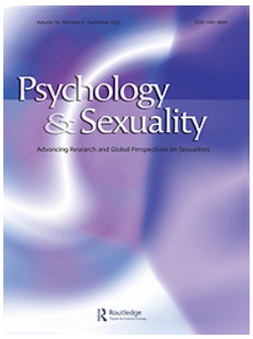

Psychology & Sexuality

ISSN: 1941-9899 (Print) 1941-9902 (Online) Journal homepage: www.tandfonline.com/journals/rpse20

Development and validation of a measure of attitudes towards sex doll ownership

Craig A. Harper, Rebecca Lievesley, Ellie Woodward, Roanna Wilson, Lauren Stubbs, Chloe Boneham & Elysia Norton-Clarke

To cite this article: Craig A. Harper, Rebecca Lievesley, Ellie Woodward, Roanna Wilson, Lauren Stubbs, Chloe Boneham & Elysia Norton-Clarke (2025) Development and validation of a measure of attitudes towards sex doll ownership, Psychology & Sexuality, 16:4, 1151-1190, DOI: 10.1080/19419899.2025.2506717

To link to this article: https://doi.org/10.1080/19419899.2025.2506717

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Published online: 14 Jul 2025.

Submit your article to this journal

Article views: 1061

View related articles

View Crossmark data

This article has been awarded the Centre for Open Science 'Open Data' badge.

This article has been awarded the Centre for Open Science 'Open Materials' badge.

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=rpse20

PSYCHOLOGY & SEXUALITY
2025, VOL. 16, NO. 4, 1151–1190
https://doi.org/10.1080/19419899.2025.2506717

Routledge
Taylor & Francis Group

OPEN ACCESS Check for updates

Development and validation of a measure of attitudes towards sex doll ownership

Craig A. Harper, Rebecca Lievesley, Ellie Woodward, Roanna Wilson, Lauren Stubbs, Chloe Boneham and Elysia Norton-Clarke

NTU Psychology, School of Social Sciences, Nottingham Trent University, Nottingham, UK

ABSTRACT

Sex dolls are beginning to become more mainstream, both in the public's consciousness and in academic research. However, there is no current systematic examination of public attitudes towards sex dolls within the peer-reviewed literature, which represents a barrier to the efficient study of this topic. In this paper, we report the development and validation of such a measure. Using an international public sample, we found that Sex Doll Ownership Attitudes Scale (SDOAS) was underpinned by three factors: 'Acceptability of Doll Ownership', 'Doll Owners as Immoral', and 'Doll Owners as Dysfunctional' (Study 1; $N = 377$). Scores on each of these factors were predicted by participant sex, religiosity, permissive sexual attitudes, right-wing authoritarianism, and moral intuitions that favour personal liberty. This structure was confirmed in an independent UK sample, where links to policy support related to sex doll ownership were also established (Study 2; $N = 329$). We also demonstrated how the SDOAS can be used as an outcome measure when investigating views about dolls with different appearances and functions (Study 3; $N = 292$). We argue that the SDOAS possesses strong psychometric properties, and is suitable for use in different research designs in this emerging field of study.

ARTICLE HISTORY
Received 28 January 2025
Accepted 30 April 2025

KEYWORDS
Sex dolls; public attitudes; sexuality; social policy

Introduction

Sex dolls are replicas of the human body, typically made from either silicone or thermoplastic elastomer, that are designed to produce realistic sexual experiences for owners. Materials designed to imitate the human body for sexual purposes have existed in various forms for centuries (Ferguson, 2014). With synthetic technologies constantly developing, modern sex dolls are becoming more affordable, more realistic, and more customisable than ever before (Arafat & Kar, 2021; Döring, 2020; Döring & Pöschl, 2018). This customisability has led to an increase in the global market for sex dolls, which is predicted to be worth almost $50billion by the end of the 2020s, growing by approximately 10% per year throughout the decade (Mali, 2024). The vast majority of sex doll owners are male, and own female-looking dolls (Ferguson, 2014). As a result of the predominance of this

CONTACT Craig A. Harper craigaharper19@gmail.com NTU Psychology, School of Social Sciences, Nottingham Trent University, 50 Shakespeare Street, Nottingham NG1 5FQ, UK

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (http://creativecommons.org/licenses/by-nc-nd/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

gendered nature of sex doll ownership, it is within this heteronormative context that we consider the issue in this paper.

Debates on the acceptability of ownership and the characteristics of owners are receiving increased attention in social, legal, and academic circles (Björkas & Larsson, 2021; Döring et al., 2020; Hanson, 2023; Hanson & Locatelli, 2022; Harper & Lievesley, 2020; Langcaster-James & Bentley, 2018; Maras & Shapiro, 2017). However, there is no current systematic examination of the attitudes of the public towards sex dolls within the peer-reviewed literature. In this paper we report the development and validation of a measure of such attitudes, including a commentary on the structure of these views, their personality-related correlates, and how they influence issues related to policy judgements and trust in sex doll research. We also demonstrate how attitudes differ as a function of the type (i.e. age) and function of such dolls.

Building a conceptual model of social attitudes towards sex doll ownership

Specific social views about sex dolls and their owners have not been studied within the empirical peer-reviewed literature (Harper & Lievesley, 2020), and so we must look towards the media, popular culture, and professional society reports to understand the potential foundations of prevailing opinions about doll ownership (e.g. Cheok et al., 2017). Existing publications regarding sex doll owners appear to be rather negative, highlighting numerous concerns relating to sexual aggression and offending behaviour, with those taking a less hostile approach citing the isolated and withdrawn nature of doll owners (Björkas & Larsson, 2021; Cox-George & Bewley, 2018; Danaher, 2017; Döring & Pöschl, 2018; Eskens, 2017; Strikwerda, 2017). In the sections that follow, we identify the ostensible domains of attitudes towards sex doll ownership, and identify the potential underpinnings of such viewpoints.

Domain 1: doll ownership as an indicator of sexual deviance and risk

Concerns here surround the idea that doll ownership encourages the development and rehearsal of implicit theories that are supportive of sexual aggression (Polaschek & Gannon, 2004; Polaschek & Ward, 2002), including sexual objectification and entitlement (Danaher, 2017; Eskens, 2017; Puig, 2017), which may in turn result in violent behaviours being normalised in human-human sexual interactions (Bouffard, 2010; Brown & Shelling, 2019). However, there is little evidence to suggest that there is a link between sexual aggression and sex doll ownership (for reviews, see Hanson & Locatelli, 2022; Harper & Lievesley, 2020; for data, see Desbuleux & Fuss, 2023; Harper et al., 2023). In light of this evidential vacuum, scholars are left making moralistic arguments that fail to acknowledge competing views about the potential risks and benefits associated with sex doll ownership (e.g. Brown & Shelling, 2019; Danaher, 2017; Eskens, 2017).

In many ways, the arguments linking sex doll ownership and use are contemporary framings of traditionally conservative concerns about the effects of pornography on sexual attitudes and behaviours. That is, despite a lack of meta-analytic support for the claim in either community and forensic samples (e.g. Ferguson & Hartley, 2009, 2022; Loutzenhiser et al., 2024), many authors have persisted in advocating for a link between pornography consumption and increases in sexual aggression (e.g. De Heer et al., 2021; Wright et al., 2021), and negative attitudes towards women (e.g. Wright & Bae, 2015). It is

perhaps unsurprising that these arguments span social discussions about both pornography and sex doll ownership, as such dolls might be conceptualised as a form of immersive three-dimensional pornography when considered in the context of their purest masturbatory function. The provocative and hypersexual appearance of most sex dolls and robots available on the mass market is also deemed to be controversial when looking to understand social attitudes (Oleksy & Wnuk, 2021). With a large proportion of owners reporting that sexual gratification is a key motivator for ownership (Valverde, 2012), dolls are often said to be designed to stimulate male sexual arousal and satisfy the 'male gaze' (Ponterotto, 2016; Su et al., 2019) – something else that has historically been said about mainstream pornography (Attwood, 2004).

Child-like sex dolls pose the most pressing legal and ethical issue in this area of research (Chatterjee, 2020). The importation of dolls designed to represent children has resulted in criminal prosecutions in the UK (Strikwerda, 2017), while many jurisdictions have moved to legislate bans on the ownership of such dolls (see Harper & Lievesley, 2022; Lievesley, Harper, et al., 2023). The social view that the ownership of child-like dolls acts as a gateway to child sexual abuse is reflected in various editorials and opinion pieces (Brown & Shelling, 2019; Döring & Pöschl, 2018; Maras & Shapiro, 2017). This is further reinforced by the fact that many prosecuted owners have also been found to be in possession of child sexual exploitation material (Broadhurst, 2021), though the nature of such investigations makes it difficult to establish a timeline of causes and effects. That is, it may be that some individuals own sex dolls and move on to child sexual exploitation material (the gateway hypothesis), or it may be that some individuals who use child sexual exploitation material purchase sex dolls as a means of stopping their criminal behaviour and achieving sexual satisfaction without harming real children (the prevention hypothesis; Lievesley, Harper, et al., 2023). Irrespective of the empirical status of the effects of child-like doll ownership, the association between such dolls and the stigmatised label of 'pedophilia' (Harper et al., 2018, 2022; Jahnke, 2018) may play a role in social attitudes towards sex doll ownership.

Domain 2: doll ownership as an indicator of psychological disturbance

The notion that those who own sex dolls may possess psychological dysfunction or deficiency is reflected frequently in media representations of the topic (Björkas & Larsson, 2021). That is, human owners are often depicted as being emotionally and interpersonally disadvantaged, leading to failures of 'real' relationships with human partners. In such cases, their dolls are said to become a source of sexual gratification and emotional intimacy (Döring et al., 2020; Lievesley, Reynolds, et al., 2023). These themes do appear to be accurate to some degree, with doll owners commonly reporting histories of failed relationships with human partners that causes them to retreat from the mating context (Harper et al., 2023; Lievesley, Reynolds, et al., 2023). Similarly, behavioural intentions to purchase sex dolls are higher among men who exhibit shy or reserved personality traits (Appel et al., 2019), and a fear of rejection by women is associated with enhanced ratings of robot attractiveness (Szczuka & Krämer, 2017).

The notion that sex doll ownership may represent an underlying dysfunction also emerges from discussions about their therapeutic use. For instance, Eichenberg et al. (2019) reported that around two-thirds of sex therapists see a potential role for sex dolls in

their clinical practice, particularly when working with people exhibiting sexual anxiety and psychogenic erectile dysfunction.

Domain 3: doll ownership as a sign of moral corruption

Sex dolls are often hyperfeminine and petite with symmetrical facial structures and hourglass figures (Hanson et al., 2024; Puig, 2017). It has been claimed that ownership therefore contributes towards an unrealistic standard of beauty while promoting the sexual objectification of women (Eskens, 2017; Ndonye, 2019; Shokri & Asl, 2015). Although this perspective ignores a competing view that such doll specifications might be related to evolutionarily driven consumer preferences (see e.g. Saad, 2017), it does represent the view that the availability of dolls is, in-and-of-itself, unacceptable for moral reasons. Social attitudes towards sex doll owners may be ties tied to views about the potentially misogynistic nature of the appearance of many dolls, with those who have an ideological or moral opposition to the sexualisation of the female body being more likely to express opposition to sex doll availability.

In the context of child-like sex dolls, several authors have written (notably, without data) about how the ownership of such materials represents a lack of moral virtue and that the behaviour in itself may be grounds for the kinds of registration practices that are usually reserved for those who have caused sexual harm to human victims (Danaher, 2017). In other work, Chatterjee (2020) acknowledged a lack of evidence pertaining to the objective harm caused by the ownership of child-like sex dolls, but instead invoked the concept of 'cultural harm' (p. 34), arguing that 'permitting a trade in even abstract child sex dolls and robots could be seen as sanctioning and facilitating a public atmosphere that encourages the portrayal of children as sexual objects' (p. 35).

These issues differ from those identified in relation to risk, as they occur irrespective of the actual links between doll ownership and offending behaviours. That is, the ownership of sex dolls, for some, is seen as a moral concern rather than (and separate to) a behavioural one (see e.g. Danaher, 2019; Strikwerda, 2017). This is commonly the framing applied to discussions about sex dolls by the Campaign Against Sex Robots, who are seeking to 'abolish' what they refer to as 'pornbots' within contemporary society for the 'humanity of women and girls' (CampainAgainstSexRobots.org; for a full description of the aims of this campaign, see Richardson & Odlind, 2022).

The need for a measure of attitudes towards sex doll ownership

In light of the social and legal debates surrounding sex doll ownership (Björkas & Larsson, 2021), a standardised measure of attitudes is a much-needed development if empirical research is to progress in line with such conversations (Harper & Lievesley, 2020). This is because the standardisation of the measurement of these attitudes can help us, as a field, to uniformly assess social views about sex doll ownership and avoid the temptation to frame our research questions and design our study materials in line with our a priori views and ideological positions.

Although preliminary studies have begun to suggest that gender, age, and religion may influence views towards sex doll owners (Appel et al., 2019; Eichenberg et al., 2019; Knox & Chang, 2017), more comprehensive research is needed to examine the multi-factorial nature of such attitudes in the general population. This includes going beyond

single-item indices of attitudes towards ownership, and involves an evaluation of their underlying themes and predictors. Developing an understanding of the structure and correlates of such attitudes could have real benefits in relation to public education and social messaging about doll ownership. As such, developing a valid and reliable tool for measuring social attitudes towards sex doll ownership is a vital first step in advancing this area of research.

Potential factors influencing social attitudes towards sex dolls

In beginning to think about attitudes towards sex doll ownership in a systematic way, we are guided by our knowledge of attitudes towards sexual minorities, sexual offending, and ongoing policy discussions. In doing so, we can start to see a collection of variables that may logically be associated with attitudes towards sex dolls and doll ownership.

From a personality perspective, much has been written about right-wing authoritarianism as a driver of social attitudes and preferences for paternalistic or censorious policies in the technological and sexual domains (Droubay et al., 2021; Zhai et al., 2022). Those who are more authoritarian in this regard are thus more motivated to enforce traditional social values in forceful or aggressive ways. Within the context of sex doll ownership, this may include supporting the criminalisation of dolls prior to evidence about their effects emerging, or stigmatising those who own sex dolls because of their ownership, irrespective of other information about them. On the contrary, those with a more liberal attitude towards sex generally may conceive dolls as being extensions of masturbatory activity, and therefore view them as acceptable forms of sexual self-expression. For these individuals, a 'live and let live' approach to dolls may be present, with a permissive attitude to doll ownership being expressed in the absence of evidence about harm.

The academic literature draws heavily on feminist schools of thought when describing the potential effects of sex dolls on owners' behaviour. This is particularly the case when considering theoretical links to increased levels of sexual objectification and hostility to women, as well as higher levels of sexual offence risk (for such arguments, see Brown & Shelling, 2019; Danaher, 2017; Eskens, 2017; Puig, 2017; Su et al., 2019). As such, we might expect sexist attitudes (or a rejection of these) to predict attitudes towards doll ownership, with those with lower levels of explicitly sexist views being more negative about sex dolls and their owners.

We can also draw on research into moral intuitions when thinking about attitudes towards sex doll ownership. Applying research from the literature about attitudes about people with sexual convictions (Harper & Harris, 2017), we might expect views to differ among those whose moral values vary across the moral domains of protection from harm, fairness, respect for tradition, living with purity, and individual liberty (see Graham et al., 2011; Haidt, 2013). For example, those with a greater moral concern for protecting vulnerable people from harm may be more susceptible to agreeing with arguments about the potential harms associated with dolls, while those with a greater emphasis on personal liberty may be more resistant to such ideas. Elsewhere in the model, those who place moral virtue on traditionalism or purity may be more negative about doll owners due to the transgressive nature of doll ownership, and the potentially disruptive nature of this in interpersonal and intimate relationships (Björkas & Larsson, 2021).

Conceptual and methodological approach to scale validation

In this paper we present three studies were designed to develop and validate a new measure of social attitudes towards sex doll ownership. In Study 1, we subjected an initial long list of candidate scale items to exploratory factor analysis (EFA). This study was conducted with the aim of identifying the factor structure underpinning this long list, and reducing the length of the draft scale to something that may be more usable in research contexts. We also included measures of relevant psychometrics (e.g. sexual attitudes, authoritarianism) to provide initial evidence of the construct validity of the developed measure and its factor structure.

In Study 2 we looked to confirm the identified factor structure in an independent sample to provide confidence in its veracity and replicability. We also included tasks related to judgements of a range of policy proposals and trust in academic research about the risks associated with sex doll ownership. These tasks were designed to provide evidence of the measure's concurrent validity, and to situate the scale within the context of ongoing discussions about the legal and moral status of sex dolls and their ownership.

In Study 3, we tested whether the developed scale could be used as both a standalone psychometric measure and as an outcome measure for experimental studies looking at attitudes towards people who own different types of sex doll (e.g. adult-like and child-like models). This is important when considering how attitude scales are often used in both of these ways (see, e.g. the literature on attitudes towards people with sexual convictions using the Attitudes to Sex Offenders scale; Hogue, 1993; Hogue & Harper, 2019).

Study 1: Item reduction and factor structure

To begin our development of a measure of attitudes towards sex doll ownership, in Study 1 we developed a long list of potential attitudinal items about sex dolls and their owners to subject to an exploratory factor analysis (EFA). This study was designed to identify the dimensionality of the scale. We also set out to identify whether the potential influencers of attitudes towards doll ownership identified above were present by conducting regression analyses designed to explain variance in our observed scale factors.

Methods

Participants

We set out to recruit a minimum of 300 participants to be able to confidently conduct an EFA of our draft attitudes scale, which is in line with established guidance for this analytic procedure (Tabachnick & Fidell, 2007). In total, 575 participants clicked on our survey link, which was advertised widely on various community pages on social media sites (e.g. local area pages on Facebook) and online forums related to sex and relationships (e.g. r/sex, r/love, and r/relationships on Reddit). Throughout our recruitment, we sought to make use of non-professional social networks so as to not bias the data with an excessively educated sample. That is, although we do not purport to have recruited a representative community sample, we endeavoured to recruit participants from different social groups to maximise participant diversity.

Of these 575 people, 18 did not provide informed consent and were immediately screened out of the survey, and 90 gave their informed consent but completed nothing else within the survey. We made the decision to retain as many people within the sample as possible, and retained all participants who proceeded to the page following our draft attitudes scale. In total, 86 participants provided no responses to the draft scale (i.e. they provided their demographic information and then nothing else), and four participants provided sporadic responses to draft the scale (with fewer than 50% of items responded to), indicating a lack of serious engagement with the survey. As such, these 90 participants were removed from the dataset. This left 377 participants in the sample (124 men, 246 women, 7 'other'; M_{age} = 25.39 years, SD = 9.24).

Of these 377 participants, 202 participants were in a relationship (53.6%) and 175 were not (46.4%). The majority of participants identified as heterosexual (n = 257; 68.2%) or bisexual (n = 79; 21.0%). Minorities said that they were homosexual (n = 24; 6.4%) or had another sexual orientation (n = 17; 4.5%). Politically, most participants were either 'left-wing' or 'center-left' (n = 241; 63.9%). Smaller numbers said that they were a 'centrist' (n = 86; 22.8%), or either 'center-right' or 'right-wing' (n = 50; 13.2%). Most participants were 'not at all religious' (n = 233; 61.8%). The remainder of the sample said that they were 'a little bit' (n = 80; 21.2%), 'somewhat' (n = 26; 6.9%), 'moderately' (n = 26; 6.9%), or 'very' (n = 12; 3.2%) religious.

Only 12 of our participants (3.5%) owned a sex doll at the time of data collection, while another 35 participants (10.2%) said that they would like to. The remaining 296 participants (86.3%) did not own a sex doll, nor did they express interest in doing so.

Materials

Demographics. Participants were asked to provide information about their sex (male/female/other), age (in years), location (country), relationship status (in a relationship/not in a relationship), and sexual orientation (heterosexual/homosexual/bisexual/other). We also asked participants to state their political orientation using a five-point scale anchored from 1 (left-wing) to 5 (right-wing), and their level of religiosity using a five-point scale anchored from 1 (not at all religious) to 5 (very religious). Participants also reported whether they currently owned a sex doll (yes/no but interested/no and not interested).

Sex doll ownership attitudes scale. We developed a long list of 80 potential items for our Sex Doll Ownership Attitudes Scale (SDOAS). To do this, we were guided by social discussions about sex dolls (identified in the conceptual model of attitudes discussed earlier), and the thematic content of ongoing academic work into the characteristics of doll owners and the perceived effects of doll ownership on behaviour (Desbuleux & Fuss, 2023; Hanson, 2022a; Harper et al., 2023; Lievesley, Reynolds, et al., 2023). We noted significant overlap in the ostensible underpinnings of attitudes towards sex doll owners and attitudes towards other stigmatised sexual minorities (e.g. gender-non-conforming individuals being viewed by some groups as demonstrating psychological disturbance) and individuals with sexual convictions (where concerns about sexual deviance and risk are evident). We reviewed measures related to attitudes about these to ensure that our draft SDOAS contained a comprehensive range of potential attitudinal belief statements.

At the time of writing the draft SDOAS there was no peer-reviewed literature on social attitudes towards sex doll ownership, and as such we were not aware of any researchers

who could offer an independent expert evaluation of the suitability of the items. However, the two lead authors have experience of attitudinal scale development and validation in related areas (Harper & Hogue, 2015; Hogue & Harper, 2019), and combined have more than two decades of professional experience working in allied areas of social attitudes, sexual abuse prevention, and sexual offending. The broader research team for this paper additionally provided a 'sense-check' of the draft item list, offering refinements for readability and potential missing areas of coverage. As such, despite the lack of independent evaluation process, we are confident that the draft SDOAS item list provided good coverage of the potential domains of interest. The full draft SDOAS is presented in the factor analysis reported below (see Table 1).

Each item was responded to using a six-point scale, anchored from 1 ('strongly disagree') to 6 ('strongly agree'). Six scale points were chosen to encourage participants to consider each item before answering, and to prevent them succumbing to the temptation to provide a 'neutral' response to each item. Six options also offer a greater degree of granularity than four-point alternatives, while not forcing participants to make difficult distinctions in longer eight- or ten-point scales. The presentation order of the items was randomised for each participant to reduce the likelihood of order effects influencing the data. At the beginning of the scale, no specific 'type' of doll was discussed. Instead, we defined sex dolls as 'silicone dolls that resemble the human body, and that can be functionally used to engage in penetrative sexual activity'.[1] This decision was made so as to not prime specific topics, such as that of child-like dolls.

Concurrent validity measures. In addition to conducting a factor analysis to identify the structure of attitudes towards sex doll owners, we wanted to explore potential predictors of these views. As such, we asked participants to complete a series of psychometric measures for us to be able to examine the concurrent validity of our developed scale in line with the above review.

Acknowledging that views about sex doll ownership might be reflective of broader attitudes about sex, we used Hendrick et al.'s (2006) Brief Sexual Attitudes Scale. This is a measure comprised of 23 items measuring sexual attitudes in four domains: permissiveness (characterised by tolerance of casual and premarital sex), birth control (characterised as endorsement of safe sex practices), communion (characterised as seeing sex as an important part of intimate relationships), and instrumentality (characterised as the view that sex is a biological imperative in isolation from committed relationships). In this study we did not include the 'birth control' factor due to its lack of theoretical links to the functions of sex doll ownership, and thus its lack of relevance to social attitudes. Each item was rated by participants using a 5-point scale anchored from 1 ('strongly disagree') to 5 ('strongly agree). An average score for each factor was computed, with higher values indicating a greater level of endorsement of that factor. Each factor demonstrated acceptable internal consistency in this sample: permissiveness $\alpha = 0.88$; communion $\alpha = 0.77$; instrumentality $\alpha = 0.69$.

Considering that attitudes about sexuality can be driven by perceptions of traditionalism and an aggressive policing of traditions, we used Altemeyer's (1981) Right-Wing Authoritarianism Scale. This is a 22-item measure (e.g. 'Women should have to promise to obey their husbands when they get married') with items rated using a 9-point scale anchored from 1 ('very strongly disagree') to 9 ('very strongly agree'). We computed an

Table 1. Item loadings within the exploratory factor analysis of the sex doll ownership attitudes scale (SDOAS).

	Factor				
Item	1	2	3	4	Uniqueness
77. I would support somebody who wanted to own a sex doll	**0.91**	−0.01	0.00	−0.04	0.16
76. Sex dolls should be normalised in our society	**0.89**	0.13	−0.10	−0.12	0.20
75. There are some positive uses of sex dolls	**0.83**	−0.05	0.13	−0.07	0.38
66. I would feel comfortable if I learned that my best friend owned a sex doll	**0.82**	0.01	−0.04	0.06	0.29
74. We should be more supportive of people who own sex dolls	**0.80**	−0.04	−0.03	−0.12	0.24
18. I would like associating with some people who own sex dolls	**0.80**	0.02	−0.05	0.07	0.33
67. I would feel uncomfortable if a close family member became romantically involved with a someone who owned a sex doll	0.77	0.00	−0.09	0.17	0.30
78. There is nothing wrong with people who own sex dolls	**0.75**	−0.09	−0.10	−0.01	0.20
63. Sex doll ownership should be accepted completely into our society	**0.75**	−0.05	−0.08	−0.12	0.25
72. There is nothing wrong with owning a sex doll	**0.74**	−0.18	−0.05	−0.06	0.15
64. I would feel comfortable working closely with somebody who I knew owned a sex doll	**0.72**	−0.13	−0.04	0.02	0.29
65. I would think no differently about my neighbour if I learned that they owned a sex doll	**0.72**	0.03	−0.11	0.09	0.39
73. Society's negative response to sex doll owners is wrong	**0.67**	−0.07	−0.15	−0.18	0.22
13. I would never want one of my children dating somebody who owns a sex doll	**−0.62**	0.13	0.13	−0.14	0.33
43. I have respect for people who own sex dolls	**0.62**	−0.12	−0.08	−0.11	0.37
4. I think I would like lot of people who own sex dolls	**0.54**	0.03	−0.17	−0.05	0.56
10. I wouldn't mind living next door to somebody who owns a sex doll	**0.54**	−0.34	0.02	0.09	0.39
56. If I was alone in a room with someone I knew to own a sex doll, I would feel uncomfortable	**−0.51**	0.25	0.15	0.02	0.30
35. People who own sex dolls are normal people, just like you and me	**0.50**	−0.06	−0.35	0.10	0.29
61. Owning a sex doll should be legal	**0.50**	−0.37	0.36	0.18	0.66
32. People who own sex dolls could be trusted as babysitters	**0.47**	−0.16	−0.14	0.08	0.50
71. I am sure that sex doll owners could have effective relationships with other people	**0.45**	−0.12	−0.21	0.19	0.49
17. Some sex doll owners are pretty nice people	**0.44**	−0.33	−0.03	0.04	0.47
60. Many sex doll owners are very moral and ethical people	**0.44**	−0.30	−0.08	0.00	0.43
49. It is unfair to treat somebody differently because they own a sex doll	**0.41**	−0.23	−0.14	−0.13	0.45
27. It is wrong to laugh about people who own sex dolls	0.36	0.09	−0.18	−0.32	0.66
7. People who own sex dolls are no better or worse than other people.	0.36	−0.33	−0.12	0.05	0.47
12. The values of most people who own sex dolls are about the same as the rest of us	0.30	−0.17	−0.30	0.01	0.52
41. We should harshly punish people who own sex dolls	0.07	**0.82**	−0.08	0.07	0.46
25. Regardless of how you look at it, people who own sex dolls are no longer really human	0.14	**0.81**	0.04	−0.16	0.44
16. In general, people who own sex dolls are basically bad people	0.00	**0.81**	0.10	−0.01	0.24
54. Owning a sex doll should be against the law	−0.08	**0.80**	−0.09	0.05	0.35
15. Sex doll owners are just plain immoral	−0.12	**0.72**	0.03	0.06	0.31
40. People who own sex dolls are cursed	−0.08	**0.69**	−0.04	0.07	0.47
47. People who own sex dolls are a danger to others	−0.18	**0.68**	0.08	−0.07	0.25

(*Continued*)

Table 1. (Continued).

Item	Factor				Uniqueness
	1	2	3	4	
42. It is reasonable for a company to be allowed to fire somebody because they own a sex doll	0.04	**0.64**	−0.01	0.09	0.62
11. Sex doll owners are horrible people	−0.08	**0.63**	0.15	0.04	0.36
8. You have to be constantly on your guard with people who own sex dolls	−0.19	**0.60**	0.14	−0.10	0.28
62. Sex doll owners are immoral	−0.22	**0.59**	0.06	0.21	0.25
50. We should do all we can to stigmatise people who own sex dolls	−0.12	**0.58**	−0.03	0.17	0.52
9. Sex doll owners are selfish	0.05	**0.57**	0.22	0.07	0.50
2. Sex doll owners are really dangerous	−0.26	**0.56**	0.08	−0.20	0.33
23. People who own sex dolls should be prevented from having children	−0.11	**0.54**	0.24	0.04	0.35
26. There is something about those who own sex dolls that makes it easy to tell them from normal people	0.17	**0.51**	0.31	−0.10	0.62
53. Owning a sex doll is just plain wrong	−0.34	**0.49**	0.11	0.17	0.21
58. People who own sex dolls are more likely to become involved in domestic violence	−0.16	**0.49**	0.21	0.01	0.41
24. It is easy to recognise someone who owns a sex doll	0.14	**0.47**	0.29	−0.11	0.67
59. A sex doll owner is more likely to rape a romantic partner than the average person	−0.16	**0.46**	0.24	0.01	0.40
5. Most sex doll owners are stupid	−0.02	**0.45**	0.33	−0.01	0.48
48. Sex doll owners should be treated the same as anybody else	0.35	**−0.42**	−0.10	−0.05	0.36
14. Most people who own sex dolls have the capacity for love	0.23	**−0.41**	−0.11	0.19	0.53
6. You never know when somebody who owns a sex doll is telling the truth	−0.12	**0.40**	0.22	−0.10	0.56
39. Sex doll owners are disgusting	−0.28	**0.40**	0.28	0.17	0.20
44. I have no respect for people who own sex dolls	−0.25	0.39	0.20	0.21	0.35
3. It is not wise to trust someone who owns a sex doll	−0.36	0.38	0.17	−0.01	0.32
38. People who own sex dolls should be ashamed of themselves	−0.25	0.35	0.33	0.29	0.18
36. People who own sex dolls have emotional difficulties	−0.02	−0.07	**0.80**	−0.10	0.41
45. Sex doll owners are mentally ill	0.04	0.14	**0.79**	0.02	0.25
68. People who own sex dolls are just sad people	−0.10	−0.03	**0.77**	0.12	0.29
57. Sex doll owners are rarely psychologically healthy	−0.09	0.02	**0.75**	0.10	0.28
31. People who own sex dolls are mentally disturbed	−0.05	0.21	**0.70**	0.04	0.20
28. People who own sex dolls are different to the rest of the population	−0.14	0.04	**0.64**	−0.14	0.40
29. To own a sex doll is to become a failure in life	−0.11	0.15	**0.58**	0.16	0.34
79. Sex doll owners are abnormal	−0.27	0.03	**0.56**	0.10	0.32
69. Sex doll owners are incapable of having normal relationships	−0.18	0.11	**0.55**	−0.10	0.40
37. Sex doll owners are perverts	−0.12	0.23	**0.54**	0.22	0.26
52. Sex doll ownership is a perversion	−0.12	0.25	**0.52**	0.26	0.22
34. Sex doll owners are just the same as anybody else	0.43	−0.02	−0.49	0.14	0.25
46. People who own sex dolls are perfectly healthy	0.38	−0.04	**−0.49**	0.02	0.29
21. Sex doll owners are normal people	0.38	−0.04	**−0.46**	0.09	0.33

(*Continued*)

Table 1. (Continued).

Item	Factor				Uniqueness
	1	2	3	4	
1. Sex doll owners are different from most people	−0.36	−0.13	**0.46**	−0.18	0.53
33. People who are successful do not own sex dolls	−0.23	0.06	**0.42**	−0.03	0.58
30. You would be foolish to marry a person who owns a sex doll	−0.31	0.20	**0.40**	−0.03	0.33
70. People who own sex dolls have generally been through bad break ups	0.11	0.10	**0.40**	−0.16	0.83
51. Sex doll owners just don't fit into our society	−0.07	0.36	0.39	0.14	0.41
20. People who own sex dolls let their emotions control them	−0.11	0.24	0.37	−0.10	0.60
55. Owning a sex doll indicates that somebody has an inferior form of sexuality	−0.21	0.27	0.37	−0.05	0.43
19. Most people who own sex dolls have experiences relationship separation or divorce	0.11	0.14	0.19	−0.19	0.92
Factor eigenvalue	**42.87**	**2.66**	**1.70**	**1.14**	

Note. 'Maximum likelihood' extraction method was used in combination with an 'oblimin' rotation. Items in **bold** typeface are included in the final version of the scale. Item 67 loaded significantly on to the first factor but is framed in the opposite direction. This suggests a systematic misunderstanding of the item wording, and therefore the item was removed from the scale. Item 34 loaded onto two factors, and so was removed to improve the ease of scoring.

average score for each participant, with higher scores indicating more authoritarian beliefs. This measure demonstrated excellent levels of internal consistency in this sample (α = 0.94).

We included Swim et al.'s (1995) Modern Sexism Scale to measure subtle forms of discrimination (or ignorance of potential discrimination) towards women. This is an eight-item scale (e.g. 'Society has reached the point where women and men have equal opportunities for achievement') with each item being scored using a 5-point scale anchored from 1 ('strongly disagree') to 5 ('strongly agree'). We computed an average score across all items for each participant, with higher scores indicating more modern sexist attitudes. This measure demonstrated excellent levels of internal consistency in this sample (α = 0.87).

We also asked participants to complete the Moral Foundations Questionnaire (Graham et al., 2011). This is a 30-item questionnaire that asks participants to rate the relevance of various conditions when they are making a moral decision, and their agreement with various moral statements. Each item is rated on a 6-point scale, and we calculated an average score for each of the five moral foundations measured by the scale: care/harm (α = 0.56), fairness (α = 0.57), ingroup loyalty (α = 0.74), respect for authority (α = 0.78), and purity (α = 0.81). We also embedded the nine items used by Iyer et al. (2012) to measure 'liberty'-related moral intuitions into this questionnaire as an index of moral intuitions related to the importance of individual liberty (α = 0.72).

Procedure

Upon reading the general information about the survey in various advertisements on social media platforms, participants were able to click the link for full information. If they were happy to take part, they provided their informed consent before completing the demographic questionnaire. Following this, all participants first completed the draft SDOAS, before the additional measures were presented in a randomised order. Once all scales were complete, the survey software presented a comprehensive debriefing screen and provided researcher contact details and links for support, should these be needed. This procedure was reviewed and approved by the Nottingham Trent University School of Social Sciences Research Ethics Committee.

Results

All analyses were run using the open-source *jamovi* software (v.2.2.5.0), which runs *R* packages within a user-friendly graphical user interface. In this paper, all analyses used base R code (R Core Team, 2021) and the *psych* package (Revelle, 2019). Data and statistical output can be found at the project's Open Science Framework (OSF) page at https://osf.io/46bnk/.

Exploratory factor analysis

We ran an EFA on all SDOAS items, extracting factors using the maximum likelihood method. The initial number of factors extracted was determined by parallel analysis, which runs simulations of the data. Factors with an observed eigenvalue that is above the 95th percentile of the simulated eigenvalues are said to be statistically meaningful, and thus are extracted. This process led to four factors being identified.

In relation to the suitability of the data for factor analysis, the Kaiser-Meyer-Olkin coefficient, which has a range of 0–1, was 0.98 (and thus above the acceptable minimum threshold of 0.70; Hair et al., 2006). Bartlett's test of sphericity was also significant, χ^2 (3081) = 30,092, p <.001. These results suggest that the data were suitable for factor analysis. However, no items loaded meaningfully onto factor four (operationalised as a minimum loading value of 0.40; Field, 2005). As such, we proceeded with a three-factor solution (see Table 1).

Factor one was labelled 'Acceptability of Doll Ownership' and refers to general levels of support for the legal ownership of sex dolls. This factor was comprised of 26 items, such as 'Sex dolls should be normalized in our society' and 'Society's negative response to sex doll owners is wrong'. Two of the 26 items were removed from the factor. The first was removed because it loaded in such a way as to be incompatible with the general theme of the factor ('I would feel uncomfortable if a close family member became romantically involved with someone who owned a sex doll', which depicts negativity about doll ownership but loaded positively onto the factor, indicating issues with item comprehension). The second removed item ('Sex doll owners are just the same as anybody else') also loaded meaningfully onto factor three, and so was removed from both factors to maintain clear scoring procedures in the final version of the scale. This factor demonstrated excellent internal consistency, α =.97/ω =.97. The average score on this factor was 4.14 (SD = 1.06).

Factor two was labelled 'Doll Owners as Immoral' and measures the view that people who own sex dolls are immoral, dangerous, and deserving of punishment. There were 25 items that loaded meaningfully onto this factor, such as 'Sex doll owners are just plain immoral' and 'A sex doll owner is more likely to rape a romantic partner than the average person'). This factor demonstrated excellent internal consistency, α =.97/ω =.97. The average score on this factor was 2.00 (SD = 0.79).

Factor three was labelled 'Doll Owners as Dysfunctional' and reflects views that people who own sex dolls have mental health or personality difficulties. There were 18 items that loaded onto this factor, such as 'People who own sex dolls have emotional difficulties' and 'Sex doll owners are incapable of having normal relationships'. As mentioned previously, one item was removed for also loading onto factor one. This factor demonstrated excellent internal consistency, α =.96/ω =.96. The average score on this factor was 2.69 (SD = 1.02).

Predicting attitudes towards sex doll owners

We ran a series of three linear regression analyses to separately predict scores on each of the three SDOAS factors. In these models, we entered sex (the 'Other' category was excluded here), age, relationship status, political orientation, and religiosity as demographic predictors, alongside the permissiveness, communion, and instrumentality subscales of the SAS, right-wing authoritarianism, modern sexism, and all six moral foundations. This led to models that included sixteen predictors. A power analysis conducted with G*Power (Faul et al., 2007) suggested that a minimum of 133 participants were required to detect significant regression coefficients within our model with 95% power, assuming a small-to-moderate effect (f = 0.10). We also note the guidance of Schönbrodt and Perugini (2013), who suggested that correlation estimates begin to stabilise at N = 200. Our sample is larger than both of these minimum figures.

For information, zero-order correlations between our measured variables show how there is no collinearity within the models, although all SDOAS factors were highly correlated in the expected directions with each other (owing to the size of this Table, please see Table S1 of the supplementary materials on the project OSF page for these correlations; https://osf.io/46bnk). Regression coefficients for each model are presented in Table 2.

The model predicting the 'Acceptability of Doll Ownership' explained a significant proportion of the variance in scores on this SDOAS factor, $F(16, 265) = 6.14$, $p < .001$, adj. $R^2 = .23$. Examining individual coefficients, women and those who score higher on right-wing authoritarianism were less likely than others to see the ownership of sex dolls as socially and ethically acceptable. In contrast, higher levels of acceptability were predicted by higher levels of religiosity, more permissive sexual attitudes, and more endorsement of the liberty foundation of morality.

The model predicting attitudes akin to 'Doll Owners as Immoral' explained a significant proportion of the variance in this outcome, $F(16, 266) = 6.01$, $p < .001$, adj. $R^2 = .22$. Within the model, women and those who score higher on right-wing authoritarianism were more likely to see sex doll owners as immoral. On the other hand, lower immorality perceptions were predicted by higher levels of religiosity, more permissive sexual attitudes, and more endorsement of the liberty foundation of morality. These coefficients are inverse to those reported in relation to acceptability judgements.

The model predicting the view of 'Doll Owners as Dysfunctional' also explained a significant proportion of the variance in scores on this SDOAS factor, $F(16, 267) = 3.01$, $p < .001$, adj. $R^2 = .10$. Examining individual coefficients, women and those who score higher on right-wing authoritarianism were more likely to see sex doll owners as psychologically and interpersonally dysfunctional. In contrast, lower perceptions of dysfunction were predicted by higher levels of religiosity and more endorsement of liberty-related moral intuitions.

A short-form of the SDOAS

The full form of the SDOAS is comprised of 66 items, which is a long measure that might not be feasible for use by researchers with limited survey space. As such, we decided to produce a short form of the measure, comprised of just 18 items. This shorter length was designed to produce a coherent measure with six items per factor to balance brevity with an ability to maintain stable estimates of internal consistency. We were informed by the guidance of Smith et al. (2000) when deciding upon the items to include in the short form version of the SDOAS. That is, we selected a range of higher – and lower-loading items, items with high item-total correlations, and items with a moderate average inter-item correlation. Table 3 reports these statistics and the items retained in the short form of the SDOAS.

As a check of the consistency of the full and short forms of the SDOAS we ran correlational analyses between scores on each version of the measure. As shown in Table 4, the pattern of correlations between the factors in the full and short forms is the same, and there is a high degree of concordance in the scores obtained for each factor irrespective of the version of the SDOAS used. This demonstrates that both versions can obtain the same average factor scores.

Table 2. Model coefficients predicting SDOAS factor scores.

	Factor 1 (Acceptability)			Factor 2 (Immorality)			Factor 3 (Dysfunction)		
		95% CI (β)			95% CI (β)			95% CI (β)	
Predictor	β	Low	High	β	Low	High	β	Low	High
Sex	**−0.30***	**−0.04**	**−0.55**	**0.45*****	**0.19**	**0.70**	**0.28***	**0.01**	**0.56**
Age	0.03	0.15	−0.09	0.02	−0.11	0.13	0.01	−0.12	0.14
Relationship	0.07	0.30	−0.16	0.02	−0.21	0.25	−0.03	−0.28	0.21
Politics	−0.02	0.12	−0.15	−0.05	−0.18	0.08	−0.01	−0.15	0.13
Religiosity	**0.15***	**0.26**	**0.03**	**−0.17****	**−0.29**	**−0.06**	**−0.14***	**−0.26**	**−0.01**
Permissiveness	**0.23*****	**0.36**	**0.10**	**−0.18****	**−0.31**	**−0.05**	−0.13	−0.27	0.01
Communion	0.06	0.18	−0.06	−0.02	−0.14	0.10	−0.06	−0.18	0.07
Instrumentality	0.07	0.18	−0.05	−0.02	−0.14	0.10	−0.11	−0.23	0.01
RWA	**−0.21***	**−0.03**	**−0.40**	**0.30****	**0.12**	**0.49**	**0.21***	**0.01**	**0.41**
Modern Sexism	0.06	0.19	−0.08	−0.04	−0.18	0.10	0.10	−0.05	0.25
MFQ Harm	0.08	0.22	−0.06	−0.03	−0.17	0.11	−0.02	−0.17	0.13
MFQ Fairness	−0.01	0.13	−0.14	−0.09	−0.22	0.04	0.03	−0.11	0.17
MFQ Loyalty	0.06	0.22	−0.11	−0.02	−0.19	0.15	−0.10	−0.27	0.08
MFQ Authority	−0.04	0.15	−0.22	−0.07	−0.26	0.12	0.08	−0.12	0.28
MFQ Purity	−0.13	0.05	−0.31	0.15	−0.03	0.32	0.02	−0.17	0.21
MFQ Liberty	**0.20*****	**0.31**	**0.08**	**−0.12***	**−0.24**	**−0.01**	**−0.16***	**−0.29**	**−0.04**

Note. 'Sex' refers to scores among female participants relative to male participants. 'Relationship' refers to scores among participants who were not in a relationship relative to those who were in a relationship. 'Permissiveness', 'Communion', and 'Instrumentality' refer to factors of the Sexual Attitudes Scale. RWA = Right-Wing Authoritarianism. MFQ = Moral Foundations Questionnaire. *b* refers to the unstandardised estimate, whereas β refers to the standardised estimate. Significant predictors are presented in **bold** typeface.
*p <.05 **p <.01 ***p <.001

Table 3. Selection of items for the short form of the 'Acceptability of doll ownership' factor.

	Item loading	Item-total r	Inter-item r
Factor 1: 'Acceptability of Doll Ownership'			
77. I would support somebody who wanted to own a sex doll	0.91	0.89	0.58
76. Sex dolls should be normalised in our society	**0.89**	**0.85**	**0.56**
75. There are some positive uses of sex dolls	0.83	0.76	0.50
66. I would feel comfortable if I learned that my best friend owned a sex doll	**0.82**	**0.82**	**0.53**
74. We should be more supportive of people who own sex dolls	0.80	0.85	0.56
18. I would like associating with some people who own sex dolls	**0.80**	**0.80**	**0.51**
78. There is nothing wrong with people who own sex dolls	0.75	0.88	0.57
63. Sex doll ownership should be accepted completely into our society	**0.75**	**0.85**	**0.55**
72. There is nothing wrong with owning a sex doll	0.74	0.90	0.58
64. I would feel comfortable working closely with somebody who I knew owned a sex doll	**0.72**	**0.84**	**0.53**
65. I would think no differently about my neighbour if I learned that they owned a sex doll	0.72	0.76	0.49
73. Society's negative response to sex doll owners is wrong	**0.67**	**0.85**	**0.56**
13. I would never want one of my children dating somebody who owns a sex doll	−0.62	−0.79	−0.57
43. I have respect for people who own sex dolls	0.62	0.78	0.50
4. I think I would like lot of people who own sex dolls	0.54	0.64	0.42
10. I wouldn't mind living next door to somebody who owns a sex doll	0.54	0.76	0.48
56. If I was alone in a room with someone I knew to own a sex doll, I would feel uncomfortable	−0.51	−0.82	−0.59
35. People who own sex dolls are normal people, just like you and me	0.50	0.79	0.52
61. Owning a sex doll should be legal	0.50	0.46	0.30
32. People who own sex dolls could be trusted as babysitters	0.47	0.69	0.45
71. I am sure that sex doll owners could have effective relationships with other people	0.45	0.67	0.44
17. Some sex doll owners are pretty nice people	0.44	0.71	0.47
60. Many sex doll owners are very moral and ethical people	0.44	0.74	0.49
49. It is unfair to treat somebody differently because they own a sex doll	0.41	0.71	0.47
Factor 2: 'Doll Owners as Immoral'			
41. We should harshly punish people who own sex dolls	0.82	0.68	0.43
25. Regardless of how you look at it, people who own sex dolls are no longer really human	0.81	0.68	0.44
16. In general, people who own sex dolls are basically bad people	0.81	0.85	−0.54
54. Owning a sex doll should be against the law	0.80	0.78	0.49
15. Sex doll owners are just plain immoral	**0.72**	**0.81**	**0.51**
40. People who own sex dolls are cursed	0.69	0.71	0.46
47. People who own sex dolls are a danger to others	**0.68**	**0.85**	**0.53**
42. It is reasonable for a company to be allowed to fire somebody because they own a sex doll	0.64	0.58	0.38
11. Sex doll owners are horrible people	0.63	0.79	0.50
8. You have to be constantly on your guard with people who own sex dolls	**0.60**	**0.83**	**0.52**
62. Sex doll owners are immoral	0.59	0.82	0.52
50. We should do all we can to stigmatise people who own sex dolls	0.58	0.65	0.41
9. Sex doll owners are selfish	0.57	0.69	0.44
2. Sex doll owners are really dangerous	**0.56**	**0.77**	**0.48**
23. People who own sex dolls should be prevented from having children	0.54	0.78	0.50
26. There is something about those who own sex dolls that makes it easy to tell them from normal people	0.51	0.58	0.38
53. Owning a sex doll is just plain wrong	**0.49**	**0.85**	**0.53**
58. People who own sex dolls are more likely to become involved in domestic violence	0.49	0.76	0.48
24. It is easy to recognise someone who owns a sex doll	0.47	0.55	0.35
59. A sex doll owner is more likely to rape a romantic partner than the average person	0.46	0.76	0.48
5. Most sex doll owners are stupid	0.45	0.70	0.45
48. Sex doll owners should be treated the same as anybody else	−0.42	0.76	−0.52
14. Most people who own sex dolls have the capacity for love	−0.41	0.63	−0.43
6. You never know when somebody who owns a sex doll is telling the truth	0.40	0.64	0.41
39. Sex doll owners are disgusting	**0.40**	**0.84**	**0.52**
Factor 3: 'Doll Owners as Dysfunctional'			
36. People who own sex dolls have emotional difficulties	0.80	0.73	0.42

(*Continued*)

Table 3. (Continued).

	Item loading	Item-total r	Inter-item r
45. Sex doll owners are mentally ill	**0.79**	**0.82**	**0.47**
68. People who own sex dolls are just sad people	**0.77**	**0.81**	**0.48**
57. Sex doll owners are rarely psychologically healthy	0.75	0.82	0.47
31. People who own sex dolls are mentally disturbed	0.70	0.87	0.50
28. People who own sex dolls are different to the rest of the population	**0.64**	**0.75**	**0.42**
29. To own a sex doll is to become a failure in life	**0.58**	**0.79**	**0.46**
79. Sex doll owners are abnormal	**0.56**	**0.80**	**0.45**
69. Sex doll owners are incapable of having normal relationships	0.55	0.76	0.43
37. Sex doll owners are perverts	**0.54**	**0.80**	**0.46**
52. Sex doll ownership is a perversion	0.52	0.82	0.47
46. People who own sex dolls are perfectly healthy	−0.49	−0.82	−0.55
21. Sex doll owners are normal people	−0.46	−0.77	−0.52
1. Sex doll owners are different from most people	0.46	0.63	0.35
33. People who are successful do not own sex dolls	0.42	0.64	0.37
30. You would be foolish to marry a person who owns a sex doll	0.40	0.79	−0.46
70. People who own sex dolls have generally been through bad break ups	0.40	0.36	0.21

Note. Inter-item *r* reflects the average inter-item correlation for each SDOAS item on the full form of the measure. Retained items are presented in **bold** typeface.

Table 4. Zero-order factor correlations within and between the full and short forms of the SDOAS.

	SDOAS short form		
SDOAS full form	Acceptability	Immorality	Dysfunction
Acceptability	0.97***	−0.82***	−0.82***
Immorality	−0.86***	0.97***	0.81***
Dysfunction	−0.87***	0.83***	0.97***
Short form α	0.94	0.93	0.92

Note. Data reflect Pearson's *r* correlation coefficients. Figures across the diagonal (white cells) represent correlations between the two forms of the SDOAS. Figures in the shaded cells underneath the diagonal reflect inter-factor correlations within the full form of the SDOAS. Figures in the shaded cells above the diagonal reflect inter-factor correlations within the short form of the SDOAS.

***$p < .001$

Study 2: Confirmatory factor analysis and policy-related validation

Having identified a provisional factor structure for the SDOAS and demonstrated evidence of its validity in Study 1, we next sought to confirm this structure in an independent sample. This is a crucial step in scale development work as it allows us to have confidence in the stability and generalisability of the factor structure identified in Study 1. We also sought to provide further evidence of the validity of the SDOAS by examining how it was able to predict variance in support for different sex doll policies, and trust in scientific research related to the effects of sex dolls. We predicted that more positive attitudes towards sex doll ownership (i.e. higher scores on the acceptability factor, and lower scores on the immorality and dysfunction factors) would be associated with a greater degree of support for policies that would allow access to sex dolls, and lower levels of support for doll bans. We also predicted that attitudes (as measured by the SDOAS) would predict trust in research related to sex dolls in a motivated manner. That is, those with more positive views about doll ownership were predicted to have a higher level of trust in scientific studies reporting no risks associated with sex doll ownership, whereas those with more negative attitudes were expected to place a higher degree of trust in research

reporting that sex doll ownership was associated with increased risks for engaging in sexual offending.

Methods

Participants

Using analytic heuristics and considerations of the length of the SDOAS we sought to recruit a sample of approximately 300 participants for the confirmatory factor analysis (CFA) of the SDOAS (see Bentler & Chou, 1987; Comrey & Lee, 1992; Kline, 2015). We recruited our sample via a large-scale social survey of experiences and attitudes about a range of topics related to forensic psychology. This broader survey recruited a nationally representative UK sample of 2,000 participants via the Prolific survey crowdsourcing platform, with approximately 300 participants being randomly directed to this study branch. Participants took part in several studies within the broader survey, with a median completion time of 16 minutes, and were compensated with £2.25. We retained all participants who provided full data on SDOAS, which resulted in a sample of 329 participants (55% female; M_{age} = 44.35 years, SD = 15.30).[2] This number is equivalent to five observations per scale item.

Materials

Demographics. Participant sex and age, as well as education level, were collected for those directed to this study within the broader survey. These data were collected to allow us to describe the broad composition of the sample, and to control for educational attainment in subsequent analyses.

SDOAS. The 66-item SDOAS was included in this study to confirm the three-factor structure identified previously. Items were presented in a random order for each participant to eliminate bias in responding patterns to semantically or conceptually similar items.

Doll-related policy support. We presented participants with three policy proposals that broadly represent different views about the acceptability and legal status of doll availability. The exact wording of these policy proposals was as follows:

> ***Policy proposal: Ban all dolls due to a possible risk of sexual aggression***
>
> Groups associated with preventing violence against women and girls have proposed legislation that bans the production and distribution of all sex dolls. They believe that access to sex dolls may increase an individual's risk of sexual aggression. This is because the dolls allow them to simulate sexually aggressive scenarios (i.e. rape) and obtain sexual satisfaction which may reinforce these fantasies and the desire to perform them on real women. Given the realistic nature of these dolls, it is posited that they reinforce harmful stereotypes and objectifying beliefs, which increases the risks of doll owners engaging in sexual aggression. Despite the lack of research providing evidence for this risk these groups argue that the potential risk is sufficient to ban all dolls.

Policy proposal: allow doctors to 'prescribe' sex dolls, given a demonstrable treatment effect in reducing risk

Clinical groups and researchers have proposed legislation that would allow health professionals to prescribe sex dolls to clients experiencing crime-related sexual interests (e.g. attractions to children, or rape fantasies). These dolls would only be prescribed given a demonstrable treatment effect showing a significant reduction in their risk of offending. The rationale is that dolls would provide a sexual outlet for these individuals which would reduce their likelihood of seeking sexual satisfaction through engaging in crime. These groups believe that the prescription of dolls would also help to improve the poor mental health and negative self-esteem associated with these attractions. The groups seeking this legislative change argue that the use of prescriptions would allow doll usage to be controlled and monitored meaning they could be removed on any indication of an increase in risk.

Policy proposal: allow unrestricted commercial access to dolls, given the lack of evidence that they cause any increase in risk

Manufacturers and researchers have proposed unrestricted commercial access to sex dolls. This would give all adults access to purchase sex dolls. They argue that due to the lack of evidence surrounding an increase in risk of offending, sex dolls should be accessible to purchase for adults. Their case is that moral distaste for sex dolls isn't sufficient to make private sexual behaviour a criminal act. They also argue that unrestricted commercial access would allow doll sales to be taxed which would be beneficial for the economy and reduce black market sales.

After the presentation of each proposal, participants were asked how persuasive they found it, how popular they believed that it would be, and how likely they would be to support it. These questions were responded to using a ten-point scale anchored from 1 (not at all) to 10 (completely). An average score across all three items was calculated to give a composite measure of positivity about each proposal (ban α =.88; prescribe α =.87; free access α =.88).

Judgements of doll-related academic research. We presented participants with one of two structured research study abstracts to gauge how views of such work might be contingent upon the research's conclusions. These abstracts were based on the study conducted by Harper et al. (2023), which at the time of writing remains the only direct empirical examination of the association between sex doll ownership and risk (with this finding no link between owning dolls and self-rated risks for sexual aggression). In the first condition (low risk) we structured Harper et al.'s (2023) abstract into structured headings of 'Context', 'Methods', 'Findings', and 'Implications' to improve readability for participants who may be unaccustomed to reading academic research. In the second condition (high risk) we presented the same abstract but manipulated the findings to reflect that the researchers found that doll owners presented as being at a higher risk of sexual aggression than non-owners.

Following these vignettes, participants were presented with four statements, against which they rated their agreement using a 1 (not at all) to 10 (definitely) scale. These questions were:

1. I believe that this is a rigorous study.
2. I believe that the results of this study are likely to be accurate.
3. I trust the study's findings.

4. The researchers involved in this study are likely to be biased. (reverse-coded)

We averaged scores across these four questions to give an index of trust in each study (high risk abstract α =.89; low risk abstract α =.84).

Procedure

After being recruited via Prolific's representative sampling feature, participants gave their informed consent to take part and provided basic demographic information. Randomisation to study branches then occurred. Those randomised to the current study read and responded to the SDOAS, followed by the policy judgement task. Participants were then further randomised to either the 'high risk' or 'low risk' study abstract, and responded to the trust questions related to this. Once all studies to which the participant was randomised had been completed, a comprehensive debrief (summarising all studies in the survey) was presented. This debrief included details of anything that could have been perceived as a deceptions (e.g. we told participants that we wrote the policy proposals that they saw for the purposes of the study, and that the study abstracts were based on abbreviated and/or manipulated versions of a published academic paper). A link to the source paper was also provided. Participants were finally directed back to Prolific to confirm completion. This procedure was given a favourable opinion by the Nottingham Trent University School of Social Sciences Research Ethics Committee.

Results

Confirmatory factor analysis

We used the three-factor model of the full SDOAS as the default model in a CFA run in *jamovi* (v.2.2.5.0). Item-level coefficients are presented in Table 5. This model did not demonstrate an acceptable fit to the data:

- Comparative fit index (CFI) = 0.82
- Tucker-Lewis index (TLI) = 0.82
- Standardised Root Mean Square Residual (SRMR) = 0.07
- Root Mean Square Error of Approximation (RMSEA) = 0.08 [90% CI: 0.08–0.08]

As such, modifications to the default model were required. We interrogated modification indices (MIs) in the residual covariances matrix to identify where freeing covariance may be required due to a large number of scale items on the SDOAS. This process led to 26 residual covariance terms being added where residual covariance MIs were greater than or equal to 25, which may indicate some degree of redundancy within the item pool.[3] Adding these covariance terms improved the model fit, albeit with mixed coefficient outcomes: CFI = 0.90, TLI = 0.89, SRMR = 0.07, RMSEA = 0.06 [90% CI: 0.06–0.07], supporting the view that the items to which they were applied may be the cause of item redundancy.

In light of the modifications necessary to produce a model fit that approached acceptability, we also ran a CFA on the short form of the SDOAS identified in Study 1. This model was an acceptable fit to the data: CFI = 0.95, TLI = 0.95, SRMR = 0.04, RMSEA = 0.08 [90% CI: 0.07–0.09]. As such, it may be prudent to proceed with the SDOAS short form in future research, with the option of the long form being available

Table 5. CFA item loadings for the full form and short form SDAOS.

	Full form SDOAS			Short form SDOAS		
	Stand. Estimate	*Z*	*p*	Stand. Estimate	*Z*	*p*
Doll Ownership as Acceptable						
I would support somebody who wanted to own a sex doll	0.87	19.95	< .001			
Sex dolls should be normalised in our society	0.85	19.12	< .001	0.87	19.73	< .001
There are some positive uses of sex dolls	0.81	17.87	< .001			
I would feel comfortable if I learned that my best friend owned a sex doll	0.83	18.61	< .001	0.85	19.17	< .001
We should be more supportive of people who own sex dolls	0.89	20.80	< .001			
I would like associating with some people who own sex dolls	0.79	17.14	< .001	0.80	17.46	< .001
There is nothing wrong with people who own sex dolls	0.91	21.54	< .001			
Sex doll ownership should be accepted completely into our society	0.91	21.35	< .001	0.92	21.87	< .001
There is nothing wrong with owning a sex doll	0.91	21.68	< .001			
I would feel comfortable working closely with somebody who I knew owned a sex doll	0.88	20.41	< .001	0.86	19.30	< .001
I would think no differently about my neighbour if I learned that they owned a sex doll	0.74	15.70	< .001			
Society's negative response to sex doll owners is wrong	0.87	19.94	< .001	0.88	20.12	< .001
I would never want one of my children dating somebody who owns a sex doll	−0.53	−10.41	< .001			
I have respect for people who own sex dolls	0.78	16.98	< .001			
I think I would like lot of people who own sex dolls	0.80	17.60	< .001			
I wouldn't mind living next door to somebody who owns a sex doll	0.86	19.68	< .001			
If I was alone in a room with someone I knew to own a sex doll, I would feel uncomfortable	−0.52	−10.03	< .001			
People who own sex dolls are normal people, just like you and me	0.86	19.69	< .001			
Owning a sex doll should be legal	0.64	13.04	< .001			
People who own sex dolls could be trusted as babysitters	0.79	17.18	< .001			
I am sure that sex doll owners could have effective relationships with other people	0.82	18.22	< .001			
Some sex doll owners are pretty nice people	0.78	17.00	< .001			
Many sex doll owners are very moral and ethical people	0.86	19.44	< .001			
It is unfair to treat somebody differently because they own a sex doll	0.84	18.81	< .001			
Doll Owners as Immoral						
We should harshly punish people who own sex dolls	0.76	16.32	< .001			
Regardless of how you look at it, people who own sex dolls are no longer really human	0.73	15.30	< .001			
In general, people who own sex dolls are basically bad people	0.82	18.23	< .001			
Owning a sex doll should be against the law	0.84	18.69	< .001			
Sex doll owners are just plain immoral	0.89	20.54	< .001	0.89	20.62	< .001
People who own sex dolls are cursed	0.74	15.67	< .001			
People who own sex dolls are a danger to others	0.87	19.89	< .001	0.87	19.78	< .001
It is reasonable for a company to be allowed to fire somebody because they own a sex doll	0.74	15.53	< .001			
Sex doll owners are horrible people	0.90	20.90	< .001			
You have to be constantly on your guard with people who own sex dolls	0.91	21.55	< .001	0.89	20.68	< .001
Sex doll owners are immoral	0.89	20.77	< .001			
We should do all we can to stigmatise people who own sex dolls	0.88	20.21	< .001			

(*Continued*)

Table 5. (Continued).

	Full form SDOAS			Short form SDOAS		
	Stand. Estimate	*Z*	*p*	Stand. Estimate	*Z*	*p*
Sex doll owners are selfish	0.80	17.46	< .001			
Sex doll owners are really dangerous	0.87	19.99	< .001	0.84	18.64	< .001
People who own sex dolls should be prevented from having children	0.85	19.19	< .001			
There is something about those who own sex dolls that makes it easy to tell them from normal people	0.64	12.96	< .001			
Owning a sex doll is just plain wrong	0.82	18.19	< .001	0.86	19.22	< .001
People who own sex dolls are more likely to become involved in domestic violence	0.81	17.93	< .001			
It is easy to recognise someone who owns a sex doll	0.61	12.28	< .001			
A sex doll owner is more likely to rape a romantic partner than the average person	0.77	16.52	< .001			
Most sex doll owners are stupid	0.79	17.19	< .001			
Sex doll owners should be treated the same as anybody else	−0.61	−12.06	< .001			
Most people who own sex dolls have the capacity for love	−0.57	−11.30	< .001			
You never know when somebody who owns a sex doll is telling the truth	0.65	13.10	< .001			
Sex doll owners are disgusting	0.80	17.59	< .001	0.82	18.14	< .001
Doll Owners as Dysfunctional						
People who own sex dolls have emotional difficulties	0.81	17.75	< .001			
Sex doll owners are mentally ill	0.88	20.29	< .001	0.87	19.90	< .001
People who own sex dolls are just sad people	0.83	18.45	< .001	0.82	18.03	< .001
Sex doll owners are rarely psychologically healthy	0.86	19.48	< .001			
People who own sex dolls are mentally disturbed	0.91	21.30	< .001			
People who own sex dolls are different to the rest of the population	0.83	18.43	< .001	0.81	17.81	< .001
To own a sex doll is to become a failure in life	0.85	19.20	< .001	0.87	19.78	< .001
Sex doll owners are abnormal	0.90	21.05	< .001	0.91	21.48	< .001
Sex doll owners are incapable of having normal relationships	0.84	18.86	< .001			
Sex doll owners are perverts	0.91	21.46	< .001	0.90	21.08	< .001
Sex doll ownership is a perversion	0.88	20.37	< .001			
People who own sex dolls are perfectly healthy	−0.75	−16.06	< .001			
Sex doll owners are normal people	−0.75	−15.99	< .001			
Sex doll owners are different from most people	0.78	16.99	< .001			
People who are successful do not own sex dolls	0.68	13.94	< .001			
You would be foolish to marry a person who owns a sex doll	0.87	19.86	< .001			
People who own sex dolls have generally been through bad break ups	0.49	9.47	< .001			
Model fit statistics	**Default model**: CFI = 0.82; TLI = 0.82; SRMR = 0.07; RMSEA = 0.08 [90% CI: 0.08–0.08] **Modified model**: CFI = 0.90; TLI = 0.89; SRMR = 0.07; RMSEA = 0.06 [90% CI: 0.06–0.073]			CFI = 0.95; TLI = 0.95; SRMR = 0.04; RMSEA = 0.08 [90% CI: 0.07–0.09]		

Table 6. Zero-order factor correlations within and between the full and short forms of the SDOAS in Study 2.

	SDOAS short form		
SDOAS full form	Acceptability	Immorality	Dysfunction
Acceptability	0.97***	−0.67***	−0.72***
Immorality	−0.71***	0.97***	0.86***
Dysfunction	−0.80***	0.82***	0.98***
Full form *M* (*SD*)	3.52 (1.12)	1.98 (0.90)	2.78 (1.14)
Short form *M* (*SD*)	3.24 (1.22)	2.10 (1.08)	2.59 (1.21)

Note. Data reflect Pearson's *r* correlation coefficients. Figures across the diagonal (white cells) represent correlations between the two forms of the SDOAS. Figures in the shaded cells underneath the diagonal reflect inter-factor correlations within the full form of the SDOAS. Figures in the shaded cells above the diagonal reflect inter-factor correlations within the short form of the SDOAS.
***p <.001

for those wanting to sample a broader range of attitudinal expressions. In line with this recommendation, our remaining analyses in this paper using the SDOAS use the short form of the measure. The full form of the SDOAS is provided in the Appendix for those who may wish to use it.

Scores and inter-factor correlations were consistent with those reported in Study 1, which provides further confidence in the consistency of this factor structure of the SDOAS. These statistics are presented in Table 6.

Predicting doll-related policy judgements

The free access policy was seen as being the most popular option (M = 5.16, SD = 2.16), followed by a complete ban on dolls (M = 4.71, SD = 2.33), with a middle option of controlled access through prescription being the least favoured (M = 3.78, SD = 2.03). A within-subjects ANOVA found there to be a significant effect of policy, $F(2, 650) = 31.51$, p <.001, $\eta^2_G = 0.07$. There was no difference at the sample level between levels of favour for the total ban or unrestricted free access policies, $t(325) = 2.17$, p =.078, $d_z = 0.12$. However, the prescribing policy was less favoured than both the total ban policy ($t(325) = -5.33$, p <.001, $d_z = -0.30$) and the free access policy ($t(325) = -9.83$, p <.001, $d_z = 0.54$).

We next ran a series of regression analyses designed to predict variance in judgements of each of the three policies. In each model, the composite policy support score was the outcome, with participant sex, age, education, and ideology being entered as predictors alongside each SDOAS factor. Regression coefficients are presented in Table 7.

The model explaining judgements of the total ban policy was statistically significant and explained approximately 41% of the variance in the outcome, $F(7, 306) = 31.53$, p <.001, adj. $R^2 = 0.41$. Within this model, the more that participants viewed sex dolls as acceptable, the more significantly they disagreed with this policy. In contrast, views that endorsed the view that doll owners are immoral and dysfunctional were significantly associated with an increased level of support. Age was negatively associated with support for the total ban policy, but no other demographic factors were associated with support for banning dolls.

The model explaining judgements of the prescription policy explained only 5% of the variance in the outcome, but was still statistically significant, $F(7, 306) = 3.56$, p =.001, adj. $R^2 = 0.05$. Within this model, only increasing scores on the SDOAS acceptability factor

Table 7. Regression coefficients explaining favourability judgements of potential sex doll social policies.

	Policy: Total doll ban			Policy: Doll prescriptions			Policy: Unrestricted access to dolls		
		95% CI (β)			95% CI (β)			95% CI (β)	
Predictor	β	Low	High	β	Low	High	β	Low	High
Sex	0.15	−0.03	0.33	−0.05	−0.27	0.18	−0.08	−0.28	0.11
Age	**−0.13****	**−0.22**	**−0.04**	0.01	−0.11	0.13	−0.01	−0.11	0.09
Qualification level	0.02	−0.07	0.11	0.10	−0.01	0.21	−0.02	−0.11	0.08
Political ideology	0.02	−0.07	0.11	0.06	−0.05	0.18	**0.10***	**0.00**	**0.20**
SDOAS – Acceptability	**−0.18****	**−0.32**	**−0.05**	**0.23****	**0.07**	**0.40**	**0.35*****	**0.21**	**0.49**
SDOAS – Immorality	**0.25****	**0.07**	**0.42**	−0.04	−0.26	0.17	−0.17	−0.36	0.01
SDOAS – Dysfunction	**0.22***	**0.03**	**0.41**	0.01	−0.23	0.25	−0.09	−0.30	0.11

Note. 'Sex' is coded as 0 = male, 1 = female. Significant coefficients are highlighted in **bold** typeface. SDOAS factors refer to data from the short form of the scale.
*p <.05 **p <.01 ***p <.001

were significantly associated with a greater degree of endorsement of the policy. No other coefficients in the model were statistically significant.

The model explaining judgements about the free access judgement was also statistically significant and explained approximately 31% of the variance in policy support, $F(7, 306) = 20.73$, $p < .001$, adj. $R^2 = 0.31$. Again, higher scores on the SDOAS acceptability factor were significantly associated with more favourable judgements of this policy. Elsewhere in the model, those with a more conservative political leaning were also more positive about this option. No other coefficients in the model were statistically significant.

Trust in doll-related research

The average trust score for the high risk study abstract was 5.72 ($SD = 2.04$), while the average trust score for the low risk study abstract was 6.10 ($SD = 1.62$). There was not a significant difference in these values, $t(321) = 1.87$, $p = .062$, $d = 0.21$.

We ran a two-stage regression model to examine trust in research findings related to sex dolls. In this model, our trust variable was the outcome. In the first stage, we entered participant sex, age, qualification level, political ideology, abstract condition, and each of the three SDOAS factors as predictors to understand how these factors predict variance in research trust at a general level. In the second stage, we entered two-way interactions between the experimental condition and each of the other variables to examine whether the study's findings changed the relationship between each of the predictors and study trust. That is, it may be the case that people alter their perceptions of study trust in line with whether the findings support or reject their pre-existing attitudes. Model coefficients are presented in Table 8.

The model at stage one was not statistically significant, $F(8, 302) = 0.85$, $p = .564$, adj. $R^2 = -.00$. No individual coefficients were associated with the trust outcome. In contrast, the model was statistically significant at stage two and explained around 16% of study trust outcomes, $F(15, 295) = 4.92$, $p < .001$, adj. $R^2 = .16$. However, there were no significant coefficients within this model either. This suggests that any interaction effects within the model are small and, despite improving the explanatory power of the overall model, were not detectable at the coefficient level.[4]

Study 3: Using the SDOAS as an experimental outcome

Thinking about the likely uses of the SDOAS in research contexts, it is plausible that the measure will be used as an outcome for experimental manipulations. This is similar to how forensically related attitudinal measures such as the Attitudes to Sex Offenders Scale (ATS; Hogue, 1993; Hogue & Harper, 2019) are commonly used to measure attitudes towards different offence types and perpetrator characteristics (see e.g. Gakhal & Brown, 2011; Sparks & Wormith, 2021). To give researchers confidence in such a use of the SDOAS, we thus sought to validate this by establishing its sensitivity to such manipulations. In Study 3 we therefore adapted the SDOAS in relation to various vignettes depicting sex doll owners whose dolls were either adult-like or child-like, and which were used for different purposes (e.g. companionship, sexual gratification, or forensic risk reduction). We expected the SDOAS to be sensitive enough to demonstrate different social attitudes towards child-like and adult-like dolls (with child-like doll ownership expected to be deemed less acceptable, and more likely associated with immorality and psychological

Table 8. Regression coefficients predicting variance in study trust judgements.

	Main effects			With condition interaction		
Predictor	β [95% CI]	t	p	β [95% CI]	t	p
Sex	−0.10 [−0.33, 0.13]	−0.85	.397	−0.14 [−0.44, 0.16]	−0.95	.345
Age	−0.04 [−0.16, 0.09]	−0.58	.565	0.08 [−0.08, 0.23]	0.96	.34
Qualification level	−0.08 [−0.19, 0.03]	−1.41	.159	−0.04 [−0.20, 0.11]	−0.63	.526
Political ideology	−0.06 [−0.18, 0.06]	−1.02	.309	0.06 [−0.10, 0.21]	0.62	.538
SDOAS – Acceptability	−0.01 [−0.18, 0.16]	−0.14	.890	0.20 [−0.07, 0.48]	1.54	.124
SDOAS – Immorality	−0.05 [−0.28, 0.17]	−0.46	.644	−0.09 [−0.34, 0.16]	−0.87	.383
SDOAS – Dysfunctional	0.05 [−0.20, 0.29]	0.39	.695	−0.16 [−0.51, 0.19]	−0.67	.500
Condition	−0.18 [−0.41, 0.05]	−1.57	.119	−0.35 [−0.66, −0.04]	0.12	.903
Sex × Condition				0.34 [−0.10, 0.77]	1.52	.129
Age × Condition				−0.21 [−0.44, 0.01]	−1.87	.062
Qualification level × Condition				0.00 [−0.21, 0.21]	0.00	.999
Political ideology × Condition				−0.11 [−0.34, 0.11]	−1.01	.315
SDOAS – Acceptability × Condition				−0.28 [−0.60, 0.04]	−1.74	.083
SDOAS – Immorality × Condition				0.27 [−0.15, 0.69]	1.27	.205
SDOAS – Dysfunctional × Condition				0.29 [−0.17, 0.74]	1.23	.219

Note. 'Sex' is coded as 0 = male, 1 = female. 'Condition' variables give the effect of the high risk study abstract (comparative to the low risk study abstract). SDOAS factors refer to data from the short form of the scale.

dysfunction). We also expected companionship-related uses to be more accepted (and less associated with attributions of immorality and psychological dysfunction).

Methods

Participants

An a priori power analysis aimed at detecting a small effect within our experimental design ($f = 0.10$, $\alpha = .05$, 95% power) determined that we required a minimum sample size of 166 participants for this study. We recruited our sample via the same broad survey as described in Study 2, with approximately 300 participants being randomly directed to this study branch. Oversampling in comparison to the power analysis was undertaken to account for missing data or branching issues. We retained only those participants who provided full data on all study measures. This left us with a sample of 292 participants (62% female; $M_{age} = 43.08$ years, $SD = 15.68$).

Materials

Demographics. Participant sex and age were the two demographic variables collected for those directed to this study within the broader survey. These data were collected to

allow us to describe the broad composition of the sample, but do not form a part of the analyses presented here.

Experimental vignettes and SDOAS adaptation. We wrote six vignettes for this study that were configured across two independent variables (doll age: adult vs. child; doll function: companionship vs. sexual gratification vs. risk reduction). Each of these vignettes was approximately 100 words long, and presented a description of a man who had bought a doll of each condition's age and/or function. In the companionship vignettes, doll ownership was linked to a sense of loneliness. In the sexual gratification condition, doll ownership was linked to the achievement of sexual fulfilment in a manner that was not associated with hypothetical risks of engaging in sexual offending. In the risk reduction condition, doll ownership was presented as a form of treatment for somebody who was concerned about an escalation in offence-related thinking, with the doll being an alternative sexual outlet to engaging in offending behaviour against another person. An example vignette is presented below, with all vignettes being accessible at https://osf.io/46bnk/.

> Nathan is a 34 year old man. When he was growing up he began to notice that his sexual interests were different to his friends. As his friends grew older they were attracted to girls their own age, whereas as a 15 year old, Nathan was attracted to girls several years younger than him. In the years that followed, this sexual interest remained stable until he realised that he was predominantly attracted to girls that are around the age of 10. He has never committed a sexual offence of any kind, and is adamantly against adults having sexual contact with children. While trying to find online support for his attractions, Nathan stumbled across a website selling child size dolls. He bought one of these and now uses this as a sexual outlet several times per week. This helps him to achieve a sense of sexual satisfaction.
>
> (Child-like doll; sexual gratification function)

Following each vignette, we presented an adapted version of the 18-item short form of the SDOAS. The measure was adapted by modifying each item to be reflective of the person depicted within each vignette. For example, the SDOAS item 'Owning a sex doll is just plain wrong' would be adapted to read 'Adam's doll ownership is just plain wrong' for the vignette presented above. This adaptation to the SDOAS ensured that the measure was being responded to specifically in relation to the manipulation that we were making within each vignette, and focused participants' minds on each individual that they read about. The adapted version of the SDOAS demonstrated very good to excellent levels of internal consistency across all vignette conditions in each of the three SDOAS factors (see Table 9).

Procedure

Participants gave their informed consent to take part in the same manner as previously described, before providing basic demographic information and being randomised to their respective study branches. Those randomised to the current study read and responded to all vignettes in a randomised order to eliminate any order effects or response biases. Once all studies to which the participant was randomised had been completed, a comprehensive debrief (summarising all studies in the survey) was presented, and participants were directed back to Prolific to confirm completion. This

Table 9. Descriptive statistics for study outcomes by doll type and doll function.

	Companionship function		Sexual gratification function		Risk reduction function	
	Adult-like dolls	Child-like dolls	Adult-like dolls	Child-like dolls	Adult-like dolls	Child-like dolls
SDOAS Acceptability	3.33 (1.10) [0.93]	2.89 (1.19) [0.95]	3.23 (1.18) [0.95]	2.01 (1.01) [0.92]	2.47 (0.98) [0.90]	1.86 (0.82) [0.87]
SDOAS Immoral	2.20 (0.96) [0.93]	2.57 (1.19) [0.95]	2.39 (1.07) [0.94]	4.12 (1.27) [0.94]	4.08 (1.10) [0.92]	4.72 (1.06) [0.91]
SDOAS Dysfunction	3.17 (1.00) [0.86]	3.31 (1.01) [0.86]	3.01 (1.05) [0.89]	4.25 (1.04) [0.87]	3.96 (1.05) [0.88]	4.69 (0.93) [0.84]

Note. Data represent average (*M*) scores (±1 *SD*). Internal consistency (Cronbach's alpha) is presented in square brackets.

procedure was given a favourable opinion by the Nottingham Trent University School of Social Sciences Research Ethics Committee.

Results

We ran a series of two-way repeated measures analyses of variance (ANOVAs). In each model, 'Doll Age' (adult-like vs. child-like) and 'Doll Function' (companionship vs. sexual gratification vs. risk reduction) were the independent variables. Separate analyses were run for each of the SDOAS factors. An overview of the descriptive statistics across all models is presented in Table 9. A comparison of the interaction plots for each model is presented in Figure 1. In the descriptions that follow, *p*-values for post-hoc comparisons within each model are corrected using the Tukey method.

Doll ownership acceptability

When looking at the acceptability of sex doll ownership, we found a significant main effect of doll age, $F(1, 291) = 402.17$, $p < .001$, $\eta^2_G = 0.12$. Here, child-like dolls were viewed as significantly less acceptable than adult-like dolls, $t(291) = -20.05$, $p < .001$, $d_z = -0.19$. There was also a significant main effect of doll function, $F(2, 582) = 257.05$, $p < .001$, $\eta^2_G = 0.12$. Here, doll ownership for companionship was deemed significantly more acceptable than both ownership for sexual gratification ($t(291) = 11.82$, $p < .001$, $d_z = 0.69$) and risk reduction ($t(291) = 20.27$, $p < .001$, $d_z = 1.19$). In turn, doll ownership for sexual gratification was seen as being significantly more acceptable than ownership for the purposes of risk reduction, $t(291) = 12.54$, $p < .001$, $d_z = 0.73$.

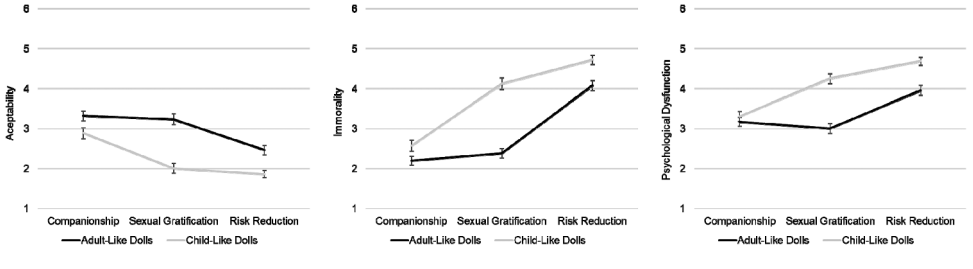

Figure 1. Interaction plots showing the effects of doll age and doll function on each of the SDAOS factors.

There was also a significant interaction between doll age and doll function in acceptability scores, $F(2, 582) = 76.39$, $p < .001$, $\eta^2_G = 0.02$. We deconstructed this interaction by looking at the simple main effects of doll function separately for each doll age condition. When considering adult-like dolls, there was no difference between the perceived acceptability of owning a doll for companionship or sexual gratification, $t(291) = 2.34$, $p = .182$, $d_z = 0.14$. However, owning a doll for risk reduction purposes was seen as significantly less acceptable than doll ownership for companionship ($t(291) = -16.61$, $p < .001$, $d_z = -0.97$) and sexual gratification ($t(291) = -14.21$, $p < .001$, $d_z = -0.83$). When considering child-like dolls, there were significant differences between judgements of the acceptability of all function options in line with the main effect of this variable. That is, doll ownership for companionship was seen as significantly more acceptable than ownership for sexual gratification ($t(291) = 13.90$, $p < .001$, $d_z = 0.81$) and risk reduction ($t(291) = 16.71$, $p < .001$, $d_z = 0.98$), and, to a lesser degree, ownership for sexual gratification was viewed more favourably than ownership for risk reduction ($t(291) = 3.89$, $p = .002$, $d_z = 0.23$).

Doll owner immorality

Turning to the issue of doll owner immorality, there was a significant main effect of doll age, $F(1, 291) = 509.65$, $p < .001$, $\eta^2_G = 0.14$, where the owners of child-like dolls were viewed as significantly more immoral than those who owned adult-like dolls, $t(291) = 22.58$, $p < .001$, $d_z = 1.32$. There was also a significant main effect of doll function, $F(2, 582) = 819.14$, $p < .001$, $\eta^2_G = 0.36$. Here, those who owned a doll for companionship were seen as less immoral than those whose ownership was for either sexual gratification ($t(291) = -19.93$, $p < .001$, $d_z = -1.17$) or risk reduction ($t(291) = -34.13$, $p < .001$, $d_z = -2.00$). Further, those who owned a doll for risk reduction were seen as more immoral than those whose ownership was more straightforwardly related to sexual gratification, $t(291) = 25.01$, $p < .001$, $d_z = 1.46$.

There was also a significant interaction between doll age and doll function in immorality scores, $F(2, 582) = 201.13$, $p < .001$, $\eta^2_G = 0.07$. When considering adult-like dolls, there was a small but significant difference in immorality judgements made about owning a doll for companionship vs. owning a doll for sexual gratification, $t(291) = -4.17$, $p < .001$, $d_z = -0.24$. This difference was much greater when considering the comparisons between risk reduction functions and doll ownership for either companionship ($t(291) = 29.17$, $p < .001$, $d_z = 1.71$) or sexual gratification ($t(291) = 25.61$, $p < .001$, $d_z = 1.50$). When considering child-like dolls, there were much more pronounced stepwise differences between immorality scores, which were more in line with the main effect of the doll function variable. That is, owners of dolls whose function was companionship were seen as significantly less immoral than those who owned a doll for either sexual gratification ($t(291) = -22.94$, $p < .001$, $d_z = -1.34$) or risk reduction ($t(291) = -30.42$, $p < .001$, $d_z = -1.78$), and owners who used their doll for sexual gratification were viewed as less immoral than those who used their doll as a route to risk reduction ($t(291) = -11.72$, $p < .001$, $d_z = -0.69$).

Doll owner psychological dysfunction

Examining perceptions of doll owner psychological dysfunction, there was a significant main effect of doll age, $F(1, 291) = 468.57$, $p < .001$, $\eta^2_G = 0.11$, where the owners of child-like dolls were seen as significantly more dysfunctional than adult-like doll owners, $t(291) = 21.65$, $p < .001$, $d_z = 1.27$. There was also a significant

main effect of doll function, $F(2, 582) = 342.99$, $p < .001$, $\eta^2_G = 0.16$. Within this effect, those who owned a doll for companionship were seen as less dysfunctional than those who owned a doll for either sexual gratification ($t(291) = -10.17$, $p < .001$, $d_z = -0.60$) or risk reduction ($t(291) = -22.35$, $p < .001$, $d_z = -1.31$). Those who owned a doll to reduce their risk of offending were judged to be more dysfunctional than those whose ownership was for sexual gratification, $t(291) = 18.13$, $p < .001$, $d_z = 1.06$.

There was also a significant interaction between doll age and doll function in relation to perceptions of doll owner psychological dysfunction, $F(2, 582) = 140.43$, $p < .001$, $\eta^2_G = 0.05$. Owners of adult-like dolls, people whose doll served a companionship function were seen as significantly more dysfunctional than those who owned a doll for sexual gratification, ($t(291) = 3.49$, $p = .007$, $d_z = 0.20$), but less dysfunctional than those who owned a doll for the reduction of risk ($t(291) = -13.75$, $p < .001$, $d_z = -0.81$). Owners whose dolls served a risk reduction function were judged to be significantly more dysfunctional than those whose dolls were more simply used for sexual gratification, $t(291) = 16.01$, $p < .001$, $d_z = 0.94$. When considering child-like dolls, the data were more consistent with the main effect of the doll function variable. Owners of dolls whose function was companionship were judged to be significantly less dysfunctional than those who owned a doll for either sexual gratification ($t(291) = -16.62$, $p < .001$, $d_z = -0.97$) or risk reduction ($t(291) = -23.94$, $p < .001$, $d_z = -1.40$). In turn, owners who used their dolls for sexual gratification were seen as less dysfunctional than those who used their dolls to reduce their risk, $t(291) = -11.12$, $p < .001$, $d_z = -0.65$).

General discussion

In light of the growing social, legal, and academic interest in sex doll ownership (Harper & Lievesley, 2020), in this paper we have developed a standardised measure of attitudes towards sex doll ownership, called the Sex Doll Ownership Attitudes Scale (SDOAS). In its complete form, this is a 66-item inventory of items, self-reported using a six-point scale, that measures views about the social acceptability of sex doll ownership, perceptions about the immorality of people who own sex dolls, and the extent to which people who own such dolls are seen as experiencing some degree of psychological dysfunction. These factors were meaningfully and statistically associated with relevant psychometric measures, including authoritarianism, permissive sexual attitudes, and moral intuitions that centre individual liberty (all in the expected directions). We were also able to demonstrate how the measure can predict support for common doll-related social policies, and how attitudinal domains can sway the interpretation of academic research about sex dolls. We have also been able to construct equally valid and internally consistent short forms of these factors for use in research whereby survey space or project resourcing is limited. As such, the systematic nature of this process has led us to make a contribution to the literature in this area, both in a theoretical way (in conceptualising attitudes and demonstrating their effects) and a methodological way (through the production of usable scales to measure attitudes as both an individual differences construct and in response to an experimental manipulation).

Attitudes towards sex doll ownership and their correlates

The factorial nature of the SDOAS highlights how 'attitudes towards sex doll ownership' can be considered a multidimensional comprised of three factors. The 'Acceptability of Doll Ownership' factor appears to be reflective of a permissive attitude about the legal availability of sex dolls, with items such as 'Sex dolls should be normalized in our society' and 'Society's negative response to sex doll owners is wrong' making up both the full and short forms of this factor. The 'Doll Owners as Immoral' factor reflects more negative attitudes that may be indicative of perceptions of sexual offending risk. This is best exemplified by items such as 'People who own sex dolls are a danger to others' and 'Sex doll owners are disgusting'. The final factor of 'Doll Owners as Dysfunctional' is reflective of stigmatising attributions made about the personalities and mental states of people who own sex dolls. For example, items on both the full and short forms include 'Sex doll owners are mentally ill' and 'Sex doll owners are perverts'.

Broadly speaking, this factorial nature of the SDOAS is consistent with Breckler's (1984) tripartite model of attitudes. This framework suggests that attitudes possess an affective component (characterised as emotional responses to an attitude object; 'Doll Owners as Immoral'), a behavioural component (characterised as physical interactions or policy-related responses to an attitude object; 'Acceptability of Doll Ownership'), and a cognitive component (characterised as stereotypes and attributions made about an attitude object; 'Doll Owners as Dysfunctional'). This consistency with established frameworks provides further evidence of the theoretical validity of the SDOAS, and its fit with the broader attitudinal literature.

When exploring predictors of SDOAS we observed a similar trend in relation to each of the factors. That is, female participants and those who scored higher in relation to right-wing authoritarianism expressed more negative attitudes than men or those with less authoritarian beliefs. 'Negative attitudes' here acts as a stand in for lower scores in relation to judgements of the acceptability of sex dolls, and higher perceptions of owners' immorality and psychological dysfunction, given that these constructs significantly predicted all of these outcomes. There might be understandable reasons for such results, given the state of the current social and academic discourse around sex doll ownership. For example, if dolls are touted as articles that have the potential to objectify women and lead to sexual aggression (Bouffard, 2010; Brown & Shelling, 2019; Danaher, 2017; Döring & Pöschl, 2018; Eskens, 2017; Puig, 2017), then women might have more of an inherent motivation to view them (and their owners) as less desirable than men do, leading to a significant difference in judgements between the sexes (see also Oleksy & Wnuk, 2021).

The purported links between doll ownership and sexual deviance and aggression might lead those with authoritarian tendencies to desire for the banning of such materials, which is consistent with the sexually censorious nature of people with right-wing authoritarian belief structures (Falgares et al., 2021; Poteat & Mereish, 2012). We did find some support for these ideas in the policy ratings tasks, with support for total bans on dolls being driven by views that doll ownership is broadly unacceptable, and that doll owners are both immoral and psychologically dysfunctional.

In contrast, more positive views about doll ownership (i.e. higher levels of doll acceptability, and lower perceptions of owner immorality and dysfunction) were significantly predicted by a higher degree of religiosity, more permissive sexual attitudes, and a greater

endorsement of individual liberty as a guiding moral principle. The only exception to this was in relation to sexual permissiveness not meeting the threshold for significance in relation to perceptions of doll owners' levels of psychological or interpersonal dysfunction. These data are mixed in terms of their expectedness. That is, higher levels of religiosity being associated with more positive views about doll ownership is a surprise, given the historical trend of finding religious affiliation to be associated with more closed sexual attitudes and restricted sexual behaviours (e.g. Ahrold et al., 2011; Luquis et al., 2012). In one study on undergraduate attitudes towards sex dolls, religiosity was reported to be negatively associated with acceptability judgements (Knox & Chang, 2017), though no data were presented in the paper to corroborate this finding. There have been some studies to suggest that religiosity itself is less of a predictor of conservative sexual attitudes than religious *engagement* (i.e. regular attendance of formal religious services; see Lefkowitz et al., 2004; De Visser et al., 2007). We did not measure engagement with religious institutions, instead asking for a single-item rating of level of religiosity, which might be interpreted as anything from belief in an omnipotent God to identification with a religious group via a religious childhood context. However, the consistency of this finding is deserving of greater study to establish its precise nature.

The effects of sexual permissiveness and endorsing liberty-relation moral intuitions is much more straightforward to explain. That is, these constructs and associated behaviours are associated with openness to experiences and a freedom of expression (Ciocca et al., 2020; Clifford et al., 2015; Matthews et al., 2018) and have been linked to a range of non-partnered sexual experiences (e.g. higher rates of pornography use; Lam & Chan, 2007). In this sense, finding more positive attitudes towards sex dolls (and less stigmatising views about their owners) to be associated with permissive sexual attitudes and the endorsement of liberty-related moral beliefs is to be expected, as individuals who endorse these views are likely to also hold the opinion that people should be allowed to engage in whatever sexual practices they like, so long as other individuals are not harmed. This might be reflective of the fact that the public are broadly aware of the primary sexual or masturbatory function of such dolls (Langcaster-James & Bentley, 2018; Su et al., 2019; Valverde, 2012).

Contextual differences in attitudes

Although we primarily see the SDOAS as an individual difference measure, in that it can be used as a predictor of policy preferences in psychometric investigations, it does also appear to be amenable to change in response to contextual information. As could be logically predicted, scenarios depicting child-like doll owners were viewed more negatively (i.e. ownership was deemed less acceptable, and owners were seen as more immoral and psychologically dysfunctional) than when the doll owned depicted an adult. Similarly, and again as predicted, dolls with a companionship function were less stigmatised than both dolls used for sexual gratification, and dolls used as a cathartic risk reduction tool (with this latter function being significantly more stigmatised than a straightforward sexual function). The only exception to this was in relation to views about psychological dysfunction, where those using dolls for companionship were more highly stigmatised than those simply using their doll for sexual gratification. This may indicate that participants had an easier time

conceptualising a sex doll as a masturbatory aid, but found it more difficult to understand how somebody might project emotional or companionship-related feelings onto an inanimate object. This is an important finding as research has indicated higher levels of schizotypal traits among people who own sex dolls (Harper et al., 2023) which may explain how they are able to anthropomorphise and humanise their dolls to see them as sexual partners (see also Hanson, 2023; Lievesley, Reynolds, et al., 2023), and as such this may be one area to explore in public education initiatives.

Of interest, though, was the interaction between these variables, particularly with regard to the sexual gratification function. When dolls depicted adults, views about this function were more closely aligned with attitudes towards a companionship function. This may indicate that owners of adult-like dolls are seen as capable of having relatively safe 'intimate relationships' containing both platonic and sexual elements. In contrast, views about the sexual gratification function for child-like dolls were similar to views about the use of such dolls for the purposes of risk reduction. This may be indicative of the view that any sexual use of a child-like doll is linked to a degree of sexual risk (though see Harper and Lievesley (2022) for evidence to the contrary).

Given this malleability and sensitivity of SDOAS in response to contextual information, it could be fruitful to explore the effects of psychoeducation programmes (possibly using narrative documentary films about doll owners) to explore whether attitudes towards dolls and their owners change as a function of receiving information about this population. The SDOAS represents a dynamic tool that can be adapted for use in various research designs in this area, as either a baseline measure of attitudes (for inclusion in analyses as a covariate) or as an adaptable direct outcome measure when investigating attitudes about doll ownership.

Innovation, implications, and contribution

The development of the SDOAS thus represents a significant step in the study of attitudes towards sex dolls. Through the use of this multidimensional and socially-informed measure, researchers can begin to move beyond binary or moralistic framings of sex doll use and instead approach it as a legitimate subject of psychological and social inquiry. In doing so, new avenues for research into how stigma is formed, maintained, and potentially disrupted can be opened up. The SDOAS also serves a practical function in enabling the systematic evaluation of public attitudes, making it a valuable tool for informing ongoing legislative debates related to the criminalisation of sex dolls, as well as in understanding how specific groups (e.g. law enforcement, healthcare professionals) may think about sex dolls within the context of their occupational activities.

As the boundaries between sexuality, technology, and identity continue to evolve, this work also lays the foundations for interdisciplinary engagement between scholars in different areas, linking psychological scientists with legal scholars, ethicists, and those involved in healthcare service provision. In this sense, the SDOAS not only captures what people think about sex doll ownership, but opens opportunities to understand what those beliefs might mean in terms of institutional responses to those who own such materials.

Limitations and future directions

Our findings are contextualised within the geographic and jurisdictional context of the UK, and as such it would be prudent for researchers to seek to replicate the SDOAS factor structure in other countries and cultures. Such studies should explore measurement invariance and factor structure to ensure that the measure responds consistently across different legal and geographical contexts. We have also highlighted how we believe the SDOAS will be sensitive to change in response to psychoeducational programmes. This is not something that we examined empirically in this paper, but should be an avenue for future research as more evidence about the characteristics of sex doll owners, and the effects of sex doll ownership, become more apparent.

The instructions for the SDOAS prime respondents to think about 'silicone dolls' when considering their answers. While this limits the type of doll against which attitudes are being assessed, it does ensure that newer more realistic models are being considered (rather than plush material objects, or more novelty inflatable dolls). This was a purposive decision that we made, as our focus was on these more realistic dolls within the context of growing social attention. While the priming of 'silicone' in the instructions does not appear to include realistic dolls made from other materials (e.g. thermoplastic elastomer), we do not believe that this limits the validity of the scale, and in fact may be the most desirable approach to focusing respondents' attention on the types of dolls we wanted them to consider. However, it is possible (though we believe unlikely) that respondents may distinguish between silicone dolls and those made from other realistic-appearing materials. To test for this, future research may look to prime other forms of material to test for differences in attitudes.

A further limitation of our work here is the lack of specificity about the 'sex' of the doll (s) under consideration, and the lack of consideration of owner sex. Although the vast majority of sex doll owners are male (with their dolls resembling women; Björkas & Larsson, 2021; Su et al., 2019), it would be interesting to study this in a direct way. Studies might look to manipulate owner and doll sex, to understand how these variables influence social attitudes and policy preferences.

As with any self-report measure, there are potential issues with self-presentation and social desirability biases inherent within the method. Given the prevailing social discussions about sex doll ownership, it is possible that some participants responded in a socially desirable manner. We did not include specific tests of socially desirable responding in our work, and future studies validating the SDOAS may wish to do so to demonstrate its resistance to such response biases. Related to response biases, we did not collect information about sex doll ownership status in either of studies two or three. This limitation means that we do not know whether a subset of our sample were sex doll owners, which may have skewed the data. Given our recruitment methods for these studies (representative sampling via Prolific), it is unlikely that a large proportion of the samples were sex doll owners. However, future research may look to compare attitudinal scores of doll owners to non-owners to see how these differ in both structure and valence.

Conclusions

In conclusion, we set out to create a standardised psychometric measure of attitudes towards sex doll ownership. In doing so, we have identified three underlying factors of such attitudes, reflecting views about the legal or social acceptability of doll ownership, the immorality and potential risks posed by owners, and their levels of psychological and interpersonal dysfunction. The SDOAS is psychometrically sound, in that it possesses good internal consistency, scores on its factors are predicted by expected constructs, and it is able to predict variance in related outcomes (e.g. policy support and judgements of doll-related research). A full form and short form of the SDOAS are offered here for use in the broader literature (to access and use the scale, see https://osf.io/46bnk) as researchers continue to explore sex doll ownership in more systematic ways.

Notes

1. We acknowledge that asking participants to respond to the scale about 'silicone dolls' does not cover other types of doll, such as plush material dolls, or those made from more advanced materials (e.g. thermoplastic elastomer). However, we do not perceive this to be a limitation for the validity of the scale. Firstly, we did not design the scale to be measuring attitudes to unrealistic plush dolls, and instead focus our attention on more realistic dolls. Second, we do not believe that lay members of the public would distinguish between silicone dolls and those made from thermoplastic materials. In using 'silicone', we were able to prime the more realistic dolls that were the focus of our attention, while limiting the use of technical material labels from scale instructions.
2. While the broader survey recruited a nationally representative sample, randomisation to study branches, and different sample size quotas being applied to each study, means that representativeness could not be guaranteed for individual studies.
3. This threshold has been suggested as an appropriate conservative threshold that indicates a clear pattern within the data that is unlikely to be due to chance, and thus improves the replicability of the CFA process (Schimmack, 2022).
4. In the model re-run with the full form SDOAS factors, SDOAS Immorality scores (i.e. the belief that doll owners are fundamentally immoral) were significantly associated with higher trust in the research described in the abstract reporting a high risk conclusion. This finding supports the view that the short form of the SDOAS may not have been sensitive enough to detect such small changes in study trust judgements within this sample.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Nottingham Trent University [Social Sciences QR Scheme].

Data availability statement

The data described in this article are openly available in the Open Science Framework at https://osf.io/46bnk/.

Open Scholarship

This article has earned the Center for Open Science badges for Open Data and Open Materials through Open Practices Disclosure. The data and materials are openly accessible at https://osf.io/46bnk/

References

Ahrold, T. K., Farmer, M., Trapnell, P. D., & Meston, C. M. (2011). The relationship among sexual attitudes, sexual fantasy, and religiosity. *Archives of Sexual Behavior*, *40*(3), 619–630. https://doi.org/10.1007/s10508-010-9621-4

Altemeyer, B. (1981). *Right-wing authoritarianism*. University of Manitoba Press.

Appel, M., Marker, C., & Mara, M. (2019). Otakuism and the appeal of sex robots. *Frontiers in Psychology*, *10*, 569. https://doi.org/10.3389/fpsyg.2019.00569

Arafat, S. M. Y., & Kar, S. K. (2021). Sex during pandemic: Panic buying of sex toys during COVID-19 lockdown. *Journal of Psychosexual Health*, *3*(2), 175–177. https://doi.org/10.1177/26318318211013347

Attwood, F. (2004). Pornography and objectification. *Feminist Media Studies*, *4*(1), 7–19. https://doi.org/10.1080/14680770410001674617

Bentler, P. M., & Chou, C.-P. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, *16*(1), 78–117. https://doi.org/10.1177/0049124187016001004

Björkas, R., & Larsson, M. (2021). Sex dolls in the Swedish media discourse: Intimacy, sexuality, and technology. *Sexuality & Culture*, *25*(4), 1227–1248. https://doi.org/10.1007/s12119-021-09829-6

Bouffard, L. A. (2010). Exploring the utility of entitlement in understanding sexual aggression. *Journal of Criminal Justice*, *38*(5), 870–879. https://doi.org/10.1016/j.jcrimjus.2010.06.002

Breckler, S. J. (1984). Empirical validation of affect, behavior, and cognition as distinct components of attitude. *Journal of Personality and Social Psychology*, *47*(6), 1191–1205. https://doi.org/10.1037/0022-3514.47.6.1191

Broadhurst, R. (2021). Child sex abuse images and exploitation materials. In R. Leukfeldt & T. Holt (Eds.), *The human factor of cybercrime* (pp. 310–335). Routledge.

Brown, R., & Shelling, J. (2019). *Exploring the implications of child sex dolls*. Australian Institute of Criminology. https://www.aic.gov.au/publications/tandi/tandi570.

Chatterjee, B. B. (2020). Child sex dolls and robots: Challenging the boundaries of the child protection framework. *International Review of Law, Computers & Technology*, *34*(1), 22–43. https://doi.org/10.1080/13600869.2019.1600870

Cheok, A. D., Devlin, K., & Levy, D. (2017). *Love and sex with robots*. Springer.

Ciocca, G., Robilotta, A., Fontanesi, L., Sansone, A., D'Antuono, L., Limoncin, E., Nimbi, F., Simonelli, C., Di Lorenzo, G., Siracusano, A., & Jannini, E. A. (2020). Sexological aspects related to Tinder use: A comprehensive review of the literature. *Sexual Medicine Reviews*, *8*(3), 367–378. https://doi.org/10.1016/j.sxmr.2019.12.004

Clifford, S., Iyengar, V., Cabeza, R., & Sinnott-Armstrong, W. (2015). Moral foundations vignettes: A standardized stimulus database of scenarios based on moral foundations theory. *Behavior Research Methods*, *47*(4), 1178–1198. https://doi.org/10.3758/s13428-014-0551-2

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Erlbaum.

Cox-George, C., & Bewley, S. (2018). I, sex robot: The health implications of the sex robot industry. *BMJ Sexual & Reproductive Health*, *44*(3), 161–164. http://doi.org/10.1136/bmjsrh-2017-200012

Danaher, J. (2017). Robotic rape and robotic child sexual abuse: Should they be criminalised? *Criminal Law and Philosophy*, *11*(1), 71–95. https://doi.org/10.1007/s11572-014-9362-x

Danaher, J. (2019). Regulating child sex robots: Restriction or experimentation? *Medical Law Review*, *27*(4), 553–575. https://doi.org/10.1093/medlaw/fwz002

de Heer, B. A., Prior, S., & Hoegh, G. (2021). Pornography, masculinity, and sexual aggression on College campuses. *Journal of Interpersonal Violence*, *36*(23–24), 13582–13605. https://doi.org/10.1177/0886260520906186

Desbuleux, J. C., & Fuss, J. (2023). Is the anthropomorphization of sex dolls associated with objectification and hostility toward women? A mixed method study among doll users. *The Journal of Sex Research*, *60*(2), 206–220. https://doi.org/10.1080/00224499.2022.2103071

de Visser, R. O., Smith, A. M. A., Richters, J., & Rissel, C. E. (2007). Associations between religiosity and sexuality in a representative sample of Australian adults. *Archives of Sexual Behavior*, *36*(1), 33–46. https://doi.org/10.1007/s10508-006-9056-0

Döring, N. (2020). How is the COVID-19 pandemic affecting our sexualities? An overview of the current media narratives and research hypotheses. *Archives of Sexual Behavior*, *49*(8), 2765–2778. https://doi.org/10.1007/s10508-020-01790-z

Döring, N., & Pöschl, S. (2018). Sex toys, sex dolls, sex robots: Our under-researched bed-fellows. *Sexologies*, *27*(3), e51–e55. https://doi.org/10.1016/j.sexol.2018.05.009

Döring, N., Rohangis Mohseni, M., & Walter, R. (2020). Design, use, and effects of sex dolls and sex robots: Scoping review. *Journal of Medical Internet Research*, *22*(7), e18551. http://doi.org/10.2196/18551

Droubay, B. A., Butters, R. P., & Shafer, K. (2021). The pornography debate: Religiosity and support for censorship. *Journal of Religion and Health*, *60*(3), 1652–1667. https://doi.org/10.1007/s10943-018-0732-x

Eichenberg, C., Khamis, M., & Hübner, L. (2019). The attitudes of therapists and physicians on the use of sex robots in sexual therapy: Online survey and interview study. *Journal of Medical Internet Research*, *21*(8), e13853. https://doi.org/10.2196/13853

Eskens, R. (2017). Is sex with robots rape? *Journal of Practical Ethics*, *5*(2), 62–76.

Falgares, G., Manna, G., Costanzo, G., De Santis, S., Kopala-Sibley, D. C., & Ingoglia, S. (2021) The predictive role of ideological, personality and psychopathological factors in homonegative attitudes in Italy. *Sexuality & Culture*. Advance online publication. https://doi.org/10.1007/s12119-021-09894-x.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Ferguson, A. (2014). *The sex doll: A history*. McFarland.

Ferguson, C. J., & Hartley, R. D. (2009). The pleasure is momentary…the expense damnable?. *Aggression and Violent Behavior*, *14*(5), 323–329. https://doi.org/10.1016/j.avb.2009.04.008

Ferguson, C. J., & Hartley, R. D. (2022). Pornography and sexual aggression: Can meta-analysis find a link? *Trauma, Violence, & Abuse*, *23*(1), 278–287. https://doi.org/10.1177/1524838020942754

Field, A. (2005). *Discovering statistics using SPSS* (2nd) ed.). Sage Publications, Inc.

Gakhal, B. K., & Brown, S. J. (2011). A comparison of the general public's, forensic professionals' and students' attitudes towards female sex offenders. *Journal of Sexual Aggression*, *17*(1), 105–116. https://doi.org/10.1080/13552600.2010.540678

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology*, *101*(2), 366–385. https://doi.org/10.1037/a0021847

Haidt, J. (2013). *The righteous mind: Why good people are divided by politics and religion*. Penguin.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. Pearson University Press.

Hanson, K. R. (2022a). The silicone self: Examining sexual selfhood and stigma within the love and sex doll community. *Symbolic Interaction*, *45*(2), 189–210. https://doi.org/10.1002/symb.575

Hanson, K. R. (2023). What does the personification of love and sex dolls explain about doll owners? *Deviant Behavior*, *44*(6), 823–840. https://doi.org/10.1080/01639625.2022.2105669

Hanson, K. R., Döring, N., & Walter, R. (2024). Sex doll specifications versus human body characteristics. *Archives of Sexual Behavior*, *53*(6), 2025–2033. https://doi.org/10.1007/s10508-024-02871-z

Hanson, K. R., & Locatelli, C. C. (2022). From sex dolls to sex robots and beyond: A narrative review of theoretical and empirical research on human-like and personified sex tech. *Current Sexual Health Reports*, *14*(3), 106–117. https://doi.org/10.1007/s11930-022-00331-0

Harper, C. A., Bartels, R. M., & Hogue, T. E. (2018). Reducing stigma and punitive attitudes toward pedophiles through narrative humanization. *Sexual Abuse*, *30*(5), 533–555. https://doi.org/10.1177/1079063216681561

Harper, C. A., & Harris, A. J. (2017). Applying moral foundations theory to understanding public views of sexual offending. *Journal of Sexual Aggression*, *23*(2), 111–123. https://doi.org/10.1080/13552600.2016.1217086

Harper, C. A., & Hogue, T. E. (2015). Measuring public perceptions of sex offenders: Reimagining the community attitudes toward sex offenders (CATSO) scale. *Psychology Crime & Law*, *21*(5), 452–470. https://doi.org/10.1080/1068316X.2014.989170

Harper, C. A., & Lievesley, R. (2020). Sex doll ownership: An agenda for research. *Current Psychiatry Reports*, *22*(10), e54. https://doi.org/10.1007/s11920-020-01177-w

Harper, C. A., & Lievesley, R. (2022). Exploring the ownership of child-like sex dolls. *Archives of Sexual Behavior*, *51*(8), 4141–4156. https://doi.org/10.1007/s10508-022-02422-4

Harper, C. A., Lievesley, R., Blagden, N. J., & Hocken, K. (2022). Humanizing pedophilia as stigma reduction: A large-scale intervention study. *Archives of Sexual Behavior*, *51*(2), 945–960. https://doi.org/10.1007/s10508-021-02057-x

Harper, C. A., Lievesley, R., & Wanless, K. (2023). Exploring the psychological characteristics and risk-related cognitions of individuals who own sex dolls. *The Journal of Sex Research*, *60*(2), 190–205. https://doi.org/10.1080/00224499.2022.2031848

Hendrick, C., Hendrick, S. S., & Reich, D. A. (2006). The brief sexual attitudes scale. *The Journal of Sex Research*, *43*(1), 76–86. https://doi.org/10.1080/00224490609552301

Hogue, T. E. (1993). Attitudes towards prisoners and sexual offenders. *Issues in Criminological & Legal Psychology*, *19*, 27–32.

Hogue, T. E., & Harper, C. A. (2019). Development of a 21-item short form of the Attitudes to Sexual Offenders (ATS) Scale. *Law and Human Behavior*, *43*(1), 117–130. https://doi.org/10.1037/lhb0000308

Iyer, R., Koleva, S., Graham, J., Ditto, P., Haidt, J., & Young, L. (2012). Understanding libertarian morality: The psychological dispositions of self-identified libertarians. *PLoS ONE*, *7*(8), e42366. https://doi.org/10.1371/journal.pone.0042366

Jahnke, S. (2018). The stigma of pedophilia: Clinical and forensic implications. *European Psychologist*, *23*(2), 144–153. https://doi.org/10.1027/1016-9040/a000325

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th) ed.). Guilford Press.

Knox, D., & Chang, I. J. (2017). Sex dolls - creepy or healthy?: Attitudes of undergraduates. *Journal of Positive Sexuality*, *3*(2), 32–37. https://doi.org/10.51681/1.323

Lam, C. B., & Chan, D. K. S. (2007). The use of cyberpornography by young men in Hong Kong: Some psychosocial correlates. *Archives of Sexual Behavior*, *36*(4), 588–598. https://doi.org/10.1007/s10508-006-9124-5

Langcaster-James, M., & Bentley, G. R. (2018). Beyond the sex doll: Post-human companionship and the rise of the 'allodoll'. *Robotics*, *7*(4), e62. https://doi.org/10.3390/robotics7040062

Lefkowitz, E. S., Gillen, M. M., Shearer, C. L., & Boone, T. L. (2004). Religiosity, sexual behaviors, and sexual attitudes during emerging adulthood. *The Journal of Sex Research*, *41*(2), 150–159. https://doi.org/10.1080/00224490409552223

Lievesley, R., Harper, C. A., Woodward, E., & Tenbergen, G. (2023). Fantasy sexual material use by people with attractions to children. *Current Psychiatry Reports*, *25*(9), 395–404. https://doi.org/10.1007/s11920-023-01435-7

Lievesley, R., Reynolds, R., & Harper, C. A. (2023). The 'perfect' partner: Understanding the lived experiences of men who own sex dolls. *Sexuality & Culture*, *27*(4), 1419–1441. https://doi.org/10.1007/s12119-023-10071-5

Loutzenhiser, L., Arrighi, F., & Rosenfeld, B. (2024). The association between pornography use and sexual offending in individuals with a history of sex offenses: A meta-analysis. *Aggression and Violent Behavior*, *78*, e101980. https://doi.org/10.1016/j.avb.2024.101980

Luquis, R. R., Brelsford, G. M., & Rojas-Guyler, L. (2012). Religiosity, spirituality, sexual attitudes, and sexual behaviors among college students. *Journal of Religion and Health*, *51*(3), 601–614. https://doi.org/10.1007/s10943-011-9527-z

Mali, S. (2024). *Sex doll market report 2024*. Cognitive Market Research.
Maras, M. H., & Shapiro, L. R. (2017). Child sex dolls and robots: More than just an uncanny valley. *Journal of Internet Law*, *21*(5), 3–21.
Matthews, S. J., Giuliano, T. A., Rosa, M. N., Thomas, K. H., Swift, B. A., Ahearn, N. D., Garcia, A. G., Smith, S. R., Niblett, C. M., & Mills, M. M. (2018). The battle against bedroom boredom: Development and validation of a brief measure of sexual novelty in relationships. *The Canadian Journal of Human Sexuality*, *27*(3), 277–287. https://doi.org/10.3138/cjhs.2017-0041
Ndonye, M. M. (2019). Mass-mediated feminist scholarship failure in Africa: Normalised body objectification as artificial intelligence (AI). *Journal of Media and Communication Studies*, *1*(1), 1–8. https://doi.org/10.51317/ecjmcs.v1i1.47
Oleksy, T., & Wnuk, A. (2021). Do women perceive sex robots as threatening? The role of political views and presenting the robot as a female-vs male-friendly product. *Computers in Human Behavior*, *117*, e106664. https://doi.org/10.1016/j.chb.2020.106664
Polaschek, D. L. L., & Gannon, T. A. (2004). The implicit theories of rapists: What convicted offenders tell us. *Sexual Abuse*, *16*(4), 299–314. https://doi.org/10.1177/107906320401600404
Polaschek, D. L. L., & Ward, T. (2002). The implicit theories of potential rapists: What our questionnaires tell us. *Aggression and Violent Behavior*, *7*(4), 385–406. https://doi.org/10.1016/S1359-1789(01)00063-5
Ponterotto, D. (2016). Resisting the male gaze: Feminist responses to the "normatization" of the female body in Western culture. *Journal of International Women's Studies*, *17*(1), 133–151.
Poteat, V. P., & Mereish, E. H. (2012). Ideology, prejudice, and attitudes toward sexual minority social policies and organizations. *Political Psychology*, *33*(2), 211–224. https://doi.org/10.1111/j.1467-9221.2012.00871.x
Prostasia Foundation. (2021). *Our campaigns against doll bans*. https://prostasia.org/sex-doll-laws/
Puig, K. (2017). *The synthetic hyper femme: On sex dolls, fembots, and the futures of sex* [Unpublished master's thesis]. San Diego State University.
R Core Team. (2021). *R: A Language and environment for statistical computing*. *(Version 4.0)* [Computer software]. https://cran.r-project.org. (R packages retrieved from MRAN snapshot 2021-04-01)
Revelle, W. (2019). *psych: Procedures for psychological, psychometric, and personality research*. [R package]. https://cran.r-project.org/package=psych
Richardson, K., & Odlind, C. (2022). *Man-made women: The sexual politics of sex dolls and sex robots*. Palgrave Macmillan.
Saad, G. (2017). On the method of evolutionary psychology and its applicability to consumer research. *Journal of Marketing Research*, *54*(3), 464–477. https://doi.org/10.1509/jmr.14.0645
Schimmack, U. (2022, October 1). *A tutorial on hierarchical factor analysis*. Improving the Replicability of Empirical Research. https://replicationindex.com/2022/10/01/a-tutorial-on-hierarchical-factor-analysis/
Schönbrodt, F. D., & Perugini, M. (2013). At what sample size do correlations stabilize? *Journal of Research in Personality*, *47*(5), 609–612. https://doi.org/10.1016/j.jrp.2013.05.009
Shokri, N., & Asl, M. P. (2015). Patriarchal hierarchies of power and the subordination of women: Real doll as a replacement of woman figure. *Advances in Language and Literary Studies*, *6*(4), 216–220.
Smith, G. T., McCarthy, D. M., & Anderson, K. G. (2000). On the sins of short-form development. *Psychological Assessment*, *12*(1), 102–111. https://doi.org/10.1037//1040-3590.12.1.102
Sparks, B., & Wormith, J. S. (2021). Assessing attitudes toward juveniles and adults adjudicated for sexual offenses in Canada: Does offender age matter? *Journal of Sexual Aggression*, *27*(1), 81–94. https://doi.org/10.1080/13552600.2020.1751888
Strikwerda, L. (2017). Legal and moral implications of child sex robots. In J. Danaher & N. McArthur (Eds.), *Robot sex: Social and ethical implications* (pp. 133–152). MIT Press.
Su, N. M., Lazar, A., Bardzell, J., & Bardzell, S. (2019). Of dolls and men: Anticipating sexual intimacy with robots. *ACM Transactions on Computer-Human Interaction*, *26*(3), e13. https://doi.org/10.1145/3301422

Swim, J. K., Aikin, K. J., Hall, W. S., & Hunter, B. A. (1995). Sexism and racism: Old-fashioned and modern prejudices. *Journal of Personality and Social Psychology*, *68*(2), 199–214. https://doi.org/10.1037/0022-3514.68.2.199

Szczuka, J. M., & Krämer, N. C. (2017). Not only the lonely - how men explicitly and implicitly evaluate the attractiveness of sex robots in comparison to the attractiveness of women, and personal characteristics influencing this evaluation. *Multimodal Technologies and Interaction*, *1*(1), e3. https://doi.org/10.3390/mti1010003

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th) ed.). Allyn & Bacon/Pearson Education.

Valverde, S. (2012). *The modern sex doll owner: A descriptive analysis*. Master's. California Polytechnic State University]. https://digitalcommons.calpoly.edu/theses/849

Wright, P. J., & Bae, S. (2015). A national prospective study of pornography consumption and gendered attitudes toward women. *Sexuality & Culture*, *19*, 444–463. https://doi.org/10.1007/s12119-014-9264-z

Wright, P. J., Paul, B., & Herbenick, D. (2021). Preliminary insights from a U.S. probability sample on adolescents' pornography exposure, media psychology, and sexual aggression. *Journal of Health Communication*, *26*(1), 39–46. https://doi.org/10.1080/10810730.2021.1887980

Zhai, Y., Liu, Y., Yang, S., & Song, C. (2022). A dual process model of popular support for internet surveillance. *Personality and Individual Differences*, *187*, e111409. https://doi.org/10.1016/j.paid.2021.111409