0.05$
Psychopathy	1.99 (0.61)	2.00 (0.61)	$t(241) = 0.20$, $p = .839$, $d = 0.03$
Schizotypal	2.08 (0.66)	1.95 (0.64)	$t(243) = 1.60$, $p = .112$, $d = 0.21$
Borderline	2.06 (0.67)	2.32 (0.83)	$t(243) = 2.71$, $p = .007$, $d = 0.42$
Narcissistic	2.17 (0.60)	2.16 (0.56)	$t(244) = 0.25$, $p = .800$, $d = 0.03$
Avoidant	2.26 (0.62)	2.32 (0.58)	$t(243) = 0.91$, $p = .366$, $d = 0.12$
Obsessive-compulsive	2.82 (0.54)	2.68 (0.59)	$t(243) = 1.95$, $p = .053$, $d = 0.25$
Antisocial	1.89 (0.68)	2.00 (0.67)	$t(243) = 0.97$, $p = .333$, $d = 0.13$
Emotion			
Positive affect	3.14 (0.77)	3.08 (0.77)	$t(247) = 0.60$, $p = .547$, $d = 0.08$
Negative affect	2.05 (0.70)	1.95 (0.74)	$t(246) = 1.06$, $p = .290$, $d = 0.14$
Emotion reappraisal	4.85 (1.28)	4.85 (1.10)	$t(241) = 0.02$, $p = .985$, $d < 0.01$
Emotion suppression	4.21 (1.11)	4.32 (1.10)	$t(241) = 0.79$, $p = .431$, $d = 0.10$
Sexual self-esteem	0.07 (1.14)	0.29 (0.89)	$t(243) = 1.71$, $p = .089$, $d = 0.22$
Attachment styles			
Secure	4.85 (1.29)	5.05 (1.29)	$t(247) = 1.18$, $p = .240$, $d = 0.15$
Insecure – anxious	4.23 (1.28)	4.23 (1.28)	$t(247) = 0.00$, $p > .999$, $d < 0.01$
Insecure – avoidant	3.27 (1.31)	3.13 (1.23)	$t(248) = 0.85$, $p = .395$, $d = 0.11$

Note. Data represent mean values, with standard deviations in parentheses.

As demonstrated in Table 2, there were very few differences between the two groups. Doll owners were no more or less prone to sexual aggression proclivity, sexual objectification, dark personality traits, or issues with emotion and attachment than non-owner controls. We did see some important differences, though. Sex doll owners were significantly more likely to see women as sex objects, to report greater sexual entitlement, and to see women as unknowable than non-owner controls. Doll owners also self-reported lower levels of borderline personality traits than non-owners. Despite the statistical significance of these differences, it is important to note the number of tests that were run as a part of the analysis, and that effects were modest in overall magnitude.

Predicting Group Membership

To identify predictors of sex doll ownership, we concluded our analyses by running a binary logistic regression. We entered all measured variables as predictors and used the binary 'sex doll owner' variable as the dependent variable. The regression model was statistically significant, $\chi^2(29) = 72.22$, $p < .001$, Nagelkerke's pseudo $R^2 = 0.37$. Model coefficients are presented in Table 3. The model correctly classified 74.2% of participants into either the 'doll owner' or 'control' groups and was more successful when classifying control participants (78.3%) than sex doll owners (69.3%).

Table 3. Binary logistic regression predicting sex doll ownership categorization

	B	SE	p	OR	95% CI for *OR* Lower	Upper
Age	0.02	0.02	.167	1.02	0.99	1.05
Education	-0.05	0.04	.209	0.96	0.89	1.03
Sexual aggression proclivity	**-0.76**	**0.27**	**.005**	**0.47**	**0.27**	**0.80**
Biastophilic fantasies	**0.36**	**0.18**	**.046**	**1.43**	**1.01**	**2.04**
Sadistic fantasies	-0.08	0.19	.662	0.92	0.64	1.33
Hostility towards women	-0.42	0.27	.123	0.66	0.39	1.12
Sexual objectification	-0.03	0.45	.957	0.98	0.40	2.38
Women as sex objects	0.26	0.39	.515	1.29	0.60	2.78
Sexual entitlement	0.51	0.55	.351	1.67	0.57	4.92
Dangerous world	-0.16	0.37	.663	0.85	0.41	1.75
Women are unknowable	**0.93**	**0.38**	**.014**	**2.52**	**1.21**	**5.28**
Uncontrollable sex drive	-0.07	0.27	.784	0.93	0.55	1.58
Machiavellianism	-0.82	0.43	.057	0.44	0.19	1.03
Narcissism	-0.26	0.46	.578	0.78	0.32	1.90
Psychopathy	0.36	0.44	.413	1.44	0.60	3.43
Schizotypal personality	0.42	0.31	.175	1.52	0.83	2.78
Borderline personality	**-1.35**	**0.39**	**< .001**	**0.26**	**0.12**	**0.55**
Narcissistic personality	0.32	0.43	.457	1.37	0.60	3.16
Avoidant personality	0.02	0.41	.963	1.02	0.46	2.27
Obsessive-compulsive personality	0.70	0.37	.059	2.02	0.97	4.19
Antisocial personality	-0.14	0.36	.697	0.87	0.43	1.76
Positive affect	.08	0.28	.777	1.08	0.63	1.88
Negative affect	**0.68**	**0.33**	**.042**	**1.97**	**1.02**	**3.78**
Emotion reappraisal	0.09	0.17	.590	1.10	0.79	1.52
Emotion suppression	-0.07	0.21	.732	0.93	0.61	1.41
Sexual self-esteem	**-0.54**	**0.22**	**.012**	**0.58**	**0.38**	**0.89**
Secure attachment	**-0.35**	**0.16**	**.030**	**0.71**	**0.52**	**0.97**
Insecure – anxious attachment	-0.01	0.14	.927	0.99	0.75	1.31
Insecure – avoidant attachment	0.19	0.18	.291	1.21	0.85	1.74
Constant	1.13	2.33	.628	3.09		

Note. Outcome coded as 0=control, 1=doll owner. The column '*OR*' represents the odds-ratio of being a sex doll owner. *OR*s where the 95% confidence interval does not include 1.00 are significant. Statistically significant predictors of group membership are presented in bold typeface.

Within this model there were relatively few predictors of doll ownership status at the coefficient level. However, those variables that do seem to distinguish between owners and non-owners seem to paint the picture of an emerging profile of doll ownership. That is, the combination of doll ownership being predicted by higher levels of biastophilic (coercive sex) fantasies ($OR = 1.43$, $p = .046$) but lower behavioral proclivities for sexual aggression ($OR = 0.47$, $p = .005$) may be indicative of doll ownership having a cathartic effect on coercive sexual fantasies when they are present. From a relational perspective, viewing women as unknowable ($OR = 2.52$, $p = .014$) and having lower levels of both sexual self-esteem ($OR = 0.58$, $p = .012$) and secure attachment ($OR = 0.71$, $p = .030$) were all predictive of being a doll owner. This potentially suggests that dolls can act as a surrogate for relationships with living people due to doll owners' concerns about their own sexual performance, or a lack of understanding of the opposite sex. From an emotional perspective, doll owners were more likely to have higher levels of negative affect ($OR = 1.97$, $p = .042$), but less likely to express borderline personality traits ($OR = 0.26$, $p < .001$). Examining the items that measure each of these constructs, this combination may indicate that although sex doll owners may experience lower mood (in the form of negative affect), their emotional condition is more stable than non-owner controls.

Potential Moderators of Sexual Aggression Proclivity

As a direct test of the applicability of Seto's (2019) motivation-facilitation model, we ran a series of exploratory moderated regression analyses. These were conducted using Hayes' (2018) PROCESS macro for SPSS, running Model 1, which tests for a simple moderation of the relationship between a focal predictor (*X*) on an outcome (*Y*) by a third variable (*W*). Here, we tested whether sex doll ownership was associated with sexual aggression proclivity at different levels (-1 *SD, M, +1 SD*) of each of our measured variables. All predictors were mean-centered within the analyses by the PROCESS macro.

All models were statistically significant, but only three models produced a significant interaction between doll ownership status and the moderator. For clarity within this paper, we only report these below, but the output files for all analyses are available at https://osf.io/d3c6b/. The model coefficients for each of the three models with a significant interaction are presented in Table 4. As per Hayes' (2018) instructions, all *b*-values are unstandardized.

**Table 4.** Significant interactions for moderated regression analyses

Variable	b (SE)	t	p	95% CI (b)
Moderator: Sexual objectification				
Doll ownership	0.19 (0.05)	1.94	.054	[-0.00, 0.37]
Objectification	0.81 (0.10)	8.42	< .001	[0.62, 1.00]
Ownership × Objectification	-0.92 (0.19)	-4.81	< .001	[-1.30, -0.54]
Moderator: Dangerous world implicit theory				
Doll ownership	0.12 (0.11)	1.27	.261	[-0.09, 0.34]
Dangerous world	0.33 (0.07)	4.77	< .001	[0.20, 0.47]
Ownership × Dangerous world	-0.29 (0.14)	-2.09	.038	[-0.57, -0.02]
Moderator: Uncontrollable sex drive implicit theory				
Doll ownership	0.17 (0.10)	1.65	.100	[-0.03 0.37]
Uncontrollable sex drive	0.41 (0.06)	6.93	< .001	[0.29, 0.53]
Ownership × Uncontrollable sex drive	-0.28 (0.12)	-2.36	.019	[-0.51, -0.05]

Note. Doll ownership coded in these analyses as 1=Yes, 2=No. All predictors were mean-centered.

The model including sexual objectification as a moderator was statistically significant and explained 30% of the variance in sexual aggression proclivity, $F(3, 244) = 34.93$, $p <$ .001, $R^2 = .300$. Within the model, sex doll ownership was not significantly associated with sexual aggression proclivity, $b = 0.19$ [95% CI: -0.00, 0.37], $p = .054$. However, higher levels of sexual objectification were associated with an increased proclivity for sexual aggression, $b = 0.81$ [95% CI: 0.62, 1.00], $p < .001$. There was a significant interaction between doll ownership and sexual objectification, $b = -0.92$ [95% CI: -1.30, -0.54], $p < .001$. This interaction is depicted in Figure 1.

At lower levels of sexual objectification there was a significant effect of doll ownership on sexual aggression proclivity, $b = .65$ [95% CI: 0.38, 0.91], $t(247) = 4.77$, $p < .001$. Here, sex doll ownership was associated with lower levels of sexual aggression proclivity. At mean levels of sexual objectification there was no effect of doll ownership on sexual aggression proclivity, $b = 0.19$ [95% CI: -0.00, 0.37], $t(247) = 1.94$, $p = .054$. However, at high levels of sexual objectification, doll owners demonstrated a slightly higher proclivity towards sexual aggression than non-owners, $b = -0.27$ [95% CI: -0.54, -0.01], $t(247) = -2.03$, $p = .043$.

Figure 1. Associations between sex doll ownership and sexual aggression proclivity, by sexual objectification level
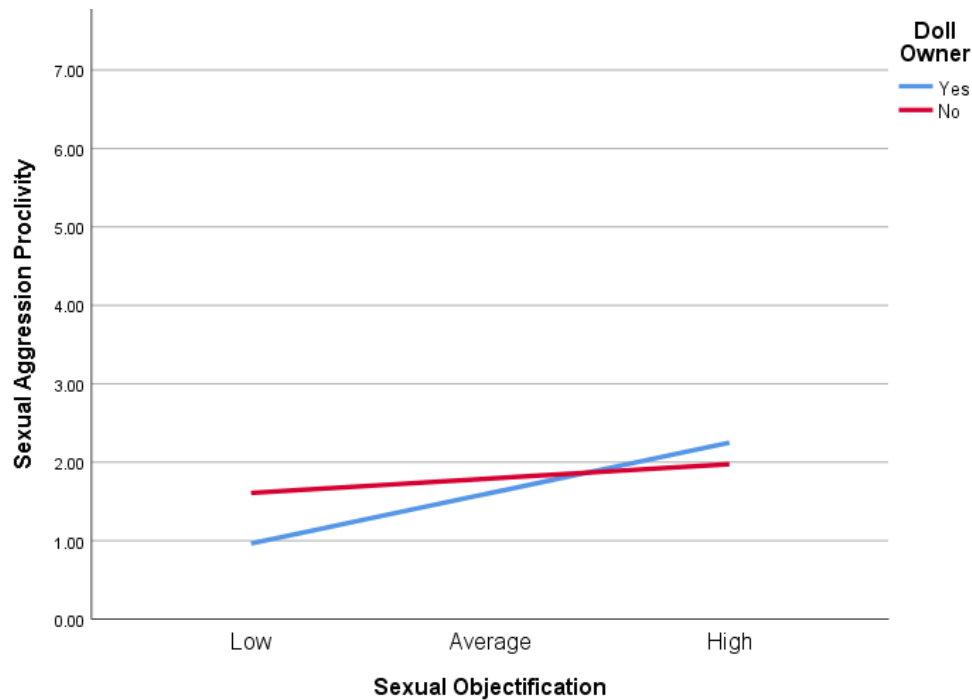
The model that included the dangerous world implicit theory as a moderator was statistically significant and explained approximately 11% of the variance in sexual aggression proclivity, $F(3, 242) = 10.07$, $p < .001$, $R^2 = .111$. Within the model, sex doll ownership was not significantly associated with sexual aggression proclivity, $b = 0.12$ [95% CI: -0.09, 0.34], $p = .261$. However, holding an implicit theory about the world being dangerous was associated with a greater tendency to self-report a proclivity for sexual aggression, $b = 0.33$ [95% CI: 0.20, 0.47], $p < .001$. There was a significant interaction between doll ownership and dangerous world implicit theory endorsement, $b = -0.29$ [95% CI: -0.57, -0.02], $p = .038$. This is depicted in Figure 2.

Breaking down this interaction, there is a significant effect of sex doll ownership on sexual aggression proclivity at low levels of the dangerous world implicit theory, $b = .35$ [95% CI: 0.05, 0.65], $t(245) = 2.28$, $p = .024$. Here, sex doll ownership was associated with lower levels of sexual aggression proclivity. At mean levels of dangerous world implicit theory endorsement there was no effect of doll ownership on sexual aggression proclivity, $b = 0.12$ [95% CI: -0.09, 0.34], $t(245) = 1.13$, $p = .261$. This was also the case among those endorsing the dangerous world implicit theory to the greatest degree, $b = -0.11$ [95% CI: -0.41, 0.20], $t(245) = -0.68$, $p = .495$.

Figure 2. Associations between sex doll ownership and sexual aggression proclivity, by dangerous world implicit theory level
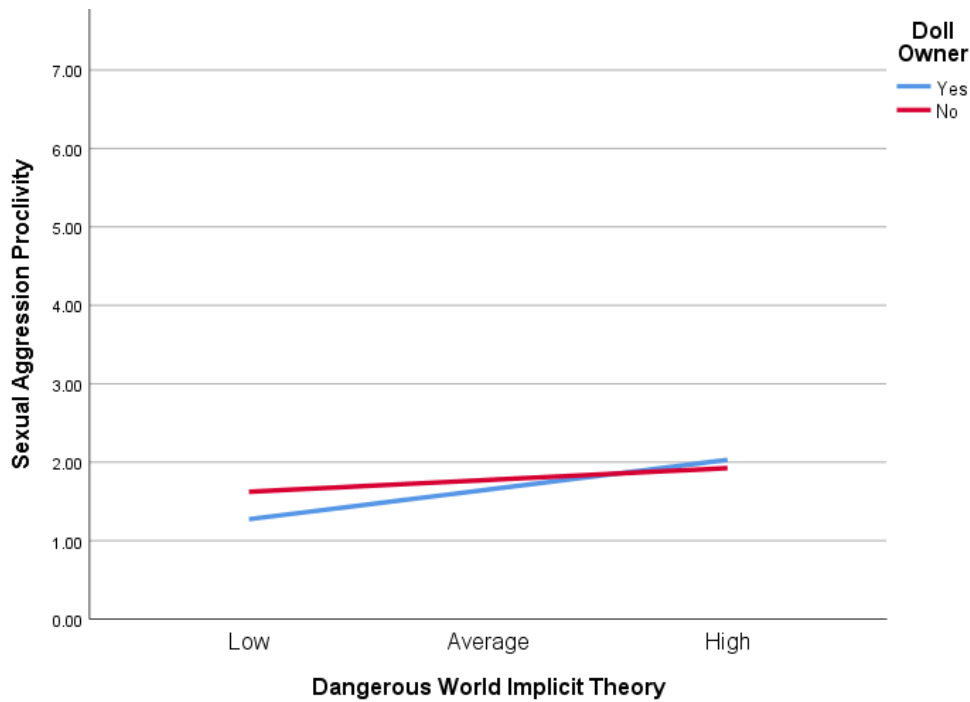
The model that included the uncontrollable sex drive implicit theory as a moderator was a statistically significant and explained 20% of the variance in sexual aggression proclivity, $F(3, 242) = 20.11$, $p < .001$, $R^2 = .200$. Within this model, sex doll ownership was unrelated to sexual aggression proclivity, $b = 0.17$ [95% CI: -0.03, 0.37], $p = .100$. However, endorsing an implicit theory about the male sex drive being uncontrollable was related to enhanced self-reported sexual aggression proclivity, $b = 0.41$ [95% CI: 0.29, 0.53], $p < .001$. There was a significant interaction between doll ownership and uncontrollable sex drive implicit theory endorsement, $b = -0.28$ [95% CI: -0.51, -0.05], $p = .019$. The interaction is shown in Figure 3.

At low levels of the uncontrollable sex drive implicit theory there was a significant effect of sex doll ownership on sexual aggression proclivity at low levels of the dangerous world implicit theory, $b = .42$ [95% CI: 0.13, 0.70], $t(245) = 2.84$, $p = .005$. Here, sex doll ownership was associated with lower levels of sexual aggression proclivity. At mean levels of seeing the male sex drive as uncontrollable there was no effect of sex doll ownership on sexual aggression proclivity, $b = 0.17$ [95% CI: -0.03, 0.37], $t(245) = 1.65$, $p = .100$. This was also the case among those who scored high in terms of their view about the male sex drive being uncontrollable, $b = -0.08$ [95% CI: -0.36, 0.21], $t(245) = -0.51$, $p = .611$.

Figure 3. Associations between sex doll ownership and sexual aggression proclivity, by uncontrollable sex drive implicit theory level
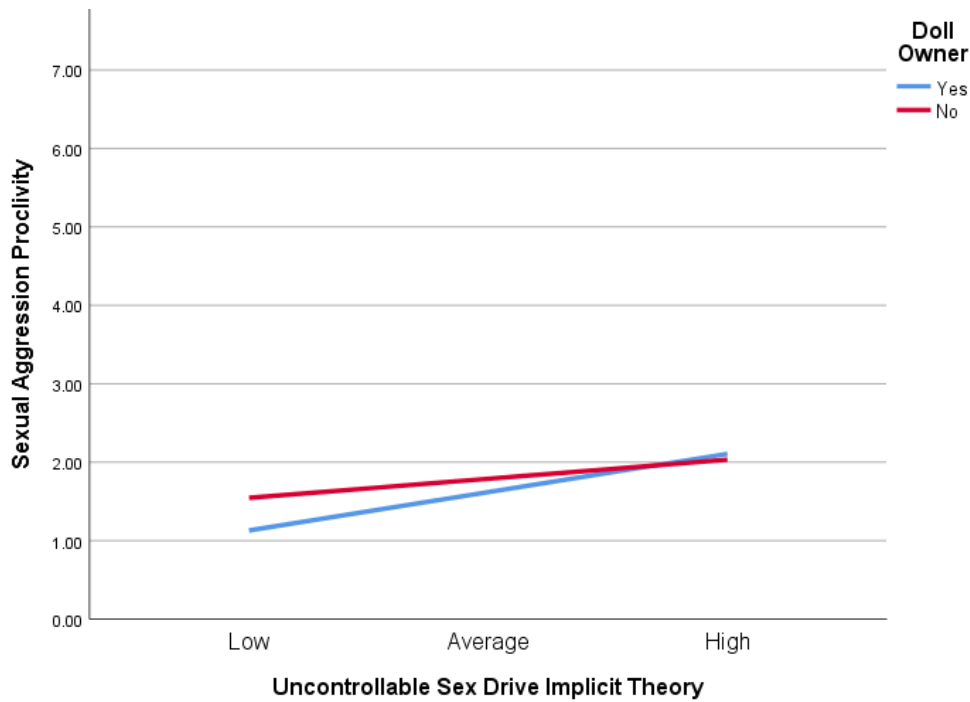
Discussion

In this work we have presented the first systematic psychological examination of sex doll owners by comparing their psychological characteristics to a convenience control sample and exploring any potential links between sex doll ownership and a proclivity for sexual aggression. Although we found very few differences between doll owners and the control sample, a small number of variables did appear to statistically distinguish the two groups. Lower affect (i.e., more negative emotion) was a distinguishing feature of doll owners, although their emotional states were more stable than controls (exemplified via their lower propensity to endorse having borderline personality traits). Sex doll owners were more likely than controls to have lower levels of sexual self-esteem, and less likely to demonstrate a secure attachment style. They were also more likely than controls to endorse the 'women are unknowable' implicit theory.

In relation to sexual aggression proclivity, those who owned sex dolls were more likely than controls to endorse having biastophilia-related sexual fantasies (i.e., sexual fantasies that involve themes of coercion and sexual violence) but were less likely to suggest a behavioral propensity to acting on these. In a test of Seto's (2019) motivation-facilitation model, we found that doll ownership (as a proposed motivator) was not related to sexual aggression

proclivity. In fact, sex doll ownership emerges as a potentially protective factor when owners possess low levels of various moderating psychological traits, including sexual objectification and implicit theories about the world being dangerous and the male sex drive being uncontrollable. At high levels of these traits (where sexual aggression proclivity may be at a higher level) we found no differences between doll owners and controls.

Our data are potentially indicative of an emergent profile of sex doll ownership that might serve to inform a more reasoned and evidence-informed social discussion of this issue. Far from being dangerous individuals at a potentially high risk for sexual offending and objectification, as has been suggested in theoretical sociological and legal work (Carvalho Nascimento et al., 2018; Danaher, 2017b, 2017a; Kubes, 2019; Lancaster, 2021; Puig, 2017; Shokri & Asl, 2015), the data paint a perhaps more vulnerable picture. Lower mood that is experienced in a chronic manner may be a driver for avoiding interpersonal relationships. Although the social stigma about doll ownership is likely to compound this (Harper & Lievesley, 2020), the idea that negative affect might be a precursor to doll ownership and withdrawal from the mating market appears to be supported within our dataset. For example, lower sexual self-esteem, less secure attachment, and viewing women as unknowable indicate potential interpersonal deficits that lead to poorer quality intimate relationships. Indeed, participants in our doll owner sample were less likely to be in a relationship and more likely to have a history of broken relationships than our non-owner control sample. Although not a variable that significantly distinguished our samples, between-groups analyses also suggest a difference in levels of sexual entitlement, with doll owners scoring slightly higher on this index than controls. This could again be related to breakdowns or avoidance of intimate personal relationships and an uncertainty about managing sexual politics and conflicts within relationships (Buss, 2021).

These data are also at-odds with the arguments presented by legal scholars who call for the criminalization of sex dolls or robots on the grounds that they potentially lead to an increase in sexual offending risk (Carvalho Nascimento et al., 2018; Danaher, 2017b, 2017a; Eskens, 2017; Puig, 2017). On the contrary, these data are indicative of a potentially attenuating effect of doll ownership on offending proclivity, with doll owners being more likely to endorse biastophilic sexual fantasies, but less likely to express a behavioral willingness to engage in sexual aggression. Of course, our results are correlational and so causation cannot be suggested. However, any causal hypotheses stemming from our work would preclude the possibility of a direct effect of doll ownership due to the direction of the correlations between doll ownership and sexual aggression proclivity within our data.

Within Seto's (2019) motivation-facilitation model, the effect of a motivating construct (here, sex doll ownership) on sexual aggression proclivity will only be present when accompanied by offense facilitators. In our data, we found the relationship between doll ownership and sexual aggression proclivity to be moderated by three facilitating constructs: sexual objectification, the dangerous world implicit theory, and the uncontrollable sex drive implicit theory. In each of these cases, higher scores on each of these moderating variables strengthened the positive relationship between doll ownership and aggression proclivity, consistent with Seto's (2019) model. However, there is an important caveat to this point. At high levels of these moderators (operationalized as +1 *SD* and above of the sample mean) there were no differences between doll owners and controls in their self-reported proclivities for sexual aggression. However, at low levels (operationalized as -1 *SD* and below of the sample mean) doll owners were significantly less likely to express a proclivity for sexual aggression. This was most starkly the case when sexual objectification was the moderating variable. With this, we can conclude that the significant gradient for doll ownership (which at face value appears to suggest a rising risk associated with doll ownership) is actually attributable to *lower* risk among doll owners who score low on these moderators. Another way of phrasing this would be to conclude that doll ownership does not exaggerate previously reported relationships between sexual objectification and offense-supportive cognition on the one hand, and a proclivity for sexual aggression on the other (Polaschek & Gannon, 2004; Polaschek & Ward, 2002; Samji & Vasquez, 2020).

Limitations and Future Directions

A key limitation of this work is the reliance on self-report methodologies, particularly in relation to contentious topics such as sexual objectification, sexual aggression proclivity, and implicit beliefs that might be supportive of sexual offending. Although we guaranteed anonymity by not tracking IP addresses or collecting any identifiable information, it is possible that participants responded in socially desirable ways to avoid increased perceptions of risk. This is particularly the case among the doll owning sample, who come at the research from a place of pre-existing stigmatization and societal suspicion about their risk level. Future work might look to incorporate more indirect assessments of such constructs, such as implicit association tests built into online surveys (Carpenter et al., 2019), or direct behavioral observations within laboratory settings.

The data collected are cross-sectional and correlational in nature, meaning that causality is difficult to prove. Although we have made arguments within this paper about the

ordering of psychological states in relation to sex doll ownership (e.g., when viewing negative affect as a precursor to ownership), these inferences cannot be conclusively supported by the data. Indeed, it might be that the societal stigma about sex doll ownership causes negative affect to increase among doll owners after they purchase a doll. The directional nature of these relationships can only be fully established in prospective longitudinal designs, and as such future research should look to explore this as a possibility. One approach might be for researchers to partner with doll manufacturers or vendors to capture baseline data at the time a new owner purchases a doll, and to then follow-up these customers at regular time points to track change over time. This kind of naturalistic creation of an experimental condition may also be more feasible in the context of increasingly risk-averse ethical review committees in sex research, where the randomization of non-owning participants into a 'doll owner' condition may lead to concerns about potential future risks. It may also be useful to explore the qualitative accounts of doll owners' experiences in an explanatory manner to deepen our understanding of what our decontextualized quantitative data might be reflecting.

Although we sampled sex doll owners in a broad sense, we did not target any particular subgroup based on the function or circumstances of their doll ownership. Previous qualitative work has reported many motivations for owning a sex doll, including sexual gratification, physical or emotional intimacy, and medical treatment (Eichenberg et al., 2019; Fosch-Villaronga & Poulsen, 2020; Langcaster-James & Bentley, 2018; Morgan, 2009; Valverde, 2012). It might be that those owning a doll specifically for sexual gratification (vs. emotional companionship or health reasons) have a different psychological profile, but our sample is not large enough to conduct such an analysis. Future research might look to explore this further by recruiting doll owners from different places, such as health settings, to look at this potentially moderating effect.

In this study we only focused on those who own adult-like dolls due to the limited sample size for those whose dolls resemble children. Although we could have presented a comparison of the small number of child-like doll owners ($n < 25$) any analyses would have been substantially underpowered. As such, targeted work continues to increase this number for comparative work to be undertaken in relation to this population. This is of particular importance, though, when considering that a large proportion of the existing theoretical literature targets child-like doll ownership for particular stigmatization (Brown & Shelling, 2019; Chatterjee, 2020; Danaher, 2017b, 2019b; Rutkin, 2016; Strikwerda, 2017). None of

the conclusions drawn from the current study should be applied to this broader social discussion about the legal or moral status of child-like sex doll ownership.

To conclude, this first psychological investigation of sex doll owners appears to support the view that doll ownership is a functional response to a history of poor quality or broken relationships, which in turn are possibly attributable to various beliefs about the unknowability of potential sex partners, less secure attachment styles, and poorer than average levels of sexual self-esteem. Contrary to sociological and legal arguments about the increased risk of sexual aggression, we found no evidence of an increased risk of sexual aggression among sex doll owners despite their statistically higher level of self-reported biastophilic fantasizing. In sum, we hope that our data can advance a more evidence-informed social conversation about sex doll ownership, shifting the focus away from blanket criminalization and stigmatization and towards a functional analysis of how, why, and under what conditions dolls are incorporated into healthy sexual expression.

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